

Final Report

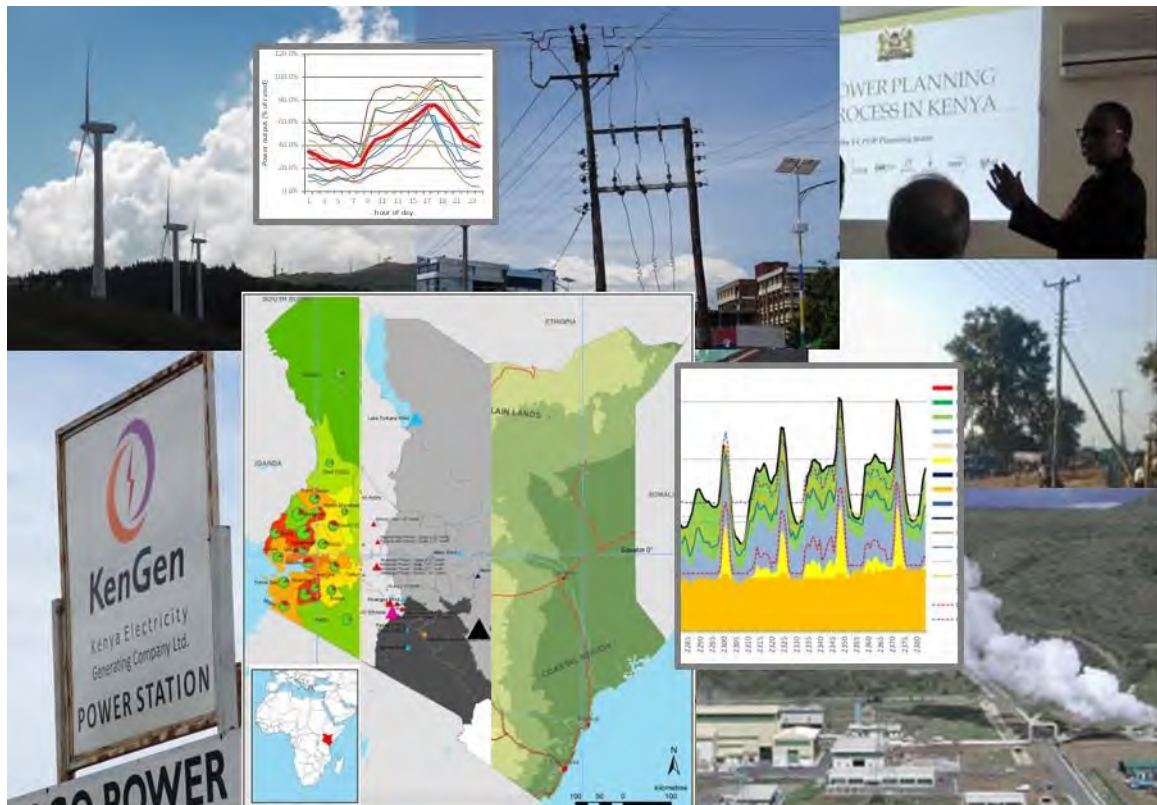
Development of a Power Generation and Transmission Master Plan, Kenya

Medium Term Plan

2015 - 2020

Volume II – Annexes

October 2016



Ministry of Energy and Petroleum



© Lahmeyer International GmbH, 2016

The information contained in this document is solely for the use of the Client identified on the cover sheet for the purpose for which it has been prepared.

Lahmeyer International GmbH undertakes no duty to or accepts any responsibility to any third party who may rely upon this document.

All rights reserved. No section or element of this document may be removed from this document, reproduced, electronically stored or transmitted in any form without written permission of Lahmeyer International GmbH.

- The photo on the title page shows a collection of photos from power generation and network assets in Kenya and figures from the planning process

Development of a Power Generation and Transmission Master Plan, Kenya

Medium Term Plan

2015 - 2020

Volume II – Annexes

October 2016

Prepared for:

Ministry of Energy and Petroleum

Nyayo House, Kenyatta Avenue, P.O. Box 30582,
Nairobi, Kenya

Prepared by:

Lahmeyer International GmbH

Friedberger Str. 173
61118 Bad Vilbel, Germany

Inspection status: Approved

Revision History:

Revision	Date	Author	Department	Checked by	Approved by	Description
v20160613	13.06.2016	PGTMP project team	LI GE7, GE2, GW, GE6; IED, EFLA	Karsten Schmitt	Dr. Tim Hoffmann	Draft PGTMP MTP Vol. II
v20161031	31.10.2016	PGTMP project team	LI GE7, GE2, GW, GE6; IED, EFLA	Karsten Schmitt	Dr. Tim Hoffmann	Final PGTMP MTP Vol. II
v20161128	28.11.2016	PGTMP project team	LI GE7, GE2, GW, GE6; IED, EFLA	Karsten Schmitt	Dr. Tim Hoffmann	Final PGTMP MTP Vol. II

Table of Contents

ANNEX 1	EXECUTIVE SUMMARY – ANNEXES	1
ANNEX 2	INTRODUCTION – ANNEXES	2
Annex 2.A	Data collection.....	3
ANNEX 3	HISTORIC AND CURRENT SITUATION OF KENYAN POWER SECTOR – ANNEXES..	12
Annex 3.A	Geographic overview of Kenya	13
Annex 3.B	Demographic overview of Kenya and population forecasts (population, households total, urban households).....	15
Annex 3.C	Economic and socio-economic overview of Kenya	30
Annex 3.D	Electricity demand statistics.....	37
Annex 3.E	Electricity transmission and distribution.....	54
Annex 3.F	Electricity supply (generation) information	55
ANNEX 4	ELECTRICITY DEMAND FORECAST – ANNEXES	65
Annex 4.A	Data situation for demand forecast	66
Annex 4.B	Changes of assumptions from previous demand forecasts	67
Annex 4.C	Driving and limiting factors for the electricity demand	69
Annex 4.D	Electrification target definition and programs.....	77
Annex 4.E	Flagship projects report	79
Annex 4.F	Substation load estimate (local load forecast).....	106
Annex 4.G	Electricity demand forecast - detailed results.....	116
ANNEX 5	ENERGY SOURCES FOR ELECTRICITY GENERATION – ANNEXES.....	121
Annex 5.A	Transport infrastructure for fossil fuels	122
Annex 5.B	Fossil fuel price forecast.....	127
ANNEX 6	EVALUATION OF POWER SYSTEM CANDIDATES – ANNEXES	133
Annex 6.A	Catalogue of generation candidates - map	134
Annex 6.B	Economic assessment – methodology and assumptions.....	135
Annex 6.C	Economic assessment – ranking scenarios	139
Annex 6.D	Candidates evaluation and description (PESTEL)	164
ANNEX 7	GENERATION EXPANSION PLANNING – ANNEXES.....	204
Annex 7.A	Modelling assumptions	205
Annex 7.B	Scenario analysis – low hydrology case.....	209
Annex 7.C	Scenario analysis - vision expansion and low expansion scenarios	214
Annex 7.D	Scenario analysis –Risk scenario: delay projects.....	224
ANNEX 8	TRANSMISSION EXPANSION PLANNING – ANNEXES.....	231
Annex 8.A	Methodology and assumptions details - transmission expansion planning	232
Annex 8.B	Substation names and codes.....	242
Annex 8.C	Single line diagram	243
Annex 8.D	Load flow results MTP	244

Annex 8.E	Sample tower profiles	245
Annex 8.F	Contingency report MTP	246
Annex 8.G	Short circuit results MTP (3PH)	247
Annex 8.H	Short circuit results MTP (Single Ph to Ground).....	248
Annex 8.I	Small signal stability MTP	249
Annex 8.J	HVDC benchmark model	250
ANNEX 9	INVESTMENT PLANNING – ANNEXES	251
Annex 9.A	Power plants and transmission lines considered in investment plan	252
Annex 9.B	Investment plan results – details	255

List of Figures

Annex Figure 1:	Map of Kenya – topography, main settlements and infrastructure	14
Annex Figure 2:	Kenya - population forecast scenarios 2009 - 2035	16
Annex Figure 3:	Map of Kenya – population growth rates 1999 – 2009 and share of urban / rural population by county	17
Annex Figure 4:	Map of Kenya – population density and rural/urban share by county (2009).....	19
Annex Figure 5:	Map of Kenya – population density and rural / urban share by county (2035, projection)	20
Annex Figure 6:	Urbanisation scenarios – vision 2030 and UN.....	22
Annex Figure 7:	Household size (urban/rural/total) and number of households per power system area prediction (2009 – 2035)	23
Annex Figure 8:	GDP annual growth (1975 – 2015)	32
Annex Figure 9:	GDP share by activity (2006 – 2014)	33
Annex Figure 10:	GDP growth by activity (2006 – 2014).....	33
Annex Figure 11:	GDP annual growth - historic (2000 – 2015) and projections / targets (2016 – 2035)	35
Annex Figure 12:	Share of connections by customer group (1999 - 2015).....	39
Annex Figure 13:	Correlation of domestic connections with street lighting and commercial connections (1998 – 2015).....	39
Annex Figure 14:	Total number of customers by power system area (1999 - 2014).....	40
Annex Figure 15:	Connection growth for commercial/industrial customers by power system area (1999 - 2014)	40
Annex Figure 16:	Map of Kenya – connectivity level by county (2009)	41
Annex Figure 17:	Map of Kenya - consumption by power system area and consumer group (2014) and population density (1999)	42
Annex Figure 18:	Population, domestic connections and consumption by power system area (1999, 2009, and 2014)	43
Annex Figure 19:	Electricity consumption largest consumers by sector (financial year 2012/2013).....	45
Annex Figure 20:	Map of Kenya - consumption by power system area and consumer group (1999, 2004, 2009, and 2014).....	46
Annex Figure 21:	Correlation of domestic electrification and specific consumption (1999 – 2015).....	47
Annex Figure 22:	Electricity consumption and GDP (2000 to 2015) – growth rates.....	48
Annex Figure 23:	Electricity consumption and GDP (2000 to 2015) – actual figures	48
Annex Figure 24:	Electricity consumption and GDP (2000 to 2015) - correlation	49
Annex Figure 25:	Monthly peak load normalized (2008 - 2015).....	49
Annex Figure 26:	Weekly sets of exemplary daily load curves for each quarter of the years 2008 and 2014.....	51
Annex Figure 27:	Change of load curve shape: variation of hourly load increase from (daily) average increase.....	52

Annex Figure 28:	Power system area exemplary daily load curves (Tuesdays) for each quarter of the year 2014	53
Annex Figure 29:	Schematic network topology Kenya (Source: KETRACO)	54
Annex Figure 30:	Map of Kenya – existing power plants (region of high density of plants).....	55
Annex Figure 31:	Left: monthly generated hydroelectricity (blue) and aggregated capacity factor (black dotted), annual capacity factors (black) (1991-2014); Right: frequency of monthly hydro power capacity factors (1991-2014).....	61
Annex Figure 32:	Development of annual generated energy (net) (2009 to 2014).....	62
Annex Figure 33:	Development of monthly generated energy (net) (2009 to 2014)	63
Annex Figure 34:	Comparison electricity demand forecast Kenya with other countries	120
Annex Figure 35:	Shipping costs for fossil fuels (BASF, 2009).....	130
Annex Figure 36:	Price forecast in USD/ton	131
Annex Figure 37:	Price forecast in USD/GJ.....	131
Annex Figure 38:	Map of Kenya – candidate power plants	134
Annex Figure 39:	LEC for coal candidates, Sc1a: no transmission link, reference fuel scenario....	141
Annex Figure 40:	LEC for coal candidates, Sc1b: no transmission link, high fuel scenario	141
Annex Figure 41:	LEC for coal candidates, Sc2b: incl. transmission link, high fuel scenario.....	142
Annex Figure 42:	LEC for CCGT candidates, Sc1a: no transmission link, reference fuel scenario .	144
Annex Figure 43:	LEC for CCGT candidates, Sc1a: no transmission link, high fuel scenario	145
Annex Figure 44:	LEC for CCGT candidates, Sc2a: incl. transmission link, high fuel scenario	146
Annex Figure 45:	LEC for geothermal candidates, Sc1a: no transmission link.....	148
Annex Figure 46:	LEC for hydropower candidates, Sc1: no transmission link	149
Annex Figure 47:	LEC as a function of discount rate for various candidates, Sc2b: incl. transmission link, high fuel scenario.....	153
Annex Figure 48:	LEC as a function of discount rate for various candidates, extract, Sc2b: incl. transmission link, high fuel scenario	154
Annex Figure 49:	LEC as a function of capacity factor for various candidates, Sc2b: incl. transmission link, high fuel scenario	158
Annex Figure 50:	LEC as a function of capacity factor for various candidates, extract, Sc2b: incl. transmission link, high fuel scenario	159
Annex Figure 51:	LEC for fuel conversion candidates Sc1a: no transmission link, reference fuel scenario	163
Annex Figure 52:	LEC for fuel conversion candidates Sc1b: no transmission link, high fuel scenario	163
Annex Figure 53:	2h-ahead positive wind forecast error per level of production for 2015	206
Annex Figure 54:	2h-ahead positive wind forecast error per level of production for 2020	206
Annex Figure 55:	24h-ahead positive PV forecast error per level of production for the LTP period	207
Annex Figure 56:	2- σ forecast error classification of wind power forecast errors for the year 2015 (2h-ahead)	207
Annex Figure 57:	2- σ forecast error classification of wind power forecast errors for the year 2020 (2h-ahead)	208

Annex Figure 58: 24- σ forecast error classification of PV power forecast errors for planning period (24h-ahead)	208
Annex Figure 59: Approach network performance analysis	232

List of Tables

Annex Table 1:	List of main power sector consultants' studies for Kenya in recent years.....	4
Annex Table 2:	List of main reference documents for the power sector	5
Annex Table 3:	Global data collection status	7
Annex Table 4:	Forecast total population - UN medium fertility scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)	24
Annex Table 5:	Forecast households - forecast - UN medium fertility scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)	25
Annex Table 6:	Forecast urban households - forecast - UN medium fertility scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035).....	26
Annex Table 7:	Forecast total population - LCPDP scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)	27
Annex Table 8:	Forecast households - LCPDP scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)	28
Annex Table 9:	Forecast urban households - LCPDP scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)	29
Annex Table 10:	Customer / tariff groups.....	38
Annex Table 11:	Population, connections, consumption by power system area (2008/2009 – 2014/2014).....	43
Annex Table 12:	Number of large consumers by power system area and annual consumption (financial year 2012/2013)	45
Annex Table 13:	Monthly peak loads (MW) and ratio of monthly peak loads / annual peak load (%) for 2008 - 2014.....	50
Annex Table 14:	Data requested and utilized for demand forecast	66
Annex Table 15:	Changes from previous demand forecasts.....	68
Annex Table 16:	Driving / limiting factors for the electricity demand and their application in the forecast.....	70
Annex Table 17:	Overview of potential key flagship projects with high electricity demand.....	81
Annex Table 18:	Demand forecast assumption – LAPSET oil pipeline	83
Annex Table 19:	Demand forecast assumption – LAPSET refinery and petrochemical industries.....	84
Annex Table 20:	Main parameters of standard gauge railway Mombasa-Nairobi	87
Annex Table 21:	Demand forecast assumption – Standard gauge railway Mombasa-Nairobi	88
Annex Table 22:	Demand forecast assumption – Standard gauge railway Nairobi-Kampala.....	89
Annex Table 23:	Demand forecast assumption – Electrified mass rapid transit system for Nairobi metropolitan region	90
Annex Table 24:	Demand forecast assumption – LAPSET railway system	91
Annex Table 25:	Demand forecast assumption – Konza Techno City.....	93

Annex Table 26:	Demand forecast assumption – Special Economic Zones	95
Annex Table 27:	Demand forecast assumption – Integrated steel mill	96
Annex Table 28:	Demand forecast key flagship projects assumptions – Base scenario.....	101
Annex Table 29:	Demand forecast key flagship projects assumptions – High scenario	101
Annex Table 30:	Electricity peak demand forecast of key flagship projects with expected high electricity demand – Base scenario (MW)	102
Annex Table 31:	Electricity consumption forecast of key flagship projects with expected high electricity demand – Base scenario (GWh)	103
Annex Table 32:	Electricity peak demand forecast of key flagship projects with expected high electricity demand – High scenario (MW).....	104
Annex Table 33:	Electricity consumption forecast of key flagship projects with expected high electricity demand – High scenario (GWh)	105
Annex Table 34:	Substation load in base year and underlying assumptions.....	107
Annex Table 35:	Load growth assumption per county, as estimated by KPLC in 2014/2015.....	109
Annex Table 36:	Regional peak loads as per load forecast (sent-out and substation level) and present substation loads.....	111
Annex Table 37:	Identified future new substations and commissioning years	111
Annex Table 38:	Adjustment of power system area loads	113
Annex Table 39:	Substations of flagship projects	113
Annex Table 40:	Substation load estimates reference scenario - 2020, 2025, 2030, 2035	114
Annex Table 41:	Demand forecast results – reference scenario (2015 (extrapolated) – 2035) ...	117
Annex Table 42:	Demand forecast results – vision scenario (2015 (extrapolated) – 2035)	118
Annex Table 43:	Demand forecast results – low scenario (2015 (extrapolated) – 2035).....	119
Annex Table 44:	Road network classification	122
Annex Table 45:	AGO Pipeline Transport Cost.....	123
Annex Table 46:	Railway indicators	124
Annex Table 47:	Port indicators	125
Annex Table 48:	Fuel price assumptions.....	128
Annex Table 49:	International fuel shipping costs.....	129
Annex Table 50:	Domestic fuel transport costs	130
Annex Table 51:	Specific fuel transport costs	130
Annex Table 52:	Reference fuel price scenario – imported fuels (cif prices) per GJ (USD)	132
Annex Table 53:	Reference fuel price scenario – domestic fuels (fob prices) per GJ (USD)	132
Annex Table 54:	High fuel price scenario – imported fuels (cif prices) per GJ (USD)	132
Annex Table 55:	High fuel price scenario – domestic fuels (fob prices) per GJ (USD)	132
Annex Table 56:	Low fuel price scenario – imported fuels (cif prices) per GJ (USD)	132
Annex Table 57:	Low fuel price scenario – domestic fuels (fob prices) per GJ (USD).....	132
Annex Table 58:	Cost estimate assumptions for grid connection measures	137
Annex Table 59:	Overview of transmission link assumptions for scenario Sc2: with T/L link cost by power plant	138

Annex Table 60:	LEC for coal candidates, Sc1a: no transmission link, reference fuel scenario....	140
Annex Table 61:	LEC for coal candidates, Sc1b: no transmission link, high fuel scenario	140
Annex Table 62:	LEC for coal candidates, Sc2b: incl. transmission link, high fuel scenario.....	142
Annex Table 63:	LEC for CCGT candidates, Sc1a: no transmission link, reference fuel scenario .	143
Annex Table 64:	LEC for CCGT candidates, Sc1a: no transmission link, high fuel scenario	144
Annex Table 65:	LEC for CCGT candidates, Sc2b: incl. transmission link, high fuel scenario.....	146
Annex Table 66:	LEC for geothermal candidates, Sc1a: no transmission link.....	147
Annex Table 67:	LEC for hydropower candidates, Sc1: no transmission link	149
Annex Table 68:	Ranking of peaking, intermediate, base load and intermittent units, Sc2b incl. transmission link, high fuel price.....	151
Annex Table 69:	LEC as a function of discount factor for various candidates, Sc2b: incl. transmission link, high fuel scenario	152
Annex Table 70:	Ranking of selected candidates for different capacity factors, Sc2a incl. transmission link, high fuel scenario	156
Annex Table 71:	LEC as a function of capacity factor for various candidates, Sc2b: incl. transmission link, high fuel scenario	157
Annex Table 72:	Techno-economic parameters of fuel conversion candidates	161
Annex Table 73:	LEC for fuel conversion candidates, Sc1a: no transmission link, reference fuel scenario	162
Annex Table 74:	LEC for fuel conversion candidates, Sc1b: no transmission link, high fuel scenario	162
Annex Table 75:	PESTEL evaluation – Coal projects.....	166
Annex Table 76:	Costs estimates for LNG infrastructure for Dongo Kundu CCGT options.....	174
Annex Table 77:	PESTEL evaluation – Natural gas projects	175
Annex Table 78:	PESTEL evaluation – geothermal projects.....	180
Annex Table 79:	Assumed schedule of drilling rigs.....	183
Annex Table 80:	PESTEL evaluation – hydropower projects.....	185
Annex Table 81:	PESTEL evaluation – wind projects.....	189
Annex Table 82:	PESTEL evaluation – biomass projects	193
Annex Table 83:	PESTEL evaluation – solar photovoltaic projects	195
Annex Table 84:	PESTEL evaluation – nuclear projects.....	198
Annex Table 85:	PESTEL evaluation – interconnector projects	201
Annex Table 87:	Low hydrology – annual data consumption and generation	209
Annex Table 88:	Low hydrology case – cost summary.....	210
Annex Table 89:	Comparison of results: reference expansion plan versus low hydrology case ..	211
Annex Table 90:	Vision expansion scenario – annual data demand, capacity, reliability criteria	214
Annex Table 91:	Vision expansion scenario – annual data consumption and generation	215
Annex Table 92:	Vision expansion scenario – cost summary.....	216
Annex Table 93:	Low expansion scenario – annual data demand, capacity, reliability criteria ...	217
Annex Table 94:	Low expansion scenario – annual data consumption and generation.....	218
Annex Table 95:	Low expansion scenario – cost summary.....	219

Annex Table 96:	Comparison of results: reference, vision and low demand scenario.....	220
Annex Table 97:	Risk scenario – annual data demand, capacity, reliability criteria	224
Annex Table 98:	Risk scenario – annual data consumption and generation	225
Annex Table 99:	Risk scenario – cost summary	226
Annex Table 100:	Comparison of results: reference expansion plan versus risk scenario	227
Annex Table 104:	Data requested and utilised for network’s performance analysis	234
Annex Table 105:	Standard substation layout used and recommended by KETRACO	235
Annex Table 106:	Conductors used by KETRACO.....	236
Annex Table 107:	Input data for ampacity calculation	237
Annex Table 108:	Conductor ampacity results	237
Annex Table 109:	Line parameters	238
Annex Table 125:	KETRACO transmission line projects	238
Annex Table 110:	Overview of power plants considered in investment plan (incl. plants with construction start in MTP period)	252
Annex Table 111:	Overview of transmission projects considered in investment plan	254
Annex Table 112:	Investment plan – supported funding scenario, 3% inflation	256
Annex Table 113:	Investment plan – commercial funding scenario, 3% inflation.....	256

Abbreviations and Acronyms

10YP	10 year plan	ERB	Electricity Regulatory Board (predecessor ERC)
A	Ampere	ERC	Energy Regulation Commission
AC	Alternating Current	ESIA	European Semiconductor Industry Association
ACSR	Aluminium Clad Steel/Reinforced	ESRP	Energy Sector Recovery Project
ADF	African Development Fund	EUE	Estimated Unserved Energy
AFD	Agence Française de Développement	EUR	Euro
AGO	Automotive Gas Oil	FCC	Fuel Cost Charge
AIS	Air Insulated Switchgear	FERFA	Foreign Exchange Rate Fluctuation Adjustment
AVR	Automatic Voltage Regulation	FGD	Flue gas desulphurisation
BB	Busbar	FIT	Feed in Tariff
BOO	Build Own Operate	Fob	Free on board
BOOT	Build Own Operate Transfer	GAMS	General Algebraic Modelling System
CAPEX	Capital Expenditure	GDC	Geothermal Development Company
CBS	Central Bureau of Statistics (predecessor KNBS)	GDP	Gross Domestic Product
CCGT	Combined Cycle Gas Turbine	GE	General Electric
CEEC	Committee for European Economic Cooperation	GEF	Global Environment Facility
CHP	Combined Heat and Power	GEO	Geothermal (energy)
Cif	Cost Insurance Freight	GHG	Greenhouse Gas
COD	Commercial Operation Date	GHI	Global Horizontal Irradiation
Cogen	Co-Generation	GIS	Geographic Information System
COMESA	Common Market for Eastern and Southern Africa	GIS	Gas Insulated Switchgear
CPI	Corruption Perception Index	GIZ / GTZ	German Development Cooperation (Deutsche Gesellschaft für International Zusammenarbeit)
CPP	Coal Power Plant	GJ	Gigajoule
CSP	Concentrating Solar Power	GoK	Government of Kenya
DANIDA	Danish International Development Agency	GOV	Governor
DC	Direct Current	GPOBA	Global Partnership Output Based Aid
DCR	Discount Rate	GT	Gas Turbine
DIN	German Institute for Standardization	GW	Gigawatt
DNI	Direct Normal Irradiation	GWh	Giga Watt-hour
DUC	Dynamic Unit Cost	HDI	Human Development Index
EAC	East African Community	HFO	Heavy Fuel Oil
EAPMP	East African Power Master Plan Study	HGFL	High Grand Falls
EAPP	East African Power Pool	HPP	Hydro Power Plant
EE	Energy Efficiency	HSD	High Speed Diesel Engine
EECA	Energy Efficiency and Conservation Agency	HV	High Voltage
EFLA	Company: Consulting Engineers	HVDC	High Voltage Direct Current
EGIS	Company: Engineering and Consulting	Hz	Hertz
EIA	Environmental Impact Assessment	I&C	Instrument and Control System
EIB	European Investment Bank	IAEA	International Atomic Energy Agency
ENDSA	Ewasa Ng'iiro South River Basin Development Authority	ICE	Internal Combustion Engine (here: MSD, HSD)
ENS	Energy Not Served		
EPC	Engineering Procurement Construction		

ICT	Information, Communication & Technology	LIPS-OP/XP	Lahmeyer International Power System - Operation Planning / Expansion Planning
IDO	Industrial Diesel Oil	LNG	Liquefied Natural Gas
IEA	International Energy Agency	LOLE	Loss of Load Expectation
IED	Innovation Energie Développement	LOLP	Loss of Load Probability
IMF	International Monetary Fund	LPG	Liquefied Petroleum Gas
IPE	Indicator Power Efficiency	LTP	Long Term Plan
IPP	Independent Power Producer	LTWP	Lake Turkana Wind Park
IPS	Industrial Promotion Services	LV	Low Voltage
IR	Inception Report	m	metre
ISO	International Organisation for Standardization	M&E	Mechanical & Electrical
ITCZ	Intertropical Convergence Zone	MAED	Model for Analysis of Energy Demand (MAED-D for kWh, MAED-L for Kw)
JICA	Japan International Cooperation Agency	MEWNR	Ministry of Environment, Water and Natural Resources
JKIA	Jomo Kenyatta International Airport	MIP	Mixed Integer Linear Optimization Problem
KAM	Kenya Association of Manufacturers	MJ	Megajoule
KenGen	Kenya Electricity Generating Company	MOE	Ministry of Energy (changed in 2013 to Ministry of Energy and Petroleum)
KENINVEST	Kenya Investment Authority	MOEP	Ministry of Energy and Petroleum
KeNRA	Kenya National Resources Alliance	MOIED	Ministry of Industrialization and Enterprise Development
KEPSA	Kenya Private Sector Alliance	MORDA	Ministry of Regional Development Authorities
KES	Kenyan Shilling	MSD	Medium Speed Diesel Engine
KETRACO	Kenya Transmission Company	MSW	Municipal Solid Wastes
KfW	KfW Development Bank German development bank; was: Kreditanstalt für Wiederaufbau)	MTP	Medium Term Plan
KISCOL	Kwale International Sugar Company Ltd	MUSD	Million USD
km	kilometre	MV	Medium Voltage
km ³	cubic kilometre	MVA	Megavolt Ampere
KNBS	Kenya National Bureau of Statistics	Mvar	Megavolt Ampere Reactive
KNEB	Kenya Nuclear Electricity Board	MW	Mega Watt (10 ⁶ Watts)
KOSF	Kipevu Oil Storage Facility	MWh	Megawatt Hours
KPC	Kenya Pipeline Company Limited	NBI	Nile Basin Initiative
KPLC	Kenya Power and Lighting Company	NCC	National Control Center
KPRL	Kenya Petroleum Refineries Limited	NCV	Net calorific value
KRC	Kenya Railways Corporation	NELSAP	Nile Equatorial Lakes Subsidiary Action Program
KTDA	Kenya Tea Development Agency	NEMA	National Environment Management Authority
kV	kilo Volt	NG	Natural Gas
Kvar	Kilo volt ampere reactive	NGO	Non-Governmental Organization
KVDA	Kerio Valley Development Authority	NIB	National Irrigation Board
KW	Kilowatt	NPP	Nuclear Power Plant
kWh	kilowatt-hour	NPV	Net Present Value
LAPSSET	Lamu Port, Southern Sudan and Ethiopia Transport	NSSF	National Social Security Fund
LCPDP	Least Cost Power Development Plan	NTC	Net Transfer Capacity
LDC	Load Dispatch Center	NTP	Notice-to-Proceed
LEC	Levelised electricity cost		
LF	Load Flow		
LFO	Light Fuel Oil		
LI	Lahmeyer International GmbH		

NWCPC	National Water and Conservation and Pipeline Corporation	SBQC	Selection Based on Consideration of Quality and Cost
NWRMS	National Water Resources Management Strategy	SC	Short Circuit
O&M	Operation & Maintenance	SCADA	Supervisory Control and Data Acquisition
ODA	Official Development Assistance	SHPP	Small Hydro Power Plants
OECD	Organisation for Economic Co-operation and Development	SHS	Solar Home Systems
OHL	Overhead Line	SKM	Sinclair Knight Merz
OPEX	Operational Expenditure	SLA	Service Level Agreement
OPIC	Overseas Private Investment Corporation	SLD	Single Line Diagram
P	Active Power	SME	Small and Medium Sized Enterprises
PB	Parsons and Brinckerhoff	SMP	System Marginal Price
PESTEL	Political, Economic, Social, Technical, Environmental and Legal criteria	SPP	Steam Power Plant
PF	Power Factor	SPV	Special Purpose Vehicle
PGTMP	Power Generation and Transmission Master Plan	ST	Steam Turbine
PPA	Power Purchase Agreement	SWERA	Solar and Wind Energy Resource Assessment
PSS/E	Power System Simulator for Engineering	T/L	Transmission Line
PV	Photovoltaic	TA	Technical Assistance
Q	Reactive Power	TARDA	Tana & Athi River Development Authority
Qc	Reactive Power Capacitive	TJ	Terra-joule
QEWEC	Qatar Water & Electricity Company	TNA	Training Need Assessment
QI	Reactive Power Inductive	TOR	Terms of Reference
QM	Quality Management	TPP	Thermal Power Plant
RAP	Resettlement Action Plan	TR	Transformer
RE	Renewable Energy	TRF	Training Results Form
REA	Rural Electrification Authority	UNDP	United Nations Development Programme
REP	Rural Electrification Programme	UNEP	United Nations Environment Programme
RES	Renewable Energy Sources	US	United States of America
RfP	Request for Proposal	USD	United States Dollar
RMS	Root-Mean-Square Value	VBA	Visual Basic for Applications
RMU	Ring Main Unit(s)	WACC	Weighted average cost of capital
S/S	Substation	WASP	Wien Automatic System Planning
		WB	World Bank
		WEO	World Energy Outlook
		WTG	Wing turbine generators

ANNEX 1 EXECUTIVE SUMMARY – ANNEXES

There is no annex to this chapter.
The rest of the page is intentionally left blank.



ANNEX 2 INTRODUCTION – ANNEXES

Annex 2.A Data collection

In this section, a brief overview of the data collection process and the information requested and received is presented, without going to the minimum detail due to quantity of files received and obtained from different sources. Based on the inception report, data collection has been divided into seven categories for the purpose of better organization of the information received. Each category has several sub-categories, where relevant.

An extensive online data base (consultant team internal) has been created based on this structure and is updated at regular intervals. It was noticed that there is not a centralised repository of all relevant information and data for both physical paper and electronic files. This is recommended (e.g. at ERC) to facilitate planning and data collection in future projects in the sector.

The main groups and sub groups for data categories are as follows:

- 1) Demand
 - a) Demographic data
 - b) Load curves
 - c) Electricity consumption
 - d) Consumption of energy/ water
 - e) Energy efficiency (EE)
- 2) Supply
 - a) Expansion plan
 - b) Power generation (thermal)
 - c) Power generation (hydro)
 - d) Renewable energy sources
- 3) Power grid
 - a) Transmission grid
 - b) Distribution grid
 - c) Dispatch
- 4) Tools
 - a) Demand forecasting
 - b) Generation planning
 - c) Network analysis
 - d) Economic modelling

5) Policy and regulation, institutional framework

- a) Policy & regulatory framework
- b) Institutional framework

6) Economic & financial framework

- a) Economic
- b) Financial

7) Environmental & geographic framework

Classification based on those categories has allowed addressing different sectors of client's offices and obtain information from the right sources.

The first type of information received was mainly: regulations, policies, annual reports and other information readily available with the client. However, later more detailed and specific information was also received via various sources and enabled an up to date collection of relevant information.

It is important to note that since the project's inception, several new developments have taken shape in the Kenyan energy sector. Therefore, access to published information is not always straightforward. However, for the very same reasons, it is vital to assemble a repository of latest documents for future updates during the lifetime of the project.

In the case of relevant data not being available, either from primary or secondary sources, appropriate assumptions have been made and identified by the consultant to perform the required analysis. These data and assumptions are detailed in the respective chapter.

In the pursuit of further information from different sources, the consultant has found several studies already developed for the sector, normally by international companies. The table below lists the main studies in chronological order providing (with acronyms) the client and author. This list is non-exhaustive. It should be further extended beyond this project to facilitate data collection in future projects.

Annex Table 1: List of main power sector consultants' studies for Kenya in recent years

Year of study – study client - study author – study title
2006_KPLC_Manitoba_Technical and Commercial Losses Study
2007_EDF CIST Entry into Nairobi of HV lines from south-eastern country - Feasibility Study
2009_MOE and EEPCo Fichtner Ethiopia-Kenya Power System Interconnection Project - Feasibility Study
2010_ERC_KIPPRA_Energy consumption patterns KE Synopsis
2010-2013_MoE_Egis_Technical Assistance to the MOE (exemplary reports for EE and RE below)
2010_MoE_Egis_Energy Efficiency Report 2010
2010_MoE_ADF Power Transmission System Improvement Project - appraisal report
2011_EAC_SNC and PB Regional Power System Master Plan and Grid Code Study

Year of study – study client - study author – study title
2011_MoE_Egis_Renewable Energy Report 2011
2012_MoE_CPCS_Options for the Development of a Power Market in Kenya
2012_MoE_Ramboll, ECA Renewable Energy Resource Potential in Kenya
2013_ERC_PB_System Study of the Kenyan Electricity Supply System
2013_KPLC_PB_Distribution Master Plan Report
2013_MoE_windforce-management_Final Report for wind energy analysis & development programme
2013_MOE_EGIS_House Hold Survey for Kenya
2013_ERC_SNC_Kenya Cost of service study - Report
2013_MEWNR_JICA_National Water Master Plan 2030
2013_MOEP_EGIS_Thermal Energies
2013_MoE_ECA; Ramboll Renewable Energy Resource Potential in Kenya 2012
2013_KPLC_PB_Distribution Master Plan Report
2015 MOEP_Fichtner Consultancy Services for Development of Electricity Connection Policy and Draft Regulations

Besides studies developed by consultants, numerous official documents (e.g. strategy and policy papers and plans) from organisations of the Kenyan power sector are available, providing guidance to the sector. This includes the official power sector plans LCPDP for the long term and medium term, developed by the Planning Team.

A non-exhaustive list of these documents is provided below. In addition to these, nearly all organisations of the power sector publish annual reports which provide an important input of validated information for current planning.

Annex Table 2: List of main reference documents for the power sector

Year of document – study author – title
2007 KENINVEST First Medium Term Plan
2010 Government of Kenya - Vision 2030 Popular Version
2013 MOE Updated Least Cost Power Development Plan (LCPDP) 2011 – 2031
2012 KENINVEST Second Medium Term Plan
2012 KNBS Kenya Facts and Figures 2012
2013 Economic Survey 2013 Highlights
2013 GDC Strategic Plan of the Geothermal Development Company
2013 Government of Kenya - Jubilee Manifesto
2013 MOE Updated Least Cost Power Development Plan (LCPDP) 2013 – 2033 Draft
2014 MOEP Power Sector Medium Term Plan 2014 – 2018 Draft

Year of document – study author – title
2014 MOEP 10 Year Power Sector Expansion Plan 2014 – 2024
2014 MOEP National Energy Policy
2015 National Electrification Strategy Draft
2015 MOEP Power Sector Medium Term Plan 2015 – 2020

In the following, a detailed status on each field of data requested is presented as a summary and with detailed explanations for each field according to the latest status of the project. The following table shows a summary by providing an extract of the data collection sheet with the following columns:

- 1) The main group, mentioned before in this chapter
- 2) The data category as a subset of the main group
- 3) The description of the data requested
- 4) Traffic lights (red, yellow, green) showing the level of collection accomplished. (Client needs to pay particular attention to data that was not fully received by the consultant.)
- 5) Traffic lights (red, yellow, green) showing the level of priority for such information
- 6) Comments on the data obtained and certain description to identify it
- 7) Comments on the current status and next actions to do in coordination with the Client.

Annex Table 3: Global data collection status

#	Data category	#	Description of the data requested	Priority	Obtained?	Data obtained & description	Analysis / Current Situation
1	Demand	(Note: separate detailed questionnaire for demand forecast provided by LI)					
1.1	Demographic data	1.1.1	Population growth (past 5-10 years & forecast 20 years) - national level and by county	high	some	2009 Census data which provides only 2009 data; population growth in LCPDP load forecast, further (different) official forecast downloaded from internet + other source (UN)	LI prepared own indicative forecast by county based on various sources.
		1.1.2	People by gender, rural/urban, income groups, households; all by county	high	yes	detailed data found on internet and indicative forecast prepared	see previous issue
		1.1.3	Average household size - national level and by county	high	yes	2009 Census + assumptions LCPDP load forecast + own research	see previous issue
		1.1.4	Towns with population > 10000; Name, location (coordinates, county), # inhabitants, main economic sectors/functions	medium	some	county fact sheets (KNBS) downloaded from internet with main 3 settlements per county; no information on sectors/functions but requested through demand forecast questionnaire	sufficient; only if forecast extended to county level the sector/function description for settlements / counties to be provided
		1.1.5	Data on socio-economic situation of population, division by income level and share; Average income per household for past years (~5) for rural vs. urban areas; definition typical income groups (e.g. census), Estimation on development of income	low	some	Household survey 2013, vision2030 docs, WB/UN reports (national level) focusing on poverty/lower income groups	information sufficient to describe frame conditions; data not sufficient as a base for the forecast (only if comprehensive socio-economic data available)
1.2	Load curves	1.2.1	24h Load curves (sent-out); 8760h data for several years (>1 year), main grid/isolated grids	high	some	8760h data for several years: sent-out, by generator, by (metered) substation	sufficient; customer specific load data (e.g. distribution feeder) could further improve the analysis; 2015 data to be provided
1.3	Electricity consumption	1.3.1	Current and historic consumption development (past 10 years); Total & by sector (domestic, agricultural, service, commercial, industry incl. industry subsector) & by month & by voltage level (HV, MV, LV)	high	yes	15 years by year and tariff group and region (KPLC annual reports); for commercial/industry by subsector, tariff, voltage level for <1 year per month and 5 years per year	largely sufficient; consumption development connected/newly connected consumers requested (more comprehensive data is not available which would allow detailed analysis by subsector)
		1.3.2	Technical and non technical losses (incl. commercial) by county for the past 5 years; in MV, HV grid, by area	medium	some	LCPDP2013, 10 year plan, KPLC annual reports and loss reduction strategy 2015, 2014 statistics (detailed by voltage level and also providing non-technical losses estimate); loss study 2006; not available per region	sufficient; outcome of currently on-going loss reduction study (WB) would be of benefit for future plans
		1.3.3	List 20 largest customers with annual consumption for the past 5 years and monthly consumption for 12 months	high	some	commercial/industry by subsector, tariff, voltage level for <1 year per month and 5 years per year	sufficient/very comprehensive; update on data (2013-2015) requested; survey among large customers on-going with support needed from KAM/ERC
		1.3.4	Number of customers by customer type and voltage level (HV, MV, LV) (past 10 years) and area	high	some	KPLC annual report statistics for 15 years by voltage level and tariff group; recent connections per county received	split by area (& customer type) beyond domestic not available and only estimated for forecast; needed for more accurate forecast (even on county level and split by urban and rural)
		1.3.5	Electrification ratio/rate (population/households and area for past 5 - 10 years. Divided by county and Urban/Rural differentiation)	high	some	county fact sheets 2013 based on census 2009, connections statistics 2009-2013 whole country divided by urban/rural	split urban/rural connections on county level would help to improve estimates
		1.3.6	Forecasted load (by area / on county level) for the next 5 years	high	yes	strategic plan KPLC, forecasts/plans (LCPDP, MTP), load by region (ERC & Distribution Master Plan)	no further need; only updated information (if available) from regional KPLC centres on load estimates & county plans
		1.3.7	Annual collection rate for the past 5 years	low	yes	KPLC annual reports	sufficient
		1.3.8	Suppressed Demand: approximate amount (MW, GWh, % of total consumption) by kind of suppressed demand: 1) Load shedding 2) No 24 hour service; 3) curtailed demand poor security / quality of supply / self-supply 4) low connection rates	medium	some	Household survey 2013; WB business survey; LCPDP 2013/10 year plan; 5000+ documents for total load shedding/suppressed demand; data base on load shedding and system failures from National Control Centre	more comprehensive data on load shedding / system failures (distribution network) would help to improve estimate; survey among large consumers and domestic consumers on-going
1.4	Consumption energy/water	1.4.1	Water consumption per city	medium	no		will not be considered for EE
		1.4.2	Natural gas consumption for industries & other sectors	medium	no		will not be considered for EE
		1.4.3	LPG consumptions per province & sector	medium	few	Household survey 2013,	will not be considered for EE
		1.4.4	LFO consumptions for industrial and domestic uses	medium	few	Household survey 2013,	will not be considered for EE
		1.4.5	Biomass consumptions (industry, domestic)	medium	few	Household survey 2013,	will not be considered for EE
		1.4.6	Fuel prices development (fossil fuels, biomass, charcoal etc.)	low	yes	ERC price info petroleum products on webpage, KPLC fuel prices	sufficient

#	Data category	#	Description of the data requested	Priority	Obtained?	Data obtained & description	Analysis / Current Situation
1.5.	Energy efficiency specific	1.5.1	Available recent EE studies (<10 year old) at national, regional, sectorial, sub sectoral levels incl. review of energy efficiency awareness and education	high	some	Designation Energy Users; EE Standards and Labelling - Kenya - Specification for compact fluorescent lamps; EE standards, The Draft Energy (Improved Biomass Cook stove) Regulation, THE ENERGY _ENERGY MANAGEMENT_ REGULATIONS	approved EE chapter covers status as data available
		1.5.2	List of potential EE stakeholders (government, customer unions, KAM, ESCOs, financing institutions, NGOs, etc.)	high	yes	contact list (from kick-off week) EE mission report	sufficient
		1.5.3	Electricity Devices: • Volume and prices of lighting devices (domestic, public and industry), air conditioner sales, Specifications of the imported large motors (> 3 kVA) • Efficiency regulations about local and imported electrical devices if any	medium	some	Household survey 2013, EE mission report	approved EE chapter covers status as data available
		1.5.4	Recent noticeable EE actions	low	yes	summarized in MTP	see previous
		1.5.5	Large building, commercial centre, hotels, industry audits	high	some	30 audits provided to EE core expert under NDA (see MTP)	see previous
2	Supply						
2.1	Expansion Plan	2.1.1	Current Power System Study and expansion plan	medium	yes	LCPDP2013, 2011, MTP 2014, 10 year plan 2014, MTP 2015	sufficient
	Power generation (general)	2.1.2	Peak load and annual generation (sent-out) for the past ten years and monthly generation for the past 3 to 4 years,	high	some	KPLC balance 2005-2013 (monthly MW, actual GWh per generator); KenGen figures for 1990-2013; LCPDP2013 and KPLC annual report with annual generation and peak load figures ~5years; several years hourly load per generator	2015 data to be provided
2.2	Power generation (thermal)	2.2.1	Existing, committed, planned units - technical: Type, # of units, fuel, capacity (installed, available, minimum), net heat rate curve, spinning reserve of units, minimum up & minimum downtimes of units, start up and shut down costs of units, commissioning/decommissioning date, planned/forced outage	high	yes	LCPDP2013, KenGen website and various www information, KenGen data, ERC data directly received	applied data and assumptions provided and approved in MTP
		2.2.2	Existing, committed, planned units -economic/financial; Investment costs; operational costs (fixed, variable)	high	yes	see above	see previous
		2.2.3	Ability of existing, committed & planned units to follow varying load and balance (future) intermittent generation from renewable sources (e.g. load/generation shift intra day, week, season)	medium	some	see above; feedback on system operation and limits to dispatch generators according to the system need	rationale on the need for an assessment of spinning reserve provided (scope beyond master plan study)
		2.2.4	Cooling - water supply resources (for existing and future plants); studies on water supply situation at existing and committed power stations	medium	no	no	applied data and assumptions provided and approved in MTP
		2.2.5	Resource/sourcing studies on fossil fuels (natural gas, coal); domestic, import	high	some	LCPDP2013; 10 year plan	applied data and assumptions provided and approved in MTP
2.3	Power generation (hydro)	2.3.1	Existing, committed, planned units - technical: Type, # of units, capacity (installed, available, minimum), commissioning/ decommissioning date, planned/forced outage; Design head, Design discharge, Power potential output & annual performance, Main problems on the management of the hydro schemes; List of reinforcement and upgrade hydro projects (provide the same type of information as in the above paragraph) and planning.; maximum Primary Reserve in MW, Maximum Spilling in m³/h, Minimum Flow of River in m³/h, Maximum Flow of River in m³/h, avg. Efficiency of HPP; How large are the typical losses in the rivers?	high	yes	LCPDP2013, KenGen website and various www information, see Hydropower mission report; limited plant information from national water master plan and other sources; various feasibility studies provided; various assumptions made by consultant were data is lacking	applied data and assumptions provided and approved in MTP
		2.3.2	Existing, committed, planned units -economic/financial; Investment costs; operational costs (fixed, variable)	high	yes	see previous issues	see previous issues

#	Data category	#	Description of the data requested	Priority	Obtain ed?	Data obtained & description	Analysis / Current Situation
		2.3.3	Data for each existing and planned Reservoir: Minimum & Maximum Reservoir Water Volume in m³, Total Natural Inflow (through precipitation, ground water, other rivers, ...) in m³ (weekly, monthly data), Total Natural Outflow (through evaporation, percolation, ...) in m³ (weekly, monthly data). Historical data on reservoir management. In particular operational restrictions accruing from sediment management; Data for existing and planned HPPs and Reservoirs (depending on expansion step): Which reservoir has inflows from which HPP?, How are outflows of reservoirs distributed (percentage-wise) on downstream HPPs?	high	some		
		2.3.4	Hydro-meteorological data; List, and geographical coordinates X, Y, Z, of rain gauges and dates of available data on the 5 major watersheds of the country and the coastal basins, Type of available precipitation data (Daily, monthly, annual data, maximum Hourly data, curve "Precipitation-duration-frequency").	high	some	see previous issues	see previous issues
		2.3.5	List, and geographical coordinates X, Y, Z, of flow gauges and dates of available data on the 5 major watersheds of the country and the coastal basins, Type of available flow data (Daily, monthly, annual data, Peak flows (instantaneous maximum flow) & Hydrographs for the major rivers.	high	some	see previous issues	see previous issues
		2.3.6	General Hydro Info □ National Hydro Strategy Development for the Country. □ Preferential policies for HPP development central & local governments. □ Feed-in-tariff policy for small hydro power generated electricity. □ Traditional barriers and risks identified in the development of hydroelectricity (barriers & risks specific to Kenya. □ Stakeholders along the hydro value chain (if existing) □ List of technologies for hydropower produced and available in Kenya. □ Hydroelectric Atlas of Kenya. □ Recent strategic studies concerning the development of the national hydropower potential. □ List of watersheds mobilized by hydroelectric power plants in KE	high	some	see previous issues	see previous issues
2.4	Renewable Energy sources	2.4.1	Studies on annual production forecast (up to 2030) committed plants (IPPs) by energy source (including investment costs, operation costs, availability)	medium	some	FIT project pipeline and status	sufficient
		2.4.2	WIND: Resource maps, studies, data sets (hourly measuring data for entire years in diverse sites for reserve requirement determination)	medium	some	wind atlas; generation curve Ngong; wind measurement data	sufficient
		2.4.3	BIOMASS: Resource maps, studies, data sets	medium	some	co-gen feasibility study; mission report; biomass project status	sufficient
		2.4.4	GEOHERMAL: Studies on geothermal sources, potential, feasibility studies geothermal plants	low	some	GDC strategic report; tabularized data requests	sufficient
		2.4.5	SOLAR: Resource maps, studies, data sets (hourly measuring data for entire years in diverse sites for reserve requirement determination)	medium	some	solar maps; solar project status	sufficient
3	Power grid		(transmission, distribution, dispatch, SCADA ...)				
3.1	Transmission grid	3.1.1	Network data drawings and information (Single line, geographic lay-out etc.)	low	some	various documents of various sources/dates	sufficient; geographical layouts might have to be updated/confirmed
		3.1.2	Network studies (load flows, short circuit, transient stability)	medium	yes	PSSE present and future system files for FS TL 2100008 (Ketraco); recent network studies by external consultants	sufficient
		3.1.3	New projects (under construction, committed, planned): technical and economic characteristics	high	yes	LCPDP2013; MTP 2014 list; updates/comments (minutes)	sufficient

#	Data category	#	Description of the data requested	Priority	Obtained?	Data obtained & description	Analysis / Current Situation
		3.1.4	Grid code & other standards/design data	low	yes	grid code Mar2008, grid code draft; some further specifications (TL, S/S)	sufficient
		3.1.5	Technical data equipment: generators (type of generator i.e. hydro, gas, steam, etc. rated power and voltage, classical machine parameters), overhead lines (sending- and receiving- ends substations, lengths, conductor ampacity, electrical parameters: R, L, C), substations (identification name and voltage level); reactive power compensation equipment (reactive power, steps)	high	yes	Some available LCPDP2013	sufficient
		3.1.6	GPS coordinates network: At least for substations 132kV and higher voltage level (11,33,66 would enhance planning)	high	yes	coordinates of substations	sufficient
		3.1.7	Metering data substation: substation name & location. energy (annual (5 years), monthly (12 months)); & load curves), typical load demands in peak and low conditions.	medium	yes	extensive hourly load data for various HV substations (some as hard copy) & distribution feeders	sufficient; if further substations data available this could be of benefit
		3.1.8	Interconnection Link to other countries (historic & future): volume, time, prices (import / export) ; load curves and metering data (from date of commissioning until today), forecast/plan future power exchange (in particular also with Ethiopia) economic and technical details from PPA (e.g. volume, pricing, technical conditions)	medium	yes	system studies, LCPDP2013 and KPLC annual report with annual import/export; various minutes of meetings	applied data and assumptions provided and approved in MTP
		3.1.9	latest version of the transmission network extension plan	low	yes	Various available: PB system study, LCPDP2013, MTP, new projects	sufficient
3.2	Distribution grid	3.2.1	Tabular summary of the 33 kV network (substations connected to which 220 / 33 kV TR, max load per feeder, transformer ratings, average cable length of the 33 kV feeders per substation / area.	low	yes	Distribution Master Plan 2013 Draft & Final	applied data and assumptions provided and approved in MTP
		3.2.2	New projects (under construction, committed, planned) for the network expansion plan	low	yes	Distribution Master Plan 2013 Draft & Final; data for local load forecast	sufficient
3.3	Dispatch	3.3.1	Dispatch: data, rules, plan: Information on current operational reserve restrictions (primary, secondary reserve)	medium	yes	exemplary dispatch for LCPDP; dispatch rules, various minutes of meetings (e.g. NCC); hourly load data for various years	applied data and assumptions provided and approved in MTP
		3.3.2	Load shedding strategy and historic statistical data for the past 5 years by county: -> Amount, frequency, location and time of load shedding (several years)	high	some	see suppressed demand above	see suppressed demand above
		3.3.3	Statistics on interruptions of power supply (other than load shedding): -> Amount, frequency, location, time, duration, unserved energy by region for several years	high	some	KPLC website information, only general; see suppressed demand above	see suppressed demand above
4	Tools	Software and other tools for power system planning					
4.1	Demand	4.1.1	MAED tool & files copy	high	yes	model & files	sufficient
4.2	Generation pl	4.2.1	VALORAGUA tool & files copy	low	yes	software received	sufficient
		4.2.2	WASP version no & tool & files copy	low	yes	software and files received	sufficient
4.3	Network	4.3.1	PSSE files	low	yes	PSSE present and future system files for FS TL 2100008 (Ketraco)	sufficient
4.4	Economics	4.4.1	Economic, financial, investment, tariff analysis tools and standards	medium	yes	tariff implications/future development, screening curve tool, wasp files	sufficient

#	Data category	#	Description of the data requested	Priority	Obtain ed?	Data obtained & description	Analysis / Current Situation
5.1	Policy & regulatory	5.1.1	Energy policies on: Energy Planning, Generation, Transmission and Consumption (EE, DMS)	low	yes	National Energy Policy - Third & Final Draft 2012/2014/2015;Vision2030 docs,5+ docs;Energy Bill2013 Draft etc.; electrification strategy	sufficient; recent updates to be provided by client if available to be mentioned in next reports
		5.1.2	Previous studies and regulations on Renewable Energy and Energy Efficiency	medium	yes	FIT policy/regulation/smallIPP 2012, biomass/cook stove regulation draft various RE studies available from www	receive any further relevant studies & policies for EE and all RE sources to mention in next reports; get RE law (under development)
		5.1.3	Planning criteria for energy and power sector	low	yes	as described in Energy Policy, LCDPD2013,discussed in kick-off meetings	applied data and assumptions provided and approved in MTP
		5.1.4	Electricity Tariff Structure (Customer Classification, Rate structure, energy & connection charges etc.)	medium	yes	tariff info ERC, KPLC website: schedule and approval; connection policy	sufficient
		5.1.5	Electricity Tariff Policy (How tariffs are modified)	low	yes	see above	sufficient
		5.1.6	Regulation for licensing & permitting, grid connection, operation of plants (conventional & renewable)	low	yes	ERC generation licenses & contacts; grid code; FIT regulation	sufficient
		5.1.7	Regulation on Tax System, Importation, Others.	low	few	basic info on applicable tax&duty rates for FS TL 2100008 (Ketraco)	applied data and assumptions provided and approved in MTP
5.2	Institutional framework	5.2.1	Roles and responsibilities of each institution participating on the energy sector.	low	yes	LCPDP2013 content on institutions, further general information on institutional set up from www, annual reports, various studies with sector description; Inception Report	applied data and assumptions provided and approved in MTP
		5.2.2	Regulation of Public-Private Partnerships; PPA schemes (between generators and off-takers)	medium	few	ERC generation licenses & contacts;	applied data and assumptions provided and approved in MTP
6 Economic & financial framework							
6.1	Economic	6.1.1	GDP historic 10 year period at least including sectoral analysis, GDP forecast(s) until 2030. Inflation, Overall Growth	high	yes	past 10y, v2030 forecast, WB/IMF historic data and forecast	applied data and assumptions provided and approved in MTP; KIPPRA analysis to be provided to mention in next reports
		6.1.2	Strategies, studies & statistical information on economic sectors: industry, commercial, agricultural, service, mining	medium	some	part of LCPDP,v2030 documents, flagship project information	applied data and assumptions provided and approved in MTP; additional infor on actual status of projects would be of benefit
		6.1.3	Planned large projects as potential energy consumers	high	some	details planned large projects (description, capacity&energy need)	see previous issue
6.2	Financial	6.2.1	National level: commercial bank loan conditions, Account Balance, Imports, Exports	low	few	basic info on applicable loan for FS TL 2100008 (Ketraco)	applied data and assumptions provided and approved in MTP
		6.2.2	International level: current international investment, source of investment: investment countries, private / government sector	low	no		no necessary
7 Environmental & Geographic framework							
7.1	Environment al procedures	7.1.1	Environmental regulation and compliances (e.g. on emission limits air, water, noise); Involved Authorities, land use, national strategies, studies on public opinion/environmental awareness/ participation	low	some	THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT, 1999, Biodiversity benefit sharing regulations 2006, EIA regulations 2003, Noise regulations 2009, verbal info from kic-off with UNDP maps	sufficient
7.2	Geographic	7.2.1	Digital maps/geographic information system (GIS) files on topography, infrastructure, population, etc.	medium	few		sufficient; official and recent GIS files would improve quality
		7.2.2	Maps of protected areas, national parks, reserves, areas by type of land	medium	some	UNDP maps	see previous issue
		7.2.3	Demographic maps, population distribution and historical migration	medium	yes	UNDP maps; own maps with GIS files and census 2009 data	sufficient
		7.2.4	Climate data (seasonal average/min/max temperature, rainfall) per province	medium	yes	online available statistics; wind speed from LI 2100008 project and wind atlas, precipitation statistics hydro data; irradiation from solar maps (also GIS files)	sufficient

ANNEX 3 HISTORIC AND CURRENT SITUATION OF KENYAN POWER SECTOR – ANNEXES

Annex 3.A Geographic overview of Kenya

The Republic of Kenya lies on the equator in the northern part of East Africa and borders on five countries and two bodies of water:

- In the north, it shares borders with South Sudan¹ and Ethiopia;
- In the east, it shares a border with Somalia and it has access to the Indian Ocean. The latter provides the major entry point for trade and transport (including import of energy sources), not only for Kenya but for many countries in East Africa.
- In the south, it shares a border with Tanzania;
- In the west, it has access to the Lake Victoria and shares a border with Uganda.

With some 0.6 million square kilometres, Kenya is the 23rd largest country in Africa and the 49th largest country in the world.

Its shape is relatively even with nearly equidistant west to east and north to south extension as well as an equidistant location on the equator. However, due to distinguished geographic regions together with historic reasons, the populated and development areas are not equally distributed but lie mainly in the southern half of the country. They concentrate around Nairobi (south centre), Mombasa (southeast) and Lake Victoria (southwest). This distribution has furthermore determined the development of the existing infrastructure². It also poses a challenge for the connection and supply of the periphery, for instance with regard to transport and power supply.

The map below illustrates the geographic framework by providing information on neighbouring countries, water bodies as well as the main settlements and infrastructure in Kenya.

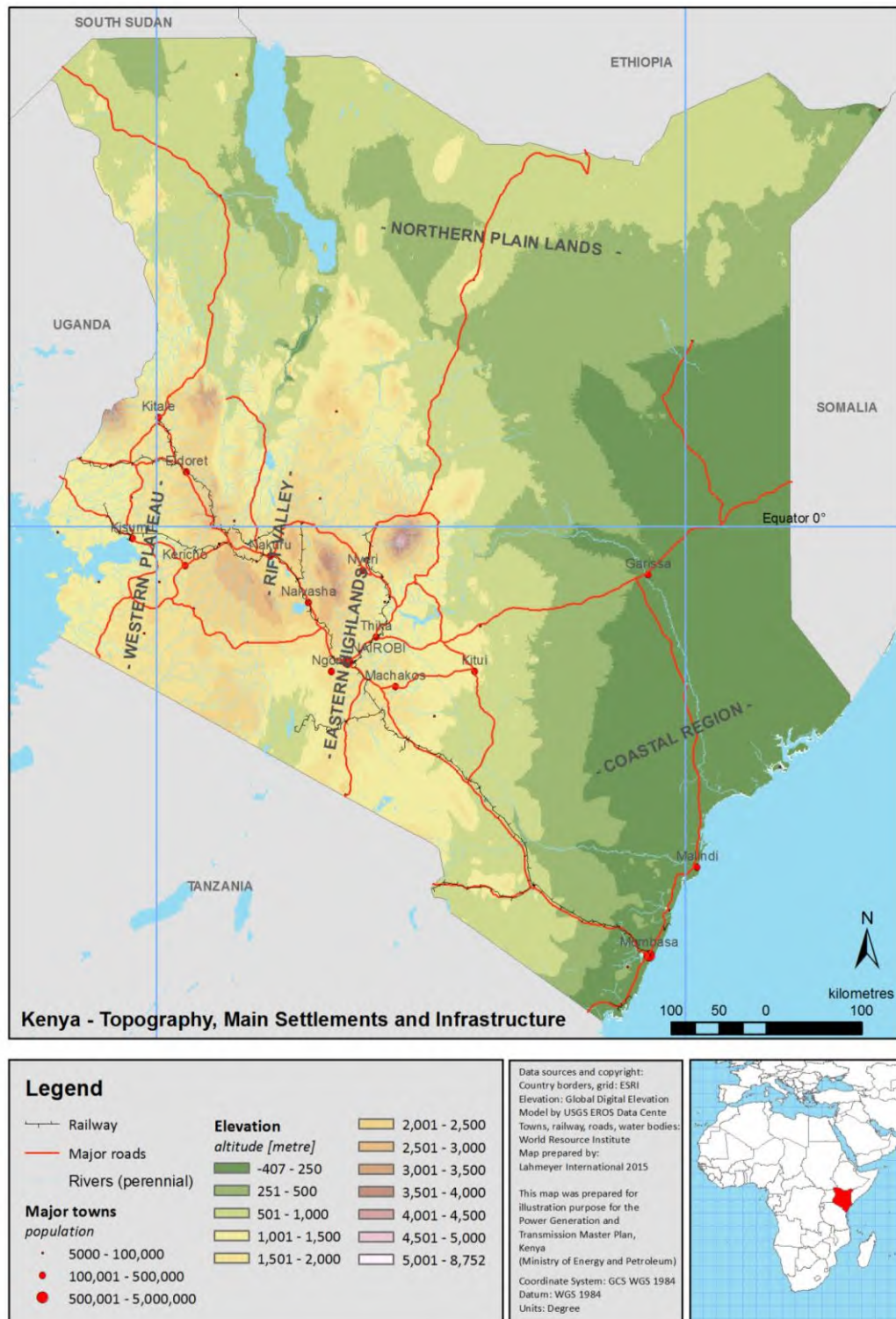
The main geographic regions are listed below:

- The (eastern) highlands in the centre south with Nairobi as the (for historic reasons) main settlement and development area of the country determined by high altitude and precipitation;
- The coastal region along the 400 km coast line to the Indian Ocean (densely populated around Mombasa in the south) and the coastal hinterland with several rivers (e.g. Tana) flowing from the highlands into the ocean;
- The western plateau along Lake Victoria with the second largest settlement area in terms of total population; The rift valley between highlands and western plateau with geologic fault lines as the resource area for geothermal energy; and

¹ With some 300 km the border to South Sudan (was until July 2011 Sudan) is the shortest border compared to around 750 km border lengths with all other countries.

² The geographic regions and features are partly mirrored in administrative and technical sub-divisions such as the previous administrative structure of provinces or the power system areas.

- The northern plain lands region covering the whole northern part of Kenya with arid and semi-arid plains and low population density but also including the Lake Turkana as the largest water body within Kenya.



Annex Figure 1: Map of Kenya – topography, main settlements and infrastructure

Annex 3.B Demographic overview of Kenya and population forecasts (population, households total, urban households)

The main objective of this section is to provide background information and assumptions for the demand forecast. These are demographic parameters and projections which determine the future domestic demand for electricity and challenges for future electrification efforts.

Annex 3.B.1 Population growth and migration

The population size and growth as well as migration strongly determine the future demand for utility services. It is interrelated with other demographic parameters such as urbanisation and the geographical distribution as well as national and local economic growth.

The most recent census of 2009 set the population of Kenya at 38.6 million people. Recent publications from KNBS³ state 41.8 million for 2013. The UN forecast⁴ assumes a slightly higher population (44.4 million in 2013; 46.7 million in 2015). It ranks Kenya at 30th and 7th among all countries in the world and Africa, respectively.

The annual population growth in Kenya in the past⁵ was 3.14%. It is forecasted to grow between 2.5% and 2.9% during the study period (about 1.0 to 1.4 million in absolute terms) which makes Kenya one of the fastest growing countries in the world in terms of population. The growth rates are expected to slow down though the absolute figures will increase due to the growing population basis.

Referring to demography, changes of trends (e.g. growth rates) and the effect of measures (e.g. family planning) tend to be very slow. Hence, the uncertainty of the projected population figures is rather small. Uncertainty exists with regard to the starting point and source of the forecast. The census 2009 data has been disputed (to be too high). As a consequence it has been adapted in some publications; though not in all official publications and it has not been broken down to a lower administrative level. As a result a rather unrealistic development (i.e. decrease) of population would be displayed if the official figures are combined.

The different official figures also differ from official UN population estimates and forecasts⁴, which are higher by 3 to 4 million (about 6%). The latter are also cited in official government publications⁶. No recent official forecast was provided during the time of this study. Instead, a forecast applied in the LCPDP 2013 was available with limited information on the source and publication date; adapted to the forecast model with rather simplified stepwise growth rates. Though different in detail, the deviation of average forecasted growth rates is very small between the two forecast sources. In addition, the LCPDP 2013 forecast and the UN low fertility scenario forecast are very close in absolute figures.

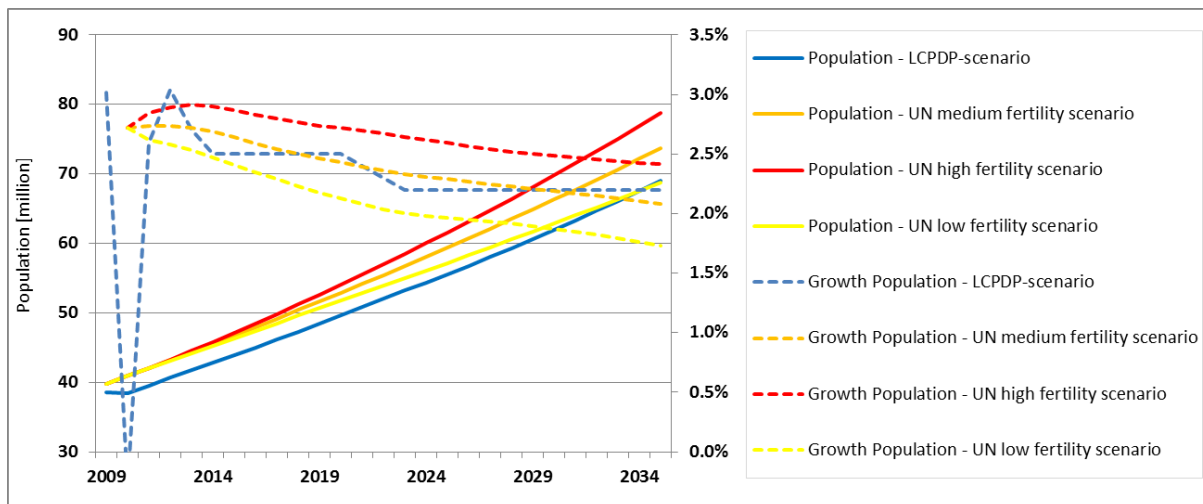
³ Source: KNBS, *Kenya Fact and Figures 2014* (2014)

⁴ Source: United Nations Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2012 Revision, Medium Fertility Scenario* (2014)

⁵ between the two censuses 1999 and 2009

⁶ GoK, National Coordinating Agency for Population and Development (NCPD) *Rapid Population and Development. Kenya Population and the Next 30 Years* (2010)

The available forecasts with growth rates are visualised below. For every forecast, the population will double or nearly double to 70 – 80 million until 2035. It would increase to 49 to 53 million at the end of the medium term period 2019/2020.

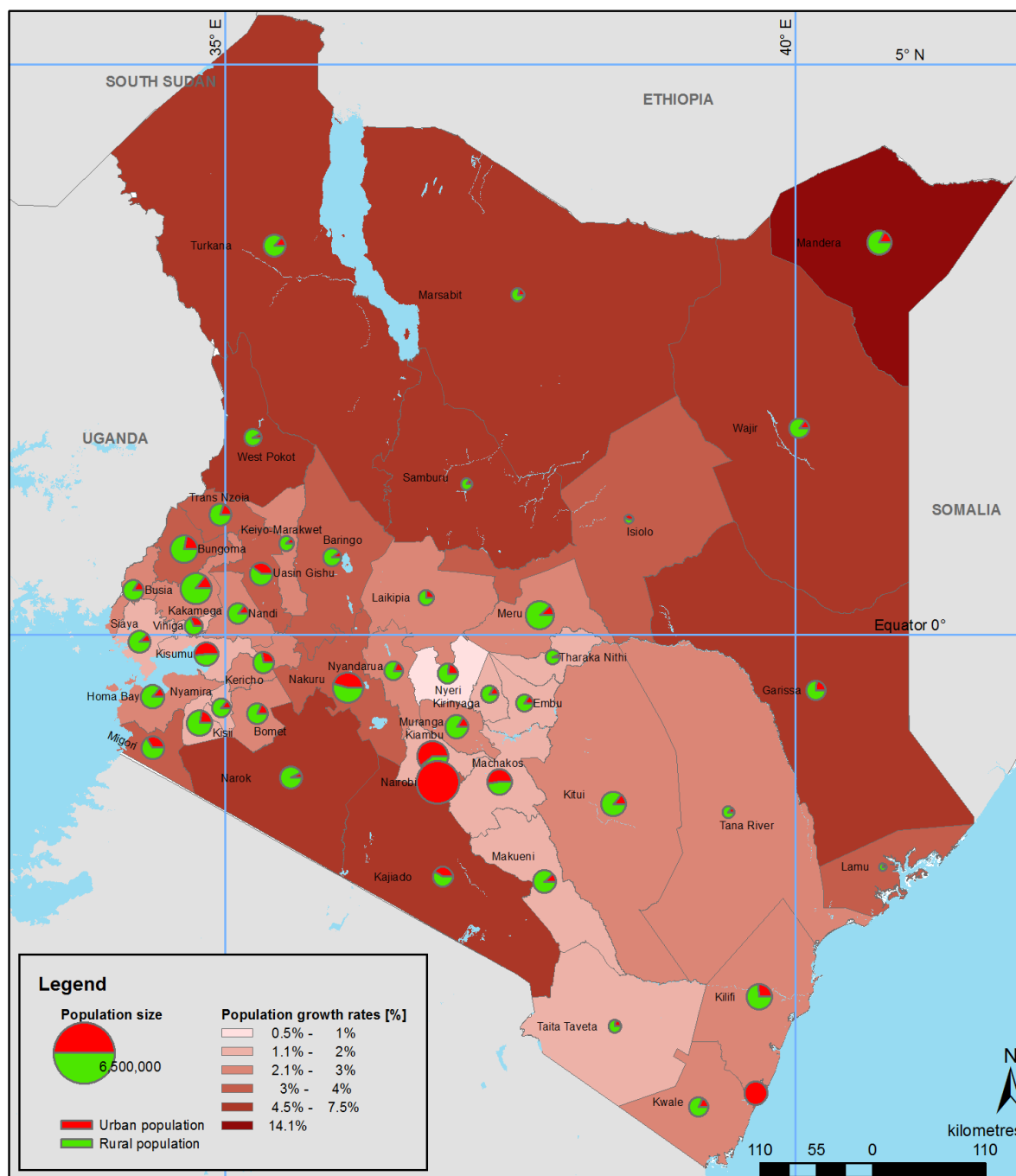


Annex Figure 2: Kenya - population forecast scenarios 2009 - 2035

The historic growth rates on a lower level are in a wide range between 0.5% in the Nyeri county and 14% in Mandera. Causes for different growth rates are:

- Regionally different fertility rates also caused by various parameters such as rural population share, socio-economics and culture;
- Internal and international migration of displaced and nomadic people (explaining the exceptional high figure for Mandera); and
- Migration for work and education towards the main regional and national (urban) commercial centres, in particular Nairobi (resulting in above average growth rates of Nairobi and Mombasa).

The population growth rates by county for the period 1999 to 2009 are provided below together with the split of rural and urban population. It can be seen that the remote counties and counties with a higher share of rural population tend to have higher growth rates worsening the situation for electrification in these areas. For most of the areas with high growth rates and high share of rural population, the number of inhabitants, its share of the national population and the population density are small compared to areas which are closer to the national grid. On the one hand this means that the group of people affected is comparably small; but at the same time, this means that for this smaller group of people, probably higher costs for the expansion of the grid have to be budgeted (i.e. higher per capita or per household costs for the transmission and distribution grid).



Annex Figure 3: Map of Kenya – population growth rates 1999 – 2009 and share of urban / rural population by county

No official forecasts by county or power system area were available during the time of this study. In order to support a demand forecast below national level population, rough predictions on county level were developed for this study. It has to be noted that these predictions are only indicative and do not represent any specific assumption on the future county specific fertility rates and mi-

gration. It is solely based on historic county growth rates which were adapted⁷ and normalized to lead to totals similar to the national forecasts explained above. It is strongly recommended to prepare official population forecasts by county and apply them in future updates of this master plan. The prediction by county and power system area is provided in tabularized form at the end of this annex.

Annex 3.B.2 Population geographical distribution

The geographical distribution of the population has a strong effect on the supply of electricity on the national (transmission network) as well as local level (distribution network) and related costs. It may also give indications on possible social impacts of new infrastructure projects.

With a density of 63 people per km² in 2009, Kenya ranks average among the countries in the world and Africa. However, the distribution of the population is very uneven as it is shown with gradual colours in the first map below. The county areas show the population density; the pie charts indicate the size of the county population and its split into rural and urban shares.

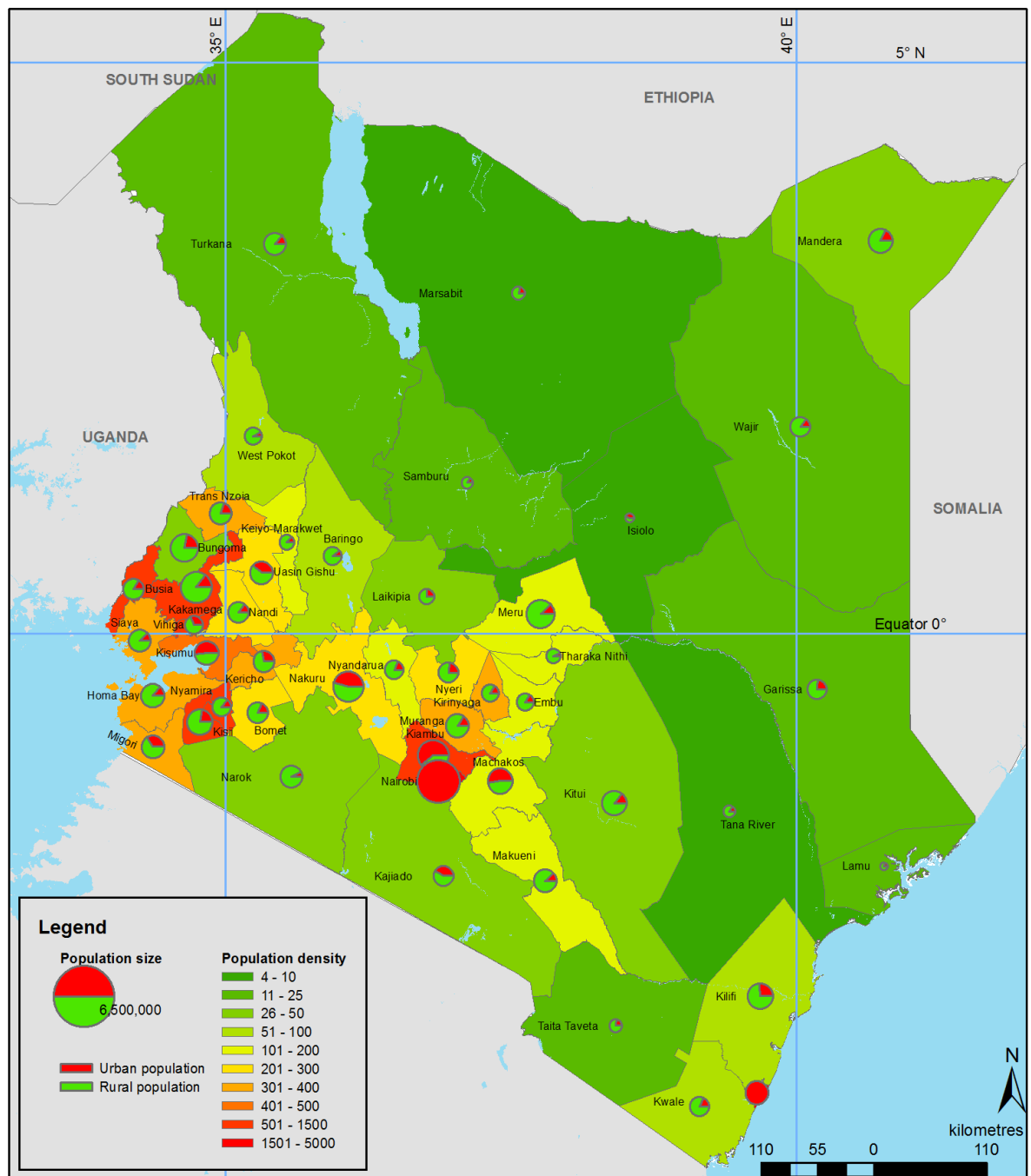
The areas with higher density of settlements follow to a large extent the natural landscape:

- The large arid areas in the north and east and along the border to Tanzania show a low population density.
- The humid areas of the highlands and the coastal regions along the Lake Victoria and the ocean are home to the majority of the population. The density on county level reaches in many areas to several hundred people per square kilometre and beyond. Nairobi and Mombasa had more than 4,000 inhabitants per km² in 2009. Nowadays this exceeds most probably 5,000. For the power system areas, Nairobi is leading with a density of 189 inhabitants per km², ahead of Western area (100), the Coast area (40) and Mount Kenya (31).

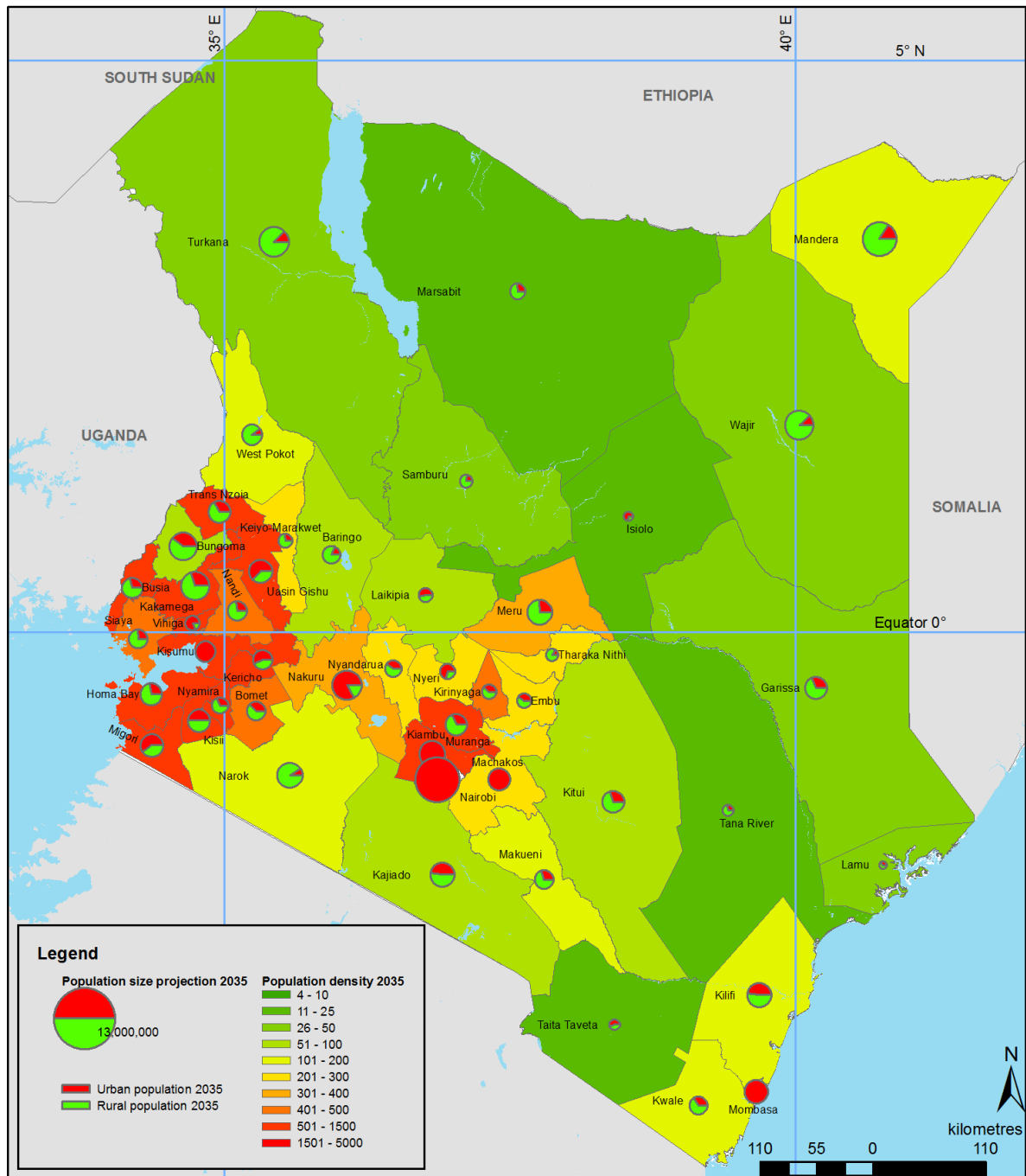
The predicted densities and split into urban and rural population for the year 2035 are displayed in the second map on population densities. In comparison to the first map it indicates:

- Possible future population concentration (probable areas of high demand for electricity, e.g. along the Lake Victoria);
- Possible future areas of origin for the long term migration to urban areas (urbanisation); and
- Areas where a high share of rural population is still expected (which is more difficult to reach).

⁷ Only for Mandera county the growth rates were also adapted downwards to account for the strong impact of the influx of displaced persons in the past.



Annex Figure 4: Map of Kenya – population density and rural/urban share by county (2009)



Annex Figure 5: Map of Kenya – population density and rural / urban share by county (2035, projection)

Annex 3.B.3 Urban and rural population and urbanisation

Urbanisation has a strong effect on the present and future electricity supply, for instance, with regard to costs and possible targets for electrification measures. Due to the high population density, urban areas are – in most cases - easier and less costly to electrify compared to rural areas. This effect is reduced by the household size which tends to be larger in rural areas.

In 2009, about one third of the Kenyan population lived in the urban areas of some 200 settlements of more than 2,000 inhabitants. Compared to other African countries the level of urbanisation in Kenya is low.

Similar to the forecast of the population, no single official and consistent⁸ projection for urbanisation was available for this study. The below figure compares the two available forecasts:

- Vision 2030 population projections 1999 – 2030⁹ (applied in the LCPDP forecasts): high urbanisation rates between 4.5% and 7.4%¹⁰
- UN World Urbanization Prospects - Urban Population at Mid-Year 1950 - 2050 for Kenya¹¹: lower urbanisation rates between 3.8% towards the end of the study period and 4.4% during the next years.¹⁰

The effect of the application of the different urbanisation rate assumptions can be seen in the figure below. Around three million more connections in urban areas (which are easier to access) are predicted with the Vision 2030 forecast (overall urban population share of more than 70% in 2035).

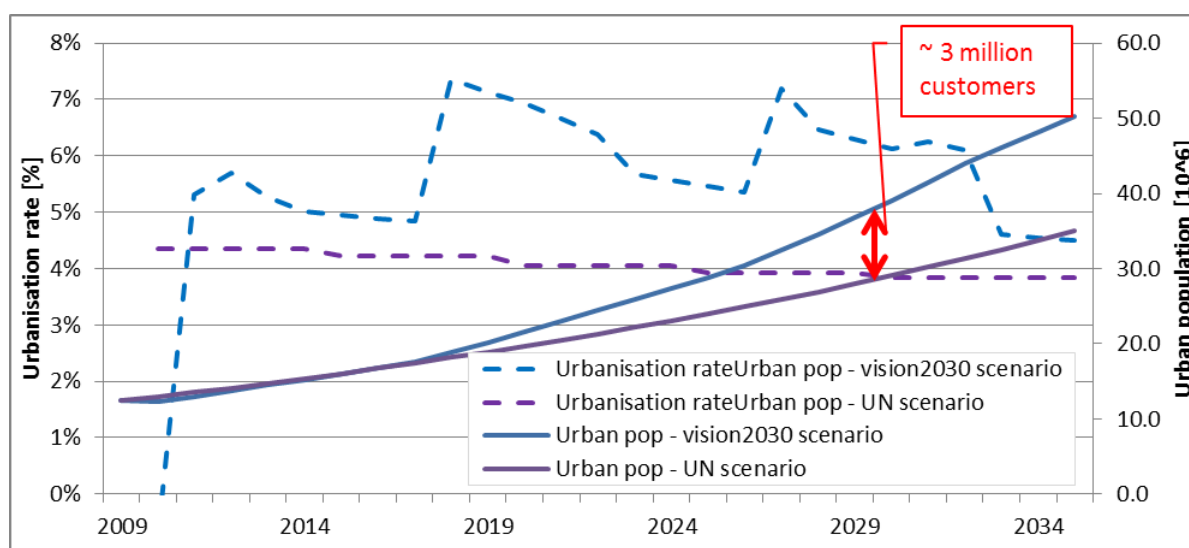
The range of urbanisation by county in 2009 and the prediction for 2035 is shown in the two maps of the previous section. For all counties a decrease of the share of rural population (and for many areas a decrease of total rural population) is expected. However, many counties are still predicted to have a considerable share of rural population in 2035.

⁸ The analysis of past urbanisation trends and the application of suitable predictions for future urbanisation are challenged by some inconsistencies which could not be finally resolved. For instance, for 1999 to 2009 a very high and hardly realistic past urbanisation rate of 8.3% is officially published (GoK and United Nations Population Fund: Kenya Population Situation Analysis, 2013), maybe caused by a change of definition in surveying for urban, peri-urban and rural groups. The Vision 2030 sessional paper of 2012 utilizes a rather old forecast: which is based on 1999 census data and applies an unrealistic stepwise development of urbanisation rates.

⁹ Source: Office of the Prime Minister, Ministry of state for Planning, National Development and Vision 2030: *Vision 2030: Sessional paper No.....of 2012*(2012)

¹⁰ For this study core and peri-urban population are combined since the electrification of peri-urban areas is more similar to urban areas than rural areas. The UN projection only considers core urban population and was therefore adapted accordingly.

¹¹ Source: UN Department for Economic & Social Affairs: *World Urbanization Prospects: The 2011 Revision* (2012).



Annex Figure 6: Urbanisation scenarios – vision 2030 and UN

Annex 3.B.4 Household size

The reduction of the average number of persons per household is a general trend worldwide¹². It has a strong impact on future electrification efforts as more connections will have to be laid for the same number of persons, i.e. it could slow down electrification process if not considered.

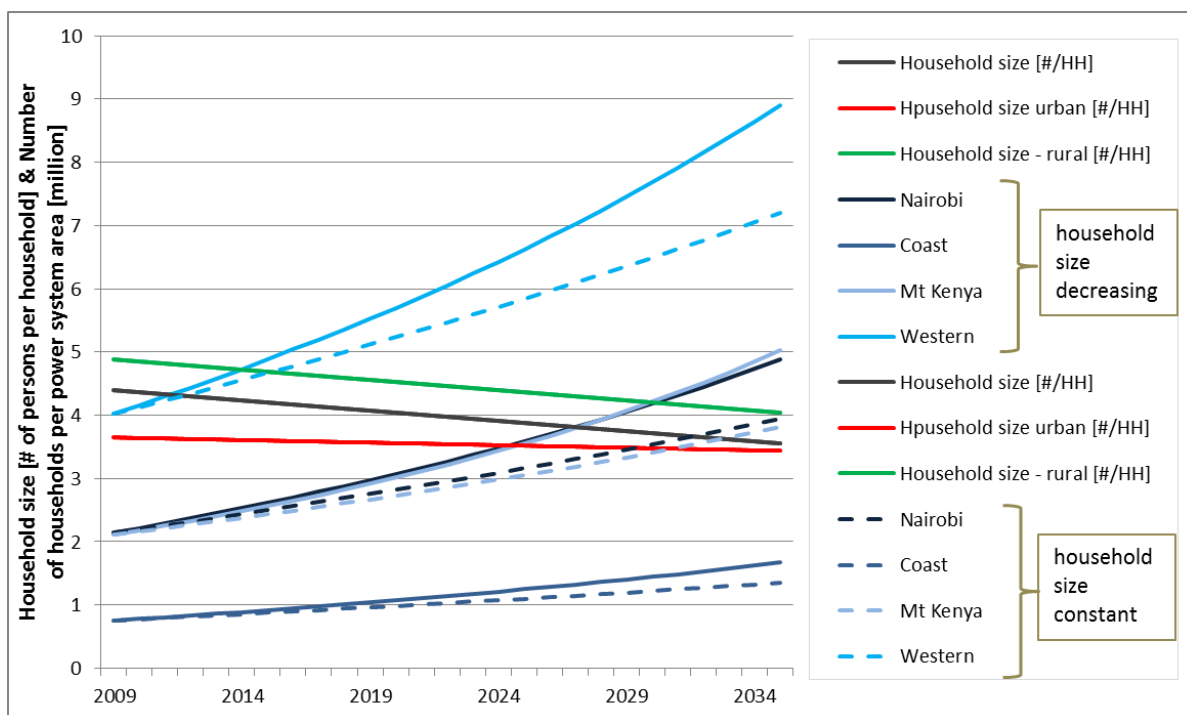
“The needs for household-level services such as connections to the water and electricity networks is likely to be substantially underestimated if governments do not take into account the impact of the demographic transition towards smaller household sizes apart from the impact of population growth”¹³

In Kenya, the average household size reduced from 5.7 in 1969 to 4.5 in 1999 and 4.4 in 2009. No official projection of the household size was available for this study. Therefore, a continuous reduction to 3.6 persons per household in 2035 is assumed. This is mainly based on the historic development in Kenya but it is also in line with the past development in other countries¹¹. For the differentiation of rural and urban households, county level indicative results were calculated.

The figure below shows the assumed decrease of the average household size for all of Kenya (and for the rural and urban population). It further shows the effect of the shrinking household size: for each power system area the projection of the total number of households with decreasing household size and with constant household sizes are compared. The difference adds up to more than four million connections.

¹² Refer for example to: John Bongaarts: *Household Size and Composition in the Developing World* (Population Council, 2001)

¹³Source: Quentin Wodon: *Demographic Transition Towards Smaller Household Sizes and Basic Infrastructure Needs in Developing Countries* (The World Bank, 2007)



Annex Figure 7: Household size (urban/rural/total) and number of households per power system area prediction (2009 – 2035)

Annex 3.B.5 Population forecast results

The prediction by county and power system area is provided in tabularized form below. Please note the indicative character as described above.

Annex Table 4: Forecast total population - UN medium fertility scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)

Population - UN medium fertility scenario																												
[million]		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Kenya- total population		39.8	40.9	42.0	43.2	44.4	45.5	46.7	48.0	49.2	50.4	51.7	52.9	54.2	55.5	56.7	58.1	59.4	60.7	62.1	63.5	64.9	66.3	67.7	69.2	70.7	72.2	73.7
Growth			2.7%	2.7%	2.7%	2.7%	2.7%	2.6%	2.6%	2.5%	2.5%	2.5%	2.4%	2.4%	2.4%	2.3%	2.3%	2.3%	2.3%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.1%	2.1%	2.1%
PS area																												
Nairobi		7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	9.6	9.8	10.0	10.2	10.5	10.7	11.0	11.2	11.5	11.7	12.0	12.2	12.5	12.8	13.1	13.3	13.6	13.9
Coast		3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.8	5.9	6.0	6.1
Mt Kenya		9.7	9.9	10.2	10.5	10.8	11.1	11.4	11.7	12.0	12.4	12.7	13.1	13.4	13.8	14.1	14.5	14.9	15.3	15.7	16.1	16.6	17.0	17.5	17.9	18.4	18.9	19.4
Western		19.1	19.5	20.0	20.6	21.1	21.6	22.2	22.7	23.3	23.8	24.4	25.0	25.5	26.1	26.7	27.3	27.9	28.6	29.2	29.9	30.5	31.2	31.9	32.6	33.3	34.0	34.7
County																												
BARINGO		0.57	0.59	0.61	0.62	0.64	0.66	0.68	0.69	0.71	0.73	0.75	0.77	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.99	1.01	1.03	1.05	1.07
BOMET		0.75	0.76	0.78	0.79	0.81	0.83	0.84	0.86	0.87	0.89	0.91	0.92	0.94	0.96	0.97	0.99	1.01	1.02	1.04	1.06	1.07	1.09	1.11	1.13	1.14	1.16	1.18
BUNGOMA		1.42	1.46	1.50	1.54	1.58	1.62	1.66	1.70	1.74	1.79	1.83	1.87	1.92	1.96	2.01	2.05	2.10	2.14	2.19	2.24	2.29	2.34	2.38	2.43	2.49	2.54	2.59
BUSIA		0.77	0.79	0.81	0.83	0.85	0.87	0.89	0.92	0.94	0.96	0.98	1.00	1.03	1.05	1.07	1.10	1.12	1.15	1.17	1.19	1.22	1.25	1.27	1.30	1.32	1.35	1.38
ELGEYO MARAKWET		0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.47	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.59	0.60	0.61	0.62	0.63	0.64
EMBU		0.53	0.54	0.55	0.55	0.56	0.57	0.57	0.58	0.58	0.59	0.60	0.60	0.61	0.62	0.62	0.63	0.64	0.64	0.65	0.66	0.66	0.67	0.67	0.68	0.69	0.69	0.70
GARISSA		0.64	0.67	0.70	0.72	0.75	0.78	0.81	0.84	0.87	0.91	0.94	0.97	1.01	1.04	1.08	1.12	1.15	1.19	1.23	1.27	1.31	1.35	1.40	1.44	1.49	1.53	1.58
HOMA BAY		0.99	1.02	1.04	1.06	1.08	1.11	1.13	1.15	1.18	1.20	1.22	1.25	1.27	1.29	1.32	1.34	1.37	1.39	1.42	1.44	1.47	1.49	1.52	1.54	1.57	1.59	1.62
ISIOLO		0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29
KAJIADO		0.71	0.74	0.78	0.81	0.85	0.89	0.93	0.97	1.01	1.05	1.09	1.14	1.18	1.23	1.28	1.33	1.38	1.43	1.48	1.54	1.60	1.65	1.71	1.78	1.84	1.90	1.97
KAKAMEGA		1.71	1.75	1.79	1.83	1.87	1.91	1.94	1.98	2.02	2.06	2.10	2.14	2.19	2.23	2.27	2.31	2.35	2.39	2.44	2.48	2.52	2.56	2.61	2.65	2.70	2.74	2.79
KERICHO		0.78	0.80	0.82	0.83	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.98	0.99	1.01	1.03	1.05	1.07	1.09	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.26
KIAMBU		1.67	1.70	1.72	1.74	1.77	1.79	1.81	1.84	1.86	1.88	1.91	1.93	1.95	1.97	2.00	2.02	2.04	2.06	2.09	2.11	2.13	2.16	2.18	2.20	2.23	2.25	2.27
KILIFI		1.14	1.17	1.20	1.24	1.27	1.30	1.33	1.36	1.40	1.43	1.46	1.50	1.53	1.56	1.60	1.63	1.67	1.70	1.74	1.77	1.81	1.85	1.89	1.92	1.96	2.00	2.04
KIRINYAGA		0.54	0.55	0.56	0.57	0.57	0.58	0.59	0.59	0.60	0.61	0.61	0.62	0.63	0.63	0.64	0.65	0.66	0.66	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72	0.72
KISII		1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.71	1.73
KISUMU		1.00	1.02	1.03	1.05	1.07	1.08	1.10	1.12	1.13	1.15	1.17	1.18	1.20	1.22	1.23	1.25	1.27	1.28	1.30	1.32	1.34	1.35	1.37	1.39	1.41	1.42	1.44
KITUI		1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.21	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.48	1.50	1.52	1.54	1.56	1.58
KWALE		0.67	0.69	0.70	0.72	0.74	0.75	0.77	0.79	0.80	0.82	0.84	0.86	0.87	0.89	0.91	0.93	0.95	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14
LAIKIPIA		0.41	0.42	0.43	0.44	0.44	0.45	0.46	0.47	0.48	0.48	0.49	0.50	0.51	0.52	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.58	0.59	0.60	0.61	0.62	0.63
LAMU		0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.20	0.20
MACHAKOS		1.13	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.55	1.57	1.59	1.61	1.63	1.65
MAKUENI		0.91	0.92	0.93	0.95	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.07	1.08	1.09	1.10	1.11	1.12	1.13	1.14	1.15	1.16	1.17	1.18	1.20
MANDERA		1.06	1.12	1.18	1.25	1.32	1.40	1.48	1.56	1.64	1.73	1.82	1.92	2.01	2.11	2.22	2.33	2.44	2.56	2.68	2.80	2.94	3.07	3.21	3.36	3.51	3.67	3.83
MARSABIT		0.30	0.31	0.33	0.34	0.36	0.37	0.39	0.40	0.42	0.44	0.46	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.61	0.64	0.66	0.68	0.71	0.73	0.76	0.78	0.81
MERU		1.40	1.42	1.45	1.48	1.50	1.53	1.56	1.58	1.61	1.64	1.66	1.69	1.72	1.74	1.77	1.80	1.82	1.85	1.88	1.90	1.93	1.96	1.99	2.02	2.05	2.07	2.10
MIGORI		0.95	0.97	1.00	1.03	1.06	1.08	1.11	1.14	1.17	1.20	1.23	1.26	1.29	1.32	1.36	1.39	1.42	1.45	1.49	1.52	1.55	1.59	1.62	1.66	1.69	1.73	1.77
MOMBASA		0.97	1.00	1.03	1.06	1.09	1.12	1.16	1.19	1.22	1.25	1.29	1.32	1.36	1.39	1.43	1.47	1.50	1.54	1.58	1.62	1.66	1.70	1.74	1.78	1.82	1.86	1.90
MURANGA		0.97	0.99	1.01	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.19	1.22	1.24	1.26	1.29	1.31	1.33	1.36	1.38	1.40	1.43	1.45	1.48	1.50	1.53	1.55	1.58
NAIROBI		3.24	3.34	3.46	3.57	3.69	3.81	3.93	4.05	4.18	4.31	4.43	4.56	4.70	4.83	4.97	5.11	5.25	5.39	5.54	5.69	5.84	6.00	6.16	6.32	6.48	6.65	6.81
NAKURU		1.65	1.70	1.74	1.79	1.83	1.88	1.93	1.98	2.02	2.07	2.12	2.17	2														

Annex Table 5: Forecast households - forecast - UN medium fertility scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)

Population - UN medium fertility scenario		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
[million]																												
Kenya- households		9.0	9.4	9.7	10.0	10.4	10.7	11.1	11.5	11.9	12.3	12.7	13.1	13.5	13.9	14.4	14.8	15.3	15.8	16.3	16.8	17.3	17.8	18.4	18.9	19.5	20.1	20.7
	Growth		3.5%	3.5%	3.5%	3.5%	3.5%	3.4%	3.4%	3.3%	3.3%	3.3%	3.2%	3.2%	3.2%	3.2%	3.2%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.0%	3.0%	3.0%
Nairobi		2.1	2.2	2.3	2.4	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.1	4.2	4.3	4.4	4.6	4.7	4.9
Coast		0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7
Mt Kenya		2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.1	4.2	4.4	4.5	4.7	4.8	5.0
Western		4.0	4.2	4.3	4.4	4.6	4.7	4.9	5.0	5.2	5.4	5.5	5.7	5.9	6.1	6.2	6.4	6.6	6.8	7.0	7.2	7.5	7.7	7.9	8.1	8.4	8.6	8.9
BARINGO		0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.26
BOMET		0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.24	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.29
BUNGOMA		0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.50	0.51	0.53	0.54	0.56	0.58	0.59	0.61	0.63
BUSIA		0.16	0.16	0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.35
ELGEYO MARAKWET		0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.16	0.16	0.17
EMBU		0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.21	0.21	0.21	0.22	0.22
GARISSA		0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.22	0.23	0.24	0.25	0.26	0.27	0.29	0.30	0.31
HOMA BAY		0.21	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43
ISIOLO		0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08
KAJIADO		0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.26	0.27	0.28	0.30	0.31	0.33	0.34	0.36	0.38	0.39	0.41	0.43	0.45	0.47	0.49	0.52	0.54	0.56	0.59	0.61
KAKAMEGA		0.37	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.47	0.49	0.50	0.51	0.53	0.54	0.56	0.57	0.59	0.60	0.62	0.63	0.65	0.67	0.68	0.70	0.72	0.74
KERICHO		0.17	0.17	0.17	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.24	0.24	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.33
KIAMBU		0.48	0.49	0.50	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.61	0.62	0.63	0.64	0.66	0.67	0.68	0.70	0.71	0.72	0.74	0.75	0.77	0.78	0.80	0.81
KILIFI		0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.41	0.42	0.43	0.44	0.45
KIRINYAGA		0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26
KISII		0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.44	0.45
KISUMU		0.23	0.24	0.25	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.40	0.41	0.42
KITUI		0.21	0.22	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.40
KWALE		0.13	0.13	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.24	0.24	0.25	0.26	0.26
LAIKIPIA		0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20
LAMU		0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05
MACHAKOS		0.27	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.40	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49
MAKUENI		0.19	0.20	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.30	0.30	0.31	0.31	0.31
MANDERA		0.13	0.14	0.15	0.16	0.18	0.19	0.21	0.22	0.24	0.26	0.28	0.30	0.32	0.35	0.38	0.40	0.43	0.47	0.50	0.54	0.58	0.62	0.67	0.72	0.77	0.83	0.89
MARSABIT		0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.20
MERU		0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.48	0.49	0.50	0.51	0.52	0.53	0.55	0.56	0.57	0.59	0.60	0.61
MIGORI		0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.42	0.43
MOMBASA		0.28	0.29	0.30	0.31	0.32	0.33	0.35	0.36	0.37	0.38	0.40	0.41	0.43	0.44	0.46	0.47	0.49	0.50	0.52	0.54	0.56	0.57	0.59	0.61	0.63	0.65	0.67
MURANGA		0.26	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.47	0.48	0.49	0.50	0.52	0.53
NAIROBI		1.02	1.06	1.10	1.15	1.19	1.24	1.29	1.34	1.39	1.45	1.50	1.56	1.62	1.68	1.74	1.80	1.87	1.94	2.00	2.08	2.15	2.23	2.31	2.39	2.47	2.56	2.65
NAKURU		0.42	0.44	0.45	0.47	0.48	0.50	0.52	0.53	0.55	0.57	0.59	0.60	0.62	0.64	0.66	0.68	0.70	0.72	0.75	0.77	0.79	0.82	0.84	0.86	0.89	0.92	0.94
NANDI		0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.2										

Annex Table 6: Forecast urban households - forecast - UN medium fertility scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)

Population - UN medium fertility scenario																											
[million]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Kenya- urban households	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.1	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.1	7.4	7.7	8.0	8.4	8.7	9.0	9.4	9.8	10.2
Growth		4.6%	4.6%	4.6%	4.6%	4.6%	4.5%	4.5%	4.5%	4.5%	4.5%	4.3%	4.3%	4.3%	4.3%	4.3%	4.2%	4.2%	4.2%	4.2%	4.2%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%
PS area																											
Nairobi	1.6	1.7	1.7	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3	3.5	3.6	3.7	3.8	4.0	4.1	4.2	4.4
Coast	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.1	1.1	1.1
Mt Kenya	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.4
Western	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.2	3.3	3.5	3.6
County																											
BARINGO	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06
BOMET	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07
BUNGOMA	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23
BUSIA	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.10
ELGEYO MARAKWET	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
EMBU	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09
GARISSA	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09
HOMA BAY	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11
ISIOLO	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05
KAJIADO	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.25	0.27	0.28	0.30	0.31
KAKAMEGA	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22
KERICHO	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.20	0.21
KIAMBU	0.31	0.33	0.34	0.36	0.38	0.40	0.41	0.44	0.46	0.48	0.51	0.53	0.56	0.58	0.61	0.64	0.67	0.68	0.70	0.71	0.72	0.74	0.75	0.77	0.78	0.80	0.81
KILIFI	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.24	0.26
KIRINYAGA	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10
KISII	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19	0.20
KISUMU	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.27	0.28	0.30	0.31	0.33	0.34	0.35	0.36	0.37	0.37	0.38
KITUI	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12
KWALE	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10
LAIKIPIA	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.10	0.10
LAMU	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
MACHAKOS	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.25	0.26	0.27	0.28	0.30	0.31	0.33	0.34	0.36	0.38	0.40	0.42	0.43	0.46	0.47	0.48	0.49
MAKUENI	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.09
MANDERA	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08
MARSABIT	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
MERU	0.05	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.15	0.15	0.16	0.17	0.18
MIGORI	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.23
MOMBASA	0.27	0.29	0.30	0.31	0.32	0.33	0.35	0.36	0.37	0.38	0.40	0.41	0.43	0.44	0.46	0.47	0.49	0.50	0.52	0.54	0.56	0.57	0.59	0.61	0.63	0.65	0.67
MURANGA	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15		

Annex Table 7: Forecast total population - LCPDP scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)

Population - LCPDP-scenario [million]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Kenya- total population	38.6	38.5	39.5	40.7	41.8	42.8	43.9	45.0	46.1	47.3	48.5	49.7	50.9	52.0	53.2	54.4	55.6	56.8	58.0	59.3	60.6	61.9	63.3	64.7	66.1	67.6	69.1
Growth		-0.3%	2.6%	3.0%	2.7%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.4%	2.3%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
PS area																											
Nairobi	7.4	7.4	7.6	7.8	8.0	8.2	8.4	8.6	8.8	9.0	9.2	9.4	9.6	9.8	10.1	10.3	10.5	10.7	10.9	11.2	11.4	11.7	11.9	12.2	12.5	12.7	13.0
Coast	3.3	3.3	3.4	3.5	3.6	3.7	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6	5.7
Mt Kenya	9.4	9.4	9.6	9.9	10.2	10.4	10.7	11.0	11.3	11.6	11.9	12.2	12.5	12.9	13.2	13.5	13.9	14.2	14.6	15.0	15.4	15.8	16.2	16.6	17.1	17.6	18.0
Western	18.5	18.4	18.9	19.4	19.9	20.4	20.9	21.3	21.9	22.4	22.9	23.5	24.0	24.5	25.1	25.6	26.2	26.7	27.3	27.9	28.5	29.1	29.8	30.4	31.1	31.8	32.5
County																											
BARINGO	0.56	0.55	0.57	0.59	0.60	0.62	0.63	0.65	0.67	0.68	0.70	0.72	0.74	0.75	0.77	0.79	0.81	0.82	0.84	0.86	0.88	0.90	0.92	0.94	0.96	0.98	1.01
BOMET	0.72	0.72	0.74	0.75	0.77	0.78	0.80	0.81	0.83	0.84	0.86	0.87	0.89	0.90	0.92	0.93	0.95	0.97	0.98	1.00	1.01	1.03	1.05	1.06	1.08	1.10	1.12
BUNGOMA	1.38	1.37	1.41	1.45	1.49	1.52	1.56	1.60	1.64	1.68	1.72	1.76	1.80	1.84	1.88	1.92	1.96	2.01	2.05	2.09	2.14	2.18	2.23	2.28	2.33	2.38	2.43
BUSIA	0.74	0.74	0.76	0.78	0.80	0.82	0.84	0.86	0.88	0.90	0.92	0.95	0.97	0.99	1.01	1.03	1.05	1.07	1.10	1.12	1.14	1.17	1.19	1.21	1.24	1.27	1.29
ELGEYO MARAKWET	0.37	0.37	0.38	0.39	0.40	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59	0.60
EMBU	0.52	0.52	0.52	0.53	0.53	0.54	0.55	0.55	0.56	0.57	0.57	0.58	0.58	0.59	0.60	0.60	0.61	0.61	0.62	0.63	0.63	0.64	0.64	0.65	0.66	0.66	0.67
GARISSA	0.62	0.62	0.64	0.67	0.70	0.73	0.75	0.78	0.81	0.84	0.87	0.90	0.93	0.96	1.00	1.03	1.06	1.10	1.13	1.17	1.21	1.24	1.28	1.33	1.37	1.41	1.46
HOMA BAY	0.96	0.96	0.98	1.01	1.03	1.05	1.07	1.09	1.11	1.13	1.15	1.18	1.20	1.22	1.24	1.27	1.29	1.31	1.33	1.36	1.38	1.40	1.43	1.45	1.48	1.50	1.53
ISIOLO	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.27	0.27
KAJIADO	0.69	0.68	0.71	0.75	0.78	0.82	0.85	0.89	0.92	0.96	1.00	1.04	1.09	1.13	1.17	1.21	1.26	1.30	1.35	1.40	1.45	1.51	1.56	1.62	1.68	1.74	1.81
KAKAMEGA	1.66	1.66	1.69	1.73	1.77	1.80	1.84	1.88	1.91	1.95	1.99	2.03	2.07	2.10	2.14	2.18	2.22	2.25	2.29	2.33	2.37	2.41	2.46	2.50	2.54	2.59	2.63
KERICHO	0.76	0.76	0.77	0.79	0.81	0.82	0.84	0.85	0.87	0.89	0.90	0.92	0.94	0.96	0.97	0.99	1.01	1.02	1.04	1.06	1.08	1.09	1.11	1.13	1.15	1.17	1.19
KIAMBU	1.62	1.62	1.64	1.67	1.69	1.71	1.73	1.75	1.77	1.80	1.82	1.84	1.86	1.88	1.90	1.92	1.94	1.97	1.99	2.01	2.03	2.05	2.08	2.10	2.12	2.14	2.17
KILIFI	1.11	1.11	1.13	1.17	1.20	1.22	1.25	1.28	1.31	1.34	1.37	1.41	1.44	1.47	1.50	1.53	1.56	1.59	1.63	1.66	1.70	1.73	1.77	1.80	1.84	1.88	1.92
KIRINYAGA	0.53	0.53	0.53	0.54	0.55	0.55	0.56	0.57	0.57	0.58	0.59	0.59	0.60	0.61	0.61	0.62	0.62	0.63	0.64	0.64	0.65	0.66	0.66	0.67	0.68	0.68	0.69
KISII	1.15	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.28	1.30	1.32	1.34	1.36	1.38	1.40	1.42	1.44	1.46	1.48	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64
KISUMU	0.97	0.97	0.98	1.00	1.02	1.03	1.05	1.06	1.08	1.09	1.11	1.13	1.14	1.16	1.17	1.19	1.20	1.22	1.23	1.25	1.27	1.28	1.30	1.32	1.33	1.35	1.37
KITUI	1.01	1.01	1.03	1.05	1.07	1.09	1.11	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.26	1.28	1.30	1.32	1.33	1.35	1.37	1.40	1.42	1.44	1.46	1.48	1.50
KWALE	0.65	0.65	0.66	0.68	0.70	0.71	0.73	0.74	0.76	0.77	0.79	0.81	0.82	0.84	0.86	0.87	0.89	0.91	0.92	0.94	0.96	0.98	1.00	1.01	1.03	1.05	1.07
LAIKIPIA	0.40	0.40	0.41	0.41	0.42	0.43	0.44	0.44	0.45	0.46	0.47	0.47	0.48	0.49	0.50	0.50	0.51	0.52	0.53	0.54	0.54	0.55	0.56	0.57	0.58	0.59	0.59
LAMU	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.18	0.19
MACHAKOS	1.10	1.10	1.11	1.13	1.15	1.17	1.19	1.21	1.23	1.24	1.26	1.28	1.30	1.32	1.34	1.36	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.55	1.57
MAKUENI	0.88	0.88	0.89	0.91	0.92	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10	1.11	1.12	1.13	1.14
MANDERA	1.03	1.02	1.08	1.14	1.21	1.27	1.34	1.41	1.49	1.57	1.65	1.74	1.83	1.91	2.00	2.10	2.20	2.30	2.40	2.52	2.63	2.76	2.89	3.02	3.16	3.31	3.46
MARSABIT	0.29	0.29	0.30	0.32	0.33	0.34	0.36	0.37	0.39	0.40	0.42	0.44	0.45	0.47	0.49	0.50	0.52	0.54	0.56	0.58	0.60	0.62	0.65	0.67	0.69	0.72	0.74
MERU	1.36	1.35	1.38	1.40	1.43	1.45	1.48	1.50	1.53	1.55	1.58	1.60	1.63	1.65	1.68	1.70	1.73	1.75	1.78	1.80	1.83	1.85	1.88	1.91	1.94	1.96	1.99
MIGORI	0.92	0.91	0.94	0.97	0.99	1.02	1.05	1.07	1.10	1.13	1.16	1.18	1.21	1.24	1.27	1.30	1.33	1.36	1.39	1.42	1.45	1.48	1.52	1.55	1.58	1.62	1.66
MOMBASA	0.94	0.94	0.96	1.00	1.02	1.05	1.08	1.11	1.14	1.17	1.21	1.24	1.27	1.30	1.34	1.37	1.40	1.43	1.47	1.50	1.54	1.58	1.62	1.66	1.70	1.74	1.78
MURANGA	0.94	0.94	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.11	1.13	1.15	1.17	1.19	1.21	1.23	1.26	1.28	1.30	1.32	1.35	1.37	1.39	1.42	1.44	1.47	1.49
NAIROBI	3.14	3.13	3.23	3.34	3.45	3.56	3.67	3.78	3.89	4.01	4.13	4.26	4.38	4.50	4.63	4.75	4.88	5.01	5.14	5.28	5.42	5.56	5.71	5.86	6.02	6.18	6.34
NAKURU	1.60	1.60	1.64	1.69	1.73	1.77	1.81	1.86	1.90	1.95	1.99	2.04	2.09	2.14	2.18	2.23	2.27	2.32	2.37	2.42	2.47	2.52	2.58	2.63	2.69	2.74	2.80
NANDI	0.75	0.75	0.77	0.79	0.80	0.82	0.84	0.86	0.87	0.89	0.91	0.93	0.95	0.97	0.99	1.00	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.23
NAROK	0.85	0.85	0.88	0.92	0.96	0.99	1.03	1.06	1.10	1.14	1.19	1.23	1.27	1.32	1.36	1.40	1.45	1.50	1.54	1.59	1.65	1.70	1.75	1.81	1.87	1.93	1.99
NYAMIRA	0.60	0.60	0.61	0.62	0.63	0.64	0.65	0.65	0.66	0.67	0.68	0.69	0.70	0.71	0.72	0.73	0.74	0.75	0.76	0.77	0.78	0.79	0.80	0.81	0.82	0.83	0.84
NYANDARUA	0.60	0.60	0.61	0.62	0.63	0.64	0.65	0.66	0.67	0.69	0.70	0.71	0.72	0.73	0.74	0.76	0.77	0.78	0.79	0.80	0.82	0.83	0.84	0.85	0.87	0.88	0.89
NYERI	0.69	0.69	0.70	0.70	0.70	0.70	0.71	0.71	0.71	0.72	0.72	0.72	0.72	0.73	0.73	0.73	0.73	0.74	0.74	0.74	0.74	0.75	0.75	0.75	0.75	0.76	0.76
SAMBURU	0.22	0.22	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.48	0.49	0.51
SIAYA	0.84	0.84	0.85	0.87	0.88	0.89	0.90	0.91	0.92	0.93	0.95	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.04	1.05	1.06	1.07	1.08	1.09	1.11	1.12	1.13
TAITA TAVETA	0.28	0.28	0.29	0.29	0.30	0.30	0.31	0.31	0.31	0.31	0.32	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.34	0.35	0.35	0.35	0.36	0.36	0.36	0.37	0.37
TANA RIVER	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.33	0.34									

Annex Table 8: Forecast households - LCPDP scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)

Population - LCPDP-scenario [million]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Kenya- households	8.8	8.8	9.1	9.5	9.8	10.1	10.4	10.8	11.1	11.5	11.9	12.3	12.7	13.1	13.5	13.9	14.3	14.7	15.2	15.7	16.1	16.6	17.2	17.7	18.2	18.8	19.4
Growth		0.5%	3.4%	3.8%	3.5%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.2%	3.1%	3.0%	3.0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Nairobi	2.1	2.1	2.2	2.2	2.3	2.4	2.5	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.6
Coast	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.6
Mt Kenya	2.1	2.1	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.7	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.7	3.8	3.9	4.1	4.2	4.4	4.5	4.7
Western	3.9	3.9	4.0	4.2	4.3	4.5	4.6	4.7	4.9	5.0	5.2	5.4	5.5	5.7	5.9	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.4	7.6	7.9	8.1	8.4
BARINGO	0.11	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.25
BOMET	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.26	0.27
BUNGOMA	0.27	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.37	0.38	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.49	0.51	0.52	0.54	0.56	0.57	0.59
BUSIA	0.15	0.15	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.32	0.33
ELGEYO MARAKWET	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.16
EMBU	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21
GARISSA	0.10	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.18	0.18	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.29
HOMA BAY	0.21	0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.39	0.40
ISILOLO	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07
KAJIADO	0.17	0.17	0.18	0.19	0.20	0.21	0.22	0.24	0.25	0.26	0.27	0.29	0.30	0.32	0.33	0.34	0.36	0.38	0.39	0.41	0.43	0.45	0.47	0.49	0.52	0.54	0.56
KAKAMEGA	0.36	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.46	0.47	0.49	0.50	0.51	0.52	0.54	0.55	0.57	0.58	0.60	0.61	0.63	0.64	0.66	0.68	0.70
KERICHO	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.30	0.30	0.31
KIAMBU	0.47	0.47	0.48	0.49	0.50	0.51	0.52	0.53	0.54	0.56	0.57	0.58	0.59	0.60	0.61	0.63	0.64	0.65	0.66	0.68	0.69	0.70	0.72	0.73	0.74	0.76	0.77
KILIFI	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.43
KIRINYAGA	0.15	0.16	0.16	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.25
KISII	0.25	0.25	0.25	0.26	0.26	0.27	0.28	0.28	0.29	0.30	0.30	0.31	0.32	0.32	0.33	0.34	0.35	0.35	0.36	0.37	0.38	0.39	0.39	0.40	0.41	0.42	0.43
KISUMU	0.23	0.23	0.23	0.24	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.39	0.40
KITUI	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.27	0.27	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.37	0.38
KWALE	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.22	0.23	0.24	0.24	0.25
LAIKIPIA	0.10	0.10	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19
LAMU	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05
MACHAKOS	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47
MAKUENI	0.19	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30
MANDERA	0.13	0.13	0.14	0.15	0.16	0.17	0.19	0.20	0.22	0.24	0.25	0.27	0.29	0.32	0.34	0.36	0.39	0.42	0.45	0.48	0.52	0.56	0.60	0.64	0.69	0.74	0.80
MARSABIT	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.15	0.16	0.16	0.17	0.18
MERU	0.32	0.32	0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.51	0.52	0.53	0.54	0.55	0.57	0.58
MIGORI	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.36	0.37	0.38	0.39	0.40
MOMBASA	0.27	0.27	0.28	0.29	0.30	0.31	0.32	0.34	0.35	0.36	0.37	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.50	0.52	0.53	0.55	0.57	0.59	0.61	0.63
MURANGA	0.26	0.26	0.26	0.27	0.28	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.49	0.50
NAIROBI	0.99	0.99	1.03	1.07	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.45	1.51	1.56	1.62	1.68	1.73	1.80	1.86	1.93	1.99	2.06	2.14	2.22	2.29	2.38	2.46
NAKURU	0.41	0.41	0.43	0.44	0.46	0.47	0.49	0.50	0.52	0.53	0.55	0.57	0.59	0.60	0.62	0.64	0.66	0.68	0.70	0.72	0.74	0.76	0.79	0.81	0.83	0.86	0.89
NANDI	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.24	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.29	0.30	0.31
NAROK	0.17	0.17	0.18	0.19	0.20	0.20	0.21	0.22	0.23	0.24	0.25	0.27	0.28	0.29	0.30	0.31	0.33	0.34	0.35	0.37	0.38	0.40	0.42	0.43	0.45	0.47	0.49
NYAMIRA	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.16	0.16	0.17	0.17	0.17	0.18	0.18	0.18	0.19	0.19	0.20	0.20	0.20	0.21	0.21	0.22	0.22	0.23
NYANDARUA	0.14	0.14	0.15	0.15	0.16	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.20	0.20	0.21	0.21	0.21	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.27
NYERI	0.20	0.20	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.27
SAMBURU	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.12	0.12	0.13	0.13
SIAYA	0.20	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.24	0.25	0.25	0.26	0.26	0.27	0.27	0.28	0.28	0.29	0.29	0.30	0.31	0.31	0.32	0.32	0.33
TAITA TAVETA	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11
TANA RIVER	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10
THARAKA NITHI	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.14			

Annex Table 9: Forecast urban households - LCPDP scenario - indicatively detailed (along historic developments) for power system areas and counties (2009 - 2035)

Population - LCPDP-scenario [million]	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Kenya- urban households	3.4	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9	5.3	5.6	6.1	6.5	6.9	7.3	7.7	8.2	8.6	9.3	9.9	10.5	11.2	11.9	12.7	13.3	13.9	14.6
Growth		2.2%	5.1%	5.5%	5.1%	4.8%	4.8%	4.8%	4.7%	7.6%	7.4%	7.2%	6.9%	6.6%	5.8%	5.7%	5.6%	5.5%	7.8%	6.7%	6.5%	6.4%	6.5%	6.3%	4.8%	4.7%	4.7%
PS area																											
Nairobi	1.6	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.5	3.6	3.7	3.9	4.0	4.1	4.3	4.5
Coast	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.4
Mt Kenya	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.1	2.2	2.4	2.5	2.6
Western	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.5	1.6	1.8	2.0	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.6	3.9	4.1	4.3	4.6	4.9	5.2	5.4	5.7
County																											
BARINGO	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.11
BOMET	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.11	0.12	0.12	0.13
BUNGOMA	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.12	0.13	0.14	0.16	0.17	0.18	0.19	0.21	0.23	0.26	0.28	0.31	0.34	0.37	0.39	0.42	0.45
BUSIA	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.17	0.18	0.19
ELGEYO MARAKWET	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.07	0.07	0.08
EMBU	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17
GARISSA	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17
HOMA BAY	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.10	0.12	0.13	0.14	0.15	0.17	0.18	0.20	0.21	0.22
ISIOLO	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07
KAJIADO	0.09	0.09	0.10	0.10	0.11	0.12	0.12	0.13	0.14	0.15	0.16	0.18	0.19	0.21	0.23	0.24	0.26	0.28	0.32	0.35	0.38	0.42	0.46	0.46	0.49	0.54	0.56
KAKAMEGA	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.20	0.22	0.24	0.26	0.29	0.32	0.35	0.37	0.40	0.42
KERICHO	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.18	0.19	0.21	0.23	0.25	0.24	0.26	0.28	0.30	0.30	0.31
KIAMBU	0.31	0.32	0.34	0.36	0.39	0.41	0.43	0.45	0.48	0.53	0.57	0.58	0.59	0.60	0.61	0.63	0.64	0.65	0.66	0.68	0.69	0.70	0.72	0.73	0.74	0.76	0.77
KILIFI	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.11	0.12	0.14	0.15	0.16	0.17	0.19	0.20	0.22	0.23	0.26	0.29	0.31	0.34	0.37	0.34	0.36	0.39	0.41
KIRINYAGA	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.17	0.18	0.19
KISII	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.21	0.23	0.25	0.27	0.30	0.33	0.35	0.37	0.39
KISUMU	0.12	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19	0.21	0.23	0.25	0.28	0.29	0.31	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.36	0.37	0.38	0.39	0.40
KITUI	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.20	0.22	0.23
KWALE	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.09	0.10	0.12	0.13	0.14	0.15	0.17	0.18	0.19	0.20
LAIKIPIA	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.19	0.19
LAMU	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03
MACHAKOS	0.15	0.16	0.17	0.18	0.19	0.20	0.21	0.22	0.23	0.26	0.28	0.31	0.33	0.35	0.36	0.37	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47
MAKUENI	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18
MANDERA	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16
MARSABIT	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08
MERU	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.18	0.20	0.22	0.24	0.26	0.29	0.31	0.33	0.35
MIGORI	0.07	0.07	0.07	0.08	0.08	0.09	0.09	0.10	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.20	0.21	0.24	0.26	0.29	0.31	0.34	0.34	0.35	0.36	0.37
MOMBASA	0.27	0.27	0.28	0.29	0.30	0.31	0.32	0.34	0.35	0.36	0.37	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.50	0.52	0.53	0.55	0.57	0.59	0.61	0.63
MURANGA	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.12	0.13	0.14	0.15	0.17	0.19	0.20	0.22	0.25	0.27	0.29	0.31	0.33
NAIROBI	0.99	0.99	1.03	1.07	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.45	1.51	1.56	1.62	1.68	1.73	1.80	1.86	1.93	1.99	2.06	2.14	2.22	2.29	2.38	2.46
NAKURU	0.21	0.22	0.24	0.25	0.27	0.28	0.30	0.31	0.33	0.37	0.40	0.44	0.48	0.52	0.55	0.60	0.64	0.67	0.70	0.72	0.74	0.76	0.79	0.81	0.83	0.86	0.89
NANDI	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16
NAROK	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	0.11
NYAMIRA	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14
NYANDARUA	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.19	0.20
NYERI	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.18	0.20	0.22	0.24	0.26	0.26	0.26	0.27	0.27	0.27
SAMBURU	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06
SIAYA	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.14	0.15
TAITA TAVETA	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.11	0.11
TANA RIVER	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05

Annex 3.C Economic and socio-economic overview of Kenya

This chapter summarizes the economic frame conditions of Kenya with regard to power system planning, in particular demand forecasting. There is a correlation between electricity consumption and economic growth making a thorough analysis of the economy necessary to support demand forecasting.

Annex 3.C.1 Economic system

Kenya is a market economy. It consists of a liberalised external trade framework and rather market-friendly policies. Compared to other developing countries, there is strong private sector participation, with both local and international companies. The Kenyan economy plays an important role for the regional economy (e.g. within the EAC) due to its size and, among other reasons, its private sector and its human capital.

The state of affairs is represented by governmental planning and regulation as well as parastatal (fully or partially state-owned) enterprises. The latter are mainly in the infrastructure sector (including power sector, see section 3.1.2.3) but also, for instance, in agriculture. This allows the implementation of government measures as well as the channelling of official development assistance (ODA) of the large donor community (see section 3.1.2). In the power sector this is done for instance through the transmission system operator KETRACO and the Rural Electrification Agency (REA).

This economic framework has brought continuous economic growth to the country in the past and facilitated the advancement in some sectors such as the technically and economically advantageous mobile communications networks. Other factors such as the mostly stable political environment and the favourable geographic location have contributed to this development as well.

However, various challenges persist. Some of these are as follows:

- Despite the market-friendly policies there are various obstacles for the private sector. Kenya is ranked 136 (out of 189 countries) in the World Bank Doing Business 2015¹⁴. This is only slightly above Sub-Saharan Africa average (142) and has barely changed in the past years. Particularly challenging areas are “Starting Business” (143), “Trading Across Borders” (153), and “Getting Electricity” (151), the latter showing a direct link to this study. Corruption in Kenya is severe as shown in the Corruption Perception Index (CPI) of Transparency International¹⁵. Kenya is ranked 145 among 174 countries with only 13 African countries ranked lower¹⁶ and is itself ranked lower than in previous years. Despite various past and on-going measures to fight corruption, it still has a strong negative effect on the private sector development and the everyday life of the population. This may probably also effect the planning and project implementation in the power sector in terms of efficiency and effectivity

¹⁴ Source: World Bank, *Doing Business 2015* (2014) www.doingbusiness.org (accessed 1.5.2015)

¹⁵ Source: Transparency International, *Corruption Perception Index 2014* (2014) www.transparency.de/Corruption-Perceptions-Index.2164.0.html (accessed 1.6.2015)

¹⁶ In the region only Burundi, Eritrea, Sudan, South Sudan, and Somalia rank lower

due to the number of private and public stakeholders involved and the large amount of private, public and donated money.

- Despite the strong economy, poverty and inequality have persisted or even increased in Kenya in the past (detailed at the end of this chapter). This means that the positive economic development has not benefited all of the population as it could have been imagined.

Since 2006, the economic but also social and political frameworks are influenced by Kenya Vision 2030: the development programme of the Government of Kenya for the period 2008 to 2030. The programme's objective is

*"...to create a globally competitive and prosperous nation with a high quality of life by 2030, that aims to transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment."*¹⁷

In addition to economic growth, Vision 2030 also covers social (e.g. poverty, education, health, gender) and political issues (highlighting democratic principles such as rule of law, transparency and accountability).

Annex 3.C.2 Gross domestic product – historic development

Kenya is categorized as a lower middle income country¹⁸ since the revised national accounts¹⁹ were introduced in 2014 to calculate the gross domestic product (GDP). With the previous calculation methodology it was categorized as a low income country.

The economy in Kenya has experienced a long period of growth during the past decades with GDP growth rates averaging at 5%¹⁹ between 2006 and 2014 and 3 to 4%²⁰ since 1990 and 2002 respectively, hence showing a trend towards growing growth rates. Growth in 2015 was 5.6%²¹, following 5.3% in 2014 and 5.7% in 2013. The figure below shows the annual growth figures of the past 40 years. While growth rates beyond 5% are quite frequent (occurring in 50% of the years); growth rates beyond 7% have only happened in 20% of the years.

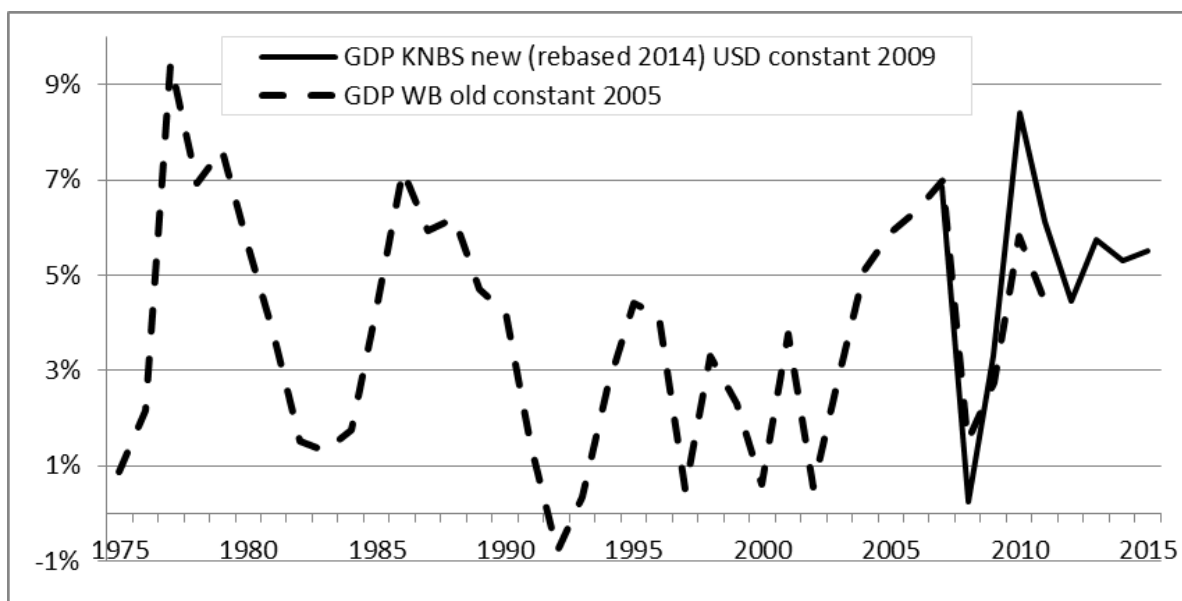
¹⁷ Source: GoK, *Kenya Vision 2030, The Popular Version* (2007)

¹⁸ According to the World Bank categorisation (low income country: less than USD 1,046; lower middle income country: USD 1,046 to USD 4,125 Gross National Income per capita). As of May 2015 the World Bank still lists Kenya as a low income country. Source: The World Bank, *Data - Country and Lending Groups* (2015) <http://data.worldbank.org/about/country-and-lending-groups> (accessed 25.5.2015)

¹⁹ Source: KNBS, *Information on the Revised National Accounts* (2014); Note: source for all data on the economy if not mentioned otherwise: Kenya National Bureau of Statistics (KNBS); GDP data before 2006 not based on revised national accounts; GDP growth 2006 – 2013 without revised accounts: 4.37%

²⁰ Source: The World Bank, *World Development Indicators* (2014) <http://data.worldbank.org/country/kenya> (accessed 1.10.2014), Note: GDP data before 2006 not based on revised national accounts

²¹ Source: KNBS, *Economic Survey 2016* (2016)



Annex Figure 8: GDP annual growth (1975 –2015)

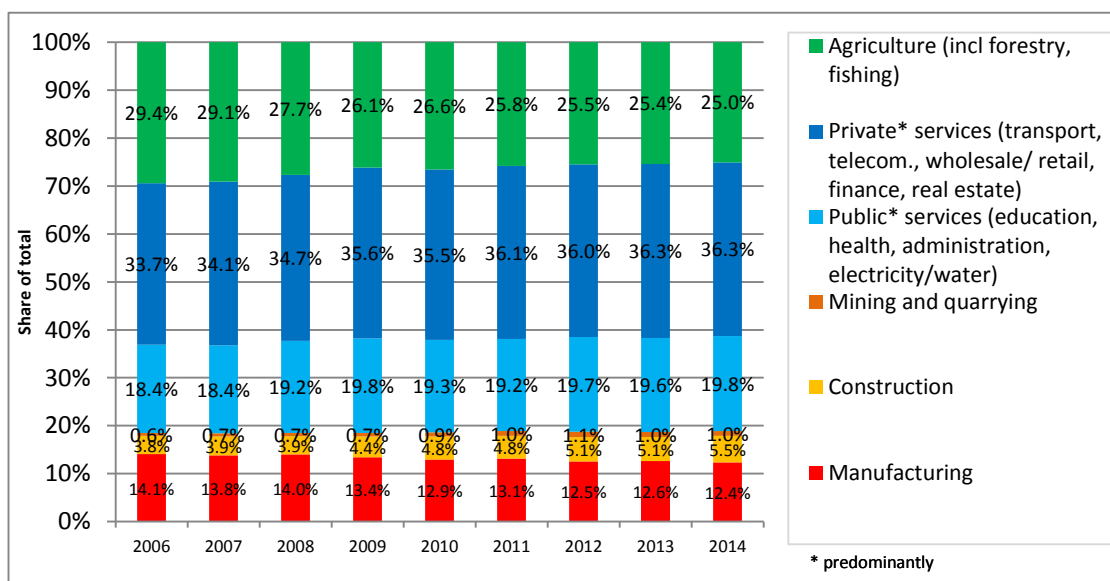
Annex 3.C.3 Gross domestic product – source by economic activity

Kenyan's GDP²² is driven and dominated by the service sector (public and private) which has contributed 56% to the GDP in 2014, constantly growing over time from 52% in 2006. The share of services predominantly delivered by the government (administration, education, health, electricity and water)²³ has been around 19% throughout the years. The remaining rather private services (e.g. transport, telecommunication, wholesale/retail, finance, real estate) contributed 36% to the GDP in 2014; growing from 34% in 2006. The agricultural sector contributed 25% in 2014, down from 29% in 2006. The contribution of manufacturing, and mining kept stable at 18-19%. While contribution of construction and mining increased above average (from 0.6% to 1% and 3.8% to 5.4% respectively) the contribution of manufacturing decreased by nearly two percentage points (from 14.1% in 2006 to 12.4% in 2014). This development (sometimes called "premature deindustrialisation") can be seen in many African countries where manufacturing is not growing in a similar way as in other developing and emerging countries. It has an effect on the creation of new jobs and also on energy consumption. The growing service sector does not provide the same employment opportunity as factories do and also needs less energy. The latter is important to consider for the demand forecast of the commercial and industrial consumers.

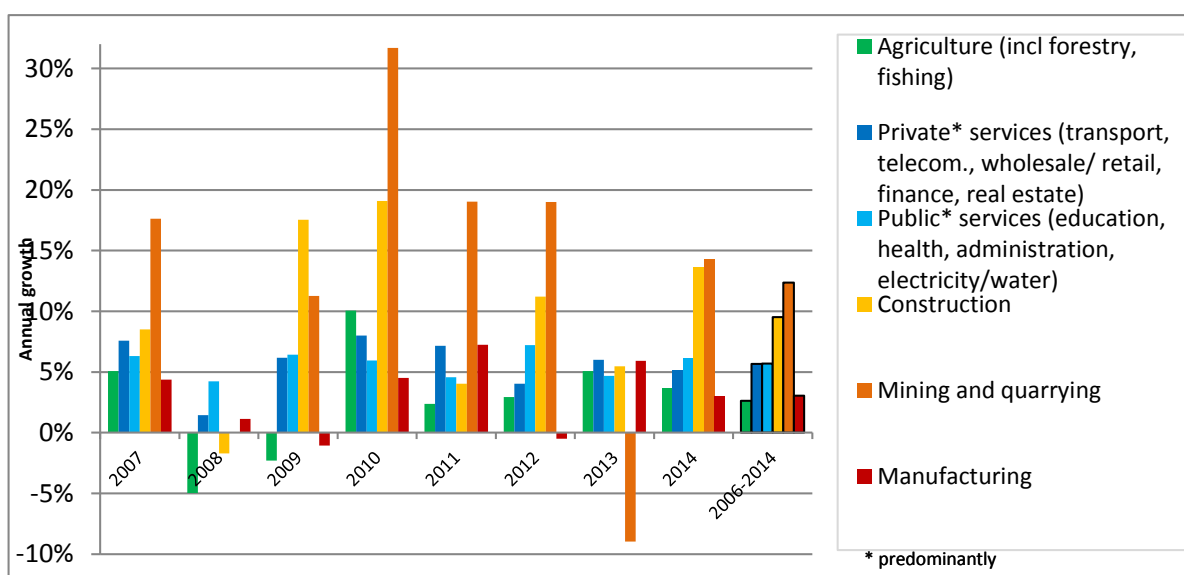
The figures below visualise this increasing economic dominance of (mainly private) services, decreasing importance of agriculture and decreasing share of manufacturing. Available figures for the first two quarters of 2015 indicate a continuation of this development.

²² Source: KNBS, *Information on the Revised National Accounts* (2014)

²³ Position „Taxes on products“ has been excluded for the analysis.



Annex Figure 9: GDP share by activity (2006 – 2014)



Annex Figure 10: GDP growth by activity (2006 – 2014)

Annex 3.C.4 Gross domestic product – predictions/targets

The future growth of the Kenyan economy is difficult to predict amid the uncertain development of the world economy and the security situation in Kenya. Both already had a downward effect on the economy.

In light of these developments, the following targets and predictions for the GDP growth are considered and adapted as appropriate:

- The Vision 2030 aims at achieving a long term GDP growth of at least²⁴ 10% per year. This target - initially set for 2012 – has not been achieved yet. It is also unlikely to be achieved in the near future as the frame conditions (e.g. of the world economy and situation in Kenya) today are very different from the years when Vision 2030 was developed. The most recent official document²⁵ on when the targeted growth could be reached states 2017. However, the forecasted values in this document for 2013 and 2014 exceed the actually achieved GDP growth rates by 0.4% and 1.9%, respectively. The forecasted 8.7% growth in 2015 is unlikely. Therefore, for the below comparison of different predictions, a linear annual increase of the GDP growth rate to 10% growth in 2020 at the earliest (depending on the implementation of flagship projects, see next bullet point) is assumed²⁶.

The 10% GDP growth by Vision 2030²⁷ is phrased as a policy objective or target and not as a forecast. It is based on various general policies²⁷ but also actual projects, so called flagship²⁸ projects. It is stated as an ambitious goal²⁹. The fact that the growth figure has not been achieved underlines this. This delay might have been caused by a delay of the essential flagship projects which should contribute a considerable part to this growth. No complete information on the expected GDP contribution by flagship project was available, except for the contribution of 2 to 3% by the LAPSET project³⁰. Since this is by far largest project with regards to the expected effect on the economy, it is assumed that total flagship contribution is not more than 4%, hence leaving around 6% to 7% to the remaining (or organic) growth which is close to the growth figures Kenya has experienced in the past (though not for a longer period or on average). Hence, GDP growth is split into flagship related and organic growth. Of course the reality with causalities and feedback loops is more complicated but this description is in line with the general description of the target and

²⁴ Vision 2030 documents state „at least 10%“ and „average of 10%“. In this study the „average of 10%“ is applied on an annual basis because it is the only exact figure of the statements.

²⁵ Source: GoK, *Kenya Vision 2030, Second Medium Term Plan, 2013 – 2017* (2013)

²⁶ This assumption is made for the sake of completeness of data and does not represent a sound standing prediction. By accident this average increase in percentage points would be similar to the development between 2009 and 2013.

²⁷ *“Under Vision 2030, Kenya aims to increase annual GDP growth rates to an average of 10% over the vision horizon. This is an ambitious goal and the Government is aware of that. [...] If this goal is achieved, Kenya will be the 5th country in the world to achieve such a high level of sustained economic growth. Considering that the current economic growth of 6.1% has come primarily through rapid utilisation of existing capacity, rather than efficiency gains or new investments, achieving the 10% growth will require a dedicated campaign to alleviate existing constraints to future growth, and in particular to use our resources more efficiently. To achieve that ambition, Kenya must continue with the tradition of macro-economic stability that has been established since 2002. It must also address other key constraints, notably, a low savings to GDP ratio, which could be alleviated by drawing in more remittances from Kenyans abroad, as well as increased foreign investment and overseas development assistance (ODA), as spelt out under the Kenya Joint-Assistance Strategy between the country and her international development partners.”* GoK, *Kenya Vision 2030, The Popular Version* (2007)

²⁸ *“The strategies to deliver the 10% annual growth by 2012 will be executed through concrete flagship projects across the priority sectors in all the three pillars of the Vision.”* GoK, *Kenya Vision 2030, The Popular Version* (2007)

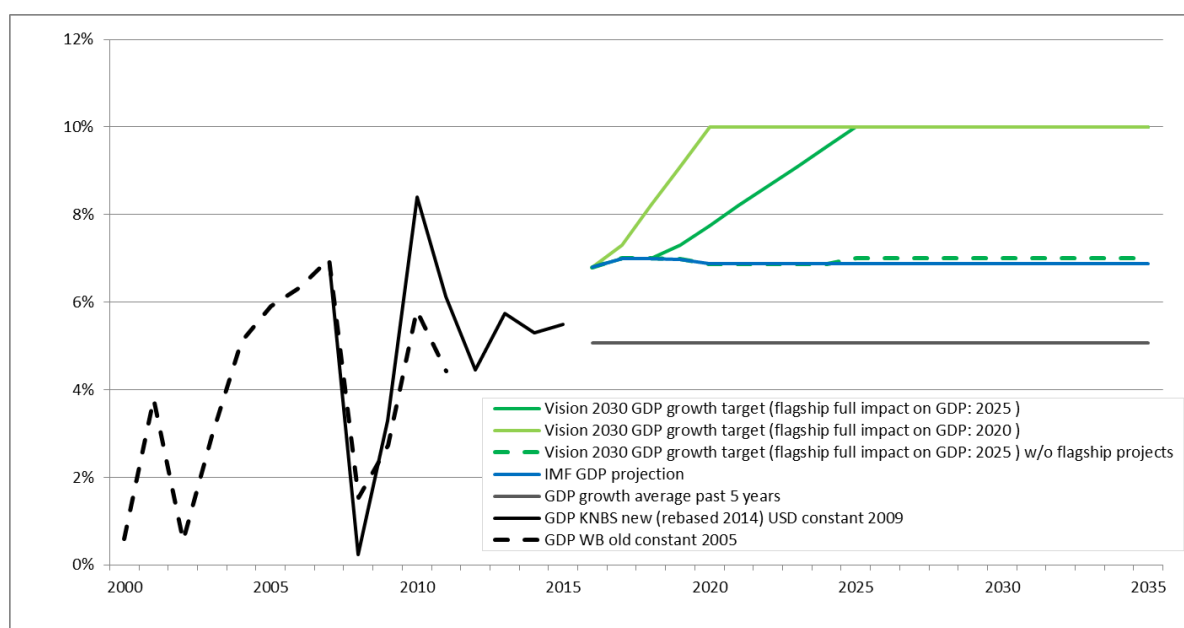
²⁹ See footnote 27. The statement which four other countries have maintained a GDP growth of at least 10% for a 23 year period could not be verified.

³⁰ *“Feasibility studies have shown that if Implemented, the LAPSET Corridor Project, will inject a growth value of approximately 2% to 3% of GDP into the economy”* LAPSET Corridor Project Coordination Secretariat (LAPSET), *Corridor Project Ppt* (2012)

provides a suitable consideration of flagship projects in the demand forecast. Flagship projects are detailed in Annex 4.E. Two scenarios for their implementation are provided: base and high with assumed full impact on GDP (i.e. GDP growth at 10%) in 2025 and 2020, respectively.

- The International Monetary Fund (IMF) provides a GDP projection for the years 2016 (6.8%) to 2020 (6.9%). Beyond 2020 the 2020 value is applied.
- Average historic growth rates provide a possible projection for comparison purpose. In the figure below, the historic average for 2006 to 2015 (5.1%) is shown.

As detailed before, the growth rate target of Vision 2030 was set up in frame conditions which differ from today. Since the current and possible future frame conditions may have changed towards not so favourable conditions (e.g. with regard to the security), the consideration of the application of alternative lower and delayed growth rate scenarios is advisable. Below the different GDP growth projections and targets as applied in the demand forecast are provided.



Annex Figure 11: GDP annual growth - historic (2000 – 2015) and projections / targets (2016 – 2035)

Annex 3.C.5 Socio-economics

Around 45%³¹ of the population in Kenya lives below the poverty line. The absolute numbers of the poor have probably even increased during the past decades (e.g. three million between 1997 and 2006). In the Human Development Index (HDI)³² – a general indicator for development consisting of the Gross Domestic Product, life expectancy and education – the UN ranks Kenya 147 out of 187 countries. This is ahead of most (34) of all African countries and all countries in East Africa. However, a strong inequality among the population persists, with a situation worse than in many other African countries. The inequality also exists with regards to access to electricity, i.e. the low electrification ratio (or connectivity level) of the population.

Numerous studies, surveys and respective data exist³³ with regard to poverty and inequality in Kenya, though only in part suitable for this study since data on income development differentiating between all income levels, urban/rural population and geographic areas is not available. The available data is difficult to combine³⁴. Furthermore, there are no assumptions and forecasts on the development of income groups. This data situation limits the utilization of socio-economic factors in the electricity demand forecast.

³¹ Source: KNBS, *Economic Survey 2014* (2014); GoK and United Nations Population Fund, *Kenya Population Situation Analysis* (2013)

³² Source: UNDP, *Human Development Report 2014* (2014)

³³ e.g. KNBS Kenya Integrated Household Budget Survey (KIBHS) 2006; Kenya Demographic and Health Survey 2008/09

³⁴ This is for instance: the definition of income groups exists only for Nairobi area. If provided at all the split into income groups is provided only in quintiles or percentiles limiting the analysis of social mobility. The Nairobi household survey derives income groups indirectly from consumption which is not considered a solid basis to be applied for the whole country.

Annex 3.D Electricity demand statistics

Below tables, figures, and maps support the analysis of electricity demand patterns of chapter 3.2. Definitions for the terms used are provided in section 4.1.4. All data derive from KPLC annual reports³⁵ unless otherwise stated. Sources of GDP figures are provided in Annex 3.C.

³⁵ All figures provided for calendar years: connections according to KPLC annual accounts end of financial years (i.e. mid of calendar years), consumption (electricity) per calendar year derived from KPLC annual accounts financial years, 2015 figures extrapolated

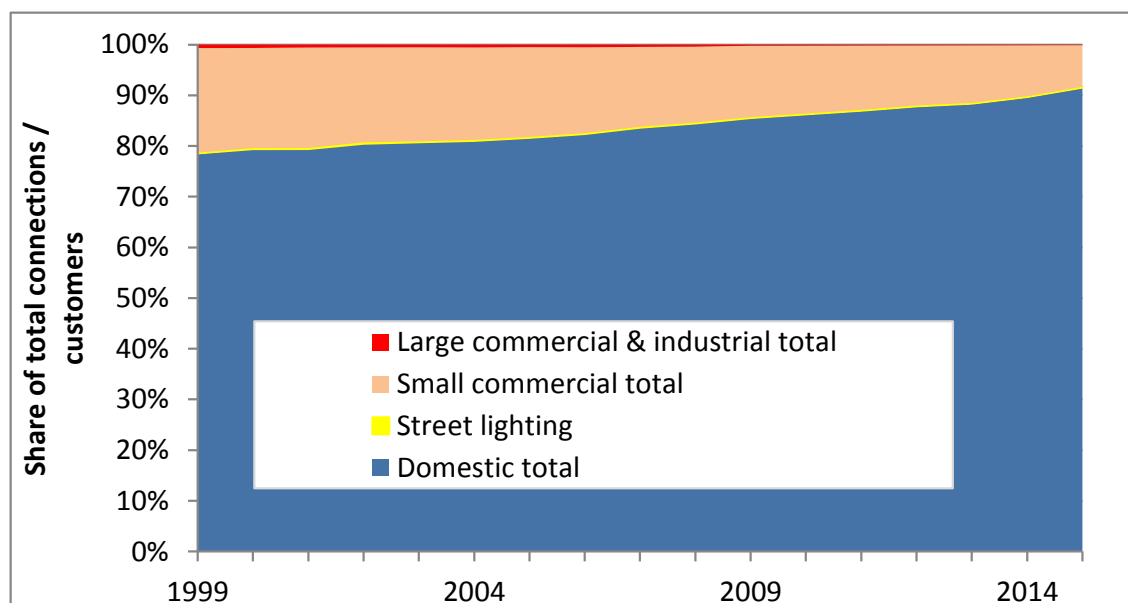
Annex 3.D.1 Customer / tariff groups

Annex Table 10: Customer / tariff groups

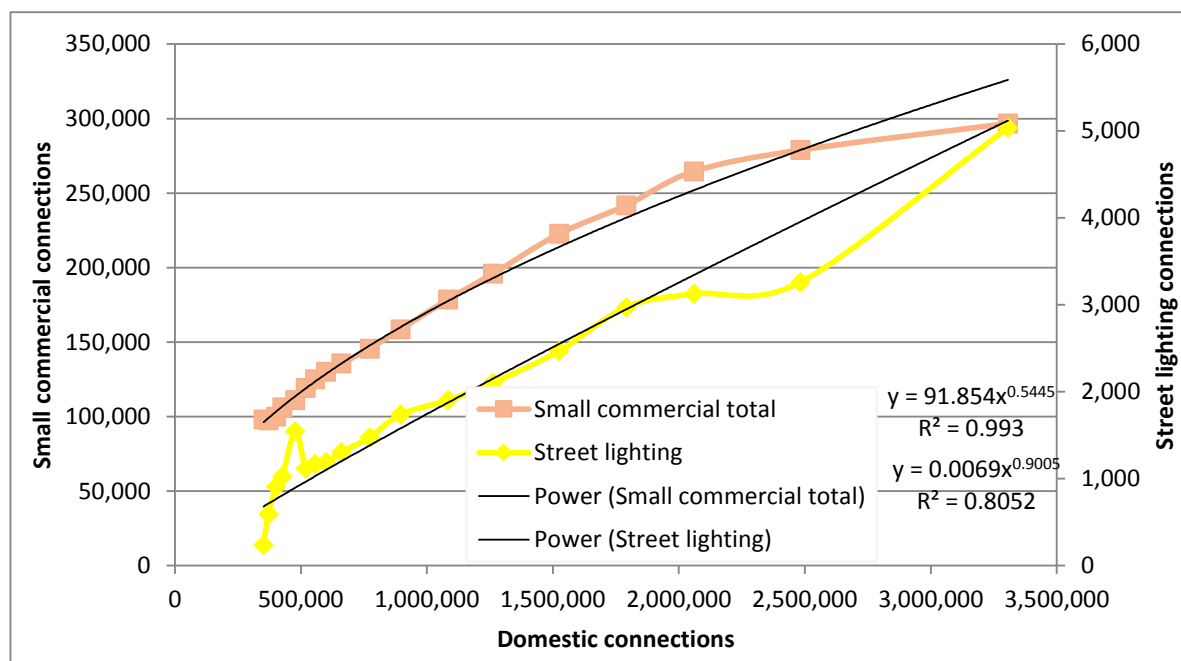
Tariff group			Comment	Voltage level (for allocation of losses)	Years (validity of tariff)	Customer group as considered in Master Plan
Name	Abbreviation [old]	Customer type ³⁶				
Domestic consumers	DC [A0]	KPLC & REP	Largest customer group, energy charge depending on consumption	LV (240,415 V)	Whole period	Domestic
	DC & IT	KPLC & REP	Combination DC & IT	LV (240,415 V)	Whole period	Domestic
Interruptible off-peak consumers	IT	KPLC & REP	Negligible group (< 0.1% of connections)	LV (240,415 V)	Whole period	Domestic
Small commercial consumers	SC [A1]	KPLC & REP		LV (240,415 V)	Whole period	Small commercial
	SC & IT	KPLC & REP	Combination DC & IT	LV (240,415 V)		Small commercial
Large commercial and industrial consumers	CI1	KPLC & REP		LV (415 V)	Whole period	Large commercial and industrial LV
	CI2	KPLC		MV (11 kV)	Whole period	Large commercial and industrial MV
	CI3	KPLC		MV (33 kV)	Whole period	Large commercial and industrial MV
	CI4	KPLC		HV (66 kV)	2006 - today	Large commercial and industrial HV
	CI5	KPLC		HV (132 kV)	2000 - today	Large commercial and industrial HV
Irrigation Load	B0	KPLC & REP	Phased out tariff	LV		Large commercial and industrial LV
Medium commercial and industrial consumers	B1	KPLC & REP	Phased out tariff	LV (240,415 V)	Until 2009	Large commercial and industrial LV
	B2	KPLC	Phased out tariff	MV	Until 2009	Large commercial and industrial MV
	B3	KPLC	Phased out tariff	HV	Until 2009	Large commercial and industrial HV
Street lighting	SL [E0]	KPLC & REP	Small group	LV	Whole period	Street lighting

³⁶ Customers can be connected under the normal (commercial) scheme of KPLC and the (subsidized) Rural Electrification Programme (REP) scheme. The latter subsidizes the extension of the distribution network and the connection of rural consumers. Electricity supply and network maintenance etc. is provided by KPLC for both schemes.

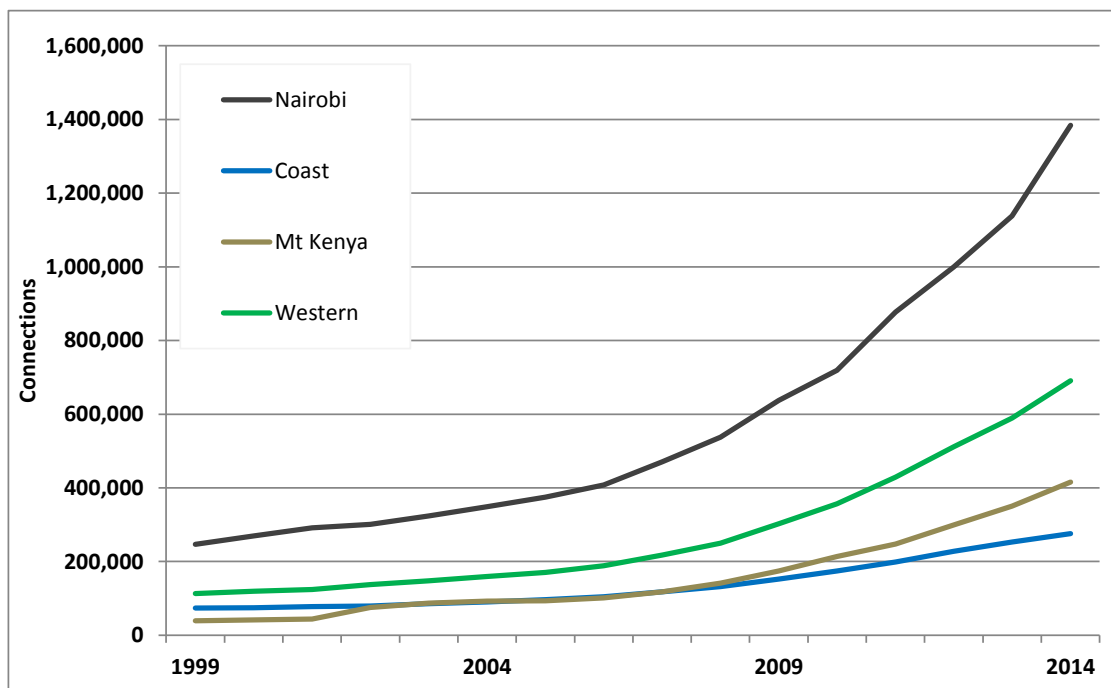
Annex 3.D.2 Connectivity level and connections by consumer groups and area



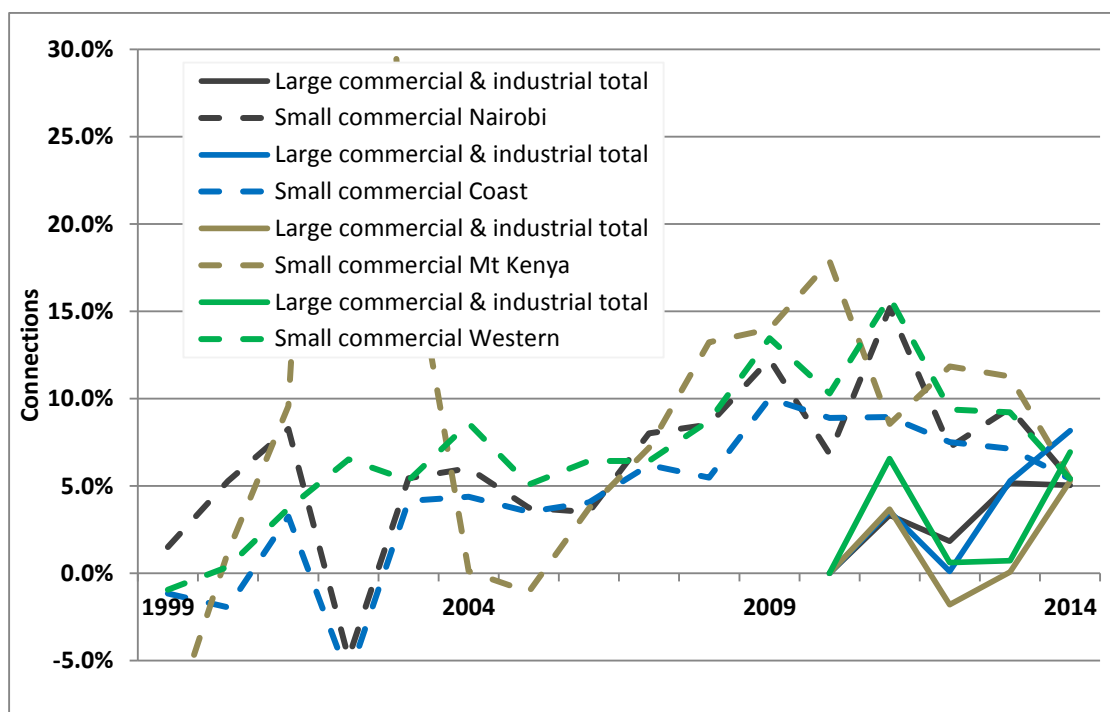
Annex Figure 12: Share of connections by customer group (1999 - 2015)



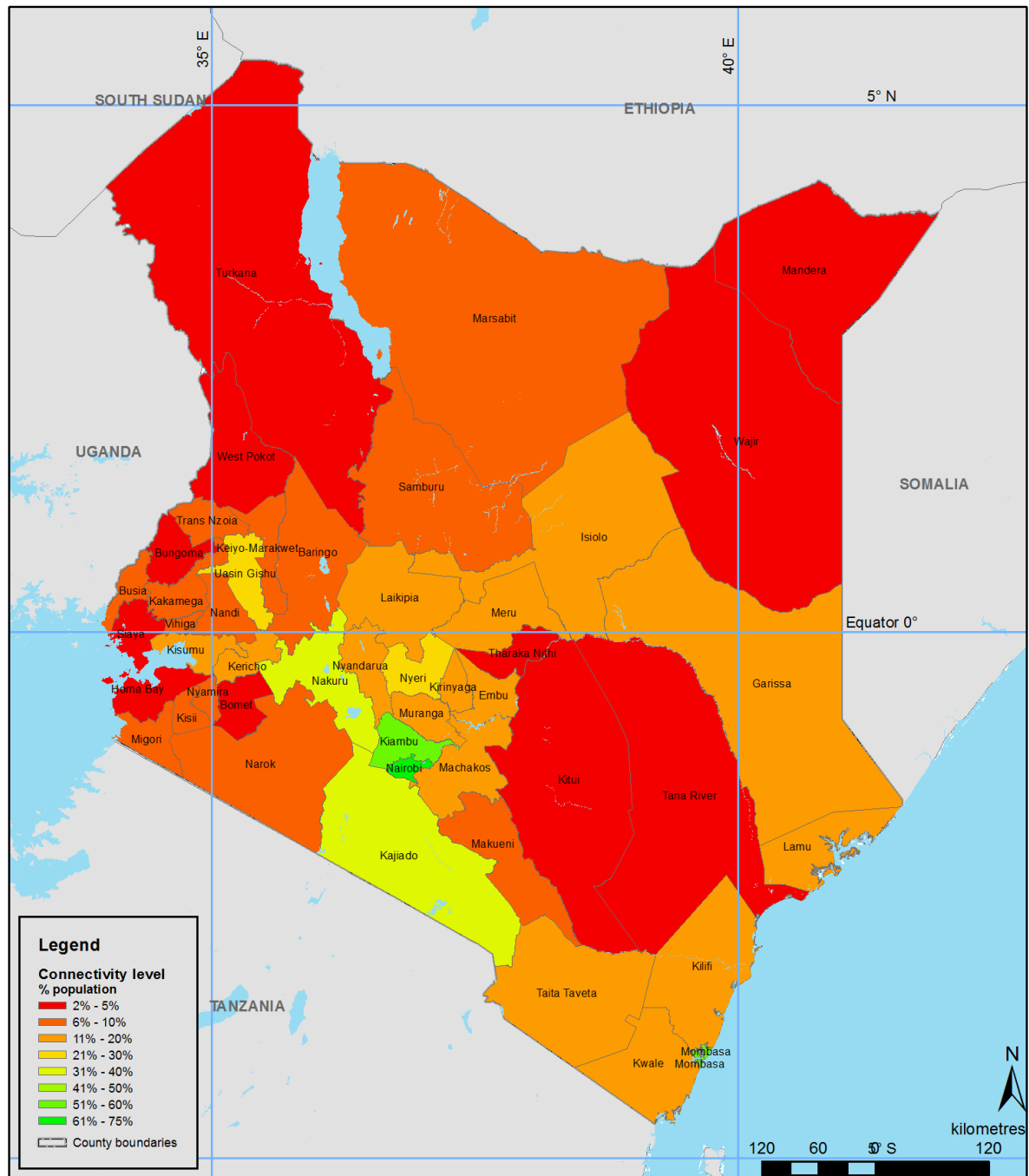
Annex Figure 13: Correlation of domestic connections with street lighting and commercial connections (1998 – 2015)



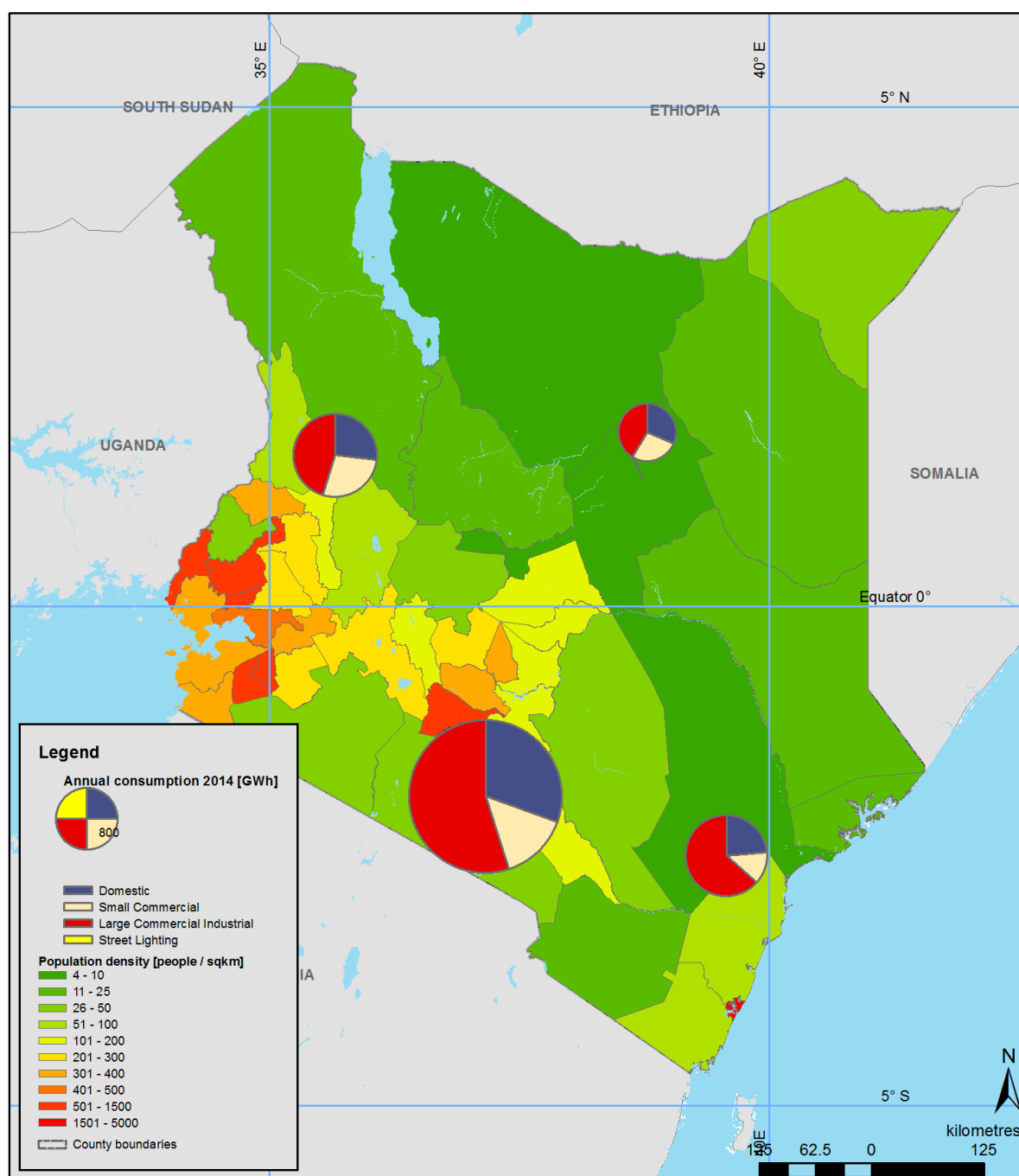
Annex Figure 14: Total number of customers by power system area (1999 - 2014)



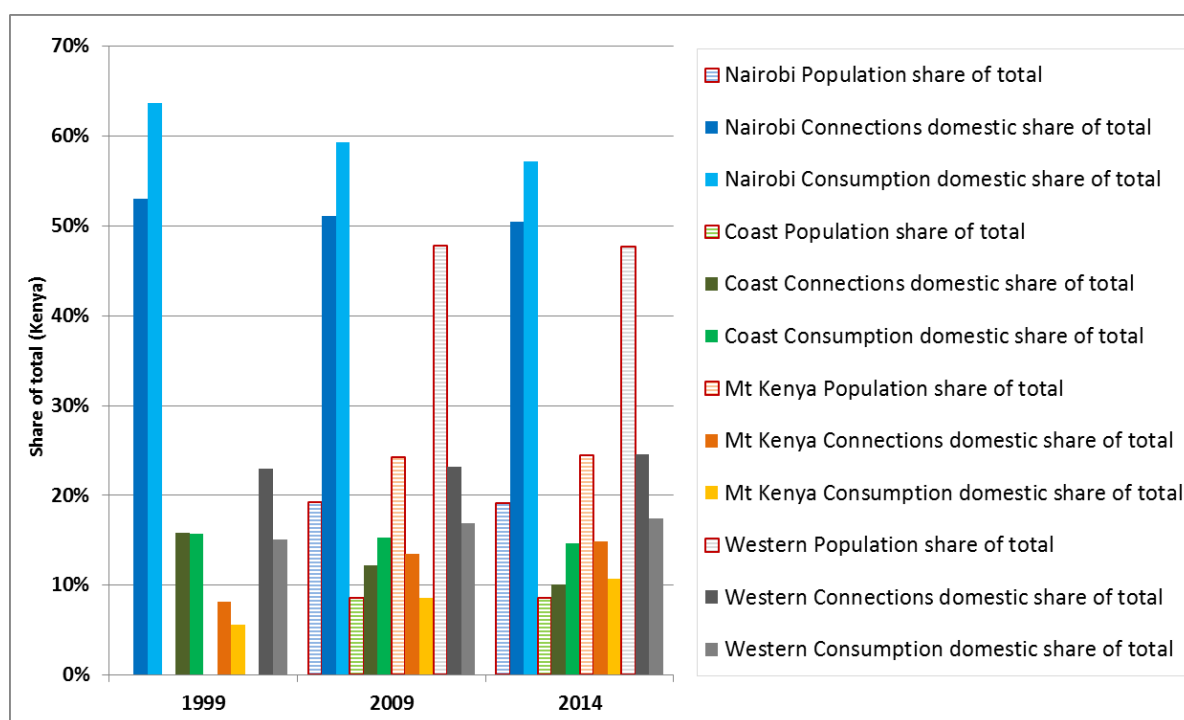
Annex Figure 15: Connection growth for commercial/industrial customers by power system area (1999 - 2014)



Annex Figure 16: Map of Kenya – connectivity level by county (2009)



Annex Figure 17: Map of Kenya - consumption by power system area and consumer group (2014) and population density (1999)



Annex Figure 18: Population, domestic connections and consumption by power system area (1999, 2009, and 2014)³⁷

Annex Table 11: Population, connections, consumption by power system area (2008/2009 – 2014/2014)³⁸

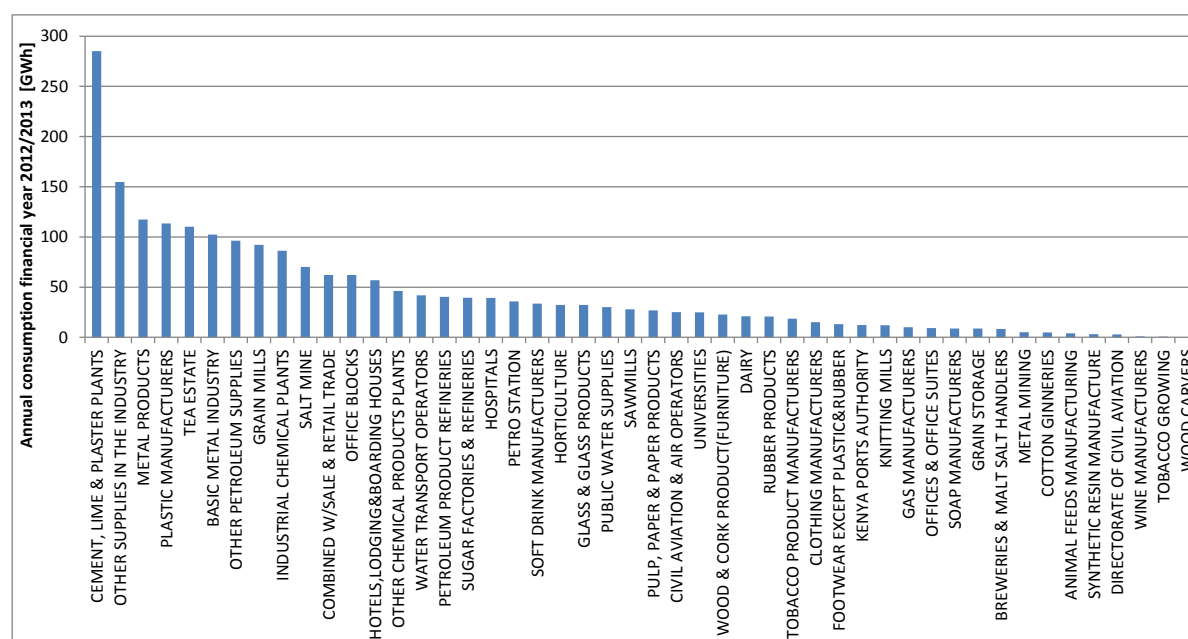
PS area		Unit	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	Change 2009-14
Nairobi	Population	Million	7.67	7.86	8.06	8.26	8.47	8.68	13%
	share of total	%	19%	19%	19%	19%	19%	19%	0%
	Connections total	Million	0.64	0.72	0.88	1.00	1.14	1.38	117%
	share of total	%	50%	49%	50%	49%	49%	50%	-1%
	Connections domestic	Million	0.55	0.63	0.77	0.89	1.02	1.26	126%
	share of total	%	51%	50%	51%	50%	49%	51%	-1%
	Consumption total	GWh/a	2,950	3,071	3,332	3,284	3,547	3,868	32%
	share of total	%	55%	55%	55%	52%	54%	54%	-1%

³⁷ Notes on connectivity level on national and power system area level: the first map shows the connectivity level for 2009. More recent data is not available except for new connections for the power system areas: the number of connections has more than doubled since 2009 (except in Coast area where it increased by around 85%), so the electrification might have doubled if the population growth of 13 to 15% is considered and average households per connection has kept constant. However, the relative situation has barely changed during the past 6 years as shown for domestic connections and consumption by power system area in the figure. Only with a long term view (since 1999), a reduction of the share from Nairobi and Coast to Mount Kenya and Western power system areas can be observed. Though very slowly, there is a shift towards a more equal distribution of connections and consumption.

³⁸ Financial years, 2015 figures are not included since KPLC annual accounts are based on a different definition of power system areas which would distort the results

PS area		Unit	2008/ 2009	2009/ 2010	2010/ 2011	2011/ 2012	2012/ 2013	2013/ 2014	Change 2009-14
Coast	Consumption domestic	GWh/a	878	880	972	927	1,072	1,152	34%
	share of total	%	59%	57%	57%	51%	56%	57%	-4%
	Population	Million	3.43	3.52	3.61	3.70	3.79	3.89	13%
	share of total	%	9%	9%	9%	9%	9%	9%	0%
	Connections total	Million	0.15	0.17	0.20	0.23	0.25	0.28	81%
	share of total	%	12%	12%	11%	11%	11%	10%	-17%
	Connections domestic	Million	0.13	0.15	0.17	0.20	0.23	0.25	89%
	share of total	%	12%	12%	11%	11%	11%	10%	-17%
	Consumption total	GWh/a	994	1,044	1,139	1,130	1,171	1,282	27%
	share of total	%	18%	19%	19%	18%	18%	18%	-4%
Mt Kenya	Consumption domestic	GWh/a	226	242	263	280	287	301	33%
	share of total	%	15%	16%	15%	15%	15%	15%	-4%
	Population	Million	9.67	9.94	10.21	10.50	10.79	11.10	15%
	share of total	%	24%	24%	24%	24%	24%	25%	1%
	Connections total	Million	0.17	0.21	0.25	0.30	0.35	0.42	139%
	share of total	%	14%	15%	14%	15%	15%	15%	9%
	Connections domestic	Million	0.15	0.18	0.21	0.26	0.31	0.37	152%
	share of total	%	14%	14%	14%	15%	15%	15%	10%
	Consumption total	GWh/a	467	496	537	622	615	712	51%
	share of total	%	9%	9%	9%	10%	9%	10%	13%
Western	Consumption domestic	GWh/a	127	147	160	212	204	220	73%
	share of total	%	9%	10%	9%	12%	11%	11%	25%
	Population	Million	19.05	19.54	20.04	20.55	21.08	21.62	13%
	share of total	%	48%	48%	48%	48%	48%	48%	0%
	Connections total	Million	0.30	0.36	0.43	0.51	0.59	0.69	128%
	share of total	%	24%	24%	24%	25%	25%	25%	4%
	Connections domestic	Million	0.25	0.30	0.36	0.44	0.51	0.61	142%
	share of total	%	23%	24%	24%	25%	25%	25%	6%
	Consumption total	GWh/a	993	989	1,084	1,262	1,215	1,356	35%
	share of total	%	18%	18%	18%	20%	19%	19%	1%
Kenya	Consumption domestic	GWh/a	250	270	303	390	360	359	44%
	share of total	%	17%	18%	18%	22%	19%	18%	4%
	Population	Million	39.83	40.85	41.91	43.01	44.14	45.28	14%
	Connections total	Million	1.27	1.46	1.75	2.04	2.33	2.77	118%
	Connections domestic	Million	1.08	1.26	1.53	1.79	2.06	2.48	129%
	Consumption total	GWh/a	5,404	5,599	6,092	6,298	6,549	7,219	33%
	Consumption domestic	GWh/a	1,481	1,539	1,699	1,809	1,922	2,032	39%

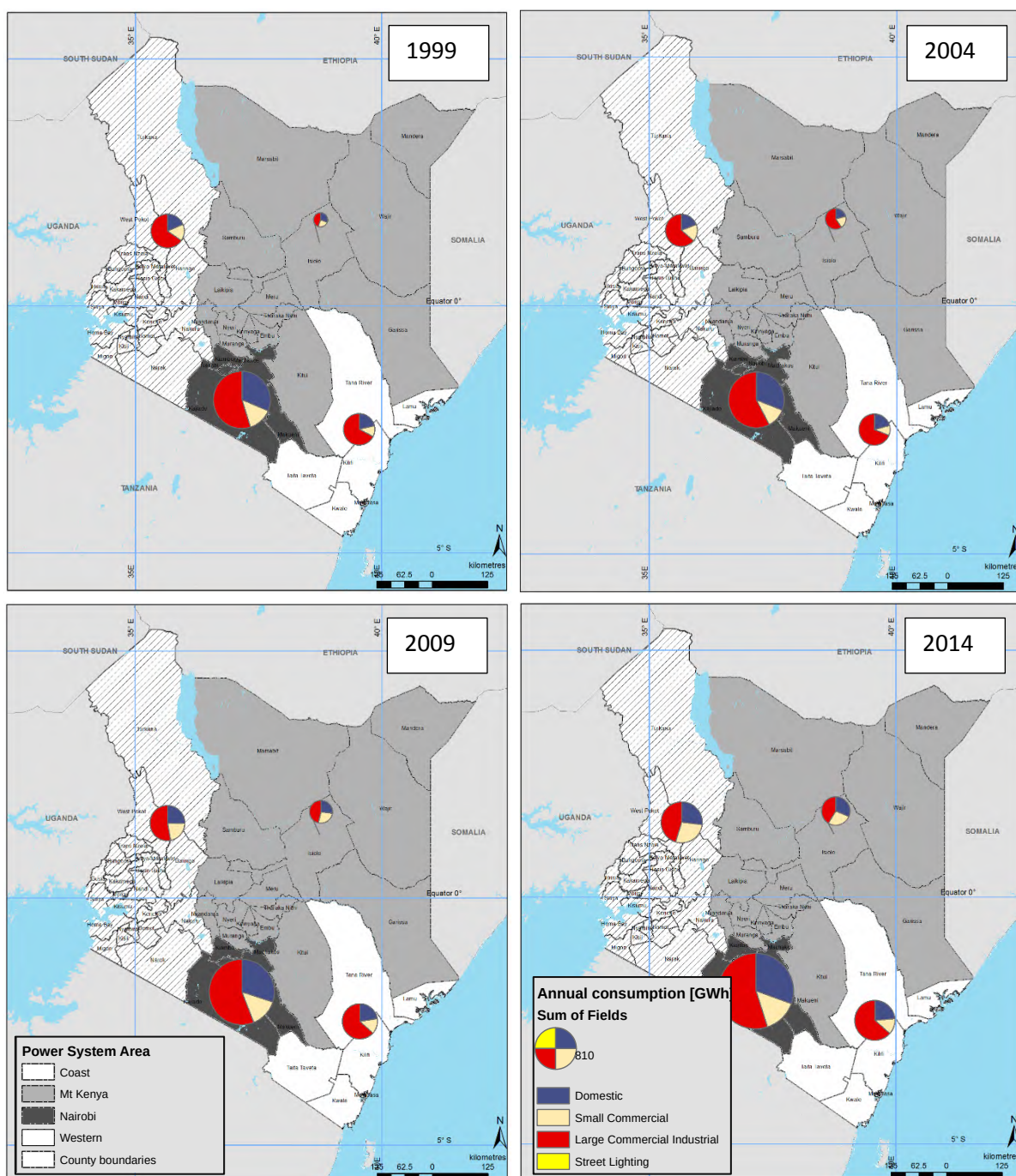
Annex 3.D.3 Electricity consumption by consumer group and area



Annex Figure 19: Electricity consumption largest consumers by sector (financial year 2012/2013)

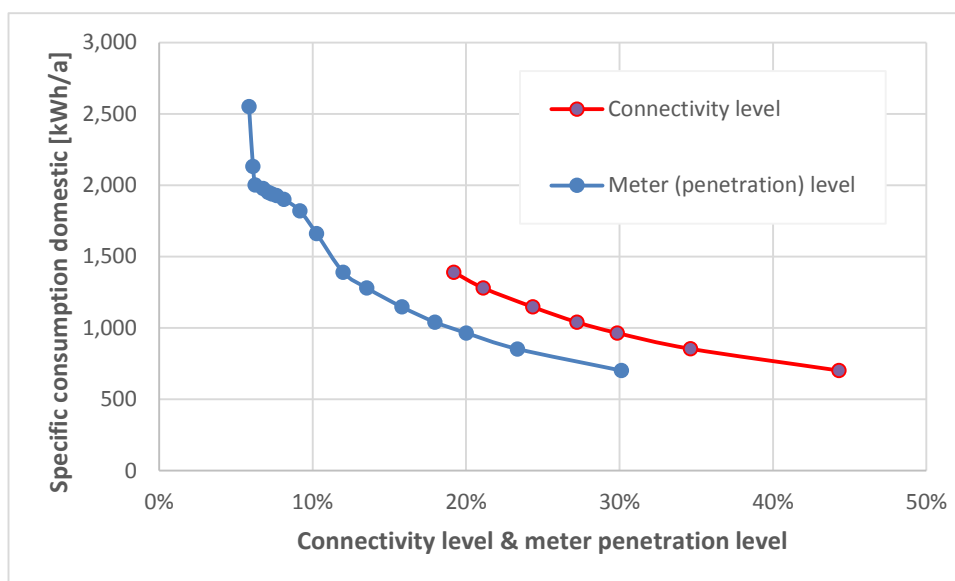
Annex Table 12: Number of large consumers by power system area and annual consumption (financial year 2012/2013)

Consumption between (GWh/a) and	0.05 0.1	0.10 0.2	0.2 0.5	0.5 1.0	1.0 2.0	2 5.0	5 10.0	10 20	20 30	30 40	40 50	50 60	60 70	70 80	
Power system area															
Nairobi	28	30	61	64	46	35	63	43	17	2	1	1	1	1	393
Nairobi North	4	6	10	18	10	4	14	16	2	0	0	1	0	0	85
Nairobi South	10	13	29	26	17	20	23	16	12	1	0	0	0	0	167
Nairobi West	14	11	22	20	19	11	26	11	3	1	1	0	1	1	141
Coast	13	5	11	13	9	14	20	6	10	2	0	0	1	1	105
North Coast	5	0	10	8	6	5	13	3	6	2	0	0	1	1	60
South Coast	8	5	1	5	3	9	7	3	4	0	0	0	0	0	45
Mt Kenya	7	1	5	7	11	10	20	2	2	0	0	0	0	0	65
Mt Kenya North	3	1	2	4	4	6	12	0	0	0	0	0	0	0	32
Mt Kenya South	4	0	3	3	7	4	8	2	2	0	0	0	0	0	33
Western	21	10	18	29	30	25	30	10	2	0	0	0	0	0	175
North Rift	1	5	3	3	11	7	8	2	1	0	0	0	0	0	41
Central Rift	10	3	10	13	5	10	4	5	0	0	0	0	0	0	60
West Kenya	10	2	5	13	14	8	18	3	1	0	0	0	0	0	74
Total	69	46	95	113	96	84	133	61	31	4	1	1	2	2	738



Annex Figure 20: Map of Kenya - consumption by power system area and consumer group (1999, 2004, 2009, and 2014)

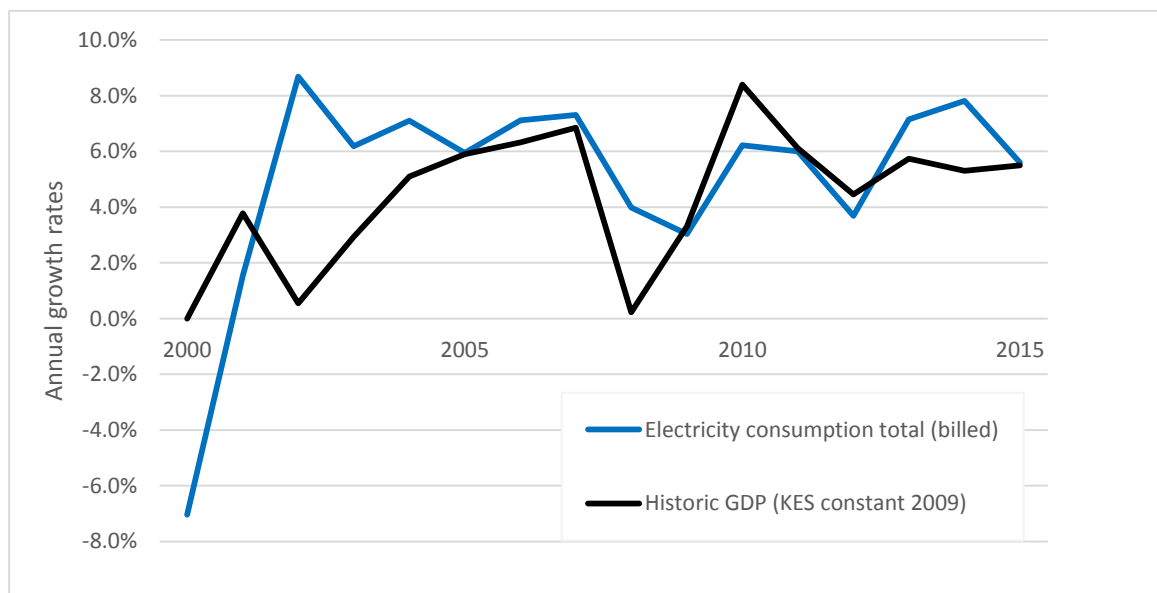
Annex 3.D.4 Specific consumption by consumer group and power system area



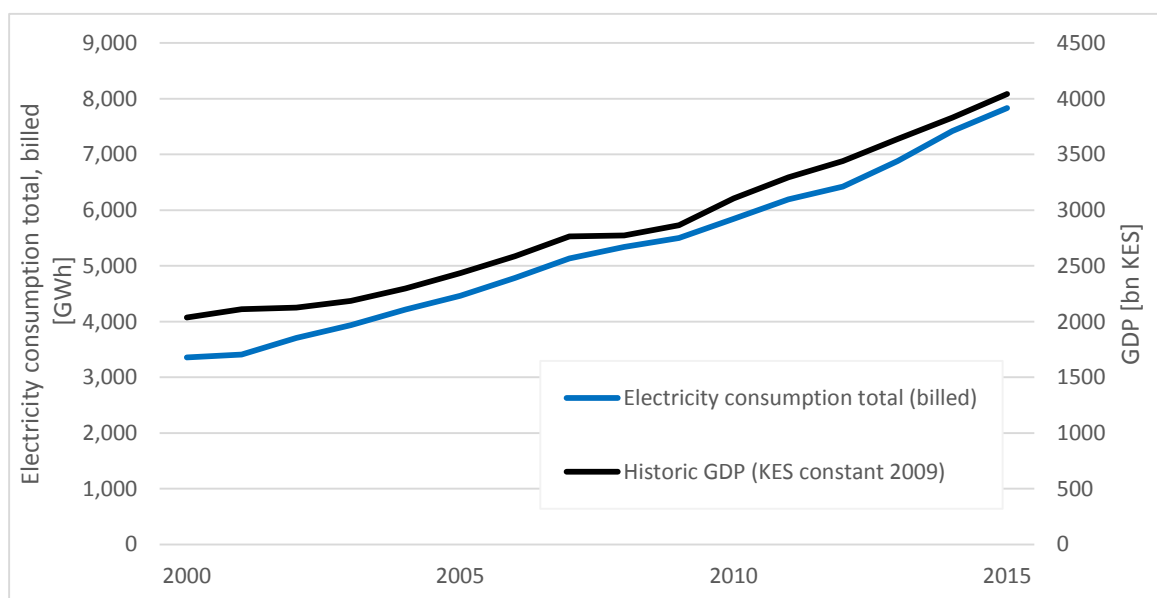
Annex Figure 21: Correlation of domestic electrification and specific consumption (1999 – 2015)³⁹

³⁹ The figure illustrates the dependency between specific consumption and electrification (for meters (meter connectivity level) and assumed connectivity level i.e. share of population connected to power supply). This dependency could be linear for some periods but shows a dampening effect for the most recent years. This effect could be a sign that the increase of specific consumption of connected households is not fully offset by the low consumption of newly connected households anymore and the overall specific consumption may not decrease to the large extent as it has in the past.

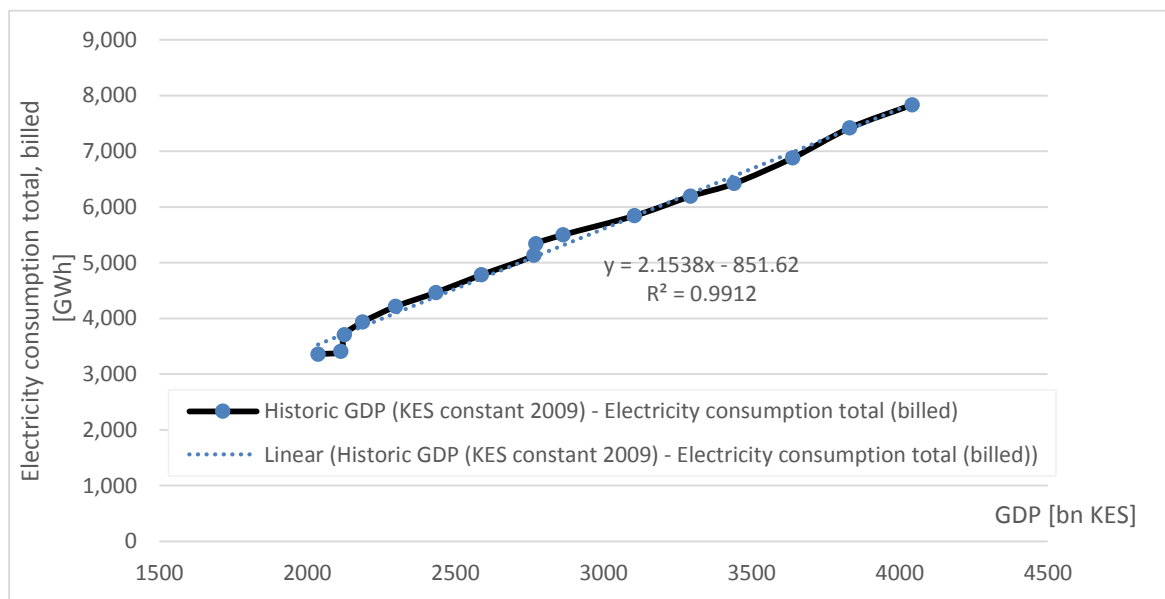
Annex 3.D.5 Correlation between electricity consumption and economic growth



Annex Figure 22: Electricity consumption and GDP (2000 to 2015) – growth rates

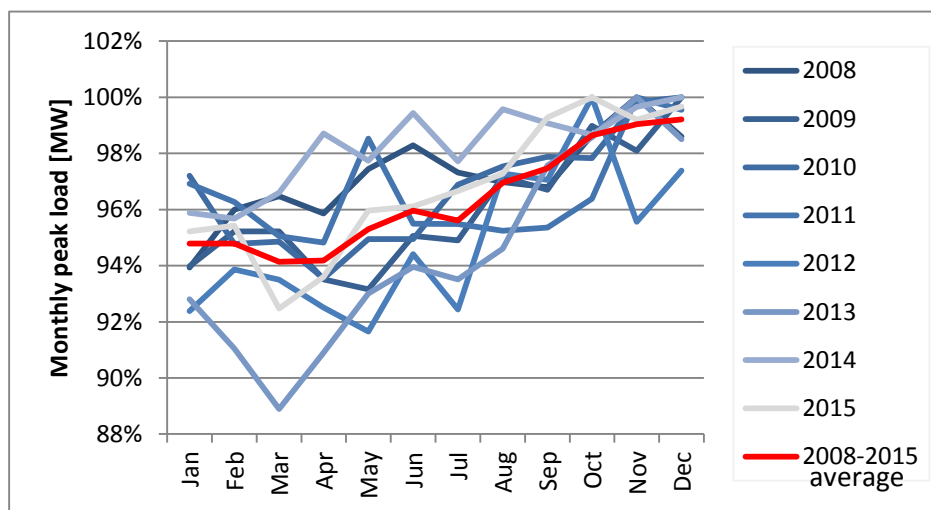


Annex Figure 23: Electricity consumption and GDP (2000 to 2015) – actual figures



Annex Figure 24: Electricity consumption and GDP (2000 to 2015) - correlation

Annex 3.D.6 Load characteristics



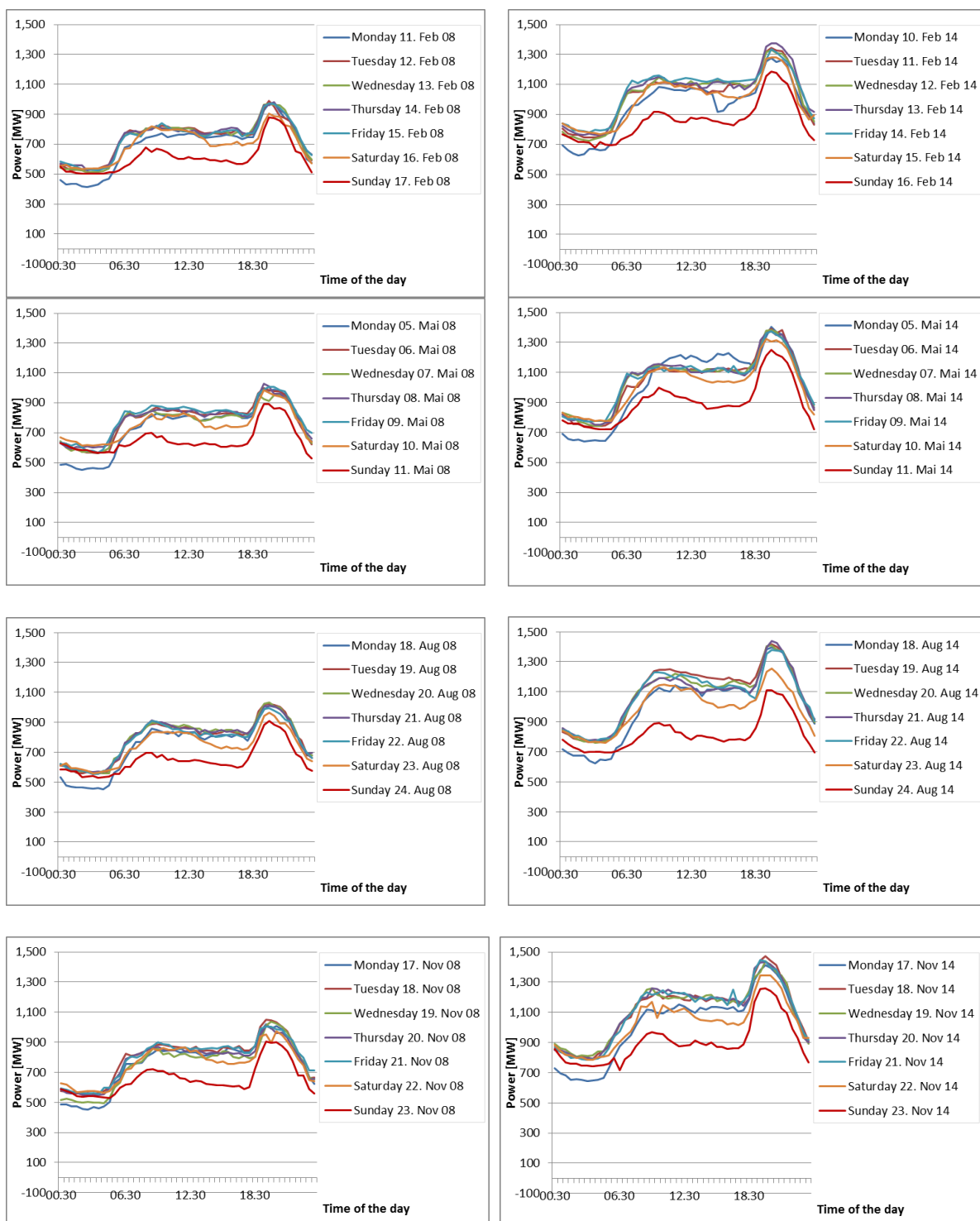
Annex Figure 25: Monthly peak load normalized (2008 - 2015)

Annex Table 13: Monthly peak loads (MW) and ratio of monthly peak loads / annual peak load (%) for 2008 - 2014

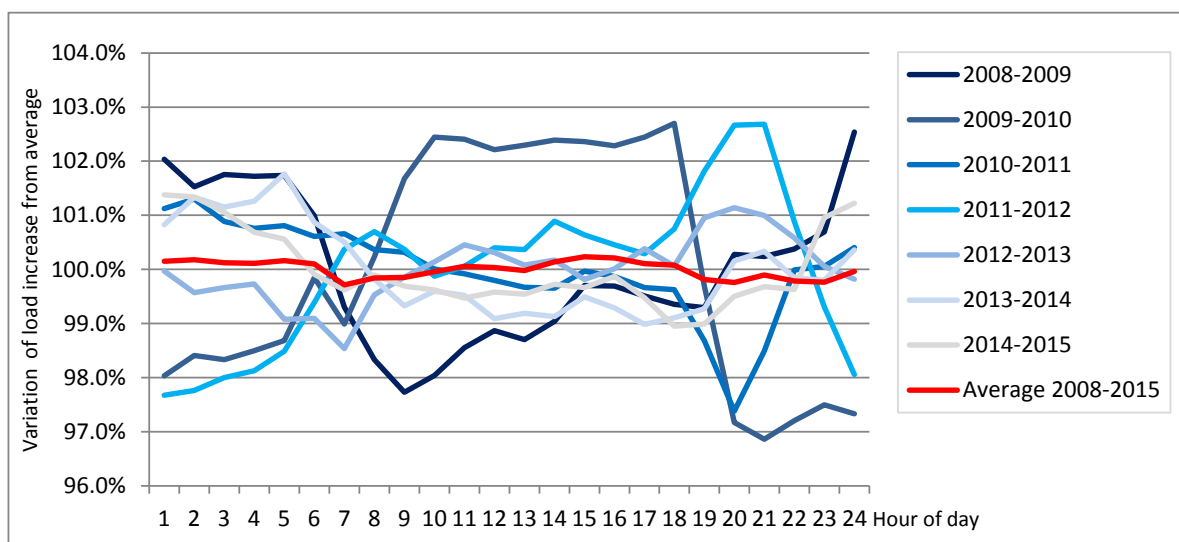
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	1,000	1,022	1,027	1,023	1,040	1,046	1,036	1,037	1,030	1,050	1,072	1,072
2009	1,040	1,054	1,054	1,050	1,041	1,052	1,054	1,075	1,070	1,099	1,088	1,107
2010	1,107	1,079	1,080	1,065	1,081	1,081	1,103	1,111	1,114	1,123	1,146	1,145
2011	1,156	1,148	1,154	1,139	1,194	1,145	1,145	1,136	1,145	1,150	1,195	1,195
2012	1,210	1,221	1,216	1,203	1,202	1,228	1,202	1,266	1,263	1,301	1,243	1,267
2013	1,330	1,305	1,274	1,303	1,333	1,347	1,340	1,356	1,398	1,413	1,433	1,412
2014	1,417	1,413	1,426	1,457	1,443	1,468	1,442	1,470	1,463	1,458	1,471	1,476
2015	1,486	1,500	1,443	1,467	1,497	1,499	1,508	1,517	1,549	1,560	1,548	1,555
2008-2015 (average)	1,179	1,177	1,173	1,174	1,185	1,194	1,188	1,207	1,211	1,226	1,232	1,234

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2008	94%	96%	96%	96%	97%	98%	97%	97%	97%	99%	100%	99%
2009	94%	95%	95%	94%	93%	95%	95%	97%	97%	99%	98%	100%
2010	97%	95%	95%	94%	95%	95%	97%	98%	98%	98%	100%	100%
2011	97%	96%	95%	95%	99%	95%	95%	95%	95%	96%	100%	100%
2012	92%	94%	93%	93%	92%	94%	92%	97%	97%	100%	96%	97%
2013	93%	91%	89%	91%	93%	94%	94%	95%	98%	99%	100%	99%
2014	96%	96%	97%	99%	98%	99%	98%	100%	99%	99%	100%	100%
2015	95%	95%	92%	94%	96%	96%	97%	97%	99%	100%	99%	100%
2008-2015*	95%	95%	94%	94%	95%	96%	96%	97%	97%	99%	99%	99%

*Average variation of monthly peak load from annual peak load



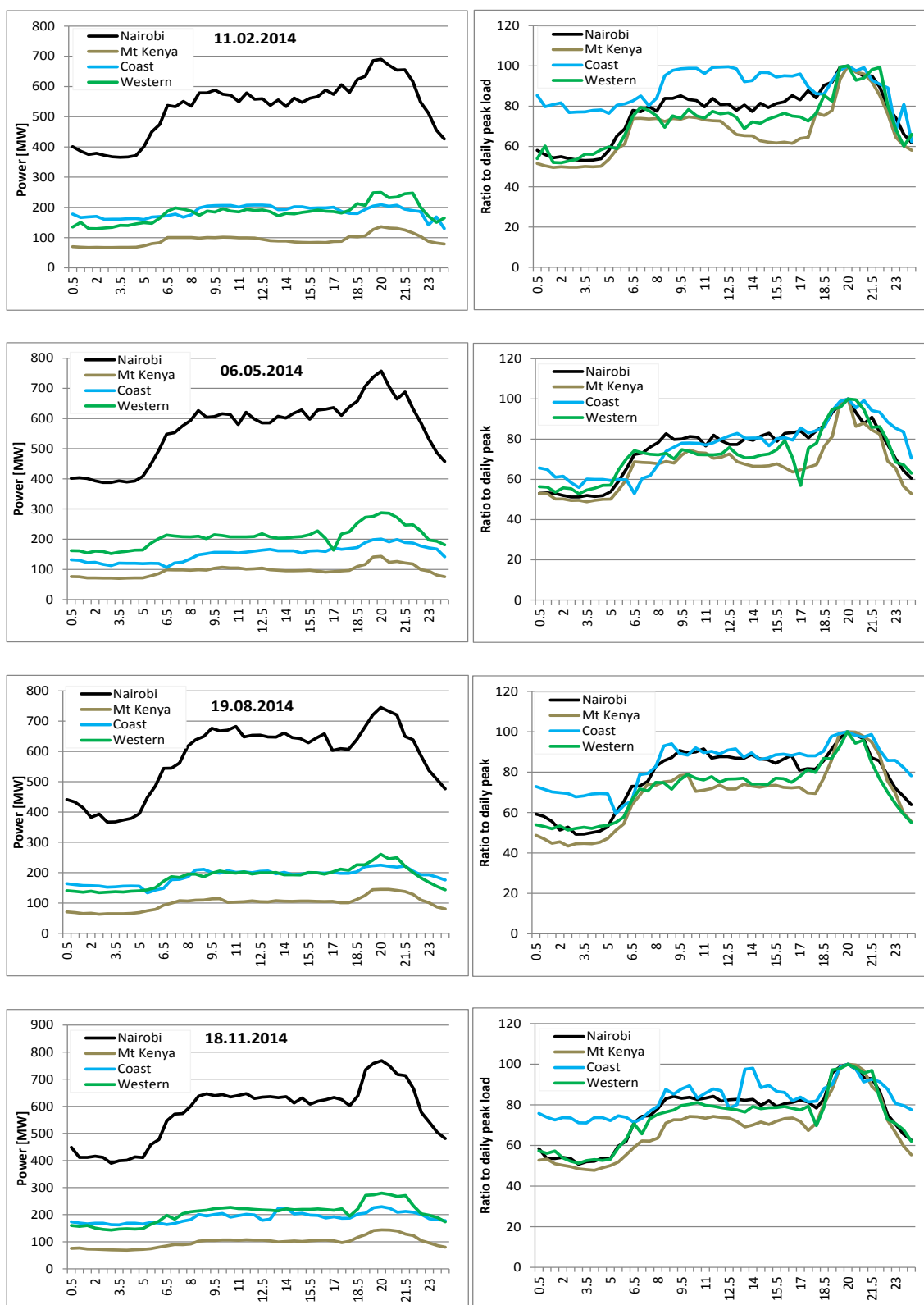
Annex Figure 26: Weekly sets of exemplary daily load curves for each quarter of the years 2008 and 2014



Annex Figure 27: Change of load curve shape: variation of hourly load increase from (daily) average increase⁴⁰

⁴⁰ The shape of the load curve has not changed since 2008 and only the overall load has increased. A more detailed analysis of the average change of load for each hour of the day for the years 2008 to 2015 revealed the following:

- In some years, the load growth happened to be stronger for particular periods of the day (e.g. considerable increase from 2009 to 2010 during the day and from 2011 to 2012 during evening peak). However, this effect levelled out during the whole period (see red line).
- No trend for an overall change of the load curve could be identified. Hence, there is no indication of a change of the load curve in the long term.
- For this reason, the recent hourly load data for 2013 and 2014 can be used as generic load profile e.g. for generation optimization. The load may however change if the mix of consumer groups will change.



Annex Figure 28: Power system area exemplary daily load curves (Tuesdays) for each quarter of the year 2014

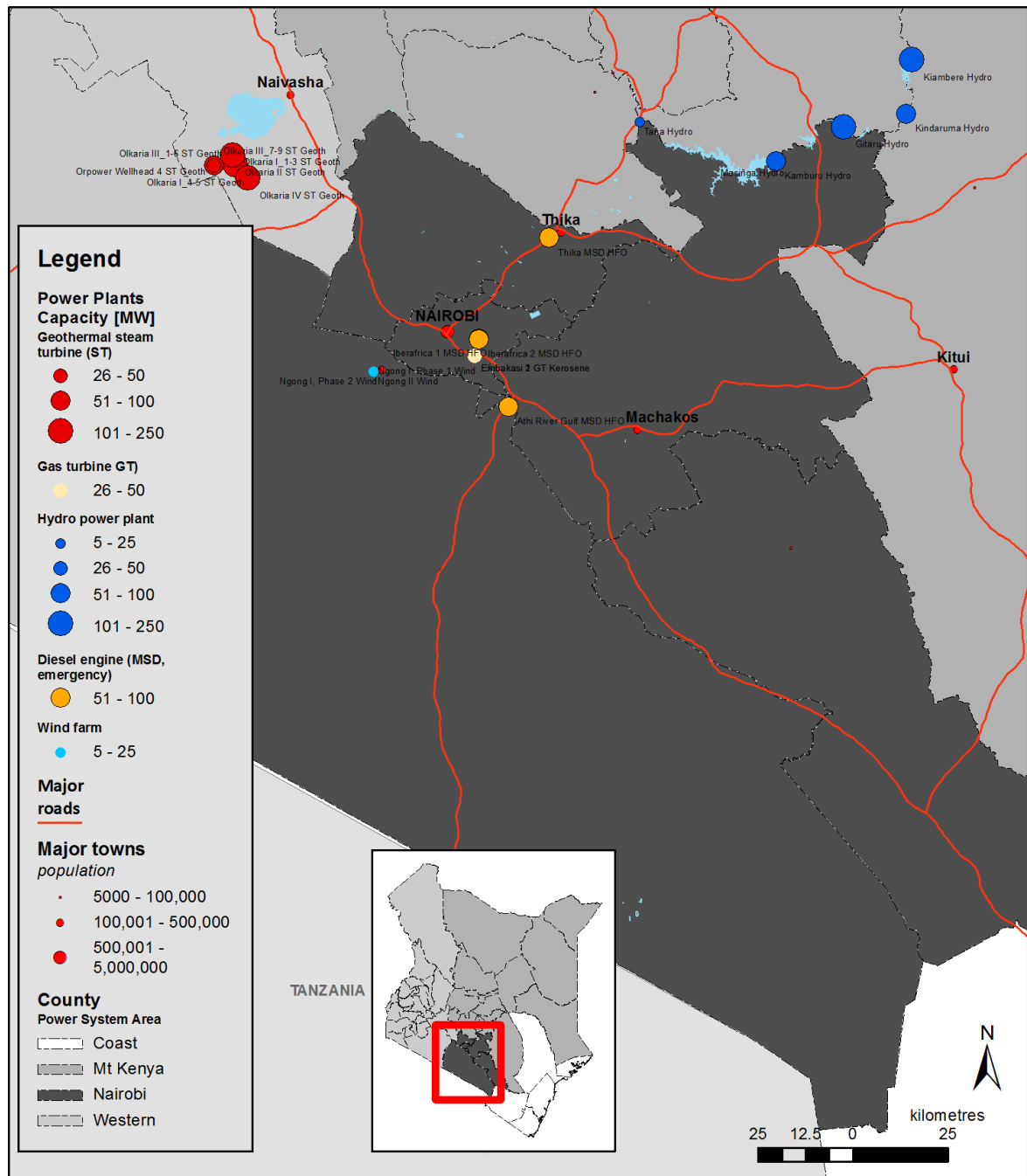
Annex 3.E Electricity transmission and distribution



Annex Figure 29: Schematic network topology Kenya (Source: KETRACO)

Annex 3.F Electricity supply (generation) information

Annex 3.F.1 Existing power plants - detailed information



Annex Figure 30: Map of Kenya – existing power plants (region of high density of plants)

Below the main characteristics of each⁴¹ existing power plant are briefly introduced.

1) Thermal power plants

a) Kipevu 1 power plant

The Kipevu 1 power plant located in Mombasa city was commissioned in 1999 and is owned and operated by KenGen. The plant comprises six diesel engine driven generators of the type 9L 58/64 manufactured by Mitsubishi Heavy Industries under license of MAN B&W. The engines are rated at 12.5 MW. However, due to environmental restrictions the engines were de-rated to 10.4 MW each. The engines are fuelled with heavy fuel oil (HFO). Industrial diesel oil (IDO) is used for start-up and stop-down purposes. The average capacity factor of Kipevu I from 2012 to 2014 was 41%.

b) Kipevu 3 power plant

The Kipevu 3 power plant is the largest fossil-fuelled power plant in Kenya with a contracted effective capacity of 115 MW. It is owned and operated by KenGen and was commissioned in 2011. The power plant comprises seven Wärtsilä gensets of the type 18V46 that are rated at 17 MW and are fuelled with HFO. The average capacity factor from 2012 to 2014 was 41%.

c) Tsavo power plant

The Tsavo (Kipevu 2) power plant is located directly next to the Kipevu 1 power plant and is owned and operated by the IPP Tsavo Power since its commissioning in 2001. The power plant consists of seven Wärtsilä 18V38 generating sets fuelled with HFO. The installed capacity of the power plant is 79 MW. In the last three years the Tsavo power plant was mainly used for peaking purposes. The capacity factor decreased from 30% in 2012 to 20% in 2014.

d) Rabai power plant

The Rabai power plant is situated next to the KPLC Rabai substation 15 km north of Mombasa city and is operated and owned by Rabai Power. The power plant was commissioned in 2009 and consists of five 17 MW HFO-fired medium speed diesel engines of the type 18V46 manufactured by Wärtsilä. Additionally, the plant is equipped with a waste heat recovery system and a steam generator set rated at 5 MW in order to enhance the efficiency of the power plant. In 2014 the capacity factor of the Rabai power plant was remarkable high with 83%. The average capacity factor from 2012 to 2014 was 65%.

e) Ibrafrica power plant

The Ibrafrica power plant is situated in the south-eastern area of Nairobi and is owned and operated by the IPP Ibrafrica Power. The first block was commissioned in 1997 with an installed capacity of 56 MW comprising eight units rated at 5.5 MW each and two units rated at 6 MW each. In 2004, the second block with a net capacity of 54 MW was put into operation. The block consists of seven units rated at 7.5 MW each. The power plant is fuelled with HFO. From 2012 to 2014 the average capacity factor was 63%.

⁴¹ The description focusses on large power plants. Various existing small hydropower plants as well as bio-mass and PV plants are not listed.

f) Athi River Gulf power plant

The Athi River Gulf power plant is located 25 km south-east of Nairobi in Athi River. It was commissioned in October 2014 and is owned and operated by the IPP Gulf Energy. The eight medium speed diesel engines are fuelled with HFO. The total installed capacity is 80 MW.

g) Triumph power plant

The MSD power plant Triumph is located in Athi River and was recently commissioned in 2015. The contracted capacity amounts 80 MW. The power plant consists of eight medium speed diesel engines fuelled with HFO.

h) Thika power plant

Thika power plant was commissioned in second half of 2013 and is located in Thika District north-east of Nairobi city. The plant comprises five MAN 48/60 reciprocating engines as well as a waste heat recovering system and a steam generator providing 87 MW electricity to the national grid. Similar to Athi River Gulf, the power plant is fuelled with HFO. The power plant is owned and operated by the IPP Thika Power. In 2014 the power plant generated 451 GWh corresponding in a capacity factor of 59%.

i) Embakasi power plant (partly relocated to Muhoroni)

The two gas turbines owned and operated by KenGen were commissioned in 1987 and 1999 respectively. Originally, the gas turbines were situated in Mombasa Kipevu. With the objective to provide active and reactive power in the load centre Nairobi, they were relocated to Embakasi in 2011. The 27 MW gas turbines are fuelled with Kerosene. Due to the high short-run marginal costs the Embakasi gas turbines are mainly used to provide peak load capacity. The average capacity factor from 2012 to 2014 was 6%. One gas turbine was relocated from Embakasi to Muhoroni (commissioned mid 2016) in order to provide back-up capacity for the western area (replacing the 30 MW Emergency Power Producer Aggreko in Muhoroni, Kisumu).

j) Aggreko Emergency power

With the objective to strengthen the power supply in the western part of the country KPLC contracted Aggreko to provide 30 MW rental power situated in Muhoroni. Further 90 MW are installed in Embakasi, but are however not contracted at the time of this study. The high speed diesel engines are fuelled with Automotive Gas Oil (AGO). In 2014, the average capacity factor was 26%. The contract of the 30 MW rental power located in Muhoroni expired mid 2016. It was replaced by one gas turbine relocated from Embakasi to Muhoroni (see previous paragraph).

2) Hydropower plants

In the following, existing large hydropower plants (HPPs) are briefly described focusing on large hydropower plants (There are various small hydropower plants (below 20 MW) which supply electricity to the grid). Further details of the hydropower plants are presented in the separate report on renewable energy sources (Long Term Plan – Renewable Energy) submitted with this report.

a) Masinga HPP

Masinga HPP is located on the Tana River, about 90 km north-east of Nairobi. The hydropower scheme represents the first hydropower plant in the “Seven Forks” cascade. The power plant was commissioned in 1981 and comprises two vertical Kaplan turbines with a capacity of 20 MW each. The average capacity factor from 2012 to 2014 was 47%.

b) Kamburu HPP

Kamburu HPP is situated on the Tana River and is the second hydropower scheme in the “Seven Forks” cascade. The power plant was put into operation in 1976. The power station comprises three vertical Francis turbines with 31.4 MW each. The average capacity factor 2012 to 2014 was 57%.

c) Gitaru HPP

With an installed capacity of 225 MW the Gitaru HPP is the largest hydropower scheme in Kenya. The first two Francis turbines rated at 72.5 MW each were commissioned in 1978. In 1999, a third unit with an installed capacity of 80 MW was put into operation. The average capacity factor from 2012 to 2014 was 47%.

d) Kindaruma HPP

Kindaruma HPP is the fourth hydropower scheme in the “Seven Forks” complex and is also located on the Tana River, about 5 km downstream of the Gitaru HPP. The power plant was commissioned in 1968 and is the oldest large hydropower plant in Kenya. Originally, the power house comprised two Kaplan turbines with 20 MW each. In 2012, these turbines were upgraded and a third unit was additionally installed resulting in a total installed capacity of 72 MW. The average capacity factor from 2012 to 2014 was 38%.

e) Kiambere HPP

Kiambere HPP is situated on the Tana River and is the last hydropower plant in the “Seven Forks” cascade. The power plant has a total installed capacity of 164 MW and was commissioned in 1988. The power house comprises two Kaplan turbines. The average capacity factor 2012 to 2014 was 69%.

f) Tana HPP

Tana HPP is located about 80 km north-east of Nairobi and utilise the Merila and Maragua flow for electricity generation. The run-of-river (RoR) power plant was commissioned in 1932 and redeveloped in 2010. The rehabilitated power station comprises four Francis turbines with an overall installed capacity of 20 MW. The average capacity factor from 2012 to 2014 was 53%.

g) Turkwel HPP

Turkwel HPP is located on the Turkwel River in West Poko County. The power house was commissioned in 1988 and comprises two Francis turbines with an installed capacity of 54 MW each. The average capacity factor from 2012 to 2014 was 63%.

h) Sondo Miriu HPP

Sondo Miriu HPP is situated on the Sondo River in Kisumu County. The Run-of-River (RoR) scheme was commissioned in 2008 with a contracted capacity of 60 MW. The average capacity factor in the past three years was 72%.

i) Sang'oro HPP

Sang'oro HPP is situated in Kisumu County and uses the tail water of Sondo Miriu HPP for electricity generation. Similar to Sondo Miriu HPP, Sang'oro HPP is a RoR scheme. The power house comprises two turbines with 10 MW each and was commissioned in 2012. The average capacity factor from 2013 to 2014 was 68%.

3) **Geothermal power plants**

Geothermal power is currently mainly being utilised in the Greater Olkaria Field located in the Hell's Gate National Park 120 km north-west of Nairobi. Due to the low short-run marginal costs geothermal power plants generally run as baseload. Two thirds of the installed geothermal capacity is owned and operated by KenGen. These power plants are equipped with flash steam technology. The remaining capacity is owned and operated by independent power producers (IPP) using binary steam cycle technology. Further details of the geothermal energy are presented in the separate report on renewable energy sources (Long Term Plan – Renewable Energy) submitted with this report

a) Olkaria 1 – Unit 1-3 (alternatively: Olkaria 1)

Olkaria – Unit 1-3 is the first geothermal power plant that has been constructed in Kenya and is located at the Olkaria East field. The power plant uses single-flash steam technology and comprises three Mitsubishi 15 MW generating units with a net capacity of 45 MW. The first unit was commissioned in 1981, followed by the second unit in 1982. The last unit was put into operation in 1985. The power plant is owned and operated by KenGen. The average capacity factor was 89% from 2012 to 2014.

b) Olkaria 1 – Unit 4-5 (alternatively: Olkaria 1AU)

In 2014, two further units with a net capacity of 70 MW each and manufactured by Toshiba were commissioned in the Olkaria East sector. Equal to Olkaria 1 – Unit 1-3, the facility is equipped with single-flash steam technology. The power plant is owned and operated by KenGen.

c) Olkaria 2

Olkaria 2 is also owned and operated by KenGen. The power plant has a net capacity of 70 MW consisting of two Mitsubishi generation units. Olkaria 2 was commissioned in 2003 and is located in the Olkaria Northeast field. Equal to the Olkaria 1 units, it is equipped with single-flash steam technology. The average capacity factor was 91% from 2012 to 2014.

d) Olkaria 3 – Unit 1-6 (alternatively: OrPower4 Steam I)

Olkaria 3 – Unit 1-6 was commissioned in 2000 with installed contracted capacity of 48 MW and is equipped with binary steam cycle technology. The power plant is located in the Olkaria West sector. Olkaria 3 – Unit 1-6 is owned and operated by the IPP OrPower 4, a subsidiary of Ormat Technologies Inc., and is the first private geothermal power plant in Kenya.

e) Olkaria 3 – Unit 7-9 (alternatively: OrPower4 Steam II+III)

In 2013 and 2014 further 62 MW geothermal power has been put into operation by Orpower 4. The Olkaria 3 – Unit 7-9 geothermal power plant is located next to Olkaria 3 – Unit 1-6 in the Olkaria West Field. It is also equipped with a binary steam cycle technology.

f) Olkaria 4

Olkaria 4 was commissioned in 2014. It is Kenya's largest geothermal power plant. It comprises two 70 MW generating units manufactured by Toshiba. KenGen owns and operates the power plant.

g) Eburru

The Eburru Wellhead geothermal power plant was constructed by Civicon Ltd. and is owned and operated by KenGen since its commissioning in 2012. The power plant is located next to the Ol Doinyo Eburru Volcano, about 11 km north-east of Lake Naivasha. It is equipped with single-flash steam cycle technology providing 2.2 MW electricity to the national grid.

h) Olkaria wellheads

KenGen operates several single flash steam wellheads in the Olkaria field. The first wellhead station (OW37) was commissioned in 2012 and has a contracted effective capacity of 2.2 MW. The mobile wellheads OW 43 were put into operation in 2014 with an effective capacity of 12.8 MW. In 2015 the wellheads OW914 and OW915 were commissioned. Their net capacity is 37.8 MW. Additional 20 MW have been commissioned in 2016.

i) OrPower Wellhead 4

This wellhead geothermal power plant is owned and operated by the IPP OrPower4 since its commissioning in 2015. The power plant is located in the Olkaria West sector. As typical for OrPower4 it is equipped with binary standalone technology. The contracted capacity is 24 MW.

4) Wind power plants

a) Ngong

There is presently (end of 2015) only one site with wind farms in operation, namely Ngong. It was developed and commissioned in stages (Ngong 1, Phase I (5 MW) in 2008, Ngong 1, Phase 2 (6.8MW) and Ngong 2 (13.6 MW) in 2015). They are located in the northern part of the Ngong Hills, about 20 km south-east of Nairobi. Ngong 1 Phase I comprises of six Vestas V52 turbines rated at 850 kW each with an average capacity factor of 30% from 2012 to 2014. Ngong 1 Phase 2 and Ngong II consist of 24 Vestas V52 turbines.

5) Co-generation biomass power plants

a) Mumias power plant

Mumias Sugar Mill Company located in Kakamega County utilises a co-generation steam power plant for electricity production. Since 2009, the power plant also provides electricity with an average export capacity of 10 MW to the national grid. However, power supply is not constant over the year, since electricity production relies on the availability of sugar cane. For instance, Mumias failed to supply electricity to the national grid for 45 days by the end of 2013 due to a shortage of

bagasse at the power plant. Due to fuel supply issues there was no supply of electricity to the grid for most of 2015 and 2016. There is no agreed date to restart the electricity supply, for this study 2018 is assumed.

b) Kwale power plant

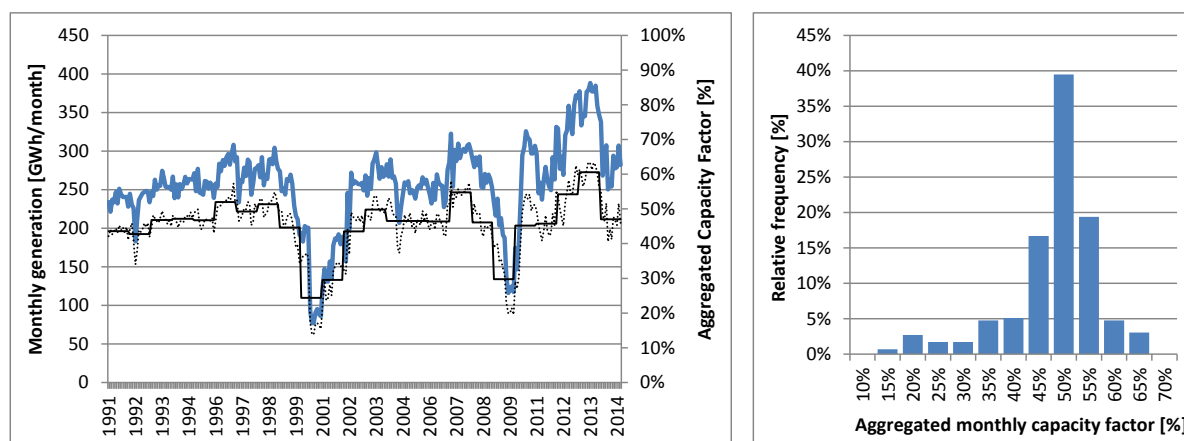
Kwale Int. Sugar Company located in Kwale close to Mombasa commissioned a co-generation steam power plant for electricity production (18 MW) in 2015, providing electricity with an export capacity of 10 MW to the national grid. According to the Kenya Sugar Board, at the end of 2015 Kwale co-generation plant was commissioned for own supply but has not been feeding into the grid yet. For this study it is assumed to feed into the grid from 2017 onwards.

c) Biojoule power plant

Biojoule biomass power plant (2 MW) was commissioned in the beginning of 2016.

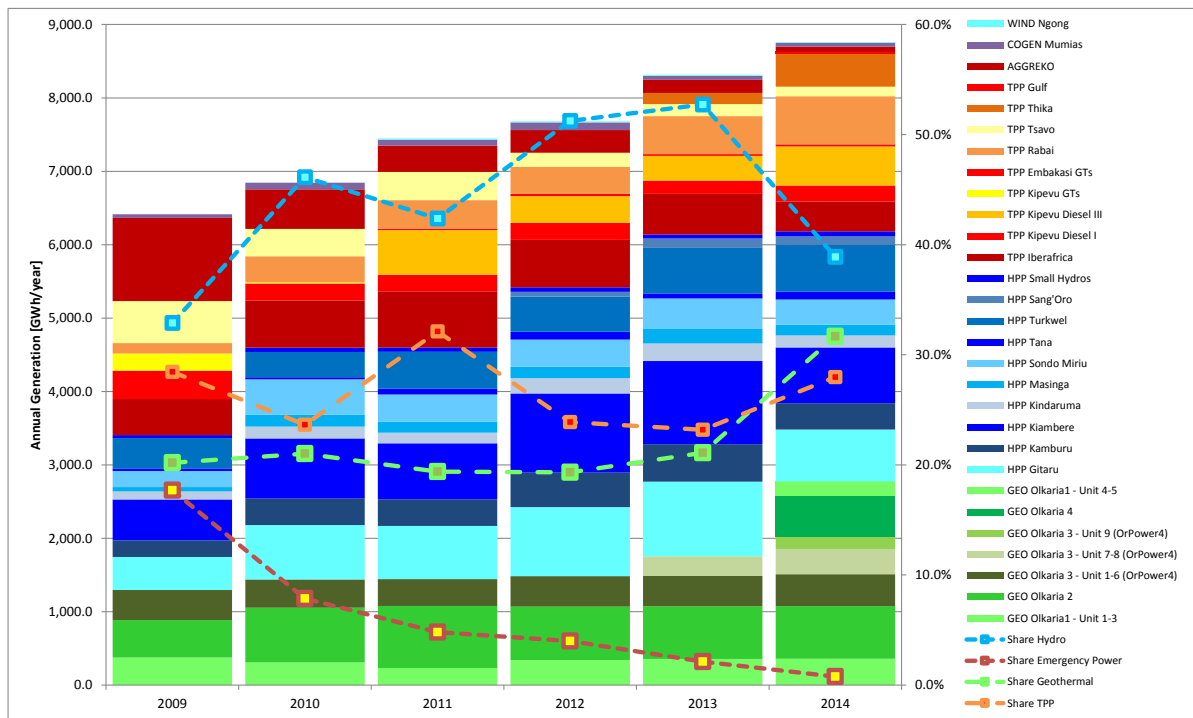
Annex 3.F.2 Historic monthly and seasonal electricity generation characteristics

The development of monthly and annual hydro capacity factors between 1991 and 2014 as well as the monthly development of generation by power plant and energy mix are depicted below.

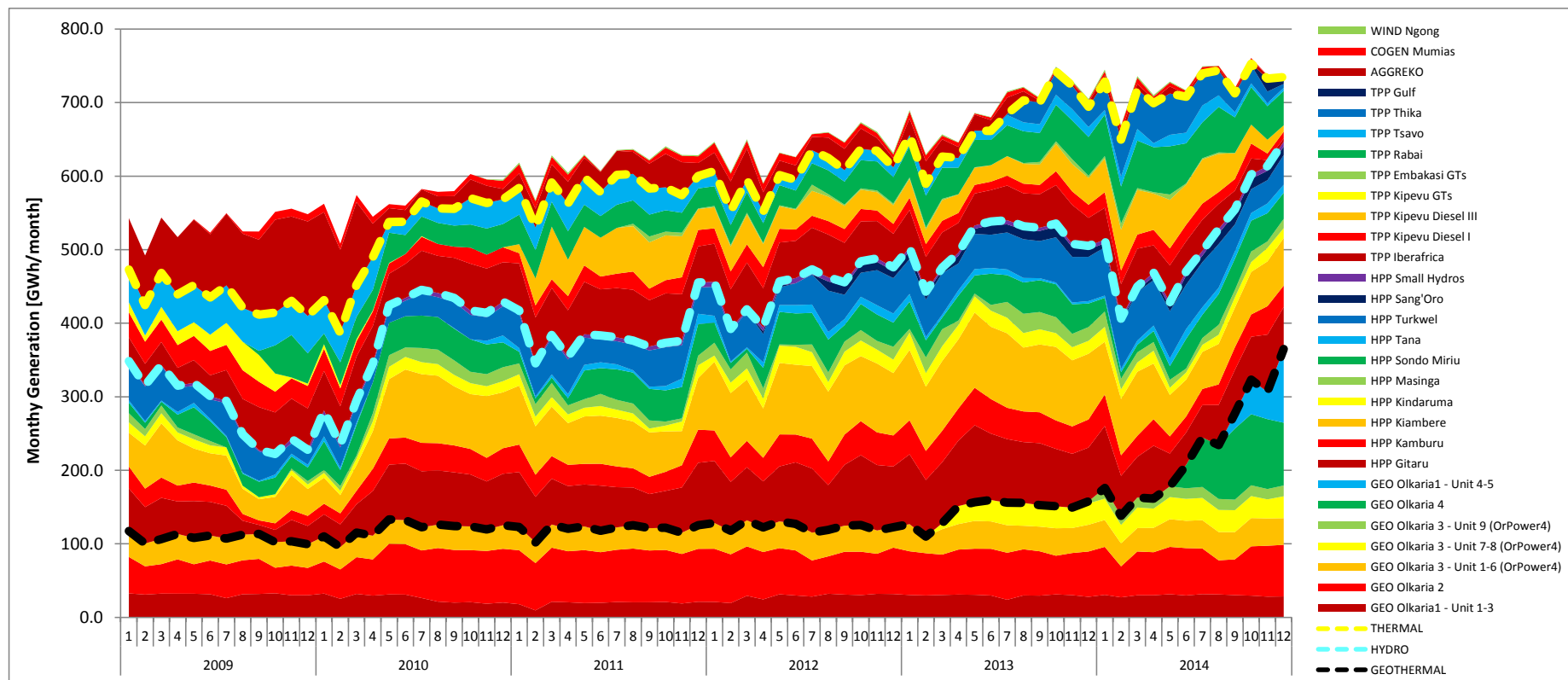


Annex Figure 31: Left: monthly generated hydroelectricity (blue) and aggregated capacity factor (black dotted), annual capacity factors (black) (1991-2014); Right: frequency of monthly hydro power capacity factors (1991-2014)

In the figures below the annual and monthly details of power generation in the diverse power plants are visualised for the years 2009-2014.



Annex Figure 32: Development of annual generated energy (net) (2009 to 2014)



Annex Figure 33: Development of monthly generated energy (net) (2009 to 2014)

It can be seen how the lack of hydroelectricity generation in 2009 has been faced across different generation plants. In particular, in the second half of 2009 the output of the hydropower plants was very low. During this time, the existing thermal power plants ramped up their generation. This is particularly true for TPP Iberafrica and Kipevu gas turbines. Also the newly commissioned TPP Rabai could compensate a part of the lack of hydropower generation. However, the existing thermal power plants at the time could not entirely cover the deficit. A large part of the hydro deficit had to be covered by the generation of expensive rental Aggreko power plants. In 2009 their production rose up to 1,134.9 GWh. The share of emergency power accounted for up to 20% of the entire Kenyan supply in 2009. In that year the share of hydropower went partly down to a level of approx. 25%. However, after 2009 the hydrology recovered and in subsequent years more hydroelectricity could be generated. Furthermore, the introduction of Sang'Oro HPP (20 MW) in 2012 brought hydropower production up. The average share of hydropower then counted for 40-55% of the total generation. Since 2009 the share of emergency power in the Kenyan electricity supply went down to only a few percent until at the end of 2014 when it accounted for only 0.4% of the total generation (avg. 2014: 0.8%). This said, it can be observed that despite the below average hydrology in the first half of 2014, there was only a limited need to dispatch the emergency power plants. In 2011, where hydrology was in a similar range as in first half of 2014, the recourse to emergency power plants was larger: In 2011 the annual share of emergency power was 4.8%. On a monthly, basis it even reached the level of 7.1% at certain times.

The smaller dependence on the hydrology can partly be explained by the commissioning of new thermal power plants in the last years like Kipevu 3, Thika and Athi River Gulf. However, with the commissioning of the new geothermal plants Olkaria 1 - Unit 4-5 (Olkaria 1AU) and Olkaria 4, which generally run as baseload supply, the conventional thermal power plants run less because they are displaced by more economical geothermal power plants. This phenomenon gets clearer when looking at the recent developments of the energy mix. In the second half of 2014 geothermal power reached a share of 50%, which is a plus of approximately 150% compared to its average share of 20% in 2011. Comparing it to its share of 24% in January 2014, geothermal power more than doubled its share in electricity supply within less than one year.

On the other hand the share of conventional thermal power declined in 2014 from a level of approximately 35% in the beginning to 12% in December 2014. The thermal plants are thus dispatched much fewer. A non-negligible part of their capacity stands idle and can be considered a buffer for the compensation in times of poor hydrology in the future.

ANNEX 4 ELECTRICITY DEMAND FORECAST – ANNEXES

Annex 4.A Data situation for demand forecast

The reliability and completeness of the underlying data is essential for the accurateness of any forecast. For this study the data collection approach and data situation was as follows:

- Definition of data and information requirements at the beginning of the project and development of respective questionnaire and data inventory;
- Collection of data actively facilitated by client and stakeholders for national sources (e.g. from Kenyan power sector and other national institutions such as KNBS) and complemented by international and Consultant's in-house sources (such as international agencies, scientific research, and similar projects);
- Review of data and discussion and decision on review results (e.g. recommended assumptions for identified data gaps) with client and stakeholders to arrive at a final data / assumptions set. Some data are considered mostly complete and reliable. Other data sets are incomplete or not available at all. As many assumptions as possible were derived from the more reliable data sets. However, various assumptions for the scenario definitions base on less reliable data or more general, deduced assumptions. These uncertainties are mentioned in the respective sections (e.g. for data related to geography, administration/policy, economy, and demography please refer to Annex 3.A, Annex 3.B, and Annex 3.C; for data related to historic electricity consumption patterns please refer to Annex 3.D).

The table below summarizes the most important requested and utilized data by category and provides a brief description on the quality and related uncertainties. It should be seen as an opportunity to further improve the existing data base and thus the reliability of future results.

Annex Table 14: Data requested and utilized for demand forecast

Data category	Source	Description	Data quality and areas for improvements
Energy policy	MOEP	Current and intended policy on power supply	Information sufficient for demand forecast; actual and detailed electrification plan (when available) would be of benefit
Demography	KNBS, UN	Population and household size by county and urban/rural areas and historic growth	Data complete and reliable with few uncertainties and inconsistencies. Detailed demographic forecasts would improve the demand forecast (however changes to demography rather low and effect in long term)
Administrative area	KPLC, open source	Area and borders for counties and power system areas	Data complete and reliable; official GIS county border file would be of benefit; allocation of power system areas to counties should be reassessed and detailed and linked to previous consumption statistics as the network expands

Data category	Source	Description	Data quality and areas for improvements
Economy	KNBS, GoK, IMF	GDP development by sector and forecasts, socio-economic situation of population	Data complete and reliable only on national level. Statistical information on regional/county level could be of benefit. National and international GDP forecasts differ in terms of objectives and assumptions; comprehensive data and forecast on socio-economic situation missing
Electricity consumption - historic	KPLC	Consumption and customers by power system area and consumer group, large customers and system failures / suppressed demand for recent years, load curves on national and main substation level	Data complete (except for connections per power system area and load data for some substation) and reliable for recent years (some variation between data sets which are tolerable for this study); data on the following topics would be of benefit: connection and consumption on county level (to develop forecast on this level), load by customer groups (e.g. feeders, partly still under review), suppressed demand, more extensive data on large customers and rural electrification and actual billing data
Electricity consumption - future/ planned ; electrical network	MOEP, KPLC and various other stakeholders	Electrification targets & strategy with an outline of the general plan; Flagship project assumptions and plans	Detailed electrification plan would be of benefit to support demand forecast and test assumptions; Information on flagship projects often general / to be further complemented as planning proceeds; data on captive supply and plans of large customers only partly completed with survey; expansion of the electrical network (in particular distribution) system to connect new demand could not fully be taken into consideration as data was not complete (coverage of existing distribution system)

Annex 4.B Changes of assumptions from previous demand forecasts

For the previous LCPDP reports (see section 3.1.1) a forecast approach and model was developed and continuously updated⁴². The below table summarizes the main findings of the assessment of previous forecasts, underlying models, and assumptions as well as respective changes applied. A

⁴² It is based on spread sheets applying MAED (Model for Analysis of Energy Demand developed by the International Atomic Energy Agency IAEA) electricity demand methodologies and assumptions combining econometrics (e.g. correlation of GDP and industrial/commercial consumption) with end-use / bottom-up (e.g. specific consumption characteristics and flagship projects). Input data is derived from within the Planning Team (e.g. consumption statistics, household survey) and external sources (e.g. GoK Vision 2030 assumptions/targets). The Consultant considers the tool good, in particular with regard to the overall methodology applied. The experts of the Planning Team are very familiar with the approach and utilisation of the tool (including advantages and shortcomings) and the general area of demand forecasting. Together with the client and stakeholders it was decided i) to keep the well proven general structure of the demand forecast ii) enhancing usability (e.g. overview of assumptions), and iii) adapt the methodologies and assumptions were considered necessary and as the data basis allows.

comparison of previous forecasts with past and actual electricity demand growth is provided in section 4.6.4 and Annex 4.G.4.

Annex Table 15: Changes from previous demand forecasts

#	Category / topic	Comment	Conclusion
1 Base data / inputs			
	Demographic data & forecasts	Applied data not fully up-to-date and consistent (see Annex 3.B)	Adapted forecasts based on review and application of various sources (see Annex 3.B)
	Historic data electricity consumption	Restricted to shorter period (mainly after change of tariff structure 2009)	Extension to whole available period (1998 onwards, period covered by available KPLC Annual Reports) to allow for evaluation long term trends (although some frame conditions have changed)
2 General model outline / functionalities			
	Correlation GDP & electricity consumption large commercial & industrial	Coefficient (between growth rates of electricity consumption and GDP) considered rather high; further data and assumption basis for this coefficient uncertain; could not be reviewed; application for high GDP growth rates not proven; correlation between growth rates usually lower (in comparison with correlation of absolute figures) as the spreading (of growth rates) is higher (see 3.2.5 for details)	Linear relation of absolute figures (actual consumption and GDP) applied instead of factor between growth rates (see 3.2.5 for details)
	Flagship consideration	Potential double counting of flagship projects (consumption per project and GDP - consumption coefficient although flagships are part of overall GDP growth assumption)	Flagship projects only on top of development of the existing consumer structure (which is – contrary to the LCPDP forecasts - based on trend projection and not GDP correlation). The separate comparison of the demand forecast results with a simplified GDP based demand forecast (part of the “benchmarking”) is done without flagship projects. This also requires a reduction of the underlying GDP forecast by the expected flagship induced GDP growth rates (see section Annex 3.C.4)
	Geographical area	Only two areas; applying same assumptions to Nairobi and Western / Mt Kenya areas	Distinguishing between all 4 power system areas for as many parameters as data is available (e.g. demographics, consumption, connections)
	Consumer groups	Combination of domestic and small commercial only to some extent considered suitable (e.g. connection rate)	Distinguishing between the two groups to consider differing characteristics (e.g. specific consumption) and applying a correlation between domestic and small commercial connection rates

#	Category / topic	Comment	Conclusion
	Household income groups	Usually a suitable approach to describe development of income groups and effect on consumption; but data to differentiate income groups (urban/rural) and relate income to consumption patterns as well as forecasts of both is not available or too uncertain; as a consequence forecasted specific and absolute consumption unrealistic for most income groups	Approach skipped to reduce uncertainty; only to apply if proper data basis and forecasts exist (e.g. KNBS); instead domestic consumers considered as one group; development of specific consumption according to past developments (improved by correlation of electrification and consumption growth)
	Electrification / connectivity level	Connection of more than one household to one connection (meter) neither considered in connectivity level calculation nor survey and influence on specific consumption development; however, could be considered as conservative assumption Forecast driven by official and conservative electrification target	Approach added to model for connectivity level and specific consumption (reduces possible adverse effect if assumption inaccurate); though indicative only (latest available data from 2009 census); Consider besides target also "what if" (certain connection rate) scenario
	Specific consumption	No link to electrification applied assuming too high specific consumption for new consumers	Link modelled between electrification (of new consumers) and specific consumption to account for their lower initial consumption
	Suppressed demand	Considered through electrification of unconnected households and through assumption of 100 MW ⁴³ suppressed load during peak demand	Extended to all consumer groups and further categories of suppressed demand (see 3.2.3)
	Results	All forecast scenarios considered rather on the high side; forecasted demand of previous years not achieved (see Annex 4.G.4)	Additional scenarios to provide a wider range of possible future demand results for predefined assumptions

Annex 4.C Driving and limiting factors for the electricity demand

Below the main driving and limiting factors for electricity demand in Kenya are listed with a brief description and selected interrelations⁴⁴. Further, a brief note on whether and how this was implemented in the demand forecast is provided in the column on the right.

⁴³ 100 MW is provided in LCPDP reports, no source or underlying data provided.

⁴⁴ The sources for these interrelations are scientific research, Consultants experience from similar projects, and analysis of Kenya framework. The list and the interrelations are not exhaustive. Its purpose is only to give an indication on the systemic set-up of the factors and the challenges to model it.

For some interrelation the direction (increase/decrease following an increase of one factor) are shown. This is done in a simplified way by showing the impact of an increase of the concerned factor on another factor with arrows (↑=strong increase ↗=increase →=not known ↘=decrease ↓=strong decrease). Where this system cannot be applied a description is provided. 'Demand' is to be understood as demand for electricity.

Annex Table 16: Driving / limiting factors for the electricity demand and their application in the forecast

Category and driving / limiting factor		Description	Impact on	Impacted from	Conclusion forecast
1	Geography, climate	Geography has an effect on the demand through e.g. elevation / temperature and precipitation as well as the seasonality of these factors (e.g. in coastal hotter climate there is higher power use for AC; besides this there are only limited seasonality and differences between power system areas)	Increase / decrease demand	Climate change	Different assumptions for specific consumption and load characteristics by power system areas represent different climate characteristics
2	Institutional, political, administrative framework				
2.1	Administrative area	No direct effect on demand but allows measuring, analysing and displaying area specific patterns and changes of other driving factors (e.g. migration, electrification, large projects) for regional planning solutions. In the medium to long term different planning efforts and capacities and financing might affect the electricity consumption of the counties (see next topic)	Possible positive effect on demand from local power system analysis and planning (medium to long term)	Policy	Forecast for 4 power system areas with some data from lower county level (county data availability limited; might be fostered with new county planning)
2.2	Energy policy and institutional frame	Policy, regulatory, institutional framework should facilitate growth of electricity consumption & economy for the people's wellbeing (reflected in many GoK official documents). However, overall resources (financing, human resources, etc.) are limited and often different sectors (education, health, transport, etc.) compete for the same. The rather complex planning framework (including the - to be developed - county level) may challenge the growth while clever policy measures could enhance electricity consumption.	Increase / decrease demand; increase of power system (generation and network)	Other sectors, policies (environment, finance, etc.); economy	In general supporting environment (governmental, international, private) for increased consumption assumed, providing required subsidies for electrification, transmission network and new power generation projects
2.3	Tariff scheme	Tariff increase through the price elasticity for electricity consumption and ability and willingness to pay will ham-	↘ demand (long term stronger); EE;	Lower than expected electricity	Electricity prices (relative to income) assumed to stay in historic range

Category and driving / limiting factor	Description	Impact on	Impacted from	Conclusion forecast
	per demand. Listed companies KPLC and KenGen as well as IPPs have to receive cost covering tariffs and have to pass through any additional costs (electrification, fuel price increase, etc.) which may affect the demand	electrification; quality and security of supply (potential); power generation surplus	consumption (compared to power supply) may increase tariffs	with the possibility of a further reduction with slight positive effect on overall demand (sensitivity analysis possible); subsidies assumed to be available (see previous issue) where tariffs are not cost covering (e.g. connections; surplus of supply)
3 Demography				
3.1 Population growths	The population size and growth as well as migration strongly determine the future demand for any utility service including electricity supply.	↗ demand; urbanisation/urban share, household size, economy, income growth	Urbanisation; policy; economy	Population growth predictions based on external (UN, LCPDP/KNBS) assumptions; indicatively detailed for county level (based on historic development, KNBS)
3.2 Urbanisation	Strong positive effect on connections and consumption through lower specific costs and as convenient targets for electrification measures. Due to the high population density urban areas are - in most cases - easier and less costly to electrify compared to rural areas. This effect is reduced by the household size which tends to be smaller than in rural areas (i.e. more people supplied with one connection)	↗ demand & connections (electrification); population growth, household size, shift to lower income groups	Population growth; economy/socio-economics	Prediction based on external (UN, Vision 2030/KNBS) assumptions; indicatively detailed for county level (based on historic development, KNBS); urban areas in model rank higher for new connections but a possibility to define particular rural electrification schemes
3.3 Household size	The shrinking household size both in urban and rural areas increases the number of households to be newly connected in addition to the population growth.	↑ number of connections needed, ↓ connectivity level (e.g. population versus number of households)	Population growth; urbanisation; economy/socio-economics	Prediction based on historic development (KNBS); indicatively detailed for county level (rural/urban)

Category and driving / limiting factor	Description	Impact on	Impacted from	Conclusion forecast
4 Economy				
4.1 National economic development (GDP)	The most prominent factor since it provides in the long-term the income on state level to finance the expansion of the power system and (indirectly) on consumer level to pay for connection to and the use of electricity (existing and new customers). There is a strong correlation between economic growth and the consumption of electricity and connection rate. The causal dependency could be in both directions but there are indications that for Kenya GDP growth is driving energy and electricity consumption. There are various concerns/uncertainties with regard to application of a simple coefficient (GDP or GDP growth / consumption or consumption growth)	↑ demand / connections (bidirectional); demography; socio-economics; EE	↗/→ energy/electricity consumption (bidirectional); policy; world economy; flagship project implementation; quality/security of supply	Correlation of absolute figures for GDP and industrial and commercial consumption instead of GDP – consumption coefficient; complemented by bottom-up (flagship projects on top) approach and testing with analysis of existing large consumer data base/ survey/ historic consumption data; verification with regression analysis; scenario analysis with different GDP assumptions)
4.2 Income group characteristics (population)	Details on past, present and future income groups (e.g. split urban/rural, by area, relation to energy consumption) would allow a very accurate modelling of demand. However, sufficient data not available limiting the utilization of socio-economic factors in the forecast.	Specific and total consumption	Economic growth; demographics/urbanisation	Approach not applied due to lack of data basis for current and future income group distribution
4.3 Policies and plans for large demand projects	Large projects for economic development might boost the electricity demand in particular sectors and regions beyond the usual development. In this study these projects are considered as 'flagship projects'. Information availability and certainty greatly differs among these projects.	↑ demand; ↑ economic growth	Economy (world & national); policy; financing capacity (governmental, private); power supply	Evaluation and identification of suitable (electricity demand) flagship projects and development of two scenarios (see Annex 4.E). Flagship considered "on top" of demand from existing consumer groups
5 Electricity demand and power sector characteristics				
5.1 Capacity of power sector to implement	The future served demand also depends on the available capacity and energy. This means that the supply side (whether and what kind of power generation is available) can be also seen as a driving factor for demand. Lack of	Lack of supply: ↓ demand; ↑ suppressed demand;	Policy; expectations/forecast of demand; tariffs/subsidies	As the common approach for expansion planning the future power generation capacity is scheduled so that all demand (restricted by the above

Category and driving / limiting factor		Description	Impact on	Impacted from	Conclusion forecast
	projects:	power supply reduces consumption and increases suppressed demand and substitution (e.g. with solar home systems); surplus instead may encourage large demand projects (although often developed back to back with generation projects for security of supply).	surplus: ↗/→ demand (large projects); tariff	(encourage or hamper investment); locals (ESIA, RAP ⁴⁵)	issues) can be met. The approach therefore assumes sufficient supply of power.
	Power generation				
5.2	Transmission system	Transmission projects are necessary to serve currently not connected areas / population, connect new power plants and strengthen the existing network. It is determined by the capacity of the responsible institutions and the financial resources. Assumptions on overall implementation capacity and schedules for transmission projects should be based on experience with projects in the past and include not only the average construction duration but also any delay in the overall planning process.	↑demand (total and specific) & connections & quality/security supply; ↓suppressed demand, losses	Power sector capacity (e.g. financing); policy (ESIA ⁴⁵); local population & participation (ESIA, RAP ⁴⁵)	Assumed that most areas are already reached by transmission network (70% of national area reached by distribution network) and will be extended as needed though with bottlenecks with regard to losses/suppressed demand (approach could be expanded if more detailed data available)
5.3	Distribution system	Distribution projects are necessary to connect new customers to the existing and future transmission system (see previous issue). New connections in urban areas are easier to be realized (for technical and economic implications of shorter distances). Considerations for the overall implementation capacity and schedules similar to transmission system (see previous issue). Particular projects (large demand projects and electrification schemes) should be considered where possible (though consistent quality and quantity of data required).	↑demand (total and specific) & connections & quality/security supply; ↓suppressed demand, losses	Power sector capacity (e.g. financing); policy	Assumed high coverage of distribution network (70% of national area) and will be extended as needed; but technical and economic constraints expected to grow as electrification proceeds, hence limitation on electrification process (see next topic, approach could be expanded if more detailed data available); Priority to connection of urban areas

⁴⁵ ESIA: Environmental and Social Impact Assessment; RAP: Resettlement Action Plan

Category and driving / limiting factor	Description	Impact on	Impacted from	Conclusion forecast
5.4 Connection rate domestic (electrification of new consumers)	The electrification of not connected areas and households to raise the currently low connectivity level is one of the major objectives of the energy policy to improve the well-being of the people and spur economic growth but also to connect demand for the various planned power supply projects. There is a range of economic and technical challenges to reach the desired targets: costs are high and will increase (e.g. future connections increasingly rural and outside existing LV & MW network) which will be addressed with specific programs and funding. New connections will increase connectivity level but will only slightly increase overall consumption (even reduce specific consumption) and might challenge economical supply of new customers.	↑ connectivity level, total consumption; ↓ specific consumption; ↗ → specific costs of system operation; ratio households / connections; self-enhancing effect of electrification efforts (economies of scale)	Subsidies/ electrification programs; economy; demographics (growth, household size, urbanisation); technical constraints and capacities of KPLC; customers' willingness & ability to pay; quality/security of supply	Definition of possible number of new connections (based on capacity or budget for new connections or particular electrification programs; by areas / national level, urban/rural) or electrification targets Link between connection of new customers and specific consumption modelled (consumption new customers & annual consumption growth connected customers)
5.5 Ratio households / connections	On average more than one household connected to one connection (meter) for e.g. economic reasons; i.e. connectivity level higher than meter penetration among households. Should be considered in connectivity level calculation to accurately monitor and evaluate electrification targets. The information basis is not up-to-date and future development can only to be estimated.	Higher connectivity level with same number of connections; ↑ specific consumption (per meter)	Costs of connections / subsidies, ability/willingness to pay for own meter	Number of household per connection assumed to continuously decrease from 1.8 in 2009 (census and KPLC data combined) to 1 in 2035 (end of LTP). Modelled in forecast in a way to indicate connectivity level but not to distort results if assumption is not accurate
5.6 Connection rate street lighting	There has been a strong correlation between the connection rates of domestic consumers and street lighting (though the latter varied a lot); a respective causality is the extension the LV network with new domestic consumers which allows the installation of street lights on the same network. Street lighting projects would add to this connection rate	Economic growth; safety	Outreach LV network (domestic connections); street lighting projects	Link to connection rate domestic (80% of domestic connection growth) and street lighting projects

Category and driving / limiting factor	Description	Impact on	Impacted from	Conclusion forecast
5.7 Connection rate small commercial	There has been a very strong correlation between the connection rates of domestic consumers and small commercial consumers (the reason why it was combined to one consumer group in previous forecasts); a respective causality is the extension the LV network with new domestic consumers which allows to serve typical existing or new small commercial entities in residential areas.	Economic growth	Outreach LV network (domestic connections); economic activity	Link to connection rate domestic (approx.. 60% of domestic connection growth; lower growth if electrification is very high)
5.8 Connection rate large commercial & industrial	There is a correlation between GDP and connections and consumption of large consumers. However, the higher the tariff group (i.e. voltage level and for most cases the overall consumption) the lower the correlation. In addition, the connection rate and consumption patterns per power system area differ so that an analysis and forecast on this level is considered more accurate (also to facilitate network planning)	Economic growth	Economy (national and international); tariff; surplus power supply; quality and security of supply; location	Analysis of large consumer data for power system areas to indicate connections from historic developments and GDP correlation of overall consumption.
5.9 Consumption patterns of connected consumers	Daily, seasonal, regional and consumer group consumption patterns typical for Kenya, which can be used to estimate the future development of the connected consumers and the probable consumption patterns of any new consumers.	Suppressed demand; EE; electrification; quality and security of supply	Population, economic growth; quality and security of supply; electrification	Trends for specific consumption by consumer group and areas, partly adapted (e.g. effect of enhanced electrification on domestic consumption); long term correlation with GDP for industrial and commercial consumers
5.10 Energy efficiency	EE does not mean rationing the supply of electricity but rather promoting the rational use of this form of energy through increasing the efficiency in transport, distribution and end-use, which are critical for the improvement of the energy access in the whole country. (i.e. a disconnection is desired on the long term between economic growth, which by no means should be jeopardized, and the related level of energy consumption growth, which	↘ specific and total consumption (but sometimes rebound effect); ↗ → quality and security of supply; correlation GDP - consumption	High consumption (and costs) may encourage EE; economic growth / alternative investments	EE sub-scenario for LTP considering reduced specific consumption (existing and future customers) by customer group

Category and driving / limiting factor		Description	Impact on	Impacted from	Conclusion forecast
		must be reduced)			
5.11	Suppressed demand	Demand for electricity which cannot be met by the means of the national electricity supply due to various technical and economic limitations. It can only be estimated because of its wide range of interlinked causes and insufficient data basis. There are expectations in Kenya that the growing power generation and network will shift currently suppressed demand to served demand (e.g. overall consumption)	↓ specific & total consumption; economic growth; socio-economics (might even affect health & educational situation); ↘ willingness to pay; ↗ captive supply	increased consumption (due to population or economic growth; electrification) may trigger the existing network; capacity for generation and network enhancement	Different current forms of suppressed demand identified and estimated; medium and long-term reduction assumed (to add to specific consumption)
	Quality and security of supply	Lack of quality and security of supply is one cause for suppressed demand, hence different direction if it increases.			
5.12	Losses	Losses are directly related to the actual electricity consumption (load) for the respective voltage level. They usually differ by region and can be distinguished between technical and non-technical losses (mainly on LV level); but can often be only analysed on an aggregated level.	↑ power supply need; ↗/→ tariffs; ↘/→ profit KPLC; ↘ security and quality of supply	Expansion of network (length of lines & capacity equipment); energy theft; peak load / load curve	Assumed average losses of base year to largely prevail for the medium and long term as increase through expansion and decrease through loss reduction measures might balance
5.13	Load characteristics / factor	Load characteristics (load curve, peak load, load factor, contribution to system peak) differ by consumer group and region. If the respective shares change in future also the overall load characteristics may change with an impact on the overall power system (e.g. total power capacity, losses, operation of power plants)	Losses; required generation capacity & operation	EE; consumer group connection & specific consumption growth by area	Very general load characteristics per consumer group and power system area assumed to model probable effect on peak load.

Annex 4.D Electrification target definition and programs

The evaluation and definition of electrification programs and targets is of high importance to develop parameters, causalities and restrictions to the demand forecast.

There is no detailed definition and specification on what qualifies a household to have ‘access’ and ‘connectivity’. However, it has been successively applied (e.g. in previous LCPDP reports National Energy Policy Draft) as actual connection and supply with electrical power (even with solar home systems) and not only the opportunity to access (e.g. a nearby transformer). Details on how it is applied in this master plan is provided in section 4.4 of this report. The target of 100% (see below) is very ambitious, both in terms of the time line of few years until 2020 as well as the targeted factor. Even if alternative technologies such as solar home systems are utilized for rural electrification, there are technical, economic, and in particular socio-economic challenges to reach this level of electrification within this time frame. Some of these challenges are beyond the influence of the government, such as the willingness and ability of the people to adapt to such technologies within the given time frame.

There is a recent history of information on desired or agreed electrification targets:

- a) 100% access by 2020: The ruling government Jubilee Coalition Manifesto declares⁴⁶ “every Kenyan has access to electricity by 2020”.
- b) “rural electrification connectivity to at least 40% by 2016” and “100% connectivity by 2020”: target set by GoK in the National Energy Policy Draft⁴⁷
- c) Possibly 75% in about four years (i.e. around end of 2018), target announced by MOEP⁴⁸ for the Last Mile Electricity Connectivity project.
- d) 1 million new connections in financial year 2014/2015: target announced by KPLC⁴⁹
- e) 80% by 2016: announced by KPLC to actually connect 80% of Kenyans⁵⁰
- f) “70% by 2017 and universal access by 2020” (or connect about 1 million new households per year): stated by MOEP in the National Electrification Strategy⁵¹, the most recent target re-confirming and specifying previous announcements.

Numerous electrification programs are under implementation or are planned to increase the connectivity level of the population and other potential consumers:

⁴⁶ Source: Jubilee Coalition, *Transforming Kenya, Securing Kenya's Prosperity 2013 - 2017* (2013)

⁴⁷ Source: National Energy Policy Draft (24.2.2014), page 86f

⁴⁸ Source: CapitalFM, *Electricity connectivity to hit 75pc in four years* (19.9.2014)

<http://www.capitalfm.co.ke/business/2014/12/electricity-connectivity-to-hit-75pc-in-four-years> (accessed 15.2.2015)

⁴⁹ Source: KPLC, *Power demand forecasting programme launched* (1.10.2014) <http://www.kplc.co.ke> (accessed 21.10.2014)

⁵⁰ Source: The Star, *New electricity project for slum* (2.2.2015) <http://www.the-star.co.ke/news/new-electricity-project-slum> (accessed 19.2.2015)

⁵¹ Source: MOEP, *National Electrification Strategy* (2015). This document is closely linked to a recent study: MOEP, Fichtner, *Consultancy Services for Development of Electricity Connection Policy and Draft Regulations* (2014). Some of the study's assumptions and conclusions are to some extent taken over into this master plan (e.g. electrification scenarios) while some assumptions differ (e.g. household size).

- a) REA has for many years extended the electrical grid in rural and peri-urban areas to enable electricity supply to public facilities. Connection of all secondary schools, health centres and market centres have been reached. It will be continued with other sectors, e.g. primary schools. This program has brought the grid to many new areas allowing an increase in the number of private connections to the new transformers. However, the majority of neighbouring households still remain unconnected⁵¹. REA statistics focus on its mandate (the connection of public institutions). Statistics on the historic connection of domestic and other private consumers is lacking, although this would be of benefit to accurately plan for future rural electrification. There is a newly set target of 40% rural electrification by 2016, probably under the mandate of REA.
- b) The Global Partnership Output Based Aid (GPOBA) scheme: this World Bank / KPLC electrification project for slum areas has achieved beginning of 2014 below 10% of the desired connections despite highly subsidised connection fees; there are indications that this has accelerated contributing a large part to the newly connected customers in KPLC financial year 2014/2015. The program will be continued.
- c) Loan schemes (donor supported and commercial) to finance individual connection fees;
- d) Cluster of 50 project of KPLC (not yet under implementation), building on economies of scale to connect clusters of consumers;
- e) Last Mile Connectivity Project of REA and KPLC (not yet under implementation during the time of this report), aiming at electrifying (with donor funding) unconnected households within the reach of existing transformers;
- f) Reduction of connection fee: in 2015, to increase connections, a reduced connection fee⁵² was officially announced and related donor supported projects announced. However, there are indications⁵³ that households outside these projects are obliged to pay even more than the previous set threshold of 35,000 KES.
- g) National Electrification Strategy⁵¹⁵¹ of January 2015 summarizes electrification targets and efforts and provides some details on the implementation path and how the identified technical, economic and organisational challenges can be solved. A plan on how and where the estimated 5.5 million unconnected households will be connected is not part of the document. It is foreseen that KPLC is developing a GIS-based data base until the end of 2015 to support such a plan.

There have been successful electrification measures in the past, but mainly for institutional consumers. The opportunities and challenges to achieve the desired ambitious electrification targets are studied. Various programs are under development and funding is partly secured. However, only detailed plans and the implementation of these programs will provide more reliable information on the probable future electrification levels. Therefore, any overall demand forecast should assume different electrification scenarios.

⁵² 15,000 KES down from 35,000 KES, see National Electrification Strategy for details

⁵³ Household survey May – October 2015

Annex 4.E Flagship projects report

This section summarizes the information and the analysis results for flagship projects with regard to their future potential contribution to demand for electricity in Kenya. This is included in the demand forecast (detailed in Chapter 4).

Annex 4.E.1 Background information and assumptions

As presented in Chapter 4, the electricity demand forecast considers both domestic as well as commercial and industrial consumers supplied at different voltage levels. Additionally, the government promotes so-called flagship projects. Flagship projects are projects identified under the Kenya Vision 2030 as key to the realisation of the vision.

“While the “flagship” projects are expected to take the lead in generating rapid and widely-shared growth, they are by no means the only projects the country will be implementing. A flagship project only sets the pace for multiple vessels behind it. By the same token there are many on-going projects and yet others planned for the future by the Government and the private sector.”⁵⁴

Some of the 120 projects may considerably increase the overall electricity need in future beyond the organic growth of demand for electricity in Kenya, and hence they must be carefully assessed.

Therefore, an assessment mission and successive evaluation of available information on flagship projects was carried out in June 2014⁵⁵. The purpose of the assessment mission on these potential large power consumers was

- The identification of flagship projects characterized by an unnaturally high electricity demand not accounted for by the natural growth of demand over time.
- The evaluation of the flagship projects with regard to their possible future demand for electricity, peak power, commissioning years, demand growth and location. The respective scenarios are to be incorporated into the demand forecast.

The results are introduced in the present section.

In order to focus on the projects relevant for the Power Generation and Transmission Master Plan study, these flagship projects with high electricity demand should largely satisfy the following requirements:

- The projects are “exceptional” in terms of size, sector or purpose. Exceptionality can be determined by the following characteristics
 - Promoted by the government (e.g. Vision 2030 flagship projects, LAPSET)

⁵⁴ Source: GoK, *Kenya Vision 2030, The Popular Version* (2007)

⁵⁵ The Consultant visited the various responsible institutions and implementing agencies of the flagship projects. For this, the Vision 2030 Secretary Board provided a list with about forty flagship project and the respective agencies and contact persons.

- It does represent a new initiative; i.e. it is not a mere advancement of an implemented project or existing (sub)sector (e.g. a port extension). With regard to the demand forecast this means it is not considered in the organic increase in electricity demand.
- Its size in terms of investment, capacity etc. is large (affecting the next issues)
- The project is characterized by considerable electricity consumption, e.g. minimum peak demand in the final stage of the project is around 50 to 100 MW or more (depending on the time when it will be implemented; compared to overall system demand). Often projects with high electricity demand and certain production processes (e.g. requiring process heat, high security and quality of supply) are planned with their own power supply or at least in proximity to power generation plants with excess capacity (e.g. smelters, industrial parks). This has to be kept in mind when transferring the estimated power need of the large projects into the overall expansion need of the power system to avoid overbuilding of the system.

As could be seen in previous assessments of the flagship projects their implementation comes with high uncertainty with regard to implementation schedule, initial and future energy utilisation, energy need and related initial and peak electricity and power need. This is for various reasons: their unique character, the present frame conditions in Kenya and the dependency on players outside the government, e.g. for financing and implementation but also on international level, e.g. for the utilisation of the pipeline for oil from South Sudan.

Due to the often high uncertainty two scenarios were developed to display a probable range of developments:

- Base scenario: applying rather conservative assumptions given the present status and outlook for the projects and frame conditions and also considering typical time lags in such unique developments.
- High scenario: applying more optimistic assumptions close to the government plans, however applying latest information on status of the projects.

It should be noted that these scenarios and the overall assessment are by no means statements on the projects actual status or technical and economic feasibility. They should be seen as a general assessment in order to channel the vast information into this study and reduce the respective uncertainty as some projects may develop as planned while others maybe be delayed or their characteristics maybe changed.

The flagship projects listed in the following table are identified as potential key flagship projects with an expected high electricity demand. These projects have been analysed with regard to the future electricity demand in order to allow a final decision if they are considered as flagship projects with high electricity demand or as flagship projects whose demand is already covered by the organic increase in electricity demand.

Annex Table 17: Overview of potential key flagship projects with high electricity demand

ID	Flagship project	Location	Implementing agency
1	LAPSSET oil pipeline	Lamu-Isiolo-South Sudan, Lamu-Isiolo-Ethiopia	LAPSSET Authority
2	Refinery and petrochemical industries (LAPSSET)	Lamu, Isiolo	LAPSSET Authority
3	Construction of 3 berths at Lamu Port	Lamu	LAPSSET Authority, Kenya Ports Authority
4	Second container terminal Mombasa Port	Mombasa	Kenya Ports Authority
5	Electrified standard gauge railway Mombasa – Nairobi	Mombasa-Nairobi	Kenya Railways Corporation
6	Electrified standard gauge railway Nairobi – Kampala	Nairobi-Kampala (via Malaba)	Kenya Railways Corporation
7	Electrified mass rapid transit system for Nairobi	Nairobi	Kenya Railways Corporation
8	Electrified mass rapid transit system for Mombasa and Kisumu	Mombasa, Kisumu	Kenya Railways Corporation
9	Electrified LAPSSET railway system	Lamu-Isiolo-South Sudan, Isiolo-Moyale	LAPSSET Authority, Kenya Railways Corporation
10	Konza Techno City	Makueni	Konza Technopolis Development Authority, Ministry of Industrialization and Enterprise Development (MOIED)
11	Textile city	Nairobi (Athi River)	MOIED
12	Free trade zone	Nairobi	MOIED
13	Special economic zones	Mombasa, Lamu, Kisumu	MOIED
14	Small and medium enterprise	Taita Taveta, Kiambu/Nairobi, Uasin Gishu	MOIED
15	Mini and integrated steel mills	Nairobi, Machakos	MOIED
16	Resort Cities	Lamu, Isiolo, Lake Turkana	Ministry of East African Affairs, Commerce and Tourism
17	Kenya Airports	JKIA, Isiolo, Kisumu, Nairobi	Kenya Airports Authority
18	ASAL irrigation projects	Tana River, Turkana, Kilifi (Galama Ranch)	National Irrigation Board

Annex 4.E.2 Analysis of the flagship projects – key projects with potential of high power demand

LAPSSET PROJECTS

One very important project and driving element of the further economic development in Kenya is the LAPSSET initiative. It covers various sectors of the national economy and consequently it is presented first in a general description in order to provide an overview of this initiative. LAPSSET, which stands for **Lamu Port, Southern Sudan and Ethiopia Transport corridor**, hopes to achieve a number of strategic objectives upon completion:

- The establishment of reliable access to the sea for Northern/ Eastern parts of Kenya, South Sudan and Ethiopia;
- Facilitating trade and regional economic integration and interconnectivity between African countries;
- In particular facilitate trade and investment with South Sudan and Ethiopia;
- Promotion of regional and socio-economic development along the transport corridor especially in the northern, eastern, north- eastern and coastal parts of Kenya.
- The project which is being financed through a public private partnership is also expected to spur the countries overall development through stimulation of national equity and inject a growth value of 2% to 3% into the economy.

Within LAPSET, each country has a role to play to make this project a success. Kenya has seven projects to undertake under LAPSET. These are:

- Lamu Port at Manda Bay;
- Railway line from Lamu to Isiolo, Isiolo to South Sudan, and Isiolo to Ethiopia;
- Airports at Isiolo, Lamu and Lokichoggio;
- Highway from Lamu to Isiolo, Isiolo to South Sudan and Isiolo to Ethiopia
- Resort Cities at Lamu, Isiolo and Lake Turkana;
- Oil Refinery at Lamu; and Oil Pipeline from Lamu to Isiolo, Isiolo to South Sudan, and Isiolo to Ethiopia;
- Fibre optic cables linking Kenya with Ethiopia, South Sudan and Sudan.
- It is expected that the LAPSET project will have a positive effect on the socio-economic environment in Kenya in the following ways;
- New access communication link with neighbouring countries which will foster regional economic development and growth through trade facilitation;
- Creation of substantial job opportunities directly related to the port & corridor development and also indirect jobs in other sectors such as agriculture, fisheries, manufacturing, logistics, trade and commerce;
- Rapid economic development anticipated in all economic growth areas identified along and connected with the LAPSET Corridor;
- Increased international tourism arrivals at Lamu, Isiolo and Turkana by provision of Airports.

In 2011, a feasibility study for the LAPSET transport corridor project prepared by Japan Port Consultants Ltd. in cooperation with BAC/GKA JV Company has been completed. The Services included the preparation of the feasibility for the LAPSET project as a whole as well as the preparation of a Master Plan and Design and Development for the first three berths at Lamu Port (also called “the new Lamu Port”).

LAPSSET oil pipeline

The desire to no longer export crude oil from South Sudan⁵⁶ through Sudan and to provide a possible pipeline for Kenyan oil expected in the Turkana region are the driving factors for the construction of an crude oil pipeline from South Sudan to Lamu Port. The total length of the pipeline is estimated at 1,715 km (1,288 km in Kenya, 427 km in South Sudan). Additionally, a product pipeline is planned to be constructed from Lamu to Isiolo and from Isiolo to Ethiopia.

Details of the project, financing and the sequence of activities have not yet been determined since many steps still have to be considered concerning detailed design, bilateral treaties, financing and contracting, and finally construction works. This makes it impossible to make a firm prediction of the electricity demand for pumping stations along the oil pipelines, power demand of refineries, petrochemical industries and manufacturing industries along the corridor. The various options provide further uncertainty: pumping stations may be run for technical reasons with fossil fuels; refineries might be built with an on-site power generation utilizing waste products of the refining process. The LAPSSET study indicates that the construction of the oil pipeline from Lamu to the oil fields in South Sudan will require 3.5 years. Electricity supply for the pipeline is required for the pumping stations, block valve stations and storage tank terminals. The LAPSSET study indicates that the project components located on Kenyan territory will require 160 MVA of electricity by 2030.

Assumptions for electricity demand forecast

With regard to the on-going unrest in South Sudan, the early stage of oil exploration in Kenya as well as that the project as a whole is in an early stage of development, the Consultant assumes that construction works of the pipeline will not start before 2021. Considering construction time and testing phase it is expected that commissioning of the pipeline will be feasible in 2025 (base scenario)⁵⁷. It is also assumed that pumping stations in areas far away from the national grid (e.g. in Turkana County) will run with fossil fuels in the first years of operation. As a result, a successive increase in electricity peak load is assumed starting with 50 MW (allowing the operation of a several pumping stations) in the initial year and reaching its total electricity load estimated at 150 MW ten years later. An annual utilisation time of 6,500 h is expected. The following table provides an overview of the assumptions.

Annex Table 18: Demand forecast assumption – LAPSSET oil pipeline

	Unit	Base scenario	High scenario
First year of operation	Year	2025	2020
Initial load	MW	50	50
Utilisation first year (electricity need)	% (GWh/a)	74% (325)	74% (325)
First year of highest load/utilisation	Year	2035	2030/2035
Total load	MW	150	150
High utilisation	% (GWh/a)	74% (975)	74% (975)

⁵⁶ However, an oil pipeline from South Sudan to Djibouti is also still under discussion since this pipeline is much shorter than the LAPSSET project which offers the possibility to serve several countries. Furthermore, it will be necessary that the civil unrest in South Sudan will come to an end; else the pipeline project will be delayed.

⁵⁷ Provided that the unrest in South Sudan will come to an end and/or the oil resources in Kenya are evaluated as suitable for commercial production in the near future

Refinery and petrochemical industries

In the framework of the LAPSSET oil pipeline project, it is envisaged to construct large refineries and petrochemical industries along the LAPSSET corridor. The LAPSSET study includes a feasibility study of a refinery supposed to be located in Lamu. The electricity consumption is expected to be some 200 GWh annually. Considering a load factor of 85%⁵⁸ the electricity load of the refinery will be about 25 MW.

In general, the sizes of refineries and petrochemical industries range from a few MW up to 100 MW or even beyond. However, refineries might be built with an on-site power generation utilising waste products of the refining process.

Currently, no defined and detailed plans exist for the construction of the planned refinery and petrochemical industries of the LAPSSET project.

Assumptions for electricity demand forecast

It is expected that investors will only start the projects when the flow of the oil is guaranteed and the supply has been proved to be reliable. Throughout the study the complex is assumed not be operational until 2080 (base scenario), 3 years after the start of operation of the oil pipeline.

No details of the petrochemical plants and firm commitment exist. Against this uncertainty and in order to estimate generation capacity for the refinery and petrochemical industries of the LAPSSET Project, the Consultant proposes as a very rough assumption to allocate 25 MW for this sector starting from 2028 with a linear increase up to 100 MW in 2035 for the base scenario. In the high scenario it is very generally assumed that double amount is implemented: 50 MW are considered as initial load starting in year 2023 and a total load of 200 MW in 2030.

A load factor of 85% is considered a suitable assumption for the purpose of this study.

These uncertain assumptions are to be rectified at due time.

Annex Table 19: Demand forecast assumption – LAPSSET refinery and petrochemical industries

	Unit	Base scenario	High scenario
First year of operation	Year	2028	2023
Initial load	MW	25	50
Utilisation first year (electricity need)	% (GWh/a)	85% (186)	85% (372)
First year of highest load/utilisation	Year	2035	2030/2035
Total load	MW	100	200
High utilisation	% (GWh/a)	85% (745)	85% (1,489)

⁵⁸ Refineries are generally highly utilised.

Development of port facilities

Construction of 3 berths at Lamu Port

At Lamu a second port is being constructed that will house 3 berths with a length of about 900 m and a draft of 18 meters to accommodate bigger ships of 100,000 tons and more. The berths will house four ship-to-shore gantry cranes and seven rubber tyre gantry cranes. The construction works will also include an administration block, police station, staff housing, fencing, lighting, etc. Assembling of a 220 kV transmission line from Rabai to the port of Lamu is also underway.

The KES 38 billion tender for the 3 berths was awarded to China Construction and Communication Company and the 3 new berths will be completed by the year 2017. As per LAPSET feasibility study Lamu port will have 32 berths when the whole LAPSET project is complete in 2030.

The second port in Lamu is assumed to require the double amount as Mombasa, namely 4 MW with estimated 5,000 hours of utilisation resulting in 20 GWh/year.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand (e.g. in relation to a national expansion of port capacity in Kenya which is currently only provided by Mombasa).

Second container terminal Mombasa

Mombasa Port is Kenya's sole international sea port and is managed and operated under the auspices of Kenya Ports Authority (KPA). The port and the facilities around it, as well as the railway that runs from the coast to Rwanda Uganda and Burundi, are important to the economy of the whole of East Africa. Transit trade to these countries, the DRC, Tanzania and South Sudan accounts for 30 percent of the port's throughput and this proportion is growing by up to 10% a year. The port has grown rapidly in recent years as a transshipment node for fuel and containers. Now a second container terminal is being planned for the port as a further extension of Mombasa's capacity. The present peak of Mombasa Port amounts to below 4 MW and it can be expected that electricity demand will rise constantly in the future.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand.

KENYA RAILWAYS PROJECTS

Electrified standard gauge railway Mombasa-Nairobi

The existing track leads from sea level to about 1,700 m altitude with a maximum gradient of 1.2 %. Presently passenger trains operate daily between Nairobi and Malaba in both directions, powered by 2 locomotives with diesel engines of 4.5 MW each and running on small gauge tracks. The passenger trains need 14 hours per trip. In addition freight trains are circulating that offer not very competitive services, since the freight trains are slow and double handling is necessary for loading and unloading in the wagons that are narrow due to the small track.

Contract for the construction works of the standard gauge railway between Mombasa and Nairobi was signed with Chinese contractor China Road and Bridge Corporation in July / August 2013 with a construction period of 2 years. Commissioning of the railway is envisaged for December 2016⁵⁹.

The new line runs parallel with the existing track but partly takes a totally different route from the existing metre gauge one, in an effort by the project designers to get maximum efficiency, based on the “gradient and curvature” of the route, requiring the re-settlement and compensation of those who currently own the affected pieces of land.

The Contract with China Road and Bridge Corporation includes:

- Construction of a single line (equivalent) standard gauge railway connecting Mombasa to Nairobi; total track length 609.3 kilometres;
- Construction of freight exchange centres at Mombasa, Voi and Nairobi;
- Supply and installation of facilities: water system, electricity supply, signalling, communication and IT at 33 stations;
- Construction of traffic control centre for the whole line at Nairobi;
- Construction of state-of-the-art passenger stations at Mombasa and Nairobi and five other intermediate stations;
- Supply locomotives and rolling stock (passenger coaches and freight wagons);
- Build and equip maintenance workshops for infrastructure, locomotives, rolling stock and facilities;
- Liability for defects for 12 months after the handing over of the various project elements.

The main parameters of the railway system are shown in the following table.

⁵⁹ Cost of the project amounts to KES 327 billion (US\$ 3.804 billion) covered by 2 loans from EXIM Bank of China to finance 85% of project from a concessional loan (US\$ 1.6 billion) and a commercial loan (US\$ 1.633 billion) and a 15%GoK contribution of the project cost raised from annual budgets and the railway development fund, financed from 1.5% levy on cost of imports.

Annex Table 20: Main parameters of standard gauge railway Mombasa-Nairobi

Item	Specification
Gauge	1,435 mm
Design standard	Class 1 (robust and low maintenance requirement due to superior design)
Axe load	25 t (minimum)
Number of tracks	Single initially (civil infrastructure prepared for future doubling)
Design speed	Freight trains: 80 to 100 km/h Passenger trains: 120 km/h
Transit time	Freight trains: 8 h Passenger trains: 4.5 h
Design capacity	22 million t per year (projected 40% of Mombasa port throughput in 2035)
Motive power type	Diesel initially, future electrification
Trailing load	4,000 t (216 TEUs)
Loading gauge	Double stack containers and electrification

The transit time will be considerably reduced, compared to the present 14 hours for passenger trains.

It is envisaged that the train system will be electrified in the future. The electrified railway will operate with 25 kV AC and will require an infeed about every 50 km. Ketraco will provide power along the railway line at seven points stepped down to 66 kV. Kenya Railways will then develop their own power system and finally step down to 25 kV single phase for the railway overhead line that will receive an infeed about every 50 km of the 608 km track. The transmission grid and substations are not yet fully designed and agreed. Kenya railways estimate that the electric energy will be provided both through own generation and supply from the national transmission system.

Kengen and Ketraco had been requested to work out how the new railway system can be supplied with a permanent and reliable power supply, since trains cannot be unexpectedly stopped in the open field due to power cuts. Ketraco can supply Kenya Railways from the parallel running 400 kV and 132 kV lines, so that necessary intermediate transformer stations can be constructed without substantial and important additional transmission lines.

Assumption for electricity demand forecast

The passenger trains are presently moved with 2 diesel locomotives of 4.5 MW each. The electric engines will have a traction rating of 6 MW each, and one locomotive is calculated with a power rating of 7.5 MVA. This important rating is necessary since a peak of energy is needed for the start of the train after stops and for acceleration. Given that always two locomotives are coupled to a unit, 15 MVA are accounted for each convoy. In the first years probably 2 trains (one passenger and one freight train) will go in each direction, requiring a traction force of 30 MVA when 2 trains circulate in each direction.

Taking into account other electricity needs, such as air conditioning, lighting, controls, service, communication, signalling, workshops and building, and reserve capacity about 70 MW will be needed in the initial year of the electrified railway system which will increase by 10 MW annually

until 2035 (base scenario). It is also expected that the railway will not be electrified before construction works of the Nairobi-Kampala railway is completed, because then the diesel locomotives, which were on the Nairobi-Mombasa railway used until then, can be used on the new Nairobi-Kampala track. Thus, the Consultant assumes that electrification of the railway will not be implemented until 2030. A load factor of 25% is assumed for the initial year which will reach 40% in 2035 (50% in the high scenario assuming a better utilisation of the railway capacity). This load factor derives from the fact that during night and on the weekends less motive force will be required and stopping times are to be considered. However, it is a very general estimate solely for the purpose of this study. It should be complemented if detailed and comprehensible feasibility studies on the envisaged operation of the railway system are available.

In the high scenario electrification of the railway is expected in 2025 with an initial load of 100 MW (assuming about double amount of trains which could about double the peak load of all trains) and an annual increase of 20 MW. In the initial stage the same load factor is assumed.

Annex Table 21: Demand forecast assumption – Standard gauge railway Mombasa-Nairobi

	Unit	Base scenario	High scenario
First year of operation	Year	2030	2025
Initial load	MW	70	100
Utilisation first year (electricity need)	%(GWh/a)	25% (153)	25% (219)
First year of highest load/utilisation	Year	2035	2035
Total load	MW	130	300
High utilisation	%(GWh/a)	40% (456)	50% (1,314)

These uncertain assumptions are to be rectified at due time.

Electrified standard gauge railway Nairobi-Kampala

It is planned to construct a railway system from Nairobi to Kampala. The section in Kenya between Nairobi to Malaba amounts to 500 km (63 % of the total 800 km) and studies for this line have already been completed by Kenya Railways. The design of the railway system will be the same as the Nairobi - Mombasa section. Electrification of the railway is considered as alternative to diesel driven engines.

Kenya Railways indicated that financing is presently not ensured for this railway section. It will need a longer preparation time since the financing must be ensured in two countries. In addition the question is not answered if the train will initially run with diesel engines and electrification will be performed at a later stage.

Assumption for electricity demand forecast

The consumption of electric power of the railway system from Nairobi to Kampala will be similar to that of the Nairobi - Mombasa section since the ton-kilometres are approximately the same. Since the line section in Kenya amounts 63 % of the total length from Nairobi to Kampala, 63 % of the

electricity demand of the Nairobi – Mombasa line shall be applied for the demand of electric power for the Nairobi – Malaba railway system.

In the base scenario, 2035 is considered as the earliest COD of the electrification of the railway.

In the high scenario, electrification of the railway is considered in 2030.

Annex Table 22: Demand forecast assumption – Standard gauge railway Nairobi-Kampala

	Unit	Base scenario	High scenario
First year of operation	Year	2035	2030
Initial load	MW	44	63
Utilisation first year (electricity need)	% (GWh/a)	25% (96)	25% (138)
First year of highest load/utilisation	Year	2035	2035
Total load	MW	44	189
High utilisation	% (GWh/a)	25% (96)	40% (662)

These uncertain assumptions are to be rectified at due time.

Electrified mass rapid transit system for Nairobi metropolitan region

In the greater Nairobi area old lines shall be rehabilitated, in total 26 new railway stations shall be built and new electrified tracks are to be constructed on 9 corridors (partly rehabilitated but mainly new tracks) in order to relieve the present traffic congestions and provide efficient mass transportation. In addition construction of tracks for cargo delivery is foreseen.

Phase 1 was completed in December 2013 with the operation of the Swokimu – Imaradamia – Makadara stations. However, according to the timetable published by Kenya Railways in the internet, only 3 trains circulate in each direction every day and the system operates with diesel engines and is not electrified.

10 more railway stations shall be built in Phase 2. It will cost about 10 billion KES and shall be financed by World Bank with International Competitive Bidding according to World Bank rules. The Consultant was informed by Kenya Railways that they are not yet involved in phase 2. The implementation according WB rules requires the selection of Consultant with an international bidding, the design and preparation of tender documents, international bidding, contracting and the proper construction works, requiring at least 3 to 4 years.

In addition, Kenya Railways stated that for the development of the Mass Rapid Transit system for Nairobi Metropolitan region a feasibility study is necessary to ascertain how and in what steps the system shall be rehabilitated and extended followed by dedicated attribution of funds for the different line sections.

Since phase 1 runs with diesel powered trains and phase 2 will not be operational before 2018 an immediate extra demand for Nairobi Mass Rapid Transit System is identified after 2019, when ei-

ther the existing phase 1 is electrified or phase 2 will operate with electric driven locomotives. Presently, no decision has been made on the further development of the Mass Rapid Transit System for Nairobi Metropolitan region.

Assumption for electricity demand forecast

Although no firm commitment exists and in order to safeguard generation capacity for the Nairobi Mass Rapid Transit System, the Consultant proposes to allocate 40 MW for the Nairobi system starting from 2030 with an increase of 5 MW annually until 2035 for the base scenario. Similarly, it is estimated that the load factor will also rise over the years from 30% in the initial year to 50% in 2035 in the base scenario (50% in the high scenario).

A starting date of the year 2025 will be considered in the high scenario with an annual increase of 10 MW annually until 2035.

These uncertain assumptions are to be rectified each year.

Annex Table 23: Demand forecast assumption – Electrified mass rapid transit system for Nairobi metropolitan region

	Unit	Base scenario	High scenario
First year of operation	Year	2030	2025
Initial load	MW	40	40
Utilisation first year (electricity need)	% (GWh/a)	30% (105)	30% (105)
First year of highest load/utilisation	Year	2035	2035
Total load	MW	90	140
High utilisation	% (GWh/a)	40% (315)	50% (491)

Mass Rapid Transit System for Mombasa and Kisumu

Kenya Railways indicated that in 2010 a study was made concerning the development of mass transportation in the Coast Region and Lake Region but no sequence followed this study.

Consequently no electricity demand is foreseen in the load forecast of key flagship projects.

LAPSSET railway system

The LAPSSET project is one of the largest transport and infrastructure projects in East Africa and was launched on 2nd March 2012 by Presidents Mwai Kibaki of Kenya, General Silva Kiir of South Sudan and Ethiopian Prime Minister Menes Zenawi. Part of the project involves the development of a modern high speed, high capacity standard gauge railway for passengers and freight within the proposed Lamu Corridor. The development will open up Northern Kenya for exploitation of stranded resources and will provide the landlocked Republic of South Sudan and Ethiopia with access to the sea. It is planned to construct a standard gauge railway from Lamu via Isiolo to Nakodok as well as a second section from Isiolo to Moyale resulting in an overall length of about 1,800 km. The sec-

tion Lamu - Isiolo – Nakdok with 1,250 kilometres will be extended to Juba in South Sudan and to Douala in Cameroon.

A pre-feasibility study was performed in 2010 for these lines. Since then Kenya Railways has received no further instruction to proceed with the project and seen no possibility to provide answers on power demand of railways of the LAPSET project. Varying information exist whether and when electrification should be introduced and the respective demand. As per pre-feasibility study electrification is not recommended due to high costs. A draft feasibility study⁶⁰ on transmission network for this region indicates a demand of 14 MW from 2020 onwards.

Assumption for electricity demand forecast

Due to the varying information the electrification of LAPSET railway system is assumed to happen – if at all – in the far future after (some three years) the main railway lines are electrified (the last being the Nairobi – Malaba line). This would shift this project for the base scenario beyond the LTP study period. However, for the base scenario it is assumed that the LAPSET railway will not be electrified (as per feasibility study). As discussed with the client for the high scenario an electrification is assumed, initially 14 MW and a similar utilisation factor as the other electrification projects.

Annex Table 24: Demand forecast assumption – LAPSET railway system

	Unit	Base scenario	High scenario
First year of operation	Year	na	2033
Initial load	MW	na	14
Utilisation first year (electricity need)	% (GWh/a)	na	25% (31)
First year of highest load/utilisation	Year	na	2035
Total load	MW	na	14
High utilisation	% (GWh/a)	na	40% (49)

General Kenya railway system

In an overall assessment of the future development of the railways in Kenya, the Consultant was told that a Master Plan had been developed by Kenya Railways indicating which sections need to be constructed in the country. However, the Government did not indicate until now what budget will be provided for the railway system in the coming years, to enable Kenya Railways to proceed with further feasibility studies as to how to best develop the different railway schemes and optimise design and the use of funds.

Consequently, it is difficult for Kenya Railways to plan the future operation, rehabilitation and extension of the Kenya railway system and to perform well in advance the necessary feasibility and design studies. Taking into account this situation it is even more difficult to predict the forecast of electricity demand of the uncertain railway system.

⁶⁰ Source: KETRACO, Parson Brinckerhoff, *Feasibility Study for Kenya Power Transmission Improvement Project - Assignment IV study* (2011)

COMMERCIAL AND INDUSTRIAL CENTRES

Konza Techno City

The ICT (Information and Communication Technology) Park Konza Techno-City lies about 60 km south of Nairobi on the road to Mombasa and covers an area of 5,000 acres first opened land at an empty area, not far from the airport. 5,000 acres are equal to 20.24 km² (or for visualisation this area would cover a rectangular field of about 4.5 km x 4.5 km).

The Government will create the entire infrastructure of the Techno City consisting of streets, public lighting, water, electricity and telecommunication. KONZA Technopoli Development Authority will develop and guide the settlement of ICT (Information, Communication & Technology) companies blending both light industries and services.

In the Technocity Business Process Outsourcing, light manufacturing and services, as well as university, hospital housing and schools are planned. The first phase, extending from 2014 -2017 will cover an area of 400 acres (1.62 km²).

The framework for infrastructure and management has already been carried out. The land has been acquired and the infrastructure works at site started with the drilling of 7 boreholes for water supply. After the installation of the first power supply, water pumping can be ensured for the construction works, electrical machinery for civil works can be utilised and infrastructure for workers can be created.

Ketraco is going to construct a 132/33 kV substation with 2 transformers 23 MVA each. These transformers can be replaced by bigger units and further substations of 132/33 kV will be erected according to the growing demand. Finally Ketraco plans to erect at Konza a 400/132 kV substation with 2 transformers 200 MVA each, since the 400 kV transmission line Nairobi – Mombasa bypasses the Konza Park a short distance away and can be tapped without difficulties.

In view of the fact that presently the infrastructure consists of 7 boreholes only and the start of construction of the first building (first phase to be ready in 2017) was announced⁶¹ during the finalisation of this study, it is estimated that the complete infrastructure and first buildings will be operational by the end of 2017 or later so that the further construction works for buildings and functional operation of installed entities will intensify the demand of electricity.

Assumption for electricity demand forecast

It is estimated that electricity demand in 2017 will be 2 MW which increase up to 190 MW in 2035 (base scenario). This estimate is derived from the demand of similar commercial and industrial zones. The utilisation will rise from 30% in 2015 to 50% in 2035, due to the intensified use in the light manufacturing and ICT industry.

⁶¹ <http://www.standardmedia.co.ke/mobile/article/2000188417/konza-tech-city-breaks-ground-march> (accessed 2.4.2016)

In the high scenario the electricity demand will grow faster, starting with 2 MW in 2016 and reaching 300 MW in 2035. In absence of any details on committed entities to start operations these figures are very vague estimates just for the purpose of this study to cover a range of possible power demand characteristics.

The development of applications of enterprises for the Konza Techno Park and the subsequent construction of the civil structures will allow the development of demand to be adjusted at an early stage. In addition, the electric substations can be easily adapted to the actual increase of demand since transformers can be upgraded and transmission lines already pass near to the Park.

Annex Table 25: Demand forecast assumption – Konza Techno City

	Unit	Base scenario	High scenario
First year of operation	Year	2017	2016
Initial load	MW	2	2
Utilisation first year (electricity need)	% (GWh/a)	30% (5)	30% (5)
First year of highest load/utilisation	Year	2035	2035
Total load	MW	190	300
High utilisation	% (GWh/a)	50% (832)	50% (1,314)

Textile City

It is planned to establish a textile city at Athi River, close to Nairobi and to invite investors to use the local labour force to produce garments for sale abroad. Such Textile factories already exist for example in China, Cambodia and Bangladesh but increase of labour cost, complaints about working conditions and the need for regional diversification make it attractive to set up such factories in Africa.

It is judged that within 2 years and with great probability the textile city will start operation so that electricity demand exists in the production factories for lighting, air conditioning and light machinery. The initial load is estimated at only a few MW in the beginning.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand.

Free Trade Zone

Various enterprises requested the introduction of a free trade zone at Nairobi and it is judged that the establishment of the free trade zone will attract numerous enterprises and create additional job opportunities. Parliament recently agreed to the establishment of a tax-free zone, but the main obstacle why such zones are not yet set up is the lack of legislation.

It is estimated that after the time of four years from now the free trade zone will be fully operational with the necessary legislation, acquisition of land, fencing, and technical infrastructure of roads, water, electricity, and a demand of few MW is expected (in the absence of defined plans) and some 50% load factor is estimated for the free trade zone containing light industry. This amount of additional demand is not considered as key flagship project and will be considered in the overall demand forecast correlated with the GDP.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand.

Special Economic Zones

Special economic zones shall be installed in

- Mombasa with 2,000 km²,
- Lamu with 700 km² and
- Kisumu with 700 km².

The area of 700 km² corresponds to a square of 26 km each side, a rather large area. The land in Mombasa is already acquired; the land is not yet defined nor acquired for the other sites. Presently detailed plans are developed for the use and lay-out of the special economic zones. It is expected that these zones may trigger exceptional developments which go beyond the current economic activities in Kenya similar to Konza city. Therefore, it is considered to contribute to power demand beyond organic growth. However, this has to be further monitored in future.

Government intends to install the necessary infrastructure, such as roads, electricity, water, telecommunication, etc. and will define the future use and type of companies to settle in the economic zones. Parallel to the preparation of the infrastructure, investors will be sought.

An interesting development is recorded at Machakos, close to Nairobi, where the community dedicated 260 acres of land as industrial park and plans to give the land free of charge to investors. Much interest has been shown to these plans both by investors and by other communities who will follow this initiative if it is successful and in order to attract companies to establish plants.

Assumption for electricity demand forecast

A starting date of the first Special Economic Zone in the year 2019 will be considered in the base case analysis and the year 2017 for the high scenario (the respective bill was enacted end of 2015).

Since no demand figures are known from potential firms acting in the economic zones, a vague estimate is made that 5 MW will be required in the first year and reach 110 MW in 2035 in the base scenario. In the high scenario it is expected that already 30 MW are required in the initial year and that the first year of the highest utilisation with 110 MW will already be in 2025.

It can be assumed that some investors will only change the location from existing locations to the special economic zones so that the actual load from the special economic zones might be even higher (and lower for the original areas). This effect is not possible to estimate and model.

These uncertain assumptions are to be regularly rectified and adjusted to match the actual development.

Annex Table 26: Demand forecast assumption – Special Economic Zones

	Unit	Base scenario	High scenario
First year of operation	Year	2019	2017
Initial load	MW	5	30
Utilisation first year (electricity need)	% (MWh/a)	40% (18)	40% (105)
First year of highest load/utilisation	Year	2035	2025/2035
Total load	MW	110	110
High utilisation	% (MWh/a)	50% (482)	50% (482)

Small and Medium Enterprise (SME) parks

About 180 SME centres have already been established throughout the country. They will be equipped with tools and machinery so that people can rent the machines and utilise them for works without the necessity to purchase the equipment that will be needed only for a short time and remain idle during the rest of the day. The supply with machinery has just started. In addition training will be offered so that users understand the correct and safe operation of the machinery.

The centres need a low voltage three phase power supply that can be provided within the small commercial consumer class.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand, in particular since the SME parks are scattered throughout the country with gradually increasing demand.

Mini and integrated steel mills

In 2010 Posco, a worldwide acting Korean steel company intended to install mini steel mills in Kenya using scrap iron in cooperation with Numerical Machining Complex Ltd. After detailed studies it was found that sufficient scrap iron is not available, so that integrated steel mills should be developed using local deposits of iron ore. In particular Hamelite iron ore is interesting since it already melts at about 900 degrees and is found at various locations in Kenya, thus providing good conditions for local iron industry.

Comprehensive explorations still have to be performed to determine magnitude, quality, and depth of the different iron ore deposits in the Kisumu region and Homabay County. Following this research, it will be necessary to investigate details of the smelter using electricity, and to determine whether to use imported or local coal for the reduction of the iron ore to steel. Once these studies are completed it is expected that companies will soon set themselves up in order to excavate the iron ore and produce steel. Already eight firms have shown interest at the Ministry of Industrialization in setting up the production.

Independent of these activities, various steel mills have operated in Kenya for several years. For instance, Abyssinia Prime Steel Mill at Awasi is already producing steel since 2013 using local iron ore and utilising machinery brought from India, thus proving the feasibility of integrated iron mills. The steel mills in Kenya according to recent 2013/2014 figures use several MW of peak power (up to 10 MW in some cases).

Creating steel from iron ore requires a long process of mining, crushing, separating, concentrating, mixing, pelletizing, and transport to the furnace. It is judged that within short time and with great probability the mining activities will start with the subsequent blast furnaces and steel mills. The steel mill industry will require significant quantities of electricity. For this high electricity need and to enhance supply security large mill and smelter projects are usually developed back to back with power generation facilities. Hence, any development beyond the existing size in Kenya would most probably be connected to a new power generation plant.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast:

- The additional demand from small steel mills is not considered a key project as these steel mills already operate in Kenya and could be therefore assumed to be covered by the organic growth of the demand.
- Though large mill or smelter projects would usually be developed with their own power generation projects for the high scenario it is assumed as discussed with the client that one generic steel mill will be considered. Initially 100 MW (200 MW after five years) are assumed for 2030. The respective power generation projects could be for instance the various planned large base load power plants analysed in other parts of this study (coal power plants or geothermal power plants).

Annex Table 27: Demand forecast assumption – Integrated steel mill

	Unit	Base scenario	High scenario
First year of operation	Year	na	2030
Initial load	MW	na	100
Utilisation first year (electricity need)	% (MWh/a)	na	75% (657)
First year of highest load/utilisation	Year	na	2035
Total load	MW	na	200
High utilisation	% (MWh/a)	na	75% (1,314)

RESORT CITIES

Three resort cities shall be constructed and operated by private investors at the following locations:

- Isiolo/Kipping Gap
- Lamu
- Lake Turkana

These resorts are subprojects of the *Lamu Port and South Sudan Ethiopia Transport (LAPSSET) Corridor* project and shall be connected to the LAPSSET infrastructure.

Isiolo

Isiolo is located in Isiolo County, 285 km north to Nairobi and is planned to be the junction of the LAPSSET corridor headed to South Sudan via Lokochokio and Ethiopia via Moyale. The resort will be located south of the Isiolo town centre.

A first step towards the implementation of the resort cities has been made with the completion of three tarmacked highways leading to the Isiolo and the improvement of the airport. But a major setback is recorded since the land acquisition for the resort city is not completed as no budget was available for the compensation of loss of land of the present land owners. The resort shall be constructed and operated as a private partnership project.

As per LAPSSET feasibility study it is planned to construct a hotel and recreation complex, service zone, golf course, and sport zone. The following key data for Isiolo Resort City were assumed:

- Number of visitors/year: 45,000
- Bed capacity: 1,200
- Total stay: 120,000
- Number of employees: 1,327

However, land acquisition is not yet accomplished and an investor is not yet found.

Lamu

Lamu is located at the coast 340 km north to Mombasa. Regarding tourists attractions different tourist facility centres shall be constructed, i.e. convention centre (for conferences), amusement centre (opera and music hall, children's park, shopping mall, sports park with yacht harbour), cultural centre (university, national library, laboratories of companies, modern art museum, botanical garden), fisherman's wharf and market and tours operation programs. It has to be considered that these mentioned facilities plans only represent general ideas. Land acquisition is not yet made, neither feasibility studies, financing plans, risk analysis nor precise concepts and designs have been carried out. No private investors are known.

In the LAPSSET feasibility study the following key data are considered:

- Number of visitors/year: 62,100

- Bed capacity: 1,770
- Total stay: 177,000
- Number of employees: 2,019

Lake Turkana

Lake Turkana is a salt lake in the Kenyan Rift Valley, with its far northern end crossing into Ethiopia. The resort shall be constructed in Lodwar, west of Lake Turkana.

For Lake Turkana Resort City the status of land acquisition, planning and private investor is the same as for Lamu.

In the LAPSSET feasibility study the following key data are considered:

- Number of visitors/year: 4,000
- Bed capacity: 220
- Total stay: 22,046
- Number of employees: 601

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered a key project as it is comparably small and assumed to be covered by the organic growth of the demand (of the touristic sector). Given the current unfavourable framework for the touristic sector all project may be even delayed.

Kenya Airports

Kenya Airport Authorities has identified four airports that will be further improved or extended or works are already ongoing for these works. In the following the respective projects are briefly described.

Green Field Terminal JKIA (Jomo Kenyatta International Airport)

Work for the Greenfield Terminal started in December 2013. On completion in 2017 it will comprise 50 international check-in counters, eight air bridges for aircraft to dock, 45 aircraft parking stands on the linked apron space and an additional runway.

Second Runway JKIA

Work for the second runway is scheduled to start in 2016. After completion it will allow for continuous airport operations should an aircraft incident render the existing runway unusable. The runway will also enable direct long haul flights to destinations such as New York City, carrying up to 32 tonnes.

Upgrading of existing JKIA

Upgrading of the existing runway system includes: pavement rehabilitation, upgrading of the taxiway capacity and upgrading of the Instrument Landing System.

The planned upgrade will involve expansion of the runway to 2.5km, building of a passenger terminal with an area of 4,500 square meters and a capacity to handle 125,000 passengers annually, construction of a parking area, fire station, control tower and hanger.

Isiolo Airport

First phase of the Isiolo International Airport was the construction of 1.4 kilometres runway that was completed last year. The ongoing second phase will include car parks and a modern passenger terminal to handle more than 600,000 people annually, an administration block with a floor area of 1,025 square metres and a passenger terminal car park to accommodate 200 cars.

Kisumu Cargo Terminal

In February 2014 Kisumu Airport was officially opened. The new Airport boasts a modern control tower and a terminal with separate lounges for arrival and departures, the passenger, cafeteria, VIP lounge and offices alongside a parallel taxiway and a cargo apron.

Currently, fish and flowers for export from the region are transported to Nairobi by road resulting in heavy losses in terms of the lost, wastage and added transportation costs. The extension works at the airport is expected to start handling cargo.

Expansion of Wilson Airport

Wilson Airport lies approximately 4 kilometres by road, south of the Nairobi central business district. This airport, close to the town centre, was the first airport in Nairobi and serves small domestic and international traffic after JKIA took over the big international flights. It is used mostly by general aviation traffic. Industries that use Wilson Airport extensively include tourism, health care and agriculture. It presently handles an estimated 1,300 international and domestic aircrafts annually with around 120,000 landings and take-offs.

A master plan was developed in 1983 that will guide the upgrade of Wilson Airport to handle heavier commercial airplanes while a proposed revised road map has never been approved since 1996.

These six activities of the aviation sector show a constant development and growth of activities at various locations that will entail a constant growth of demand of electricity. The demand of JKIA is already high and the continuous refurbishments and extensions will continuously add to this high demand. The other five extension works will require smaller demand of power. The Consultant judges that total demand of the six aviation projects will grow in correlation with the GDP, no sudden and steep raise of demand of the total of aviation demand will occur. The demand of Kenya airports is not considered as key project for electricity demand.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand.

ASAL irrigation projects

Presently 150,000 acres (37,500 ha) are under irrigation in Kenya. In the framework of the government's 2nd MTP the capacity of irrigated Arid and Semi-Arid Land (ASAL) areas shall increase up to 1,000,000 acres (250,000 ha) within the next 5 years. The project could be implemented in 2 areas only, on Galana Ranch located in Tana River and Kilifi County, but it is the aim of the National Irrigation Board to spread the expansion throughout the whole country, so that many counties will benefit. Further planned areas are i.e. Bura/Tana River, Turkana/Turkwel and Kisumu area. However, no overall plan for the irrigation project exists (regarding to definition of areas, pumping mechanism, precise time schedules etc.).

Irrigation of all current projects is mainly by gravity with few scattered diesel driven systems. The National Irrigation Board would prefer to implement electrified pumping for these diesel schemes (since cheaper, less maintenance and less environmental footprint and damages), but due to the rural location of the projects electricity grid connection is currently scarce. It is assumed that the future projects will also be of the gravity scheme and the remaining diesel driven, because of the prevailing large distance to the electricity grid.

Fortunately only few diesel pumps are needed for irrigation, but in order to provide an impression of the energy requirement of irrigation with diesel driven pumps, the National Irrigation Board needed 45,000 liters diesel for the irrigation of 10,000 acres of land, so that the conversion to electric pumping is of importance from the ecological point of view.

In the Turkana region good soil prevail but little water resources are available. However, in the underground aquifer groundwater reservoirs exist that might be exploited and used for agricultural purposes but up till now no plans for the use of this groundwater reservoir exist, using electricity pumping and utilization as drinking water or for drip irrigation or other use.

In view of the dominant irrigation by gravity, it can be stated that no key demand of electricity exists for the Irrigation Projects of the ASAL Development Projects.

Assumption for electricity demand forecast

Based on the previous analysis the following is assumed for the demand forecast: This amount of additional demand is not considered as a key project and is assumed to be covered by the organic growth of the demand.

Annex 4.E.3 Summary

In the framework of the assessment mission a large number of flagship projects have been analysed. Key flagship projects with an expected high electricity demand which is not covered by the

organic increase in electricity demand have been identified and evaluated in terms of the expected electricity needs until 2035.

However, due to their unique character, the implementation of the projects is associated with high uncertainty with regard to implementation schedule, initial and future energy utilisation, energy need and related initial and peak electricity and power need. The chosen scenarios and the overall assessment are by no means statements on the project actual status or technical and economic feasibility. It should be seen as a general evaluation in order to channel the vast information into the Power Generation and Transmission Master Plan study and reduce the respective uncertainty as some projects may develop as planned while others maybe be delayed or their characteristics maybe changed.

The assumptions and the electricity demand forecasts (base and high scenario) of the identified key flagship projects with high electricity demand are summarised in the following tables.

Annex Table 28: Demand forecast key flagship projects assumptions – Base scenario

No.	Project	Considered in forecast	First year of operation	Initial load [MW]	Year of total load	Total load [MW]	Utilisation in first year of operation [%]	First year of highest utilisation	Highest utilisation [%]
1	Electrified mass rapid transit system for Nairobi	yes	2030	40	2035	90	30%	2035	40%
2	Electrified standard gauge railway Mombasa - Nairobi	yes	2030	70	2035	130	25%	2035	40%
3	Electrified standard gauge railway Nairobi - Malaba	yes	2035	44.1	2035	44.1	25%	2035	25%
4	Electrified LAPSSET standard gauge railway	no							
5	Resort Cities - Isiolo, Lamu, Lake Turkana (LAPSSET)	no							
6	Oil pipeline and Port Terminal (LAPSSET)	yes	2025	50	2035	150	74%	2035	74%
7	Refinery and Petrochemical Industries (LAPSSET)	yes	2028	25	2035	100	85%	2035	85%
8	Konza Techno City	yes	2017	2	2035	190	30%	2028	50%
9	Special Economic Zones	yes	2019	5	2035	110	40%	2035	50%
10	Integrated Steel Mills	no							

Annex Table 29: Demand forecast key flagship projects assumptions – High scenario

No.	Project	Considered in forecast	First year of operation	Initial load [MW]	Year of total load	Total load [MW]	Utilisation in first year of operation [%]	First year of highest utilisation	Highest utilisation [%]
1	Electrified mass rapid transit system for Nairobi	yes	2025	40	2035	140	30%	2035	50%
2	Electrified standard gauge railway Mombasa - Nairobi	yes	2025	100	2035	300	25%	2035	50%
3	Electrified standard gauge railway Nairobi - Malaba	yes	2030	63	2035	189	25%	2035	40%
4	Electrified LAPSSET standard gauge railway	yes	2033	14	2035	14	25%	2035	40%
5	Resort Cities - Isiolo, Lamu, Lake Turkana (LAPSSET)	no							
6	Oil pipeline and Port Terminal (LAPSSET)	yes	2020	50	2030	150	74%	2035	74%
7	Refinery and Petrochemical Industries (LAPSSET)	yes	2023	50	2030	200	85%	2035	85%
8	Konza Techno City	yes	2016	2	2035	200	30%	2028	50%
9	Special Economic Zones	yes	2017	30	2025	110	40%	2035	50%
10	Integrated Steel Mills	yes	2030	100	2035	200	75%	2035	75%

Annex Table 30: Electricity peak demand forecast of key flagship projects with expected high electricity demand – Base scenario (MW)

Electricity demand [MW]	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LAPSSET oil pipeline and port terminal											50	60	70	80	90	100	110	120	130	140	150
LAPSSET refineries and petrochemical industries														25	36	46	57	68	79	89	100
Electrified railway Mombasa-Nairobi																70	82	94	106	118	130
Electrified railway Nairobi-Kampala																					44
Electrified mass rapid transit system Nairobi																40	50	60	70	80	90
Konza Techno City			2	12	23	33	44	54	65	75	86	96	106	117	127	138	148	159	169	180	190
Special Economic Zones					5	12	18	25	31	38	44	51	58	64	71	77	84	90	97	103	110
Total			2	12	28	45	62	79	96	113	180	207	234	286	324	471	531	591	651	710	814

Annex Table 31: Electricity consumption forecast of key flagship projects with expected high electricity demand – Base scenario (GWh)

Electricity consumption [GWh]	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LAPSSET oil pipeline and port terminal											325	390	455	520	585	650	715	780	845	910	975
LAPSSET refineries and petrochemical industries														186	266	346	425	505	585	665	745
Electrified railway Mombasa-Nairobi																153	201	255	316	382	456
Electrified railway Nairobi-Kampala																					97
Electrified mass rapid transit system Nairobi																105	140	179	221	266	315
Konza Techno City			5	35	67	104	143	186	232	281	334	390	449	512	558	603	649	695	741	786	832
Special Economic Zones					17	41	65	90	116	143	170	198	227	256	286	317	348	381	414	447	482
Total			5	35	85	145	208	276	348	424	829	978	1131	1474	1695	2174	2479	2795	3121	3457	3901

Annex Table 32: Electricity peak demand forecast of key flagship projects with expected high electricity demand – High scenario (MW)

Electricity demand [MW]	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LAPSSET oil pipeline and port terminal						50	60	70	80	90	100	110	120	130	140	150	150	150	150	150	150
LAPSSET refineries and petrochemical industries									50	71	93	114	136	157	179	200	200	200	200	200	200
Electrified railway Mombasa-Nairobi											100	120	140	160	180	200	220	240	260	280	300
Electrified railway Nairobi-Kampala																63	88	113	139	164	189
Electrified mass rapid transit system Nairobi											40	50	60	70	80	90	100	110	120	130	140
Electrified LAPSSET railway system																			14	14	14
Konza Techno City		2	12	23	33	44	54	65	75	85	96	106	117	127	137	148	158	169	179	190	200
Special Economic Zones			30	40	50	60	70	80	90	100	110	110	110	110	110	110	110	110	110	110	110
Integrated steel mill																100	120	140	160	180	200
Total		2	42	63	83	154	184	215	295	347	539	610	682	754	826	1061	1147	1232	1332	1417	1503

Annex Table 33: Electricity consumption forecast of key flagship projects with expected high electricity demand – High scenario (GWh)

Electricity consumption [GWh]	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LAPSSET oil pipeline and port terminal						325	390	455	520	585	650	715	780	845	910	975	975	975	975	975	975
LAPSSET refineries and petrochemical industries									372	532	691	851	1011	1170	1330	1489	1489	1489	1489	1489	1489
Electrified railway Mombasa-Nairobi											219	289	368	456	552	657	771	894	1025	1165	1314
Electrified railway Nairobi-Kampala																138	216	308	413	531	662
Electrified mass rapid transit system Nairobi											105	140	179	221	266	315	368	424	484	547	613
Electrified LAPSSET railway system																			31	40	49
Konza Techno City		5	34	67	102	140	182	226	274	324	378	434	494	556	602	648	693	739	785	830	876
Special Economic Zones			105	142	180	219	259	300	341	384	428	433	439	444	450	455	460	466	471	476	482
Integrated steel mill																657	788	920	1051	1183	1314
Total		5	139	209	282	684	830	981	1507	1825	2471	2863	3270	3692	4109	5334	5761	6214	6723	7236	7775

Annex 4.F Substation load estimate (local load forecast)

The objective of this section is to develop load estimates per substation, so that this forecast can be used for the transmission grid planning activity of the Power Generation and Transmission Master Plan, e.g. for the Long Term Plan (LTP) reaching the period 2030 to 2035.

This load forecast is built to be consistent with the national load forecast prepared for the Power Generation and Transmission Master Plan (see Chapter 4). Therefore, it matches the regional forecast load for each of the four “electrical” regions (the power system areas Nairobi, Coast, Mt Kenya, and Western). It is adjusted to the related values year by year for the study period. It is based on information and data provided during various meetings with responsible staff mainly from KPLC.

Annex 4.F.1 Available data and assumptions

Substation load

For the substation peak load a simultaneity factor close to one is assumed, i.e. they would have their peaks in the same time slice (same half hour) than the region hosting that substation. This is based on the assumptions that economic development⁶² and thus demand will converge throughout the country in the long term and that in the long term the types of loads are anyway uncertain.

No complete set of hourly substation loads was available for this study (see Chapter 3.2 for details on available load data). Therefore, substation loads in base year had to be developed through proxy assumptions as detailed in the table below:

- Columns “From LCPDP” refer to the last Least Cost Planning Development Plan (2013) for years “2017” and “2019”. Values in column 2014 are proportional to these figures so that their sum reach the peak of 2014 (1,514 MW).
- Column “Using NCC measures” has been prepared from the load data files provided by the National Control Center (NCC) for each power system area: some substations appear not to be measured, the sum of the peak loads amounts to 1,459 MW
- Column “Best guess” uses both the above mentioned NCC values and the values provided by Kenya Power headquarters (Transmission department)
- Column “Adj. for demand forecast” is obtained by adjusting the “Best guess” levels to the peak loads at substation level of the national demand forecast.

⁶² This is supported by various policies, e.g. as per Transition to Devolved Government Act of 2012, each county may develop infrastructures so that the industry will not anymore be concentrated in Nairobi. This is in line with the new competencies of the counties, as per the new constitution and the plans of the Ministry of Devolution and Planning to give the counties more autonomy than in the past, and therefore are likely to invest in more economic sectors and be more independent than in the past.

Annex Table 34: Substation load in base year and underlying assumptions

Substation	Zone / power system area	County	From LCPDP 2017	From LCPDP 2019	From LCPDP 2014	NCC mea- sures 2015	Best guess 2015	Adj. for demand forecast 2015
Total load [MW]			2,189	2,658	1,514	1,459	1,530	1,520
Ld 1KIP33 (33 kV)	4_COAST	MOMBASA	133,3	161,3	92,2	81,7	90,0	92.7
Ld ATHI (66 kV)	2_NAIROBI	NAIROBI	118,4	143,3	81,9	81,9	81,9	84.4
Ld AWENDO (33 kV)	7_W REGION	MIGORI	2,0	2,4	1,4	1,5	1,5	1.5
Ld BAMBURI (33 kV)	4_COAST	MOMBASA	38,1	46,0	26,3	49,2	49,2	50.6
Ld BOMET (33 kV)	7_W REGION	BOMET	11,8	14,3	8,2	4,0	4,0	4.1
Ld CHEMA33 (33 kV)	7_W REGION	NYAMIRA	19,6	23,7	13,5	31,9	31,9	32.9
Ld ELD33 (33 kV)	7_W REGION	KISUMU	37,6	45,4	26,0	29,0	29,0	29.9
Ld EMBAKASI (66 kV)	2_NAIROBI	NAIROBI	166,3	201,3	115,0	115,0	115,0	118.5
Ld GALU (33 kV)	4_COAST	KWALE	28,9	35,0	20,0	17,7	17,7	18.2
Ld GARISSA (33 kV)	4_COAST	GARISSA	5,1	6,1	3,5		5,1	5.3
Ld GARSEN (33 kV)	4_COAST	TANA RIVER	1,3	1,6	0,9	1,1	1,1	1.2
Ld GATUNDU (33 kV)	2_NAIROBI	NAIROBI	7,4	8,9	5,1	3,0	3,0	3.1
Ld GITHAMBO (33 kV)	5_MT KENYA	MURANG'A	8,4	10,2	5,8	4,7	4,7	4.8
Ld ISIOLO (33 kV)	5_MT KENYA	ISIOLO	8,0	9,7	5,6	1,5	1,5	1.5
Ld JUJA (66 kV)	2_NAIROBI	NAIROBI	107,2	129,7	74,1	74,1	74,1	76.4
Ld KABARNET (33 kV)	7_W REGION	NAKURU	3,6	4,3	2,5	2,5	2,5	2.5
Ld KAINUK (66 kV)	7_W REGION	TURKANA	1,4	1,7	1,0	1,0	1,0	1.0
Ld KAJIADO (1)	2_NAIROBI	KAJIADO	16,9	20,4	11,7	11,7	11,7	12.0
Ld KAJIADO (33 kV)	2_NAIROBI	KAJIADO	17,0	20,6	11,8	11,8	11,8	12.1
Ld KAMBURU (132kV)							24,0	
Ld KEGATI (132 kV)							29,7	
Ld KIBOKO (132 kV)	4_COAST	MAKUENI	2,6	3,2	1,8	1,8	1,8	1.9
Ld KIGA33 (33 kV)	5_MT KENYA	NYERI	37,9	45,8	26,2	25,5	25,5	26.3
Ld KILIFI (33 kV)	4_COAST	KILIFI	19,2	23,2	13,3	29,3	29,3	30.1
Ld KINDARUMA (33 kV)	5_MT KENYA	EMBU	0,5	0,6	0,3	0,3	0,3	0.4
Ld KISII33 (33 kV)	7_W REGION	KISII	23,1	27,9	15,9	15,9	15,9	16.4
Ld KISU33 (33 kV)	7_W REGION	KISUMU	55,7	67,4	38,6	38,3	38,3	39.4
Ld KITALE (33 kV)	7_W REGION	TRANS NZOIA	10,1	12,3	7,0	7,0	7,0	7.2
Ld KITUI (33 kV)	5_MT KENYA	KITUI	6,3	7,6	4,3	4,3	4,3	4.5
Ld KOKOTONI (132 kV)	4_COAST	MOMBASA	7,7	9,3	5,3	5,3	5,3	5.5
Ld KOMOROCK (66 kV)	2_NAIROBI	NAIROBI	149,8	181,3	103,6	103,6	103,6	106.7
Ld KUTUS (33 kV)	5_MT KENYA	KIRINYAGA	22,1	26,7	15,3	15,3	15,3	15.7
Ld KYENI (33 kV)	5_MT KENYA	EMBU	10,4	12,6	7,2	7,2	7,2	7.4
Ld LAMU (33 kV)	4_COAST	LAMU	11,3	13,7	7,8		2,6	2.7
Ld LANET33 (33 kV)	7_W REGION	NAKURU	48,6	58,8	33,6	24,1	24,1	24.8
Ld LESSO33 (33 kV)	7_W REGION	NANDI	11,9	14,4	8,2	13,5	13,5	13.9
Ld LUNGA (33 kV)	4_COAST	MOMBASA	1,9	2,3	1,3	1,3	1,3	1.3

Substation	Zone / power system area	County	From LCPDP 2017	From LCPDP 2019	From LCPDP 2014	NCC mea- sures 2015	Best guess 2015	Adj. for demand forecast 2015
Ld MACHAKOS (33 kV)	2_NAIROBI	MACHAKOS	19,3	23,3	13,3	13,3	13,3	13.7
Ld MAKUTANO (33 kV)	7_W REGION	KISUMU	2,9	3,5	2,0	2,0	2,0	2.1
Ld MALINDI (33 kV)	4_COAST	KILIFI	17,5	21,2	12,1	5,5	5,5	5.7
Ld MANGU (66 kV)	5_MT KENYA	NAIROBI	48,6	58,8	33,6	52,0	52,0	53.6
Ld MANYANI (132 kV)	4_COAST	TAITA T.	2,5	3,1	1,8	9,2	9,2	9.4
Ld MARIKANI (132 kV)	4_COAST	MOMBASA	16,3	19,7	11,3	11,3	11,3	11.6
Ld MATASIA (66 kV)	2_NAIROBI	KAJIADO	178,4	215,9	123,4	123,4	123,4	127.1
Ld MAUA (33 kV)	5_MT KENYA	MERU	1,6	1,9	1,1	1,1	1,1	1.1
Ld MAUNGU (132 kV)	4_COAST	TAITA T.	4,0	4,8	2,7	0,8	0,8	0.8
Ld MERU (33 kV)	5_MT KENYA	MERU	13,8	16,7	9,6	20,0	20,0	20.6
Ld MTITO (132 kV)	4_COAST	MOMBASA	4,0	4,8	2,7	2,7	2,7	2.8
Ld MUHORONI (33 kV)	7_W REGION	KISUMU	22,3	26,9	15,4	15,7	15,7	16.2
Ld MUSAGA (33 kV)	7_W REGION	KISUMU	17,7	21,4	12,2	21,0	21,0	21.6
Ld MWINGI (33 kV)	5_MT KENYA	KITUI	5,2	6,3	3,6	3,6	3,6	3.7
Ld NAIVA33 (33 kV)	7_W REGION	NAKURU	19,5	23,6	13,5	13,5	13,5	13.9
Ld NAKURU (33 kV)	7_W REGION	NAKURU	29,5	35,7	20,4	20,4	20,4	21.0
Ld NANYU33 (33 kV)	5_MT KENYA	LAIKIPIA	11,7	14,2	8,1	11,0	11,0	11.3
Ld NAROK (33 kV)	7_W REGION	NAROK	4,9	5,9	3,4	3,4	3,4	3.5
Ld NBNOR66 (66 kV)	2_NAIROBI	NAIROBI	116,2	140,7	80,4	80,4	80,4	82.8
Ld NGONG (66 kV)	2_NAIROBI	NAIROBI	63,5	76,8	43,9	43,9	43,9	45.2
Ld NYAHURURU33 (33 kV)	7_W REGION	NAKURU	5,7	6,9	3,9	3,9	3,9	4.0
Ld ORTUM (220 kV)	7_W REGION	TURKANA	5,7	6,9	3,9	3,9	3,9	4.0
Ld OWEN (132 kV)	3_UGANDA		150,0	181,5	103,7			0.0
Ld RABAI33 (33 kV)	4_COAST	KILIFI	7,5	9,0	5,2	56,5	56,5	58.2
Ld RANGALA (33 kV)	7_W REGION	KISUMU	5,8	7,0	4,0	15,0	15,0	15.4
Ld RUARAKA (66 kV)	2_NAIROBI	NAIROBI	74,5	90,2	51,5	51,5	51,5	53.1
Ld SAMBURU (132 kV)	4_COAST	KWALE	2,5	3,1	1,8	1,8	1,8	1.8
Ld SULTAN (33 kV)	2_NAIROBI	NAIROBI	2,5	3,1	1,8	1,8	1,8	1.8
Ld TANATX1 (33 kV)	5_MT KENYA	KITUI	2,2	2,6	1,5	2,9	2,9	2.9
Ld TAVETA (132 kV)	4_COAST	TAITA T.	2,1	2,5	1,4	1,4	1,4	1.5
Ld THIKA (66 kV)	2_NAIROBI	NAIROBI	167,7	202,9	116,0	27,0	27,0	27.8
Ld ULU (132 kV)	4_COAST	NAIROBI	2,4	2,9	1,6	1,6	1,6	1.7
Ld VOI (132 kV)	4_COAST	TAITA T.	7,6	9,1	5,2	20,6	20,6	21.2
Ld WAJIR (33 kV)	4_COAST	WAJIR	1,3	1,6	0,9		1,4	1.4
Ld_BB RURAKA (PSS/E 1151)	2_NAIROBI	NAIROBI	1,0	10,0	0,7	0,7	0,7	0.7

Growth rates

Two kinds of growth rates were applied for the further development of substation loads from the assumed base year loads: growth rates by county as assessed and provided by KPLC and the growth rates of peak load by power system area (i.e. adjustment of substation growth rates to match overall system peak).

The local growth rates have been assessed by KPLC, and prove to range from an average 4% per year to 11% per year, with an average of 6.8% per year (non-weighted average⁶³). There are 44 counties and the growth rate of the peak load foreseen by KPLC on the 2014-2019 period is assessed as follows.

Annex Table 35: Load growth assumption per county, as estimated by KPLC in 2014/2015

County / Year	2014	2015	2016	2017	2018	2019	Growth
NAIROBI	809,7	855,2	966,1	1.056,3	1.156,7	1.301,8	8%
NYANDARUA	7,0	8,0	9,0	10,0	11,0	11,0	7%
NYERI	11,0	13,0	14,0	15,0	16,0	18,0	8%
KIRINYAGA	13,1	16,1	16,6	17,2	17,9	18,9	6%
MURANG'A	11,9	13,8	15,7	17,6	19,8	22,0	9%
KIAMBU	107,3	118,2	128,8	140,4	153,3	167,4	7%
MOMBASA	215,8	232,4	250,8	271,0	293,4	318,1	6%
KWALE	12,4	13,8	15,8	18,0	20,4	23,2	9%
KILIFI	10,7	12,1	13,7	15,5	17,4	19,5	9%
TANA RIVER	9,7	10,1	10,5	10,9	11,3	11,7	4%
LAMU	1,2	1,3	1,4	1,6	1,8	2,0	8%
TAITA TAVETA	2,6	3,0	3,3	3,7	4,2	4,7	9%
MARSABIT	1,4	1,6	1,8	1,9	2,1	2,3	8%
ISIOLO	5,4	6,1	6,8	7,6	8,4	9,4	9%
MERU	20,0	23,0	25,0	23,0	26,0	28,0	6%
THARAKA	10,0	11,0	12,0	13,0	14,0	15,0	7%
EMBU	13,0	14,0	16,0	17,0	18,0	20,0	7%
KITUI	11,6	12,1	12,6	13,1	13,7	14,8	4%
MACHAKOS	93,5	103,8	112,4	122,0	132,6	144,2	7%
MAKUENI	11,3	13,3	14,9	16,5	18,4	20,4	9%
GARISSA	1,6	1,8	2,0	2,2	2,4	2,6	8%
WAJIR	1,8	2,1	2,4	2,6	2,9	3,3	9%
MANDERA	2,3	2,6	3,0	3,4	3,8	4,2	9%
SIAYA	8,6	8,9	9,2	9,6	10,0	10,5	4%
KISUMU	71,7	74,5	77,5	80,8	84,2	88,0	4%
MIGORI	10,5	12,1	15,1	16,5	18,0	19,6	9%
HOMA BAY	8,1	9,1	10,3	11,7	13,0	14,5	9%
KISII	16,0	19,0	21,0	23,0	26,0	28,0	9%

⁶³ This average is slightly different from the growth observed in national load forecast prepared for this LTP, which is by definition a weighted average of the local growth rates.

County / Year	2014	2015	2016	2017	2018	2019	Growth
NYAMIRA	6,6	6,8	7,1	7,4	7,7	8,1	4%
TURKANA	1,4	1,7	2,0	2,3	2,7	3,0	11%
WEST POKOT	4,7	5,1	5,7	6,4	7,1	7,9	8%
SAMBURU	0,7	0,7	0,8	0,9	0,9	1,0	7%
TRANS NZOIA	14,6	15,5	17,1	18,8	20,6	22,5	7%
BARINGO	7,9	8,2	8,6	8,9	9,3	9,7	4%
UASIN GISHU	24,2	25,2	26,4	27,5	28,8	30,1	4%
ELGEYO-MARAKWET	5,1	5,3	5,5	5,8	6,0	6,3	4%
NANDI	9,0	9,4	9,8	10,2	10,6	11,0	4%
LAIKIPIA	7,9	8,4	8,8	9,3	9,8	10,3	5%
NAKURU	129,5	137,2	145,6	154,8	164,9	176,3	5%
NAROK	6,8	7,2	7,7	8,2	8,7	9,3	5%
KAJIADO	52,5	56,5	60,5	64,7	69,3	74,2	6%
KERICHO	16,0	18,3	19,2	20,3	21,4	22,5	6%
BOMET	7,5	8,0	8,5	9,0	9,7	11,2	7%
KAKAMEGA	26,1	27,9	29,8	31,9	34,3	36,9	6%
VIHIGA	12,0	12,4	12,9	13,5	14,0	14,6	4%
BUNGOMA	16,0	18,5	20,9	23,4	26,3	29,5	9%
BUSIA	9,7	10,7	12,0	13,3	14,8	16,3	8%

For each substation the county was identified using KPLC load data files so that the expected county growth rate could be linked to the substations. Exports were not considered (see assumptions in expansion planning chapters).

Transformer capacity

The assessment whether transformer capacity will be sufficient for the estimated future loads is done in Chapter 8 Transmission expansion planning.

Annex 4.F.2 Approach and results

The approach is based on the following steps:

1. Identification of the present loadings at HV/MV substations (best guess)
2. Load forecast as per the county growth rates
 - 2.1. Estimate of the present peak load at areas where a new substation is planned, namely Dandora, Webuye, Wajir, Namanga, Maralal, Loitokitok, Lamu, Konza, Kilimambogo, Isibenia, Chogoria
 - 2.2. Load forecast as per the county growth rates (see table above)
3. Adjustment of the substation forecast to the regional load forecasts

- 3.1. Set-up of the adjustment coefficients
- 3.2. Substation load forecasts without flagship projects
4. Flagship projects
 - 4.1. Substation load forecast for flagship projects
 - 4.2. Substation load forecasts with flagship projects

Step 1: Identification of the present loadings at HV/MV substations (best guess)

In order to ensure the consistency with the national forecasts for 2015, the recent transformer loadings obtained from the NCC have been adjusted to the peak load forecast for 2015. The total peak load at the substation level should then be the power plant sent-out value less the HV losses (see table below)

Annex Table 36: Regional peak loads as per load forecast (sent-out and substation level) and present substation loads

Power system area	Peak load sent-out [MW]	Peak load substation level [MW]	Substation total load "best guess" [MW]
Nairobi	788	749	743
Coast	278	264	316
Mt Kenya	180	171	149
Western	329	313	267
Total	1,570	1,493	1,476

Step 2: Load forecast as per the county growth rates

Step 2.1: Estimate of the present peak load at areas of new substations

The new relevant substations identified for the study period are listed with their assumed commissioning years in the table below.

Annex Table 37: Identified future new substations and commissioning years

Substation	Zone / power system area	Commissioning year
Ld_1DANDA11 (PSS/E 1921)N	2_NAIROBI	2016
Ld WEBUYE (PSS/E 1131)N	7_W_REGION	2017
Ld WAJIR (PSS/E 1169)N	5_MT KENYA	2020
Ld NAMANGA (132kV)N	2_NAIROBI	2021
Ld MARALAL (PSS/E 1180)N	5_MT KENYA	2022
Ld LOITOKITOK (PSS/E 1199)N	2_NAIROBI	2022

Substation	Zone / power system are	Commissioning year
Ld LAMU (220kV)N	4_COAST	2019
Ld KONZA (132kV)N	2_NAIROBI	2020
Ld KILIMAMBOGO (132kV)N	5_MT KENYA	2022
Ld ISIBENIA (PSS/E 1196)N	7_W_REGION	2022
Ld CHOGORIA (132kV)N	5_MT KENYA	2023

Using the regional consumption characteristics (specific consumption, households per connection, ratio non-domestic to domestic consumption, consumption growth) discussed in section 3.2 the peak load of the respective substations was calculated.

Step 2.2: Load forecast as per the county growth rates

For the existing substations a first load forecast was developed by using the country growth rates proposed by KPLC.

Step 3: Adjustment of the local load forecast to the regional load forecasts

Step 3.1 Set-up of the adjustment coefficients

The target values for each of the four power system areas are the regional load forecasts provided in Chapter 4. These represents the values T_{ij} in MW where “i” represents the region and “j” represents the year.

- For each substation, a first load growth scenario is prepared based on the initial county growth rates (provided in the table above), considering the county of the substation. The related matrix is F_{kj} where k is the index identifying the substation.
- The forecast obtained in MW leads to four regional forecasts that are different from the target regional forecasts. This load forecast consists in four vector of values F_{ij} in MW where “i” represents the region and “j” represents the year.
- For each region (“i”) and for each year (“j”), an adjustment factor is defined $A_{ij} = T_{ij}/F_{ij}$
- Each value F_{ki} of the first forecast is multiplied by A_{ij} , leading to a forecast in MW
- For each of the four electrical regions “i”, the forecast of the substation load is defined as being $L_{kj} = F_{kj} * A_{ij}$
- The sums of the loads for each region leads then by definition to the regional target loads.

Step 3.2 Substation load forecasts without flagship projects

Based on the above sequence of operations, the following values are obtained for the five-years steps (intermediate years are available in the spreadsheets) at regional power system area levels. The forecast reaches the values presented in the national forecast less the transmission losses, and are the targets for obtaining the substation forecasts. Regional load before adjustment and the adjustment factors are also provided.

Annex Table 38: Adjustment of power system area loads

	2015	2020	2025	2030	2035
National peak load forecast (substation level) reference scenario without flagship projects (T_{ij})					
Nairobi	749	1,004	1,345	1,801	2,436
Coast	264	371	500	678	923
Mt Kenya	171	267	383	534	757
Western	313	489	746	1,056	1,470
Total	1,493	2,124	2,965	4,056	5,568
Accumulated substation load per power system area as per county growth rates (F_{ij})					
Nairobi	751	1,105	1,608	2,360	3,434
Coast	320	474	757	1,232	1,855
Mt Kenya	151	210	296	414	581
Western	270	345	448	580	751
Total	1,493	2,135	3,109	4,586	6,620
Adjustment factors ($A_{ij} = T_{ij}/F_{ij}$)					
Nairobi	0.99	0.91	0.83	0.76	0.71
Coast	0.82	0.78	0.66	0.55	0.50
Mt Kenya	1.13	1.27	1.29	1.29	1.30
Western	1.15	1.41	1.66	1.82	1.95

Step 4: Flagship projects

Step 4.1 Substation load forecast for flagship projects

The flagship projects considered are detailed in the flagship report in Annex 4.E. Their corresponding substations for the substation load estimate are as follows.

Annex Table 39: Substations of flagship projects

Flagship project	Substations
Electrified mass rapid transit system for Nairobi	Ld_1DANDA11 (PSS/E 1921)N
Electrified standard gauge railway Mombasa - Nairobi	Ld EMBAKASI (66 kV), Ld VOI (132 kV), Ld MARIKANI (132 kV)
Electrified standard gauge railway Nairobi - Malaba	Ld EMBAKASI (66 kV)
Electrified LAPSSET standard gauge railway	Ld GARISSA (33 kV), Ld GARSEN (33 kV), Ld LAMU (33 kV)
Oil pipeline and Port Terminal (LAPSSET)	Ld LAMU (220kV)N
Refinery and Petrochemical Industries (LAPSSET)	Ld LAMU (220kV)N
Konza Techno City	Ld KONZA (132kV)N
Special Economic Zones	Ld KISU33 (33 kV), Ld LAMU (33 kV), Ld RABAI33 (33 kV)
Integrated Steel Mill	Ld KITUI (33 kV)

Step 4.2 Substation load forecasts with Flagship projects

Using the organic load (without flagship projects) of step 3 and the load forecasts of flagship projects, the following load forecast is obtained at substation level.

Annex Table 40: Substation load estimates reference scenario - 2020, 2025, 2030, 2035

Substation	Power system area	2015	2020	2025	2030	2035
Ld 1KIP33 (33 kV)	4_COAST	75.0	96.8	111.8	127.1	157.2
Ld ATHI (66 kV)	2_NAIROBI	82.3	107.9	143.2	187.9	251.5
Ld AWENDO (33 kV)	7_W REGION	1.8	3.3	6.1	10.4	17.5
Ld BAMBURI (33 kV)	4_COAST	41.0	52.9	61.1	69.4	85.8
Ld BOMET (33 kV)	7_W REGION	4.7	7.9	12.8	19.3	28.7
Ld CHEMO33 (33 kV)	7_W REGION	37.2	54.3	76.1	99.2	127.1
Ld ELD33 (33 kV)	7_W REGION	33.9	49.6	69.9	91.6	118.0
Ld EMBAKASI (66 kV)	2_NAIROBI	115.5	151.6	201.1	305.0	502.5
Ld GALU (33 kV)	4_COAST	14.7	21.8	28.7	37.4	52.8
Ld GARISSA (33 kV)	4_COAST	4.2	5.8	7.1	8.5	11.1
Ld GARSEN (33 kV)	4_COAST	0.9	1.1	1.1	1.1	1.1
Ld GATUNDU (33 kV)	2_NAIROBI	3.0	4.0	5.2	6.9	9.2
Ld GITHAMBO (33 kV)	5_MT KENYA	5.4	9.4	14.7	22.8	35.8
Ld ISIOLO (33 kV)	5_MT KENYA	1.7	2.9	4.4	6.7	10.2
Ld JUJA (66 kV)	2_NAIROBI	74.5	97.7	129.6	170.1	227.7
Ld KABARNET (33 kV)	7_W REGION	2.9	4.6	7.0	9.9	13.7
Ld KAINUK (66 kV)	7_W REGION	1.1	2.3	4.5	8.3	14.9
Ld KAJIADO (1)	2_NAIROBI	11.7	14.2	17.4	21.1	26.1
Ld KAJIADO (33 kV)	2_NAIROBI	11.8	14.3	17.5	21.2	26.2
Ld KIBOKO (132 kV)	4_COAST	1.5	2.2	2.9	3.6	5.1
Ld KIGA33 (33 kV)	5_MT KENYA	29.1	47.6	70.2	102.0	149.7
Ld KILIFI (33 kV)	4_COAST	24.4	35.4	46.1	59.0	82.2
Ld KINDARUMA (33 kV)	5_MT KENYA	0.4	0.6	0.9	1.2	1.7
Ld KISII33 (33 kV)	7_W REGION	18.6	34.3	60.9	100.5	162.9
Ld KISU33 (33 kV)	7_W REGION	44.7	74.8	131.7	193.5	264.1
Ld KITALE (33 kV)	7_W REGION	8.2	14.0	23.0	35.3	53.1
Ld KITUI (33 kV)	5_MT KENYA	4.9	6.9	8.6	10.7	13.4
Ld KOKOTONI (132 kV)	4_COAST	4.4	5.7	6.6	7.5	9.2
Ld KOMOROCK (66 kV)	2_NAIROBI	104.1	136.6	181.1	237.8	318.2
Ld KUTUS (33 kV)	5_MT KENYA	17.4	26.3	36.0	48.4	65.9
Ld KYENI (33 kV)	5_MT KENYA	8.2	13.0	18.5	25.9	36.7
Ld LAMU (33 kV)	4_COAST	2.2	10.0	111.4	271.5	435.7
Ld LANET33 (33 kV)	7_W REGION	28.1	44.6	67.9	96.2	133.9
Ld LESSO33 (33 kV)	7_W REGION	15.8	23.1	32.5	42.7	54.9
Ld LUNGA (33 kV)	4_COAST	1.1	1.4	1.6	1.8	2.3
Ld MACHAKOS (33 kV)	2_NAIROBI	13.4	17.1	22.2	28.4	37.1
Ld MAKUTANO (33 kV)	7_W REGION	2.3	3.4	4.8	6.3	8.1
Ld MALINDI (33 kV)	4_COAST	4.6	6.6	8.6	11.1	15.4
Ld MANGU (66 kV)	5_MT KENYA	59.3	96.0	140.3	201.7	293.3

Substation	Power system area	2015	2020	2025	2030	2035
Ld MANYANI (132 kV)	4_COAST	7.6	11.0	14.3	18.2	25.2
Ld MARIAKANI (132 kV)	4_COAST	9.4	12.1	14.0	52.0	84.5
Ld MATASIA (66 kV)	2_NAIROBI	124.0	150.2	183.9	222.8	275.3
Ld MAUA (33 kV)	5_MT KENYA	1.3	1.9	2.5	3.3	4.4
Ld MAUNGU (132 kV)	4_COAST	0.6	0.9	1.2	1.5	2.1
Ld MERU (33 kV)	5_MT KENYA	22.8	33.9	45.4	59.8	79.8
Ld MTITO (132 kV)	4_COAST	2.3	3.0	3.4	3.9	4.8
Ld MUHORONI (33 kV)	7_W REGION	18.3	26.9	37.8	49.6	63.9
Ld MUSAGA (33 kV)	7_W REGION	24.5	35.9	50.6	66.3	85.5
Ld MWINGI (33 kV)	5_MT KENYA	4.1	5.7	7.1	8.8	11.0
Ld NAIVA33 (33 kV)	7_W REGION	15.7	24.9	37.9	53.7	74.8
Ld NAKURU (33 kV)	7_W REGION	23.8	37.8	57.5	81.4	113.4
Ld NANYU33 (33 kV)	5_MT KENYA	12.5	17.7	22.5	28.2	35.8
Ld NAROK (33 kV)	7_W REGION	3.9	6.2	9.5	13.4	18.6
Ld NBNOR66 (66 kV)	2_NAIROBI	80.8	106.0	140.5	184.5	246.9
Ld NGONG (66 kV)	2_NAIROBI	44.1	57.9	76.8	100.8	134.8
Ld NYAHURURU33 (33 kV)	7_W REGION	4.6	7.2	11.0	15.6	21.8
Ld ORTUM (220 kV)	7_W REGION	4.6	9.4	18.4	33.8	60.8
Ld OWEN (132 kV)	3_UGANDA					
Ld RABAI33 (33 kV)	4_COAST	47.1	75.3	113.6	153.8	213.6
Ld RANGALA (33 kV)	7_W REGION	17.5	25.7	36.2	47.4	61.0
Ld RUARAKA (66 kV)	2_NAIROBI	51.8	67.9	90.1	118.3	158.3
Ld SAMBURU (132 kV)	4_COAST	1.5	2.2	2.9	3.7	5.3
Ld SULTAN (33 kV)	2_NAIROBI	1.8	2.3	3.1	4.0	5.4
Ld TANATX1 (33 kV)	5_MT KENYA	3.3	4.5	5.7	7.1	8.8
Ld TAVETA (132 kV)	4_COAST	1.2	1.7	2.3	2.9	4.0
Ld THIKA (66 kV)	2_NAIROBI	27.1	35.6	47.2	61.9	82.9
Ld ULU (132 kV)	4_COAST	1.4	1.8	2.3	2.7	3.5
Ld VOI (132 kV)	4_COAST	17.2	24.8	32.1	77.0	121.5
Ld WAJIR (33 kV)	4_COAST	1.2	1.7	2.2	2.8	3.9
Ld_BB RURAKA (PSS/E 1151)	2_NAIROBI	0.7	0.9	1.2	1.6	2.1
Ld_1DANDA11 (PSS/E 1921)N	2_NAIROBI		6.3	7.3	78.8	163.6
Ld WEBUYE (PSS/E 1131)N	7_W REGION		1.1	1.7	2.4	3.3
Ld WAJIR (PSS/E 1169)N	4_COAST		1.4	1.6	1.7	2.0
Ld NAMANGA (132kV)N	2_NAIROBI			0.9	1.1	1.3
Ld MARALAL (PSS/E 1180)N	5_MT KENYA			0.6	0.8	1.1
Ld LOITOKITOK (PSS/E 1199)N	2_NAIROBI			1.1	1.3	1.5
Ld LAMU (220kV)N	4_COAST		1.5	1.7	1.8	2.1
Ld KONZA (132kV)N	2_NAIROBI		63.7	157.1	242.8	324.6
Ld KILIMAMBOGO (132kV)N	5_MT KENYA			3.0	3.9	5.1
Ld ISIBENIA (PSS/E 1196)N	7_W REGION			0.8	1.2	1.7
Ld CHOGORIA (132kV)N	5_MT KENYA			1.1	1.4	1.8

Annex 4.G Electricity demand forecast - detailed results

For comparison reasons, data beyond MTP period are also provided (source: LTP 2015 – 2035).

Annex 4.G.1 Demand forecast results – reference scenario (2015 – 2035)

	Unit	Average 2009-15	growth MTP	period: LTP	2013	2014	2015 est.	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Population	million	2.6%	2.5%	2.4%	44.14	45.28	46.45	47.62	48.82	50.02	51.25	52.50	53.76	55.05	56.35	57.68	59.04	60.42	61.83	63.27	64.74	66.24	67.76	69.31	70.90	72.51	74.14
Urban share	%	4.5%	4.2%	4.0%	34%	34%	35%	35%	36%	37%	37%	38%	39%	39%	40%	41%	41%	42%	42%	43%	44%	44%	45%	45%	46%	47%	48%
Households	million	3.3%	3.2%	3.2%	10.29	10.63	10.98	11.33	11.70	12.07	12.46	12.85	13.26	13.68	14.11	14.55	15.01	15.48	15.97	16.47	16.99	17.52	18.08	18.65	19.24	19.84	20.47
Connections	million	19.1%	16.4%	9.2%	2.33	2.77	3.61	4.46	5.29	6.11	6.92	7.73	8.54	9.34	10.12	10.90	11.67	12.44	13.19	14.11	14.89	15.74	16.64	17.60	18.64	19.75	20.95
Growth	%				14%	19%	31%	23%	19%	16%	13%	12%	10%	9%	8%	8%	7%	7%	6%	7%	6%	6%	6%	6%	6%	6%	6%
Domestic	million	20.4%	17.3%	9.5%	2.06	2.48	3.31	4.13	4.95	5.75	6.55	7.35	8.13	8.91	9.67	10.43	11.19	11.93	12.67	13.57	14.34	15.16	16.04	16.99	18.00	19.09	20.27
Growth	%				15%	20%	33%	25%	20%	16%	14%	12%	11%	10%	9%	8%	7%	7%	6%	7%	6%	6%	6%	6%	6%	6%	6%
	million				0.269	0.421	0.826	0.824	0.816	0.808	0.800	0.792	0.784	0.776	0.768	0.760	0.753	0.745	0.738	0.897	0.770	0.824	0.882	0.946	1.015	1.090	1.173
Urban	million	17.8%	9.3%	7.5%	1.74	2.02	2.47	2.89	3.17	3.38	3.61	3.84	4.10	4.37	4.67	4.99	5.32	5.67	6.06	6.48	6.93	7.41	7.93	8.49	9.10	9.76	10.48
Rural	million	31.7%	33.0%	13.1%	0.32	0.46	0.84	1.24	1.78	2.38	2.95	3.50	4.03	4.53	5.00	5.45	5.87	6.26	6.61	7.09	7.40	7.75	8.11	8.50	8.91	9.33	9.78
Household/connection	#	-2.0%	-2.3%	-2.4%	1.70	1.67	1.62	1.58	1.54	1.50	1.47	1.44	1.41	1.38	1.35	1.32	1.29	1.26	1.23	1.20	1.17	1.14	1.12	1.09	1.06	1.03	1.00
Connectivity level	%	15.0%	12.7%	4.1%	30%	35%	44%	53%	61%	69%	75%	80%	85%	89%	92%	94%	96%	97%	98%	99%	99%	99%	99%	99%	99%	99%	99%
Street lighting	#	17.6%	27.0%	11.5%	0.0031	0.0033	0.0050	0.0079	0.0103	0.0126	0.0147	0.0166	0.0224	0.0237	0.0249	0.0262	0.0275	0.0288	0.0302	0.0317	0.0332	0.0348	0.0365	0.0384	0.0403	0.0424	0.0446
Small commercial	million	8.8%	4.2%	3.8%	0.26	0.28	0.30	0.31	0.33	0.34	0.34	0.36	0.38	0.40	0.42	0.44	0.45	0.47	0.48	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.62
Consumption(billed)	GWh	5.9%	6.9%	6.6%	6,877	7,367	7,789	8,311	8,905	9,516	10,154	10,881	11,692	12,477	13,303	14,172	15,085	16,048	17,065	18,187	19,336	20,567	21,887	23,305	24,827	26,464	28,145
Growth	%				7.1%	7.1%	5.7%	6.7%	7.1%	6.9%	6.7%	7.2%	7.5%	6.7%	6.6%	6.5%	6.4%	6.4%	6.3%	6.6%	6.3%	6.4%	6.4%	6.5%	6.5%	6.6%	6.4%
Domestic	GWh	6.9%	8.5%	7.5%	2,047	2,112	2,252	2,473	2,690	2,911	3,144	3,390	3,650	3,925	4,215	4,521	4,843	5,182	5,540	5,948	6,356	6,797	7,274	7,793	8,355	8,969	9,582
Growth	%				10%	3%	7%	10%	9%	8%	8%	8%	8%	8%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Specific consumption	kWh/a	-11.9%	-7.5%	-1.8%	993	851	681	599	544	506	480	462	449	441	436	433	433	434	437	438	443	448	453	459	464	470	473
Share of total	%				30%	29%	29%	30%	30%	31%	31%	31%	31%	31%	32%	32%	32%	32%	32%	33%	33%	33%	33%	33%	34%	34%	34%
Street lighting	GWh	16.4%	35.3%	14.2%	22	28	37	55	79	105	133	166	250	265	280	295	311	327	344	363	382	402	423	446	470	496	522
Growth	%				10%	29%	32%	51%	42%	33%	27%	25%	50%	6%	6%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	6%	5%
Small commercial	GWh	7.6%	5.9%	5.4%	1,156	1,293	1,349	1,448	1,531	1,606	1,673	1,795	1,915	2,039	2,162	2,284	2,407	2,529	2,652	2,793	2,923	3,060	3,205	3,359	3,521	3,693	3,852
Growth	%				6%	12%	4%	7%	6%	5%	4%	7%	7%	6%	6%	6%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	4%
Large comm./industr.	GWh	4.9%	5.9%	6.3%	3,653	3,935	4,152	4,335	4,605	4,895	5,203	5,529	5,877	6,249	6,646	7,071	7,525	8,010	8,528	9,083	9,675	10,308	10,984	11,708	12,480	13,306	14,189
Growth	%				6%	8%	6%	4%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	7%	7%	7%	7%	7%	7%	7%
Flagship projects (FP)									5	35	85	145	208	276	348	424	829	978	1,131	1,474	1,695	2,174	2,479	2,795	3,121	3,457	3,901
Consumption sent-out (without FP)	GWh	6.3%	6.9%	6.7%	8,423	8,969	9,453	10,093	10,816	11,557	12,332	13,216	14,215	15,178	16,190	17,255	18,375	19,554	20,800	22,176	23,584	25,093	26,711	28,451	30,320	32,331	34,393
Growth	%				7.5%	6.5%	5.4%	6.8%	7.2%	6.9%	6.7%	7.2%	7.6%	6.8%	6.7%	6.6%	6.5%	6.4%	6.4%	6.6%	6.4%	6.4%	6.4%	6.5%	6.6%	6.6%	6.4%
Consumption sent-out (with FP)	GWh		7.2%	7.3%	8,423	8,969	9,453	10,093	10,821	11,594	12,421	13,367	14,432	15,466	16,553	17,697	19,240	20,575	21,981	23,716	25,355	27,366	29,304	31,375	33,586	35,950	38,478
Growth	%				7.5%	6.5%	5.4%	6.8%	7.2%	7.1%	7.1%	7.6%	8.0%	7.2%	7.0%	6.9%	8.7%	6.9%	6.8%	7.9%	6.9%	7.9%	7.1%	7.1%	7.0%	7.0%	7.0%
Average power per capita	kW/ pax				22.3	23.2	23.8	24.8	25.9	27.1	28.3	29.8	31.4	32.8	34.3	35.8	38.1	39.8	41.5	43.8	45.7	48.2	50.5	52.8	55.3	57.8	60.5
Losses total	%	1.8%	0.1%	0.2%	18.3%	17.9%	17.6%	17.7%	17.7%	17.7%	17.7%	17.7%	17.7%	17.8%	17.8%	17.9%	17.9%	17.9%	18.0%	18.0%	18.0%	18.0%	18.1%	18.1%	18.1%	18.1%	18.2%
Share HV	%	5.8%	-4.1%	-0.5%	4.3%	4.7%	4.9%	4.7%	4.6%	4.4%	4.2%	4.0%	4.0%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	4.4%	4.4%	4.4%	4.5%	4.5%
Share MV	%	-1.1%	1.4%	0.3%	5.4%	5.0%	4.8%	4.9%	5.0%	5.1%	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%
Share LV	%	1.5%	1.6%	0.4%	8.6%	8.1%	7.8%	8.0%	8.1%	8.2%	8.3%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%	8.5%
Peak load sent-out (without FP)	MW	7.0%	7.1%	6.8%	1,433	1,512	1,570	1,679	1,802	1,929	2,061	2,213	2,387	2,551	2,723	2,904	3,094	3,295	3,507	3,742	3,982	4,239	4,516	4,813	5,133	5,477	5,830
Growth	%				10%	6%	4%	7%	7%	7%	7%	7%	8%	7%	7%	7%	7%	6%	6%	7%	6%	6%	7%	7%	7%	7%	6%
Flagship projects	MW								22	32	47	63	80	96	113	130	199	226	253	306	345	498	560	621	683	745	852
Peak load sent-out (with FP)	MW	7.0%	7.6%	7.5%	1,433	1,512	1,570	1,679	1,804	1,942	2,090	2,259	2,451	2,633	2,823	3,022	3,282	3,511	3,751	4,040	4,320	4,732	5,071	5,431	5,813	6,220	6,683
Growth	%				10%	6%	4%	7%	7%	8%	8%	8%	9%	7%	7%	7%	9%	7%	7%	8%	7%	10%	7%	7%	7%	7%	7%
	MW				130	80	58	109	125	138	149	169	192	181	190	199	260	229	240	289	280	412	339	360	382	407	462
Load factor	%	-0.6%	-0.4%	-0.2%	67.1%	68.1%	69.0%	68.6%	68.5%	68.2%	67.8%	67.5%	67.2%	67.1%	66.9%	66.9%	66.9%	66.9%	66.9%	67.0%	67.0%	66.0%	66.0%	65.9%	66.0%	66.0%	65.7%

Annex Table 41: Demand forecast results – reference scenario (2015 (extrapolated) – 2035)

Annex 4.G.2 Demand forecast results – vision scenario (2015 – 2035)

	Unit	Average 2009-15	growth MTP	period: LTP	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Population	million	2.1%	2.5%	2.3%	41.64	42.64	43.67	44.73	45.82	46.95	48.11	49.30	50.48	51.65	52.80	53.98	55.19	56.43	57.71	59.02	60.37	61.76	63.19	64.66	66.17	67.73	69.33
Urban share	%	4.6%	6.3%	5.8%	36%	36%	37%	38%	39%	41%	43%	45%	47%	48%	50%	52%	53%	55%	57%	59%	62%	64%	66%	68%	70%	71%	72%
Households	million	2.8%	3.2%	3.1%	9.72	10.02	10.34	10.66	11.00	11.35	11.71	12.09	12.47	12.85	13.24	13.64	14.05	14.48	14.93	15.39	15.87	16.37	16.89	17.43	17.99	18.57	19.17
Connections	million	19.1%	19.4%	8.8%	2.33	2.77	3.61	4.68	5.74	6.79	7.85	8.77	9.22	9.69	10.18	10.71	11.27	11.87	12.50	13.19	13.92	14.71	15.55	16.46	17.43	18.49	19.63
Growth	%				14%	19%	31%	30%	23%	18%	15%	12%	5%	5%	5%	5%	5%	5%	5%	5%	6%	6%	6%	6%	6%	6%	6%
Domestic	million	20.4%	20.4%	9.1%	2.06	2.48	3.31	4.35	5.39	6.43	7.47	8.36	8.80	9.26	9.74	10.26	10.80	11.39	12.01	12.68	13.39	14.16	14.99	15.88	16.83	17.87	18.98
Growth	%				15%	20%	33%	31%	24%	19%	16%	12%	5%	5%	5%	5%	5%	5%	5%	6%	6%	6%	6%	6%	6%	6%	6%
	million				0.269	0.421	0.826	1.040	1.040	1.040	1.040	0.898	0.439	0.460	0.481	0.512	0.547	0.584	0.624	0.668	0.716	0.768	0.825	0.888	0.957	1.033	1.116
Urban	million	17.5%	11.4%	9.1%	1.75	2.00	2.45	2.88	3.18	3.53	3.87	4.21	4.59	4.98	5.40	5.86	6.34	6.87	7.43	8.12	8.83	9.60	10.46	11.29	12.14	13.08	14.08
Rural	million	33.2%	37.1%	9.1%	0.31	0.48	0.86	1.47	2.21	2.90	3.60	4.15	4.21	4.28	4.34	4.40	4.46	4.52	4.58	4.56	4.56	4.56	4.53	4.59	4.69	4.79	4.90
Household/connection	#	-2.0%	-2.4%	-2.4%	1.70	1.67	1.62	1.57	1.53	1.50	1.46	1.43	1.40	1.37	1.35	1.32	1.29	1.26	1.23	1.20	1.17	1.14	1.12	1.09	1.06	1.03	1.00
Connectivity level	%	15.9%	15.8%	3.7%	32%	37%	47%	60%	72%	83%	92%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%
Street lighting	#	17.6%	36.2%	11.8%	0.0031	0.0033	0.0050	0.0118	0.0190	0.0207	0.0223	0.0236	0.0246	0.0257	0.0268	0.0280	0.0293	0.0306	0.0320	0.0335	0.0351	0.0368	0.0386	0.0405	0.0426	0.0448	0.0472
Small commercial	million	8.8%	4.7%	3.4%	0.26	0.28	0.30	0.32	0.33	0.34	0.35	0.37	0.38	0.39	0.41	0.42	0.43	0.44	0.45	0.47	0.48	0.50	0.51	0.53	0.55	0.57	0.58
Consumption(billed)	GWh	5.9%	10.8%	8.6%	6,877	7,367	7,789	8,699	9,694	10,711	11,813	13,031	13,983	15,009	16,116	17,323	18,633	20,065	21,620	23,359	25,245	27,307	29,584	32,028	34,677	37,593	40,791
Growth	%				7.1%	7.1%	5.7%	11.7%	11.4%	10.5%	10.3%	10.3%	7.3%	7.3%	7.4%	7.5%	7.6%	7.7%	7.7%	8.0%	8.1%	8.2%	8.3%	8.3%	8.3%	8.4%	8.5%
Domestic	GWh	6.9%	17.9%	11.9%	2,047	2,112	2,252	2,730	3,234	3,810	4,451	5,123	5,606	6,133	6,709	7,351	8,057	8,844	9,711	10,716	11,817	13,041	14,423	15,910	17,537	19,360	21,390
Growth	%				10%	3%	7%	21%	18%	18%	17%	15%	9%	9%	9%	10%	10%	10%	10%	10%	10%	10%	11%	10%	10%	10%	10%
Specific consumption	kWh/a	-11.9%	-2.1%	2.6%	993	851	681	628	600	593	596	613	637	662	689	717	746	777	809	845	882	921	962	1,002	1,042	1,084	1,127
Share of total	%				30%	29%	29%	31%	33%	36%	38%	39%	40%	41%	42%	42%	43%	44%	45%	46%	47%	48%	49%	50%	51%	51%	52%
Street lighting	GWh	16.4%	49.8%	14.5%	22	28	37	131	214	236	257	276	289	301	314	328	343	358	375	392	411	431	452	475	499	525	553
Growth	%				10%	29%	32%	256%	63%	10%	9%	8%	4%	4%	4%	4%	4%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Small commercial	GWh	7.6%	9.2%	6.1%	1,156	1,293	1,349	1,504	1,641	1,769	1,901	2,097	2,199	2,306	2,418	2,535	2,660	2,792	2,931	3,079	3,236	3,402	3,579	3,766	3,966	4,178	4,405
Growth	%				6%	12%	4%	11%	9%	8%	7%	10%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Large comm./industr.	GWh	4.9%	5.9%	6.4%	3,653	3,935	4,152	4,335	4,605	4,895	5,203	5,535	5,889	6,269	6,675	7,109	7,574	8,071	8,603	9,172	9,781	10,433	11,131	11,877	12,675	13,530	14,444
Growth	%				6%	8%	6%	4%	6%	6%	6%	6%	6%	6%	6%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Flagship projects (FP)								5	139	209	282	684	830	981	1,507	1,825	2,471	2,863	3,270	3,692	4,109	5,334	5,761	6,214	6,723	7,236	7,775
Consumption sent-out (without FP)	GWh	6.3%	10.9%	8.7%	8,423	8,969	9,453	10,586	11,819	13,077	14,442	15,952	17,130	18,399	19,769	21,266	22,891	24,669	26,601	28,765	31,113	33,684	36,526	39,577	42,887	46,533	50,538
Growth	%				7.5%	6.5%	5.4%	12.0%	11.6%	10.6%	10.4%	10.5%	7.4%	7.4%	7.4%	7.6%	7.6%	7.8%	7.8%	8.1%	8.2%	8.3%	8.4%	8.4%	8.4%	8.5%	8.6%
Consumption sent-out (with FP)	GWh		11.9%	9.3%	8,423	8,969	9,453	10,592	11,965	13,295	14,736	16,665	17,995	19,421	21,341	23,170	25,469	27,657	30,015	32,622	35,407	39,260	42,550	46,077	49,922	54,108	58,679
Growth	%				7.5%	6.5%	5.4%	12.0%	13.0%	11.1%	10.8%	13.1%	8.0%	7.9%	9.9%	8.6%	9.9%	8.6%	8.5%	8.7%	8.5%	10.9%	8.4%	8.3%	8.3%	8.4%	8.4%
Average power per capita	kW/pax				22.3	23.2	23.8	27.7	30.5	33.1	35.8	39.5	41.6	43.9	47.1	50.1	53.8	57.2	60.7	64.5	68.4	74.2	78.6	83.2	88.1	93.3	98.8
Losses total	%	1.8%	1.3%	0.6%	18.3%	17.9%	17.6%	17.8%	18.0%	18.1%	18.2%	18.3%	18.4%	18.4%	18.5%	18.5%	18.6%	18.7%	18.7%	18.8%	18.9%	18.9%	19.0%	19.1%	19.1%	19.2%	19.3%
Share HV	%	5.8%	-4.1%	-0.5%	4.3%	4.7%	4.9%	4.7%	4.6%	4.4%	4.2%	4.0%	4.0%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	4.4%	4.4%	4.4%	4.5%	4.5%
Share MV	%	-1.1%	2.5%	0.7%	5.4%	5.0%	4.8%	4.9%	5.0%	5.1%	5.2%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%	5.4%	5.4%
Share LV	%	1.5%	3.5%	1.1%	8.6%	8.1%	7.8%	8.1%	8.4%	8.6%	8.8%	9.0%	9.0%	9.1%	9.1%	9.1%	9.1%	9.1%	9.2%	9.2%	9.2%	9.3%	9.3%	9.3%	9.4%	9.4%	9.4%
Peak load sent-out (without FP)	MW	7.0%	11.1%	8.7%	1,433	1,512	1,570	1,768	1,981	2,195	2,428	2,685	2,885	3,102	3,336	3,591	3,869	4,174	4,505	4,877	5,281	5,724	6,215	6,743	7,316	7,949	8,645
Growth	%				10%	6%	4%	13%	12%	11%	11%	11%	7%	7%	8%	8%	8%	8%	8%	8%	8%	8%	9%	8%	9%	9%	9%
Flagship projects	MW							198	214	214	232	257	200	216	234	256	278	305	331	372	404	443	491	528	573	633	696
Peak load sent-out (with FP)	MW	7.0%	12.5%	9.5%	1,433	1,512	1,570	1,770	2,026	2,261	2,515	2,845	3,077	3,325	3,643	3,953	4,431	4,811	5,218	5,665	6,144	6,833	7,414	8,031	8,710	9,432	10,219
Growth	%				10%	6%	4%	13%	14%	12%	11%	13%	8%	8%	10%	9%	12%	9%	8%	9%	8%	11%	8%	8%	8%	8%	8%
	MW		22.6%	9.6%	130	80	58	200	256	235	254	330	232	248	318	310	478	380	407	447	479	689	581	618	678	723	786
Load factor	%	-0.6%	-0.5%	-0.1%	67.1%	68.1%	69.0%	68.3%	67.4%	67.1%	66.9%	66.9%	66.8%	66.7%	66.9%	66.9%	65.6%	65.6%	65.7%	65.7%	65.8%	65.6%	65.5%	65.5%	65.4%	65.5%	65.6%

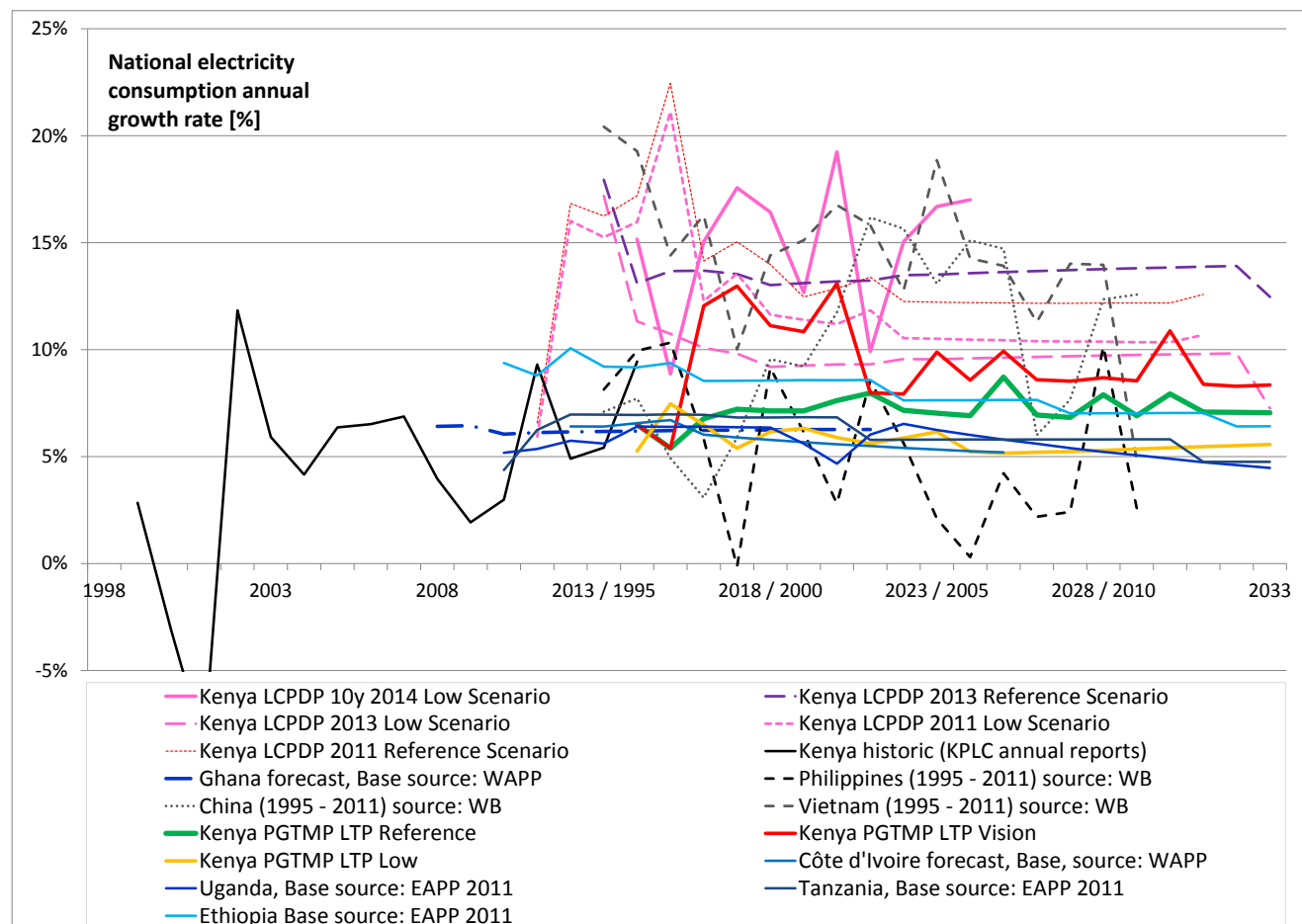
Annex Table 42: Demand forecast results – vision scenario (2015 (extrapolated) – 2035)

Annex 4.G.3 Demand forecast results – low scenario (2015 – 2035)

	Unit	Average 2009-15	growth MTP	period: LTP	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Population	million	2.6%	2.5%	2.4%	44.14	45.28	46.45	47.62	48.82	50.02	51.25	52.50	53.76	55.05	56.35	57.68	59.04	60.42	61.83	63.27	64.74	66.24	67.76	69.31	70.90	72.51	74.14
Urban share	%	4.5%	4.2%	4.0%	34%	34%	35%	35%	36%	37%	37%	38%	39%	39%	40%	41%	41%	42%	42%	43%	44%	44%	45%	45%	46%	47%	48%
Households	million	3.3%	3.2%	3.2%	10.29	10.63	10.98	11.33	11.70	12.07	12.46	12.85	13.26	13.68	14.11	14.55	15.01	15.48	15.97	16.47	16.99	17.52	18.08	18.65	19.24	19.84	20.47
Connections	million	19.1%	14.3%	8.0%	2.33	2.77	3.61	4.46	5.21	5.89	6.50	7.06	7.56	8.01	8.45	8.92	9.42	9.96	10.53	11.14	11.80	12.51	13.26	14.07	14.94	15.88	16.90
Growth	%				14%	19%	31%	23%	17%	13%	10%	9%	7%	6%	5%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
Domestic	million	20.4%	15.1%	8.3%	2.06	2.48	3.31	4.13	4.87	5.54	6.14	6.68	7.17	7.61	8.03	8.49	8.97	9.49	10.05	10.65	11.29	11.98	12.71	13.50	14.35	15.28	16.27
Growth	%				15%	20%	33%	25%	18%	14%	11%	9%	7%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	7%
	million				0.269	0.421	0.826	0.824	0.742	0.668	0.601	0.541	0.487	0.438	0.428	0.456	0.484	0.519	0.558	0.599	0.642	0.686	0.734	0.788	0.854	0.923	0.997
Urban	million	17.8%	9.3%	7.5%	1.74	2.02	2.47	2.89	3.17	3.38	3.61	3.84	4.10	4.37	4.67	4.99	5.32	5.67	6.06	6.48	6.93	7.41	7.93	8.49	9.10	9.76	10.48
Rural	million	31.7%	27.5%	10.1%	0.32	0.46	0.84	1.24	1.71	2.16	2.53	2.84	3.07	3.23	3.36	3.50	3.65	3.82	3.99	4.17	4.36	4.56	4.78	5.01	5.26	5.52	5.79
Household/connection	#	-2.0%	-2.2%	-2.4%	1.70	1.67	1.62	1.58	1.54	1.51	1.47	1.44	1.41	1.38	1.35	1.32	1.30	1.27	1.24	1.21	1.18	1.15	1.12	1.09	1.06	1.03	1.00
Connectivity level	%	15.0%	10.3%	2.9%	30%	35%	44%	53%	60%	66%	70%	72%	74%	75%	75%	75%	75%	75%	76%	76%	76%	76%	77%	77%	77%	77%	78%
Street lighting	#	17.6%	26.3%	11.2%	0.0031	0.0033	0.0050	0.0079	0.0103	0.0125	0.0144	0.0162	0.0217	0.0227	0.0238	0.0248	0.0260	0.0272	0.0285	0.0299	0.0313	0.0329	0.0345	0.0363	0.0381	0.0401	0.0423
Small commercial	million	8.8%	3.7%	3.3%	0.26	0.28	0.30	0.31	0.32	0.33	0.34	0.36	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.46	0.47	0.49	0.50	0.52	0.54	0.55	0.57
Consumption(billed)	GWh	5.9%	5.9%	5.5%	6,877	7,367	7,789	8,261	8,778	9,292	9,812	10,384	11,012	11,581	12,171	12,797	13,459	14,163	14,912	15,709	16,557	17,459	18,418	19,441	20,535	21,706	22,917
Growth	%				7.1%	7.1%	5.7%	6.0%	6.3%	5.9%	5.6%	5.8%	6.0%	5.2%	5.1%	5.1%	5.2%	5.2%	5.3%	5.3%	5.4%	5.4%	5.5%	5.6%	5.6%	5.7%	5.6%
Domestic	GWh	6.9%	8.5%	7.1%	2,047	2,112	2,252	2,488	2,715	2,939	3,163	3,387	3,612	3,839	4,074	4,328	4,599	4,891	5,206	5,548	5,917	6,314	6,743	7,208	7,714	8,265	8,835
Growth	%				10%	3%	7%	10%	9%	8%	8%	7%	7%	6%	6%	6%	6%	6%	6%	7%	7%	7%	7%	7%	7%	7%	7%
Specific consumption	kWh/a	-11.9%	-5.7%	-1.1%	993	851	681	602	557	530	515	507	504	505	507	510	512	515	518	521	524	527	530	534	537	541	543
Share of total	%				30%	29%	29%	30%	31%	32%	32%	33%	33%	33%	33%	34%	34%	35%	35%	35%	36%	36%	37%	37%	38%	38%	39%
Street lighting	GWh	16.4%	34.3%	13.7%	22	28	37	55	78	103	130	160	240	252	263	276	289	303	318	334	351	369	388	409	430	454	478
Growth	%				10%	29%	32%	51%	41%	32%	26%	24%	50%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Small commercial	GWh	7.6%	5.1%	4.7%	1,156	1,293	1,349	1,445	1,519	1,582	1,638	1,732	1,819	1,902	1,985	2,072	2,163	2,259	2,360	2,467	2,580	2,698	2,823	2,955	3,095	3,243	3,388
Growth	%				6%	12%	4%	7%	5%	4%	4%	6%	5%	5%	4%	4%	4%	4%	4%	5%	5%	5%	5%	5%	5%	5%	4%
Large comm./industr.	GWh	4.9%	4.2%	4.6%	3,653	3,935	4,152	4,272	4,465	4,668	4,882	5,106	5,341	5,588	5,848	6,121	6,408	6,710	7,027	7,360	7,710	8,077	8,464	8,870	9,296	9,745	10,216
Growth	%				6%	8%	6%	3%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Flagship projects (FP)								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Consumption sent-out (without FP)	GWh	6.3%	6.0%	5.6%	8,423	8,969	9,453	10,035	10,670	11,298	11,932	12,632	13,409	14,110	14,838	15,610	16,427	17,296	18,222	19,208	20,258	21,375	22,565	23,834	25,193	26,648	28,153
Growth	%				7.5%	6.5%	5.4%	6.2%	6.3%	5.9%	5.6%	5.9%	6.2%	5.2%	5.2%	5.2%	5.2%	5.3%	5.4%	5.4%	5.5%	5.5%	5.6%	5.6%	5.7%	5.8%	5.6%
Consumption sent-out (with FP)	GWh		6.0%	5.6%	8,423	8,969	9,453	10,035	10,670	11,298	11,932	12,632	13,409	14,110	14,838	15,610	16,427	17,296	18,222	19,208	20,258	21,375	22,565	23,834	25,193	26,648	28,153
Growth	%				7.5%	6.5%	5.4%	6.2%	6.3%	5.9%	5.6%	5.9%	6.2%	5.2%	5.2%	5.2%	5.2%	5.3%	5.4%	5.4%	5.5%	5.5%	5.6%	5.6%	5.7%	5.8%	5.6%
Average power per capita	kW/ pax				22.3	23.2	23.8	24.6	25.6	26.4	27.2	28.1	29.1	29.9	30.8	31.6	32.5	33.4	34.4	35.4	36.5	37.7	38.9	40.1	41.5	42.9	44.3
Losses total	%	1.8%	0.2%	0.3%	18.3%	17.9%	17.6%	17.7%	17.7%	17.8%	17.8%	17.8%	17.9%	17.9%	18.0%	18.0%	18.1%	18.1%	18.2%	18.2%	18.3%	18.3%	18.4%	18.4%	18.5%	18.5%	18.6%
Share HV	%	5.8%	-4.1%	-0.5%	4.3%	4.7%	4.9%	4.7%	4.6%	4.4%	4.2%	4.0%	4.0%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.3%	4.3%	4.3%	4.4%	4.4%	4.4%	4.5%	4.5%
Share MV	%	-1.1%	1.5%	0.4%	5.4%	5.0%	4.8%	4.9%	5.0%	5.1%	5.1%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.3%	5.3%	
Share LV	%	1.5%	1.8%	0.6%	8.6%	8.1%	7.8%	8.0%	8.2%	8.3%	8.4%	8.6%	8.6%	8.6%	8.6%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.7%	8.8%	8.8%	8.8%	8.8%	
Peak load sent-out (without FP)	MW	7.0%	6.1%	5.7%	1,433	1,512	1,570	1,669	1,778	1,886	1,995	2,116	2,253	2,373	2,497	2,629	2,769	2,917	3,076	3,245	3,426	3,618	3,822	4,041	4,276	4,528	4,788
Growth	%				10%	6%	4%	6%	7%	6%	6%	6%	6%	5%	5%	5%	5%	5%	5%	5%	6%	6%	6%	6%	6%	6%	6%
Flagship projects	MW							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak load sent-out (with FP)	MW	7.0%	6.1%	5.7%	1,433	1,512	1,570	1,669	1,778	1,886	1,995	2,116	2,253	2,373	2,497	2,629	2,769	2,917	3,076	3,245	3,426	3,618	3,822	4,			

Annex Table 43: Demand forecast results – low scenario (2015 (extrapolated) – 2035)

Annex 4.G.4 Benchmarking of results – with previous forecasts and in comparison with other countries



Annex Figure 34: Comparison electricity demand forecast Kenya with other countries

ANNEX 5 ENERGY SOURCES FOR ELECTRICITY GENERATION – ANNEXES

Annex 5.A Transport infrastructure for fossil fuels

Annex 5.A.1 Road infrastructure

The bulk of the country's land freight and passenger traffic are conveyed through the road network. Kenya is an important transit country and the Northern Corridor is important as a freight transport corridor for both import and exports for the countries in eastern and central Africa. Road freight transport along the Northern Corridor is critical to the competitiveness of the port of Mombasa. High freight costs come as a result of poor road conditions in the corridor which lead to high vehicle operating costs, high and multiple taxes, customs procedures and multiple weighbridges delaying the flow of goods as well as corruption. Road transport along the Northern Corridor moves more freight than rail due to the limited haulage capacity of the existing rail infrastructure.

According to the Kenya Roads Board, Kenya has 160,886 kilometres of roads with all but 11,189 kilometres unpaved. National Trunk Roads are the main roads linking Kenya to its neighbours, connecting various county headquarters and interconnecting the entire country in an equitable and well distributed manner⁶⁴ County roads are all other roads within county boundaries that have not been defined as national trunk roads. Below the road network classification is provided.

Annex Table 44: Road network classification⁶⁵

Class	Description	Purpose	Roads	paved	unpaved	Total
A	International Trunk Roads	Link centres of international importance and cross international boundaries or terminate at international ports or airports	A1, A2, A3, A14, A23, A104, A109	2,772	816	3,588
B	National Trunk Roads	Link nationally important centres (e.g. Provincial headquarters)	B1, B3, B8	1,489	1,156	2,645
C	Primary Roads	Link provincially important centres to each other or to higher class roads (e.g. District headquarters)	C107, C111, C115	2,693	5,164	7,857
D	Secondary Roads	Link locally important centres to each other, or to more important centres or to a higher class road (e.g. divisional headquarters)		1,238	9,483	10,721
E	Minor Roads	Any link to a minor centre		577	26,071	26,649
SPR	Special Purpose Roads	Government Roads (G), Settlement Roads (L), Rural Access Roads (R), Sugar Roads (S), Tea Roads (T), Wheat Roads (W)		100	10,376	10,476
U	Unclassified Roads	All other public roads and streets		2,318	96,623	98,941
All	Total	All public roads and streets		11,187	149,689	160,876

⁶⁴ Ministry of Roads, *Draft policy on aligning the roads sub-sector with the constitution*, 2012

⁶⁵ Source: Kenya Roads Board (www.krb.co.ke)

Petroleum products are moved around the country between depots located in Mombasa, Nairobi, Lanet, Eldoret, and Kisumu to their environs and other towns around the country. Transportation to the hinterland of Mombasa is also effected on road given that the pipeline system experiences capacity constraints in meeting the demand for petroleum products further inland. Pipeline capacity is planned to be extended and road transport for petroleum products is expected to decline⁶⁶. However, roads will continue to play an important role in the distribution of products from Kenya Pipeline Company Ltd to end-consumers.

Annex 5.A.2 Pipeline infrastructure

Pipeline infrastructure to transport petroleum products in Kenya was first commissioned in 1978 with a total pipeline length of 450 km running between Mombasa and Nairobi (Line 1). The pipeline was extended to connect the cities of Kisumu and Eldoret between 1992 and 1994 introducing the “Western Kenya Pipeline System” with Line 2 that runs between Nairobi and Eldoret at a total length of 325 km, and Line 3 running between Sinendet and Kisumu at a total length of 121 km. Line 1 is a 14-inch diameter pipe and avails of 8 pumping stations with enhanced operational capacity of 830 m³/h. The line has been in operation for 34 years and is going to be replaced. The system manages approximately 450 million litres a month and is connected with the Kipevu Oil Storage Facility (KOSF), and transports some of the petroleum products from Kenya Petroleum Refineries Limited (KPRL) after crude oil processing. The pipeline network is managed by a parastatal organisation called Kenya Pipeline Company Ltd. (KPC). KPC handles refinery products only, which are:⁶⁷

- Unleaded motor gasoline (premium grade and regular grade);
- Diesel (automotive gas oil);
- Illuminating kerosene; and
- Jet A-1 / aviation turbine fuel.

The existing pipelines do not carry liquid petroleum gas (LPG), fuel oils (FO) and industrial diesel oil. A share of the transported fuel is also used for power generation; more specifically pipeline transport of kerosene between Mombasa and Nairobi, and automotive gas oil (AGO) was used in Aggreko power generation units. Current pipeline transport costs for AGO between Mombasa and Nairobi are detailed below.

Annex Table 45: AGO Pipeline Transport Cost⁶⁸

Transport Tariff	Kenya Shilling
Kenya Pipeline Mombasa to Nairobi (KES/m ³)	2,250
Kenya Pipeline Mombasa to Kisumu (KES/ m ³)	3,975
Mombasa to Nairobi (KES/ton)	2,679
Mombasa to Kisumu (KES/ton)	4,732
Mombasa to Nairobi (KES/ton/km)	5.95

⁶⁶ MOEP, *Draft National Energy Policy* 2014

⁶⁷ Kenya Ministry of Transport, *Integrated National Transport Policy*

⁶⁸ Source: KPC Tariffs

Annex 5.A.3 Railway infrastructure

The railway network in Kenya consists of one-meter gauged track with a total length of 2,765 km and is owned by Kenya Railways Corporation (KRC). The rail track runs between Mombasa, Nairobi and Malaba at the Kenyan-Ugandan border representing the Kenyan section of the so-called Northern Corridor connecting Kenya, Uganda, Rwanda, Burundi, DR Congo, Tanzania, South Sudan and Ethiopia. The national rail network branches out connecting with Kisumu on Lake Victoria, Nanyuki and Nyahururu from the mainline at Nakuru, Gilgil and Nairobi respectively. The network has direct links with the port of Mombasa, the inland container depots as well as the road network.

Freight services are offered on almost all routes for both domestic and regional markets while passenger services are provided between Nairobi and Mombasa, Kisumu and Nanyuki respectively. However, freight traffic on the Kenyan rail corridor between Mombasa port and the Ugandan border today is less than one million ton per year and represents less than 6% of all cargo moving along the Northern Corridor, connecting the above mentioned countries due to deteriorating infrastructure. In 2014, only 1% of petroleum products were moved by rail from Mombasa due to capacity constraints of the Kenyan Railway Corporation and its concessionaire, which is the Rift Valley Railways Consortium. With the planned construction of the standard gauge railway line, rail transport of petroleum products is likely to increase in the future.

Heavy competition from road freight prevents the railway from generating more revenues in support of private finance for track rehabilitation. The rail – port interface needs to be improved urgently, which has become the main bottleneck in the movement of freight. Mombasa port moves more than 16 million tons of cargo per year which is expected to increase to 30 million tons in 2030⁶⁹. Inadequate port capacity and insufficient road and rail capacities are the main reasons for a congested Mombasa port. There is an urgent need to rehabilitate the rail track running along the Kenyan section of the Northern Corridor and beyond. Railway efficiency indicators of Kenya and other selected African countries are provided below.

Annex Table 46: Railway indicators⁷⁰

	Kenya (KRC)	South Africa (SPOORNET)	Malawi (CEAR)	Tanzania (TRC)	Tanzania – Zambia (TAZARA)	Uganda (URC)	Zambia (RSZ)
Concessioned (1) / State-run (0)	0	0	1	0	0	0	1
Traffic density, freight 1,000 ton-km/km	690	5,319	112	510	460	815	379
EFFICIENCY							
Staff: 1,000 unit tariff per staff	185	3,037	204	228	300	181	452
Coaches: 1,000 passenger- km per coach	1,015	596	1,285	3,157	3,120	n/a	2,772
Cars:	200	925	212	692	502	166	180

⁶⁹ World Bank, *Kenya's Infrastructure, A Continental Perspective* (2011)

⁷⁰ Source: AICD data base (www.infrastructureafrica.org)

	Kenya (KRC)	South Africa (SPOORNET)	Malawi (CEAR)	Tanzania (TRC)	Tanzania – Zambia (TAZARA)	Uganda (URC)	Zambia (RSZ)
1,000 ton-km per wagon							
Locomotive availability (%)	44.8	n/a	89.9	74.2	25.2	69.5	31.2
TARIFFS							
Average unit tariff, freight, USDcents/ton-km	3.8	n/a	5.8	4.0	3.0	15.2	3.9
Average tariff, passenger, USDcents/passenger-km	0.6	n/a	1.0	1.6	1.1	2.3	0.8

Annex 5.A.4 Port infrastructure

The maritime transport system in Kenya comprises of the Mombasa seaport, which is the only commercial port in Kenya complying with international standards. It lies on the Indian Ocean, known as Kilindini Harbour, and is operated by the Kenya Ports Authority. The port clears all types of cargo for Kenya as well as land-locked countries, which are bordering with Kenya and beyond including Burundi, Congo, Ethiopia, Rwanda, Somalia, South Sudan and North Eastern Tanzania. Kenyan imports are channelled through its port infrastructure and includes the bulk handling of coal and petroleum products and possibly also liquefied natural gas (LNG) via a LNG terminal in the future.

Mombasa port avails of 16 deep-water berths. Thirteen berths are capable of handling conventional cargo while the remaining three berths handle containers⁷¹. There are two oil jetties with a capacity each of clearing oil tankers of up to 80,000 tons deadweight delivering crude as well as refined oil products. It is the second largest port in sub-Saharan Africa in terms of containers and tonnage handled following Durban in South Africa. It handles around half a million of twenty-foot equivalent units per year and 3.7 million tons of cargo.⁷² However, the port and its infrastructure faces significant capacity constraints. Container crane productivity is currently standing at 10 containers per hour which is half of that of the port of Dar es Salaam. The port efficiency indicators of Mombasa and other selected African ports are provided below.

Annex Table 47: Port indicators⁷³

	Mombasa	Maputo	Port Sudan	Dar es Salaam	Durban
CAPACITY					
Actual container handled (TEU/year)	436,671	44,000	328,690	198,472	1,899,065
Container handling capacity (TEU/year)	600,000	100,000	400,000	400,000	1,450,000
General cargo handling capacity (tons/year)	1,500,000	n/a	7,500,000	8,000,000	n/a

⁷¹ Integrated National Transport Policy, 2009, Ministry of Transport, Republic of Kenya

⁷² World bank, 2011, Kenya Infrastructure, A Continental Perspective

⁷³ Source: World Bank / Ocean Shipping Consultants

	Mombasa	Maputo	Port Sudan	Dar es Salaam	Durban
Annual liquid bulk cargo capacity (tons/year)	5,500,000	410,000	n/a	2,000,000	n/a
Length of container berths (meters)	964	300	420	550	2,128
Length of general cargo berths (meters)	950	1,200	2,011	1,464	200
EFFICIENCY					
Average container dwell time in terminal (days)	5	22	28	7	4
Average truck processing time for receipt and delivery of cargo (hours)	4.5	4	24	5	5
Average container crane productivity (container loaded – unloaded per crane hour)	10	11	8	20	15
Average general cargo crane productivity (tons loaded – unloaded per crane working hour)	20.82	11	8	20	25
TARIFFS					
Average general cargo handling charge, ship to gate (USD/ton)	6.5	6.0	10	13.5	17.4
Average dry bulk handling charge, ship to gate or rail (USD/ton)	5	2.0	3	4.5	1.48
Average liquid bulk handling charge (USD/ton)	n/a	0.5	1	3.5	n/a

Beside Mombasa port, there are also smaller ports scattered along the Kenyan coastline namely Funzi, Kilifi, Kiungu, Lamu, Malindi, Mtwapa, Shimonu and Vanga. Also, there are advanced plans in place to build another international port in Lamu to the north east of Mombasa (see Annex 4.B.2 for details).

Annex 5.A.5 River barge transport

Kenya depends on inland water transport on Lake Victoria with Kisumu city and its inland port connecting to inland roads, railway and pipeline as well as serving Lake Victoria and international connections with Uganda and Tanzania. Inland waterways transport is restricted to the transport on Lake Victoria within the boundaries of Kenya.

In light of the recent discovery of oil in Kenya and Uganda, there is an option to transport crude oil and refined products over the lakes in the region. However, tankers as well as loading infrastructure are required to facilitate river barge transport.

Annex 5.B Fossil fuel price forecast

Annex 5.B.1 General price development assumptions

Some general assumptions underlying the WEO 2015 and, therefore, the fuel price scenarios are provided below. More details can be obtained from the IEA website⁷⁴.

- After a period of relatively stable but historically high prices from 2010 until mid-2014, **crude oil prices** fell by well more than 50% into 2015. These market developments provide a new, much lower, starting point for the formulation of the oil price trajectories used in each of the fuel price scenarios. Prices remain low for much of the early part of the projection period, although the markets work through the current supply overhang and rebalance at higher price levels. In the reference scenario, oil prices reach 80 USD/barrel in 2020, 113 USD/barrel in 2030 and finally 128 USD/barrel in 2040.
- **Natural gas prices** were closely correlated to oil prices in the OECD (Organisation for Economic Co-operation and Development) countries historically through oil price indexation clauses in long-term supply contracts, or indirectly through competition between gas and oil products in power generation and end-use markets. However, there is for the moment no global pricing benchmark for natural gas as there is for oil. Significant price differentials between three major regional markets – North America, Asia-Pacific and Europe – remain, reflecting the relative isolation of these markets and the cost of transportation between these regions. European gas price levels and projections have been used for this forecast.

The downward pressure on **coal prices** in recent years can be attributed to two primary causes. On the supply side, a period of surging demand between 2007 and 2011 triggered a large increase in mining investments in Australia, Colombia, Indonesia and South Africa. Moreover, reduced demand growth in China, where local air pollution concerns have led to a shift away from coal has led to some coal being displaced by gas and renewables. However, the international coal market is expected to return to balance by 2020, which leads to increased prices that reach 108 USD/ton by 2040.

Annex 5.B.2 Methodology and assumptions for Master Plan

Price indices have been derived from the WEO 2015, which form the basis of the fuel price forecast for crude oil, natural gas and coal in the long-term. These indices have been linked to 2015 real term prices⁷⁵ and result in three different time intervals with varying escalation rates: (i) 2015-2020, (ii) 2021-2030, and (iii) 2031-2040.

As the WEO 2015 contains prices for crude oil, natural gas and coal on an international level only, price projections for the locally used fuels (heavy fuel oil (HFO) and other distillates including industrial diesel oil (IDO), automotive gasoil (AGO), kerosene as well as liquefied natural gas, LNG) were determined by the Consultant as detailed below.

⁷⁴ <http://www.worldenergyoutlook.org>

⁷⁵ Source: World Bank Commodities Price Data (The Pink Sheet), Jan-Sep 2015 average prices

Annex Table 48: Fuel price assumptions

Fuel	Source / Assumption	Base price 2014 / 2015	Price increase 2014-2020 (p.a.)	Price increase 2021-2030 (p.a.)	Price increase 2031-2040 (p.a.)
Crude oil	WEO 2015	97 / 54 USD/bbl	-3.16%	+3.51%	+1.25%
HFO	75% of crude price	n/a	-3.16%	+3.51%	+1.25%
Gasoil products	120% IDO, 135% AGO / kerosene	n/a	-3.16%	+3.51%	+1.25%
Natural gas	WEO 2015	9.3 / 7.6 USD/MMBtu	-2.89%	+3.68%	+1.02%
LNG	NG price +45% mark-up	n/a	-2.89%	+3.68%	+1.02%
Coal	WEO 2015	78 / 59 USD/ton	+3.16%	+0.82%	+0.57%
Nuclear	WEO 2014	2.8 USD / GJ	0%	0%	0%

1) Crude oil and petroleum products

Given that crude oil is the fossil basis for all other liquid fuels, prices for crude oil, HFO and related gasoil products show strong and consistent interdependencies and correlations in the order of 98% to 99%. The price forecast for crude oil has been applied to determine petroleum product prices as well, whereas the 2015 real term price of roughly 54 USD/bbl for crude oil serves as starting point.

a) HFO

Due to the high correlation of HFO and crude oil prices, the forecasted crude oil price has been indexed with the HFO price. The price is calculated at a percentage rate of 75% of the projected crude oil price, resulting in a 2015 HFO price of 40 USD/bbl (fob). Future HFO prices are thus expressed as a fixed percentage (75%) of the projected crude oil prices throughout the projection period.

b) Gasoil (IDO, AGO) and kerosene

The same high correlation of HFO applies for other distillate products such as gasoil and kerosene. Therefore, the crude oil price index has been linked to the different products being in use in Kenya. Kerosene and AGO prices are very close. Therefore, for the sake of simplicity one kerosene/gasoil forecast is applied, expressed at a percentage rate of 135% of the crude oil price, resulting in a 2015 gasoil/kerosene price of 72 USD/bbl. Future prices are expressed as a fixed percentage (135%) of the projected crude oil prices throughout the projection period.

2) Natural gas and liquefied natural gas

The 2015 real term price for natural gas amounts to 7.6 USD/MMBtu⁷⁶ and serves as starting point for the price forecast. Natural gas and liquefied natural gas (LNG) represent the same fossil fuel except that LNG represents the liquefied version of natural gas. For the purpose of forecasting prices, the LNG price consists of the natural gas price plus a fixed charge for liquefaction and shipping to Mombasa. This cost amounts to 238 USD/ton (see transport costs below) which results in a mark-up of 45% of LNG compared to the natural gas price. The mark-up decreases over time as the cost for LNG liquefaction and shipping is kept constant whereas the price for natural gas price increases in line with the WEO 2015.

3) Coal

The 2015 real term price of the WEO 2015 for coal imports amounts to 59 USD/ton⁷⁷ and serves as starting point for the price forecast. Due to its lower energy content domestic coal prices should be lower than imported coal. However, on an energy basis (i.e. USD/GJ) similar prices are assumed.

4) Uranium / nuclear

The fuel costs are of minor importance for the evaluation of nuclear power. Nuclear fuel costs used in the WEO 2014 (10 USD/MWh, 2.8 USD /GJ) were applied without any escalation.

5) Fuel transport costs

International and national transport costs have to be considered in order to calculate the actual fuel costs at the respective power plants.

a) International transport costs

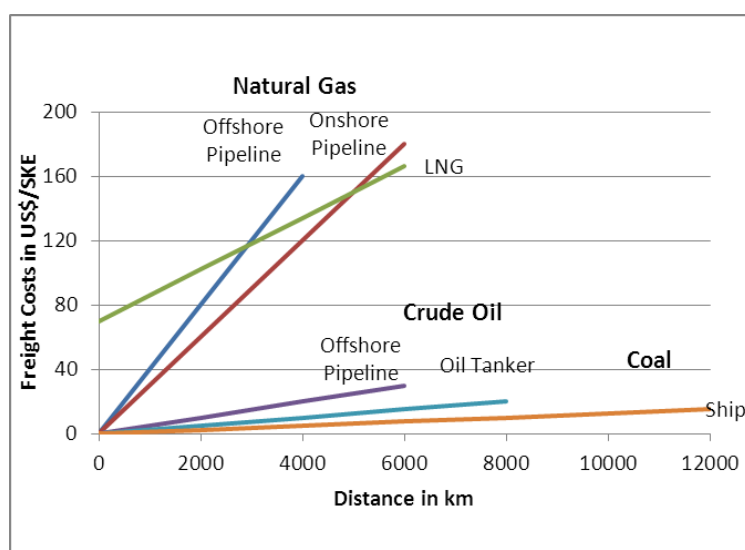
On top of the “fob” fuel prices corresponding transport prices, expressed as “cif”, have to be considered to reflect the import prices applicable at Kenya’s border. Coal is assumed to be imported from South Africa and petroleum products and LNG are assumed to be sourced from the Arabian Gulf Region. Transport prices have been kept constant in real terms. The table below lists the real shipping costs in the base year 2015, which are applied for the imported fuels. LNG shipping costs are based on the chart presented below the table.

Annex Table 49: International fuel shipping costs

Fuel	Shipping costs	Unit	Data source
LNG	238	USD/ton	BASF (see below)
Crude oil	5% mark-up on fob	%	MOEP (crude price information)
HFO	13% mark-up on fob	%	KPLC (HFO fob & cif price)
Gasoil	4% mark-up on fob	%	KPLC (AGO fob & cif price)
Coal	7	USD/ton	Simpson Spence Young Global Shipbroker ⁷⁸

⁷⁶ Natural gas, Europe imports

⁷⁷ Export coal, South Africa



Annex Figure 35: Shipping costs for fossil fuels (BASF, 2009)⁷⁹

b) Domestic transport costs

Currently, there are four large fossil fuel-based power generation locations in Kenya. This includes the greater Nairobi and Mombasa areas as well as sites in Garissa and Lamu. Fuel used for power generation has to be transported inland from the fuel import landing site, i.e. the port of Mombasa, to the respective consumption centres. Domestic fuel transport is priced in accordance with the specific transport costs summarised in the table below. There are no price differences assumed between the transport costs for liquid and solid fuels.

Annex Table 50: Domestic fuel transport costs

Location	Fuel type	Transport distance	Road transport	Pipeline transport	Road transport cost
		km			USD/ton
Nairobi	HFO / IDO / AGO / Kerosene	500	✓	✓	49 / 54 / 38 / 39
Lanet	HFO / IDO / AGO / Kerosene	650	✓	✓	64 / 71 / 49 / 51
Eldoret	HFO / IDO / AGO / Kerosene	810	✓	✓	80 / 88 / 61 / 64
Kisumu	HFO / IDO / AGO / Kerosene	840	✓	✓	83 / 91 / 63 / 66

Annex Table 51: Specific fuel transport costs

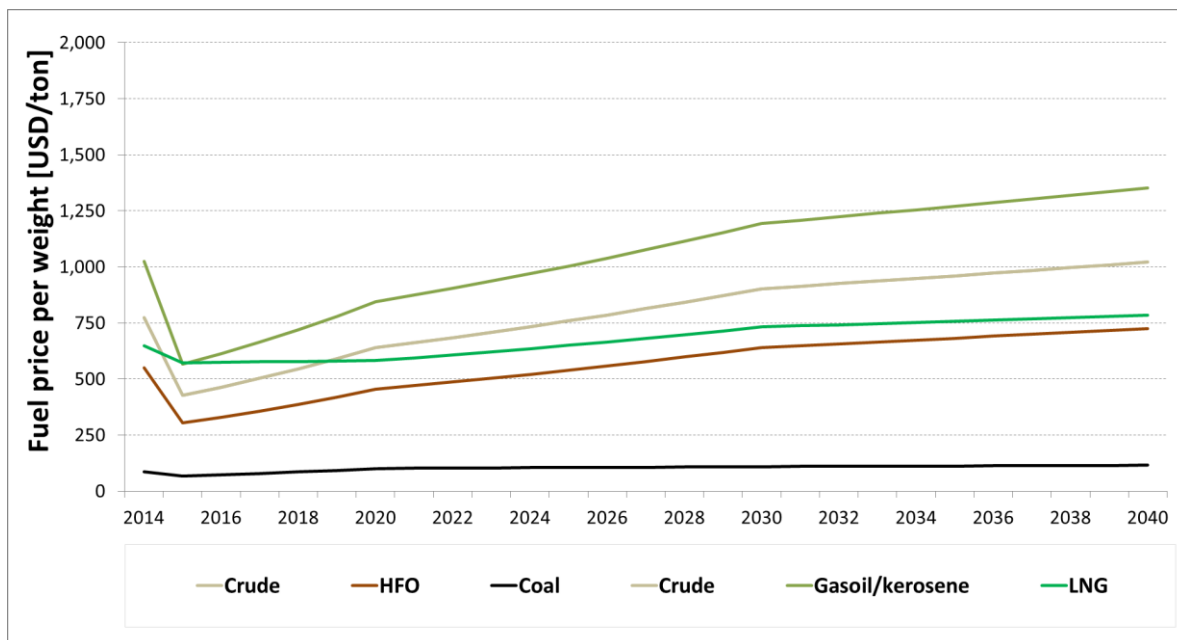
Means of transport	USD/ton/km	USD/ton/km	Data source
Road	0.0924	0.0924	LCPDP 2013
Pipeline	0.0632	n/a	KPC Tariffs

⁷⁸ <http://www.ssyonline.com/market-information/dry-cargo/>

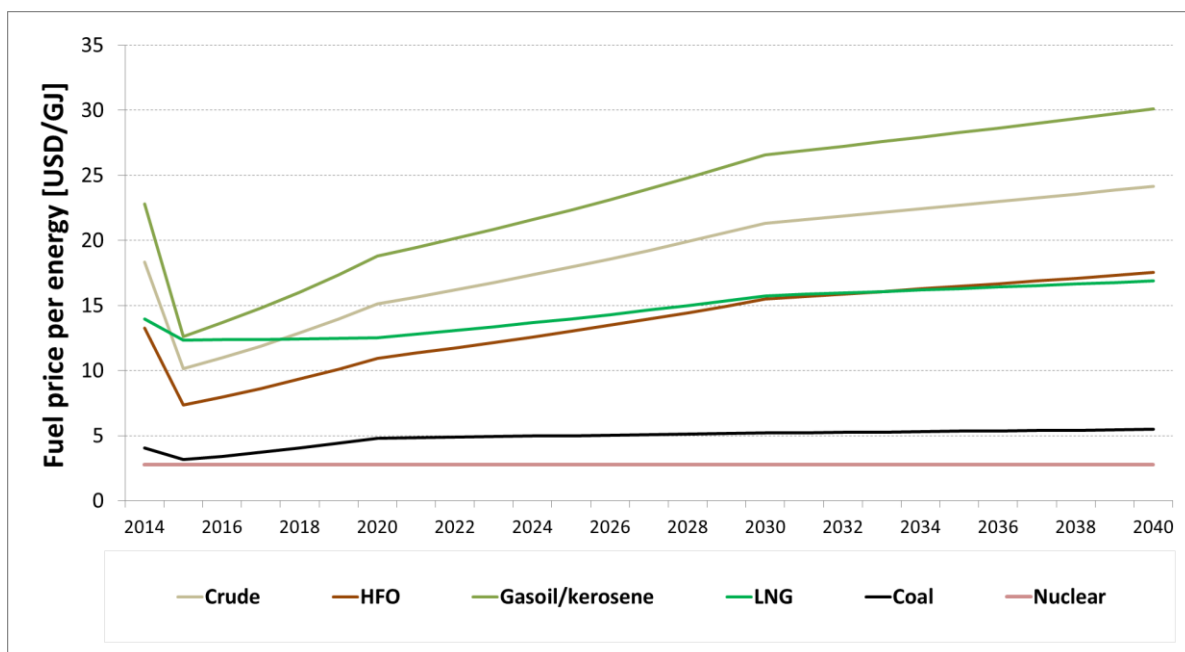
⁷⁹ 1 SKE = 1 Steinkohlegeinheit (German for coal equivalent) = 29.3 GJ

Annex 5.B.3 Fuel price forecast results

Fuel price forecast results on an annual basis are provided below. For comparison reasons, data beyond MTP period are also provided (source: LTP 2015 – 2035).



Annex Figure 36: Price forecast in USD/ton



Annex Figure 37: Price forecast in USD/GJ

Annex Table 52: Reference fuel price scenario – imported fuels (cif prices) per GJ (USD)

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Crude	USD/GJ	10.12	10.96	11.88	12.87	13.94	15.10	15.63	16.18	16.75	17.34	17.94	18.57	19.23	19.90	20.60	21.33	21.59	21.86	22.14	22.42	22.70	22.98	23.27	23.56	23.86	24.16
HFO	USD/GJ	7.34	7.95	8.62	9.33	10.11	10.95	11.34	11.74	12.15	12.58	13.02	13.48	13.95	14.44	14.95	15.47	15.67	15.86	16.06	16.26	16.47	16.67	16.88	17.09	17.31	17.53
Gasoil/kerosene	USD/GJ	12.61	13.65	14.79	16.02	17.36	18.80	19.46	20.15	20.86	21.59	22.35	23.13	23.95	24.79	25.66	26.56	26.89	27.23	27.57	27.92	28.27	28.62	28.98	29.34	29.71	30.08
LNG	USD/GJ	12.32	12.36	12.40	12.44	12.47	12.51	12.78	13.07	13.36	13.66	13.98	14.30	14.64	14.99	15.36	15.73	15.84	15.95	16.06	16.18	16.29	16.40	16.52	16.64	16.75	16.87
Coal	USD/GJ	3.14	3.42	3.72	4.05	4.41	4.81	4.85	4.88	4.92	4.96	5.00	5.03	5.07	5.11	5.15	5.19	5.22	5.25	5.27	5.30	5.33	5.36	5.39	5.42	5.45	5.48
Nuclear	USD/GJ	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78

Annex Table 53: Reference fuel price scenario – domestic fuels (fob prices) per GJ (USD)

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Natural Gas	USD/GJ	7.20	7.24	7.28	7.32	7.36	7.39	7.67	7.95	8.24	8.54	8.86	9.19	9.52	9.88	10.24	10.62	10.72	10.83	10.95	11.06	11.17	11.28	11.40	11.52	11.63	11.75
Coal	USD/GJ	2.81	3.09	3.39	3.72	4.08	4.48	4.51	4.55	4.59	4.62	4.66	4.70	4.74	4.78	4.82	4.86	4.88	4.91	4.94	4.97	5.00	5.03	5.06	5.08	5.11	5.14

Annex Table 54: High fuel price scenario – imported fuels (cif prices) per GJ (USD)

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Crude	USD/GJ	12.15	13.16	14.25	15.44	16.73	18.12	18.75	19.41	20.10	20.80	21.53	22.29	23.07	23.88	24.72	25.59	25.91	26.24	26.57	26.90	27.24	27.58	27.92	28.28	28.63	28.99
HFO	USD/GJ	8.81	9.55	10.34	11.20	12.13	13.14	13.61	14.08	14.58	15.09	15.62	16.17	16.74	17.33	17.94	18.57	18.80	19.04	19.27	19.52	19.76	20.01	20.26	20.51	20.77	21.03
Gasoil/kerosene	USD/GJ	15.13	16.39	17.75	19.23	20.83	22.56	23.36	24.18	25.03	25.91	26.82	27.76	28.73	29.74	30.79	31.87	32.27	32.68	33.09	33.50	33.92	34.35	34.78	35.21	35.65	36.10
LNG	USD/GJ	14.79	14.83	14.88	14.92	14.97	15.01	15.34	15.68	16.03	16.40	16.77	17.17	17.57	17.99	18.43	18.88	19.01	19.14	19.28	19.41	19.55	19.68	19.82	19.96	20.10	20.25
Coal	USD/GJ	3.77	4.10	4.46	4.86	5.29	5.77	5.82	5.86	5.90	5.95	6.00	6.04	6.09	6.13	6.18	6.23	6.26	6.30	6.33	6.36	6.40	6.43	6.47	6.50	6.54	6.57
Nuclear	USD/GJ	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33

Annex Table 55: High fuel price scenario – domestic fuels (fob prices) per GJ (USD)

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Natural Gas	USD/GJ	8.64	8.69	8.73	8.78	8.83	8.87	9.20	9.54	9.89	10.25	10.63	11.02	11.43	11.85	12.29	12.74	12.87	13.00	13.13	13.27	13.40	13.54	13.68	13.82	13.96	14.10
Coal	USD/GJ	3.37	3.70	4.06	4.46	4.89	5.37	5.42	5.46	5.50	5.55	5.60	5.64	5.69	5.73	5.78	5.83	5.86	5.90	5.93	5.96	6.00	6.03	6.07	6.10	6.14	6.17

Annex Table 56: Low fuel price scenario – imported fuels (cif prices) per GJ (USD)

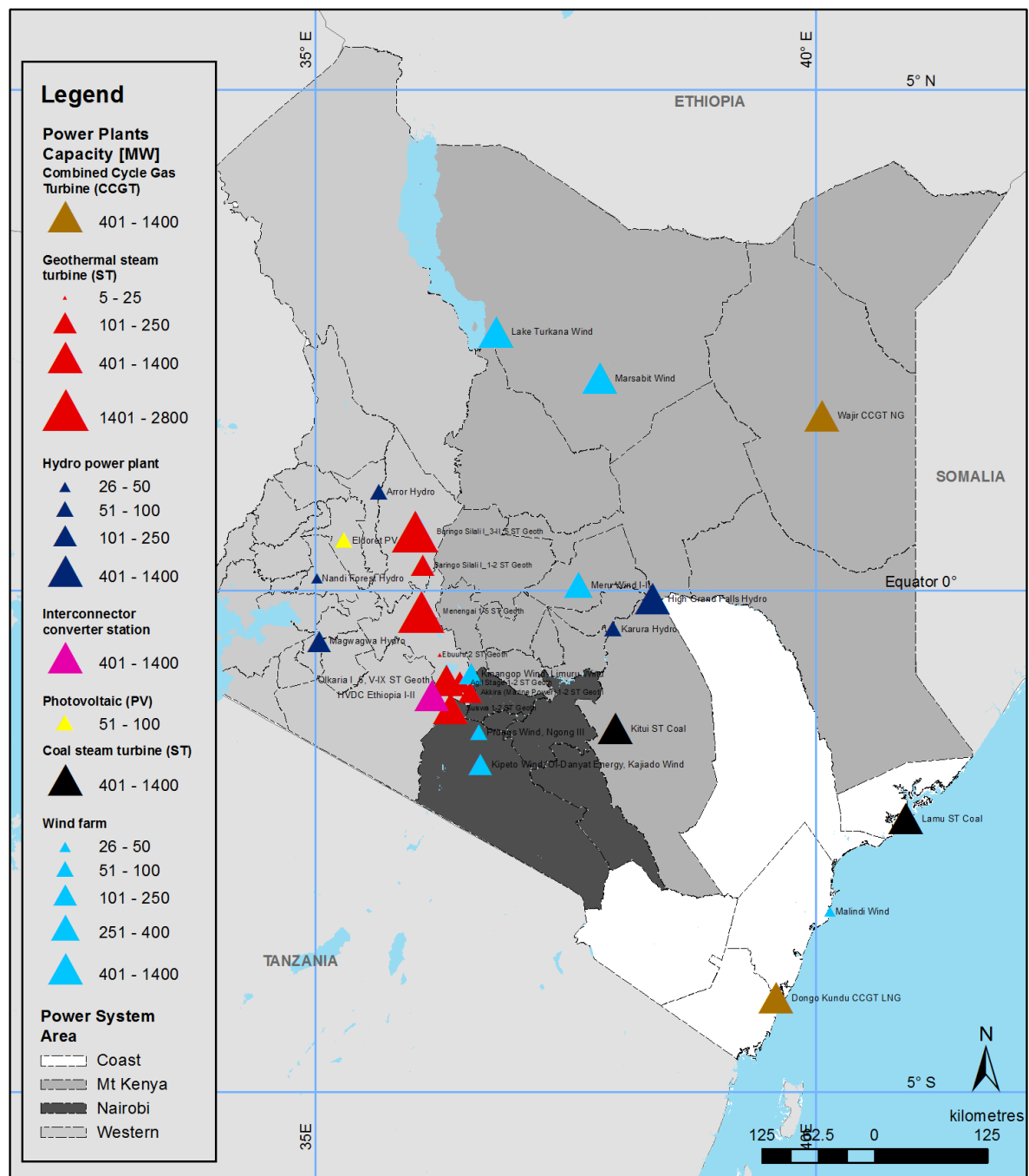
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Crude	USD/GJ	8.10	8.77	9.50	10.29	11.15	12.08	12.50	12.94	13.40	13.87	14.36	14.86	15.38	15.92	16.48	17.06	17.28	17.49	17.71	17.93	18.16	18.39	18.62	18.85	19.09	19.33
HFO	USD/GJ	5.87	6.36	6.89	7.47	8.09	8.76	9.07	9.39	9.72	10.06	10.41	10.78	11.16	11.55	11.96	12.38	12.53	12.69	12.85	13.01	13.17	13.34	13.51	13.68	13.85	14.02
Gasoil/kerosene	USD/GJ	10.08	10.92	11.83	12.82	13.89	15.04	15.57	16.12	16.68	17.27	17.88	18.51	19.16	19.83	20.53	21.25	21.51	21.78	22.06	22.33	22.61	22.90	23.18	23.48	23.77	24.07
LNG	USD/GJ	9.86	9.89	9.92	9.95	9.98	10.01	10.23	10.45	10.69	10.93	11.18	11.44	11.71	12.00	12.29	12.59	12.67	12.76	12.85	12.94	13.03	13.12	13.22	13.31	13.40	13.50
Coal	USD/GJ	2.52	2.73	2.98	3.24	3.53	3.85	3.88	3.91	3.94	3.97	4.00	4.03	4.06	4.09	4.12	4.15	4.17	4.20	4.22	4.24	4.27	4.29	4.31	4.33	4.36	4.38
Nuclear	USD/GJ	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22

Annex Table 57: Low fuel price scenario – domestic fuels (fob prices) per GJ (USD)

		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Natural Gas	USD/GJ	5.76	5.79	5.82	5.85	5.88	5.91	6.13	6.36	6.59	6.84	7.09	7.35	7.62	7.90	8.19	8.49	8.58	8.67	8.76	8.85	8.94	9.03	9.12	9.21	9.31	9.40
Coal	USD/GJ	2.52	2.73	2.98	3.24	3.53	3.85	3.88	3.91	3.94	3.97	4.00	4.03	4.06	4.09	4.12	4.15	4.17	4.20	4.22	4.24	4.27	4.29	4.31	4.33	4.36	4.38

ANNEX 6 EVALUATION OF POWER SYSTEM CANDIDATES – ANNEXES

Annex 6.A Catalogue of generation candidates - map



Annex Figure 38: Map of Kenya – candidate power plants⁸⁰

⁸⁰ Excluding generic candidates (except for PV which is represented with a typical site in Eldoret); Locations approximate: partly adapted and combined (for wind farms of different developers) to avoid overlapping and estimated for candidates with unknown location; Capacity: according to total for whole field / location as listed in Table 6-1 in chapter 6.3.1 of LTP Volume I Main Report.

Annex 6.B Economic assessment – methodology and assumptions

Annex 6.B.1 Technical and economic input parameters - general

1) Discount rate

The weighted average cost of capital (WACC) is supposed to represent the current cost of domestic and offshore debt and equity of the owner of the plants. In the framework of the 10YP two discount rates (DCR), 8% and 10%, are considered in order to reflect such borrowing costs. However, it is difficult to identify an appropriate average cost of borrowing to be applied by a public body to the funding of a new portfolio of (hydro, thermal, etc.) power plants. Any specific rate chosen would most likely provide a false sense of security.

Therefore, the consultant proposes to adopt an approach whereby a continuous range of discount rates between a floor value (i.e. lowest level) of 4% and 12% (real) will be applied. Levelised electricity costs will be calculated for different candidates for DCR between 4% and 12% to see how least cost rankings among candidates develop and to what extent such rankings change or stay robust. The lower value of 4% real has been established on the basis of taking cross references with two other African countries (Nigeria, Rwanda) which appear to have issued long term USD denominated 10-year government bonds with nominal yields ranging between 6% and 7% p.a. and adjusting for USD inflation.

2) Capital expenditure, investment cost and specific investment costs

The term capital expenditure (CAPEX) refers to monetary expenditure on capital/investment goods, i.e. goods that have investment rather than consumption character. Hence, capital is expended to cover investment costs of goods such as those required to construct a power plant, a transmission line or any supporting transport infrastructure, all of which having long term investment character. Specific investment costs represent unit costs based on investment costs on an appropriate unit selected in relation to the investment good such as installed capacity expressed in kilowatt (kW). The cost estimates of the expansion candidates are geared towards regional market prices. Cost estimates were taken from feasibility studies and respective plans of the responsible institutions where available and reviewed. For remaining cases the consultant applied average recent costs of similar projects in nearest market where sufficient data is available.

Site-specific conditions including different connection and fuel supply options might increase or decrease the final project costs.

3) Operations & maintenance cost

Contrary to CAPEX and investment costs, operating expenditure (OPEX) refers to recurring operation & maintenance costs required to maintain business operation such as power plant operation.

4) Capacity factors, load factors and power plant availability

All thermal power plants are assumed to be operated at their highest efficiency, i.e. at full load (a load factor of 100%). The expected capacity factors of the thermal power plants considered in the study are based on the Consultant's experience. Assuming full load operation, these capacity factors are significantly below the availability. Availability is defined as the total period deducted by the planned outage rate (for maintenance) and the forced outage rate. In addition to fixed capacity factors, candidates are also compared along a range of capacity factors (and fixed discount rates).

5) Construction period

The construction period of a power plant strongly relies on the applied technology.

For coal power plants, it has generally to be considered that the implementation period for a coal power plant of 600 MW amounts to approximately 70 months, i.e. almost six years. This takes into consideration the construction and testing/commissioning of the plant; the latter amounting to 9 to 10 months.

For the coal power plants (both Lamu and Kitui), a stage-wise implementation of the blocks is deemed realistic. For the three unit configurations the block-wise implementation (considering both construction and commissioning) is applied as follows:

Block 1: 53 months

Block 2: + 15 months after construction of previous stage (59 months)

Block 3: + 15 months after construction of previous stage (65 months)

For CCGT plants, the implementation period (i.e. construction and commissioning/testing) amounts to 45 months whereas 27 months accrue for open cycle gas turbines and for medium speed diesel engines.

For geothermal plants, the implementation periods vary depending on the size of their installed capacity. As opposed to other generation technologies considered in the Power Generation and Transmission Master Plan (PGTMP) and assessed in the present techno-economic analysis, the implementation periods for the geothermal power plants also take into consideration the study period for various studies undertaken before the physical erection of each plant.

For all plants of the various technologies and sizes, there is a two year exploration phase⁸¹ followed by two years preparation time⁸² before the actual physical implementation of the plant starts. The latter is variable depending on the plant's envisaged installed capacity and driven – both in terms of cost and time – by the amount of borehole drilling for the production wells.

⁸¹ Considering e.g. geological surface study, measurements and their evaluation, conceptual model, definition of drilling targets for 2-3 wells, exploration drilling.

⁸² Comprising the execution of a feasibility study, environmental and social impact assessment, bankable feasibility study, funding arrangements and financial close.

It is noted that the cost for all subsequent work steps are spread throughout the remaining implementation period although the major time and cost driver is borehole drilling. An overview of the implementation periods is provided in Annex 6.D.3.

The consideration of the study period of the geothermal power plants is mainly due to the nature of the project development cycle of geothermal plants: It is an integral part of the overall project implementation and is comprised of capital-intensive tasks as well. Hence, already up to 10% of the overall CAPEX may be accrued during exploration and preparation phase of the geothermal power plants.

With 6-11 years implementation period, the timeframe for geothermal power plants is considerably longer compared to other technologies of concern under the PGTMP. However, the entire period should be considered to appropriately derive the generation cost for geothermal power while discounting both cost and generation.

Annex 6.B.2 Technical and economic input parameters - power plants transmission link (for ranking scenario)

The cost estimate assumptions for transmission lines and substations listed in the following table are based on assumptions provided in the 10 year plan reviewed and adapted (where necessary) by the Consultant. Similar to the assumptions for required transmission line lengths, they may not reflect the exact costs for each candidate. However, they are sufficiently accurate to derive reliable and robust candidate plant rankings.

Annex Table 58: Cost estimate assumptions for grid connection measures

	Transmission system measure to connect power plant candidates	Specific investment costs [USD / km] or [USD / unit]
1	132 kV double circuit system / twin lark conductors	180,000
2	220 kV double circuit system / twin lark conductors	240,000
3	220 kV double circuit system / canary conductors	260,000
4	400 kV double circuit system / quad lark conductors	440,000
5	Large power transformers 90 MVA, 200/132 kV	1,800,000
6	Large power transformers 200 MVA, 400/132 kV	2,800,000
7	Large power transformers 350 MVA, 400/132 kV	4,800,000
8	Large power transformers 400 MVA, 400/132 kV	5,800,000
9	Large power transformers 500 MVA, 400/220 kV	7,000,000

The following table provides an overview of the transmission link assumptions applied in the framework of the techno-economic assessment.

Annex Table 59: Overview of transmission link assumptions for scenario Sc2: with T/L link cost by power plant

Power plant	Transmission line				Transformers at grid point			Total T/L link cost [MUSD]
	Voltage level [kV]	No. of circuits	Length of T/L [km]	Cost for T/L [MUSD]	Type	No. of transformers	Cost for transformers [MUSD]	
Lamu Coal	400	2	520	249.6	400/220kV Tx 500MVA	3	21	270.6
Kitui Coal	400	2	120	57.6	400/220kV Tx 500MVA	3	21	78.6
Dongo Kundu LNG CCGT	400	2	50	24	na	0	0	24
Wajir NG CCGT	400	2	500	240	400/220kV Tx 500MVA	2	14	254
Generic MSD plant	na	na	0	0	na	0	0	0
Generic nuclear plant	400	2	500	240	400/220kV Tx 500MVA	2	14	254
Generic gas turbine	na	na	0	0	na	0	0	0
Olkaria 1 Unit 6	na	na	0	0	na	0	0	0
Olkaria 5	220	2	30	7.8	na	0	0	7.8
Suswa Phase I Stage 1	132	2	10	1.8	na	0	0	1.8
Suswa Phase I Stage 2		2	10	1.8	na	0	0	1.8
Menengai Phase I, Stage 1	132	2	15	2.7	na	0	0	2.7
Eburru 2	132	2	22	3.96	na	0	0	3.96
Lake Turkana wind	400	2	428	205.44	400/220kV Tx 500MVA	1	7	212.44
Generic wind farm	na	na	0	0	na	0	0	0
Generic PV station	na	na	0	0	na	0	0	0
Generic bagasse plant	na	na	0	0	na	0	0	0
High Grand Falls	400	2	200	96	400/220kV Tx 500MVA	2	14	110
Karura	132	2	15	2.7	na	0	0	2.7
Nandi Forest	132	2	40	7.2	na	0	0	7.2
Arror	132	2	79	14.22	na	0	0	14.22
Magwagwa	132	2	10	1.8	na	0	0	1.8

Annex 6.C Economic assessment – ranking scenarios

In the following paragraphs, the results of the following scenarios of the techno-economic are presented:

- Sc1a – without site-specific transmission links, reference fuel scenario
- Sc1b – without site-specific transmission links, high fuel scenario
- Sc2b – including site-specific transmission links, high fuel scenario

Annex 6.C.1 Coal power plant ranking scenarios

Ranking scenario Sc1a and Sc1b –without site-specific transmission link cost, reference and high fuel price scenario

Neglecting site-specific grid integration cost and considering both the reference and high fuel scenario, the results of the techno-economic assessment on the coal power plant candidates are summarised as follows:

- With LEC ranging from 7.9 to 10.6 USDcent/kWh in the reference fuel scenario, the Lamu-ST “tender” candidate appears to be the cheapest option.
- Considering same unit configurations and neglecting the Lamu “tender” option, it can be seen that LEC of the two sites are in the same range both in the reference and the high fuel scenario.

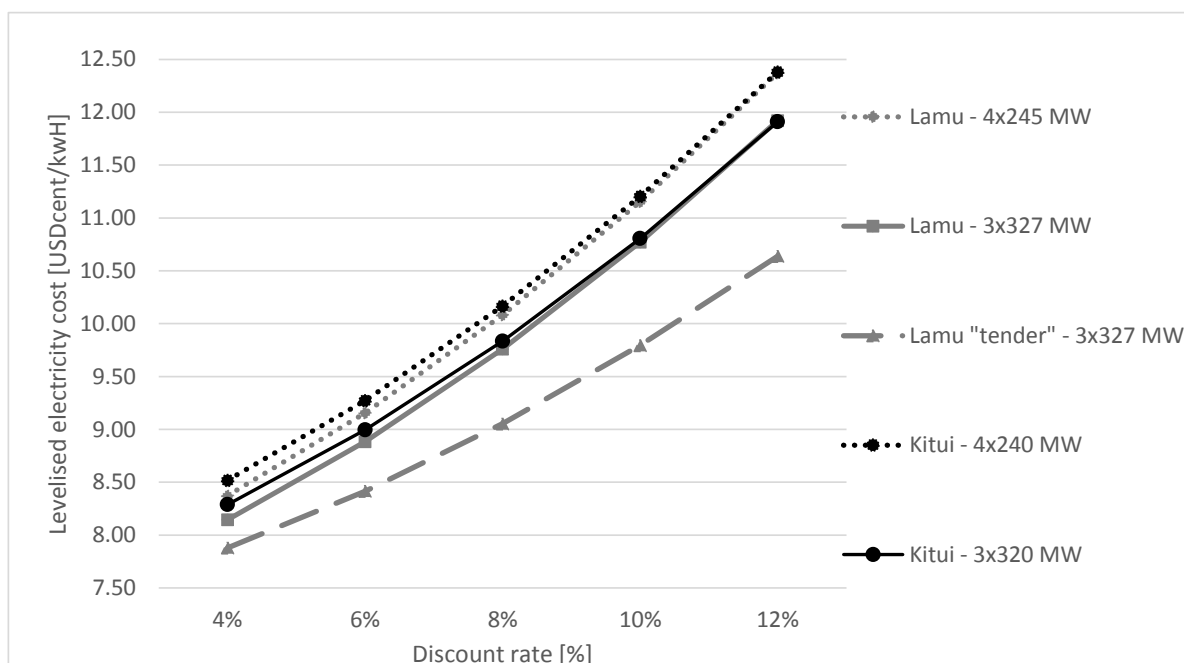
The results of the analysis are presented in the following tables and graphs.

Annex Table 60: LEC for coal candidates, Sc1a: no transmission link, reference fuel scenario

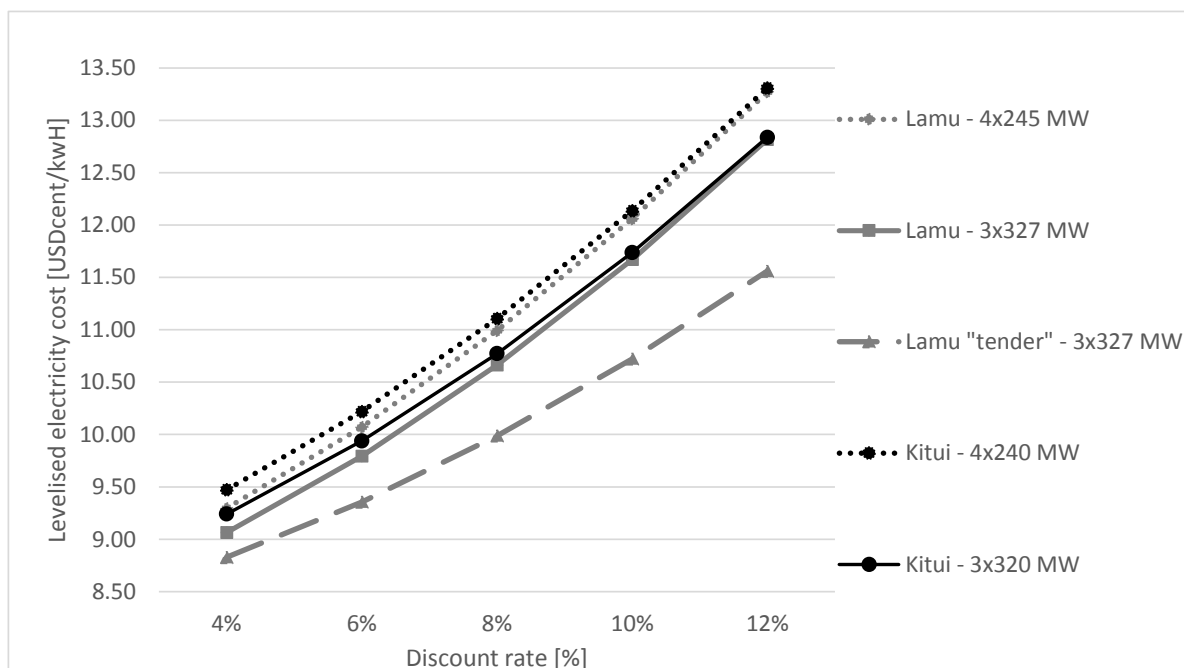
Discount Rate	Unit	Lamu-ST 4x245 MW	Lamu-ST 3x327 MW	Lamu-ST “tender” 3x327 MW	Kitui-ST 4x240 MW	Kitui-ST 3x320 MW
4%	USDcent/ kWh	8.39	8.15	7.88	8.48	8.26
6%		9.18	8.88	8.41	9.22	8.95
8%		10.11	9.76	9.05	10.11	9.78
10%		11.19	10.77	9.79	11.13	10.74
12%		12.42	11.92	10.64	12.29	11.83
Ranking	#	4-5	2-3	1	4-5	2-3

Annex Table 61: LEC for coal candidates, Sc1b: no transmission link, high fuel scenario

Discount Rate	Unit	Lamu-ST 4x245 MW	Lamu-ST 3x327 MW	Lamu-ST “tender” 3x327 MW	Kitui-ST 4x240 MW	Kitui-ST 3x320 MW
4%	USDcent/ kWh	9.31	9.06	8.83	9.44	9.21
6%		10.09	9.79	9.36	10.17	9.90
8%		11.02	10.66	9.99	11.05	10.72
10%		12.09	11.67	10.72	12.06	11.67
12%		13.31	12.81	11.56	13.22	12.76
Ranking	#	3-4	1-2	1	3-4	1-2



Annex Figure 39: LEC for coal candidates, Sc1a: no transmission link, reference fuel scenario



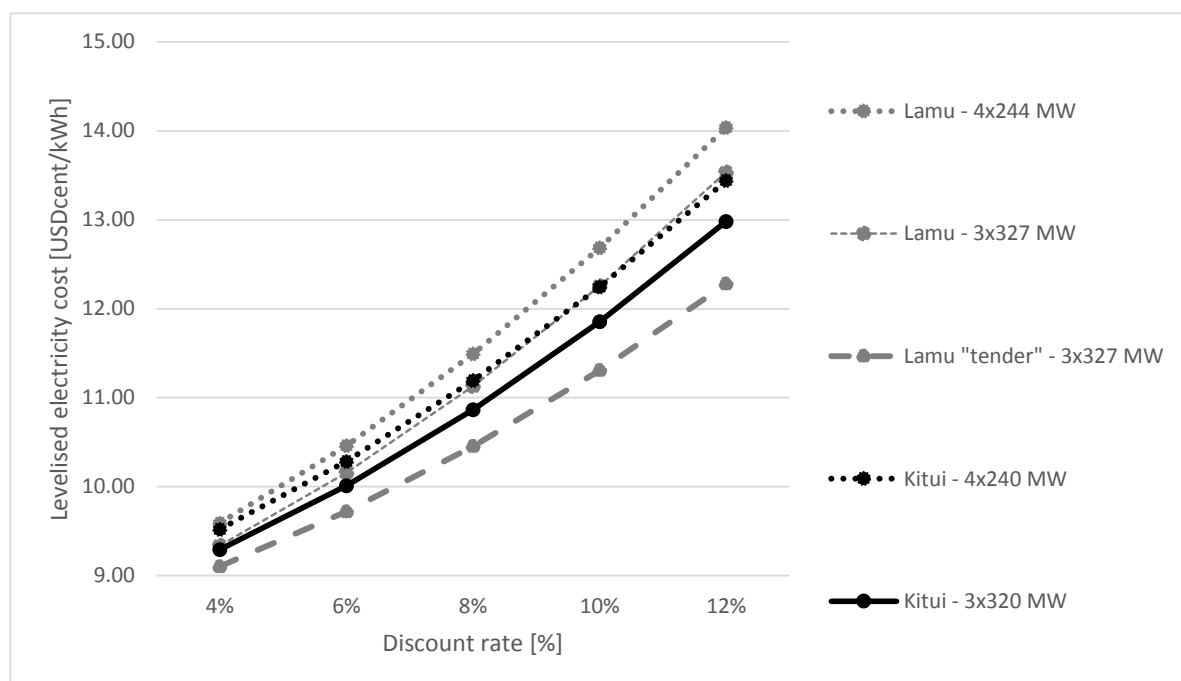
Annex Figure 40: LEC for coal candidates, Sc1b: no transmission link, high fuel scenario

Ranking scenario Sc2b – with site-specific transmission link cost, high fuel price scenario

The results of scenario Sc2b considering grid integration cost and the high fuel price scenario are depicted in the following table and graph.

Annex Table 62: LEC for coal candidates, Sc2b: incl. transmission link, high fuel scenario

Discount Rate	Unit	Lamu-ST 4x245 MW	Lamu-ST 3x327 MW	Lamu-ST "tender" 3x327 MW	Kitui-ST 4x240 MW	Kitui-ST 3x320 MW
4%	USDcent/ kWh	9.59	9.34	9.10	9.52	9.29
6%		10.46	10.16	9.72	10.28	10.01
8%		11.49	11.13	10.45	11.19	10.86
10%		12.68	12.26	11.31	12.24	11.85
12%		14.04	13.53	12.28	13.44	12.98
Ranking	#	5	3-4	1	3-4	2



Annex Figure 41: LEC for coal candidates, Sc2b: incl. transmission link, high fuel scenario

Annex 6.C.2 CCGT power plant ranking scenarios

Ranking scenario Sc1a and Sc1b –without site-specific transmission link cost, reference and high fuel price scenario

The results of scenario Sc1a and Sc2b generally confirm the results of the scenario Sc2a:

- For both fuel price scenarios, the Wajir candidates appear to be cheaper than the Dongo Kundu options (by between 33-37%). As aforementioned, the high investment and O&M costs for the required LNG terminal as well as the high fuel price for LNG considerably influence the levelised electricity cost of the Dongo Kundu options.
- 2x(2+1) unit configurations are generally more expensive than 1x(2+1) unit configurations (between 8-10%) due to higher specific investment costs of smaller unit sizes. However, smaller unit sizes are recommended from the system's point of view to ensure grid stability.
- At Dongo Kundu site the triple pressure mode configuration is the preferred option. By the use of three pressure levels in the heat recovery steam generator, the efficiency is higher, so that the fuel savings throughout the plant lifetime surpasses the higher investment costs.
- The same comparison for the Wajir site shows that the LEC of the one pressure and triple pressure configurations is nearly the same for both fuel price scenarios. Wajir plant utilises domestic natural gas which is significantly cheaper than the liquefied natural gas used at the Dongo Kundo site accounting for the similarity observed across different fuel price scenarios. Consequently, the investment in a more expensive triple pressure heat recovery steam generator resulting in a higher efficiency is hardly worthwhile.

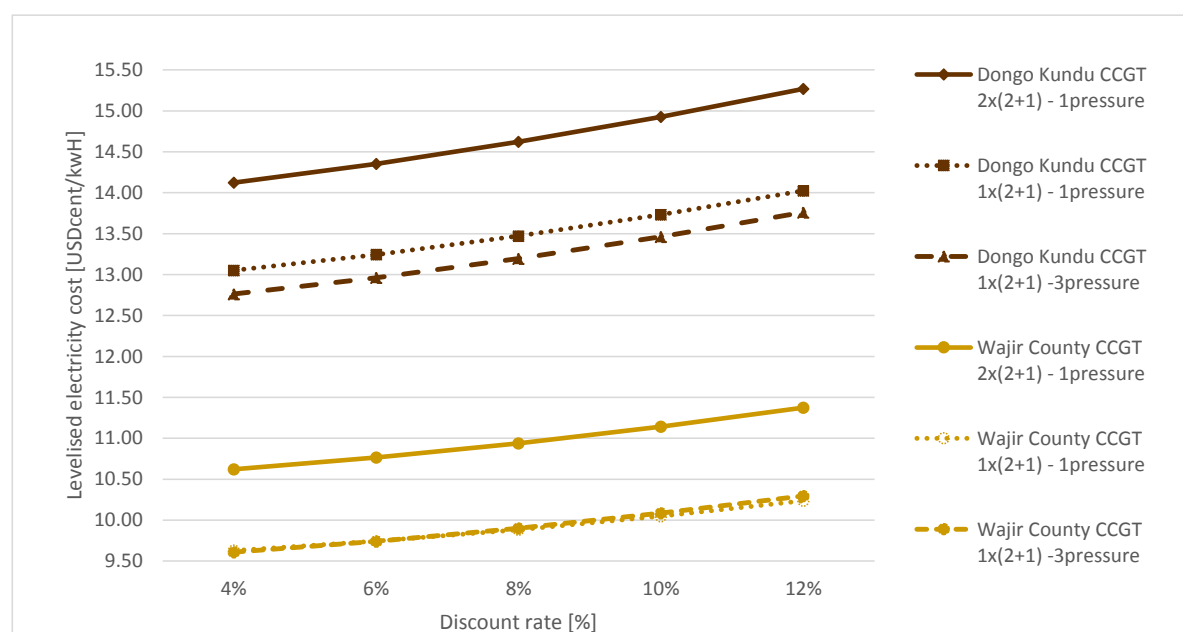
The results of scenarios Sc1a and Sc1b are presented in the following tables and graphs.

Annex Table 63: LEC for CCGT candidates, Sc1a: no transmission link, reference fuel scenario

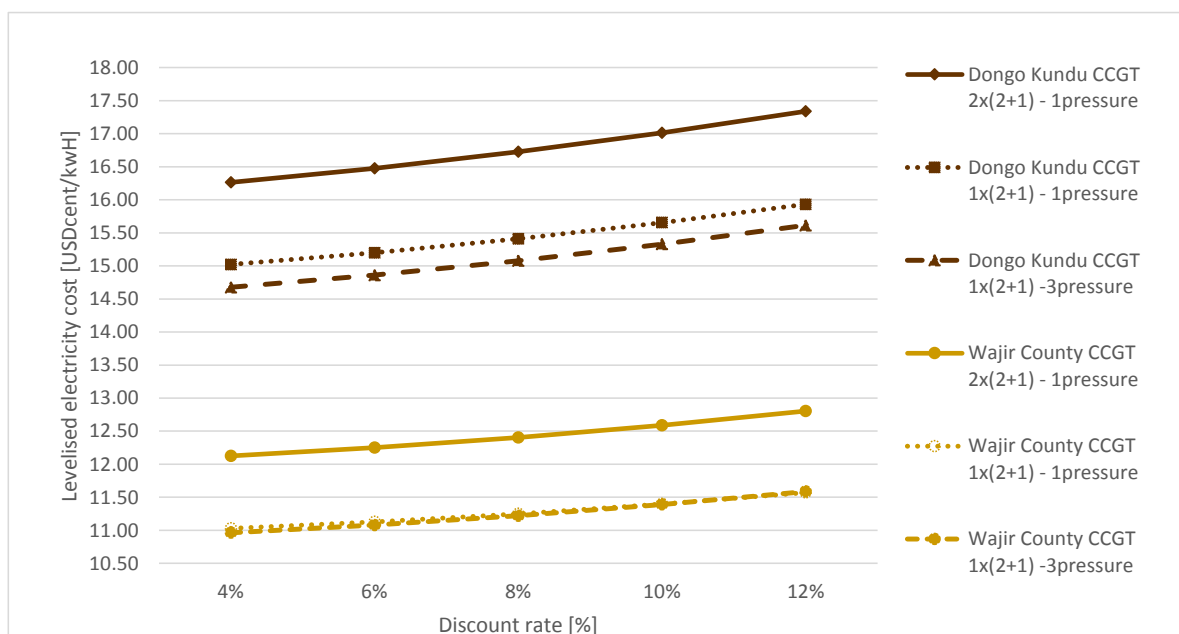
Discount Rate	Unit	Dongo Kundu 2x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 3pressure	Wajir 2x(2+1) - 1pressure	Wajir 1x(2+1) - 1pressure	Wajir 1x(2+1) - 3pressure
4%	USDcent /kWh	14.12	13.05	12.76	10.62	9.63	9.61
6%		14.35	13.24	12.96	10.77	9.74	9.74
8%		14.62	13.47	13.20	10.94	9.88	9.90
10%		14.93	13.73	13.46	11.14	10.05	10.08
12%		15.27	14.02	13.76	11.37	10.24	10.30
Ranking	#	6	5	4	3	1-2	1-2

Annex Table 64: LEC for CCGT candidates, Sc1a: no transmission link, high fuel scenario

Discount Rate	Unit	Dongo Kundu 2x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 3pressure	Wajir 2x(2+1) - 1pressure	Wajir 1x(2+1) - 1pressure	Wajir 1x(2+1) - 3pressure
4%	USDcent /kWh	16.26	15.02	14.68	12.13	11.03	10.96
6%		16.47	15.20	14.86	12.25	11.13	11.08
8%		16.73	15.41	15.08	12.40	11.25	11.22
10%		17.01	15.65	15.33	12.59	11.40	11.39
12%		17.34	15.93	15.61	12.80	11.57	11.59
Ranking	#	6	5	4	3	1-2	1-2



Annex Figure 42: LEC for CCGT candidates, Sc1a: no transmission link, reference fuel scenario



Annex Figure 43: LEC for CCGT candidates, Sc1a: no transmission link, high fuel scenario

Ranking scenario Sc2b – with site-specific transmission link cost, high fuel price scenario

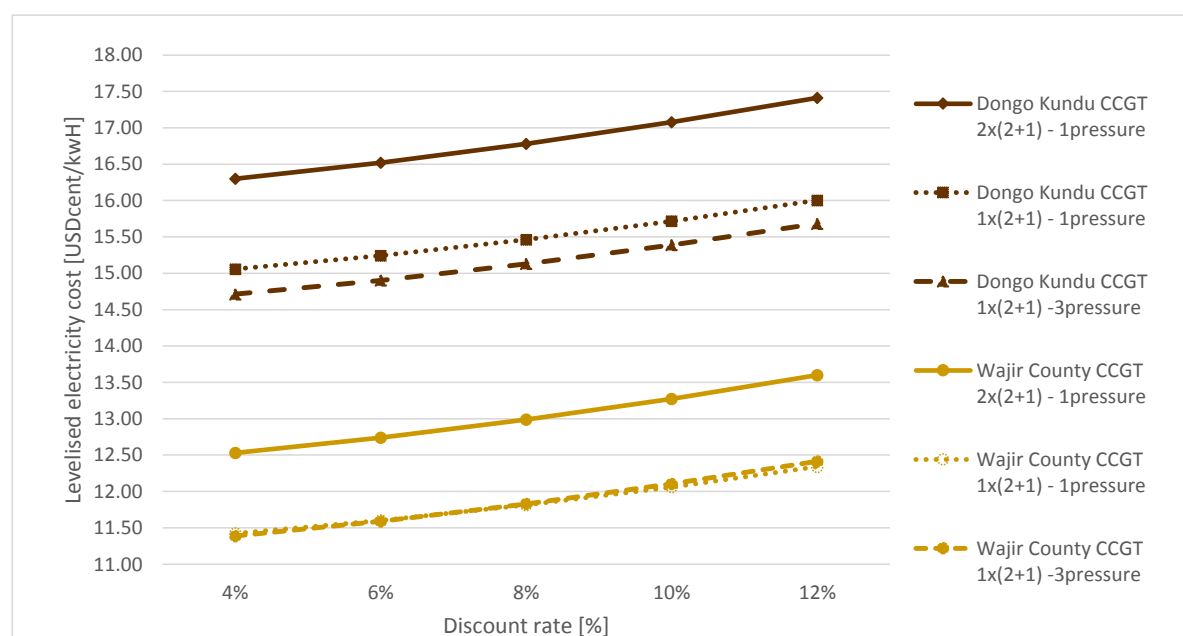
In this scenario, costs for required transmission links and the high fuel price scenario are considered.

- Similar to the previous scenarios, the analysis reveals that Wajir site appears to be cheaper than the Dongo Kundu option (by between 26-30%).
- As aforementioned in the previous scenarios, the triple pressure configuration is the preferred option at Dongo Kundu site. Considering the high fuel price scenario, LEC of this configuration are 2% lower than LEC of the one pressure option.
- At Wajir site, the same comparison shows that the LEC of the one and triple pressure configurations are in the same range.

The resulting LEC are presented in the following table and graph.

Annex Table 65: LEC for CCGT candidates, Sc2b: incl. transmission link, high fuel scenario

Discount Rate	Unit	Dongo Kundu 2x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 3pressure	Wajir 2x(2+1) - 1pressure	Wajir 1x(2+1) - 1pressure	Wajir 1x(2+1) - 3pressure
4%	USDcent /kWh	16.32	15.08	14.73	12.55	11.45	11.41
6%		16.55	15.27	14.93	12.77	11.63	11.62
8%		16.81	15.49	15.16	13.02	11.84	11.86
10%		17.11	15.75	15.42	13.31	12.10	12.14
12%		17.45	16.04	15.72	13.64	12.38	12.46
Ranking	#	6	5	4	3	1-2	1-2



Annex Figure 44: LEC for CCGT candidates, Sc2a: incl. transmission link, high fuel scenario

Annex 6.C.3 Geothermal power plant ranking scenarios

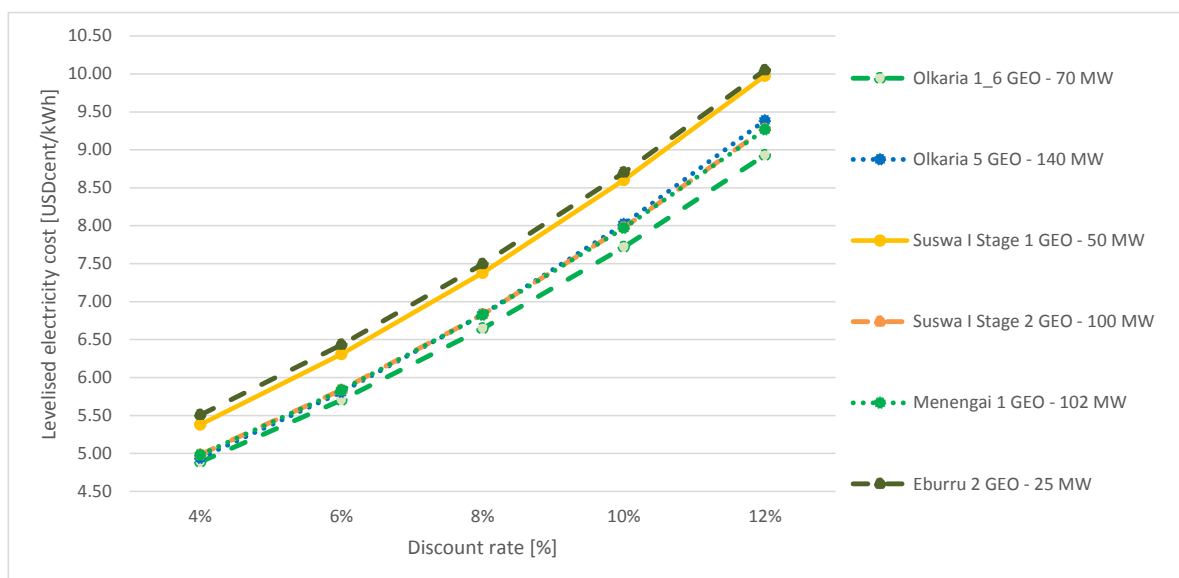
Ranking scenario Sc1–without site-specific transmission link cost

In this scenario, cost for required transmission links for power evacuation are neglected. Due to the low influence of grid integration cost for the selected geothermal power plant candidates, the results of the analysis confirm the results of scenario Sc2 (including transmission link cost):

- For all discount rates Olkaria 1 Unit 6 shows the lowest LEC ranging from 4.9 to 8.9 USDcent/kWh. For discount rates below 8%, the 2nd cheapest option is Olkaria 5, followed by Menengai Phase I Stage 1 and Suswa Phase I Stage 2. For discount rates above 8%, Menengai Phase I Stage 1 and Suswa Phase I Stage 2 show slightly lower LEC than Olkaria 5 despite of higher specific investment costs. This stems from the longer implementation period of Olkaria 5 (investments are thus disbursed over a longer period).
- Due to the small unit size Eburru shows the highest LEC ranging from 5.5 to 10.1 USDcent/kWh.

Annex Table 66: LEC for geothermal candidates, Sc1a: no transmission link

Discount Rate	Unit	Olkaria 1 Unit 6	Olkaria 5	Suswa Phase I Stage 1	Suswa Phase I Stage 2	Menengai 1 Phase I - Stage 1	Eburru 2
4%	USDcent /kWh	4.89	4.94	5.38	4.99	4.98	5.51
6%		5.70	5.81	6.31	5.84	5.83	6.43
8%		6.65	6.83	7.38	6.83	6.83	7.50
10%		7.72	8.02	8.60	7.98	7.97	8.70
12%		8.93	9.39	9.98	9.28	9.27	10.05
Ranking	#	1	2-4	5	3-4	2-3	6



Annex Figure 45: LEC for geothermal candidates, Sc1a: no transmission link

Annex 6.C.4 Hydropower plant ranking scenarios

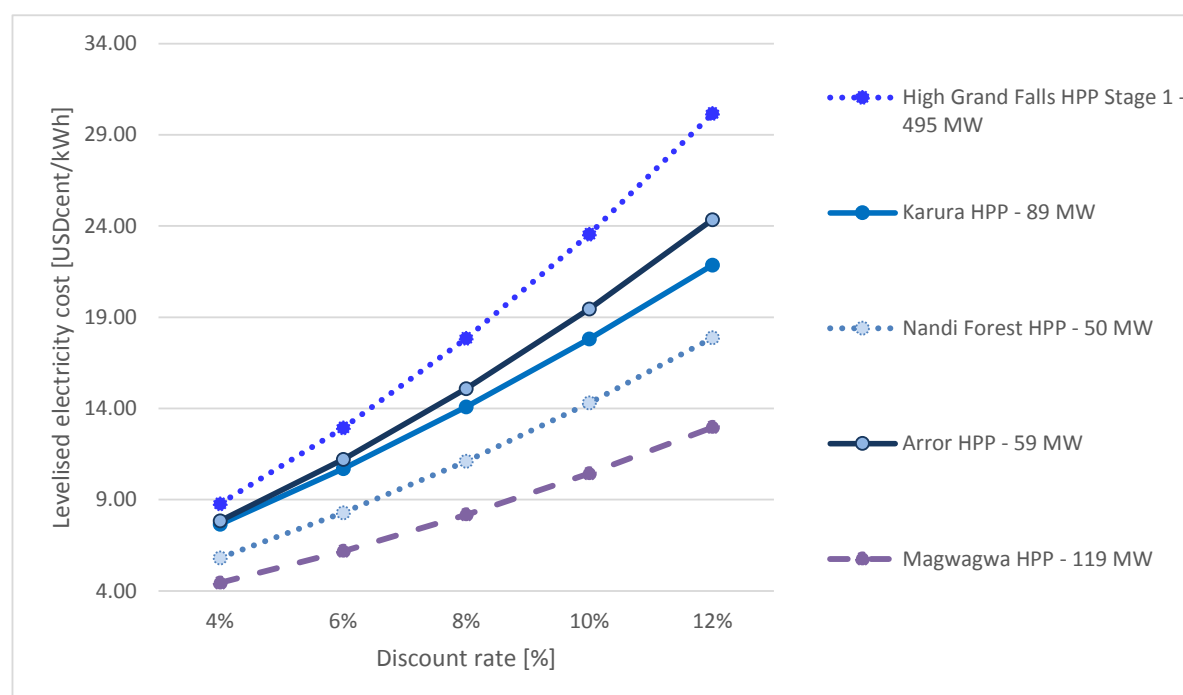
Ranking scenario Sc1—without site-specific transmission link cost

In this analysis cost for required transmission links for power evacuation of the five hydropower plant candidates are neglected. The results confirm the results of scenario Sc2 (including transmission link cost) and can be summarised as follows:

- Magwagwa appears to be the preferred option from an economic point of view (LEC ranging from 4.4-13.0 USDcent/kWh), followed by Nandi Forest (LEC increased by 33-38%), Karura (LEC increased by 69-74%), Aror (LEC increased by 73-85%) and High Grand Falls (LEC increased by 104-133%).
- With LEC ranging from 8.8 to 30.2 USDcent/kWh High Grand Falls shows by far the highest LEC which results from the high investment cost and the comparatively low capacity factor. However, High Grand Falls will provide more than 400 MW peaking capacity. From the system's point of view High Grand Falls is thus a very valuable candidate.

Annex Table 67: LEC for hydropower candidates, Sc1: no transmission link

Discount Rate	Unit	High Grand Falls (HGFL) HPP	Karura HPP	Nandi Forest HPP	Arror HPP	Magwagwa HPP
4%	USDcent/kWh	8.77	7.66	5.81	7.83	4.43
6%		12.93	10.69	8.28	11.21	6.17
8%		17.83	14.08	11.10	15.08	8.17
10%		23.55	17.81	14.30	19.45	10.43
12%		30.16	21.86	17.87	24.34	12.96
Ranking	#	5	3-4	2	3-4	1



Annex Figure 46: LEC for hydropower candidates, Sc1: no transmission link

Annex 6.C.5 Comparison of power plants from different technologies

Ranking scenario Sc2b – with site-specific transmission link cost, high fuel price scenario

The following paragraphs present the results of scenario Sc2b (including transmission link cost, high fuel price scenario) for selected candidates both as a function of discount rate and as a function of capacity factor.

Varying discount rates

Considering the high fuel price scenario and plotting the LEC as a function of discount rates, the results can be summarised as follows:

- It can be seen that the ranking of traditional peaking units (gasoil fuelled gas turbine, HFO fuelled MSD engine, hydropower plants with storage facilities) does not change in case of high fuel price developments. For discount rates below 12%, Karura shows the lowest LEC, followed by High Grand Falls, the HFO fuelled MSD engine and the gasoil fuelled gas turbine. However, considering a discount rate of 12% it can be seen that the resulting LEC of High Grand Falls and the generic MSD engine are in the same range.
- When comparing traditional intermediate load units such as coal and CCGT power plants, it can be seen that for discount rates below 10%, the coal power plants are cheaper than natural gas fuelled CCGT power plants.
- The high fuel price scenario strengthens the effect that non fossil fuelled power plants are the preferred base load plants. The geothermal power plant Suswa Phase I Stage 2 shows the lowest LEC, followed by the generic bagasse power plant and the HVDC.
- The LEC of volatile RE candidate are not influenced by the fuel price forecast. Thus, the ranking remains the same as in the reference fuel price scenario: Lake Turkana wind farm has by far the lowest LEC for all discount rates, followed by the generic wind farm (LEC increased by 13-23%) and the generic PV power station (LEC increased by 35-43%).

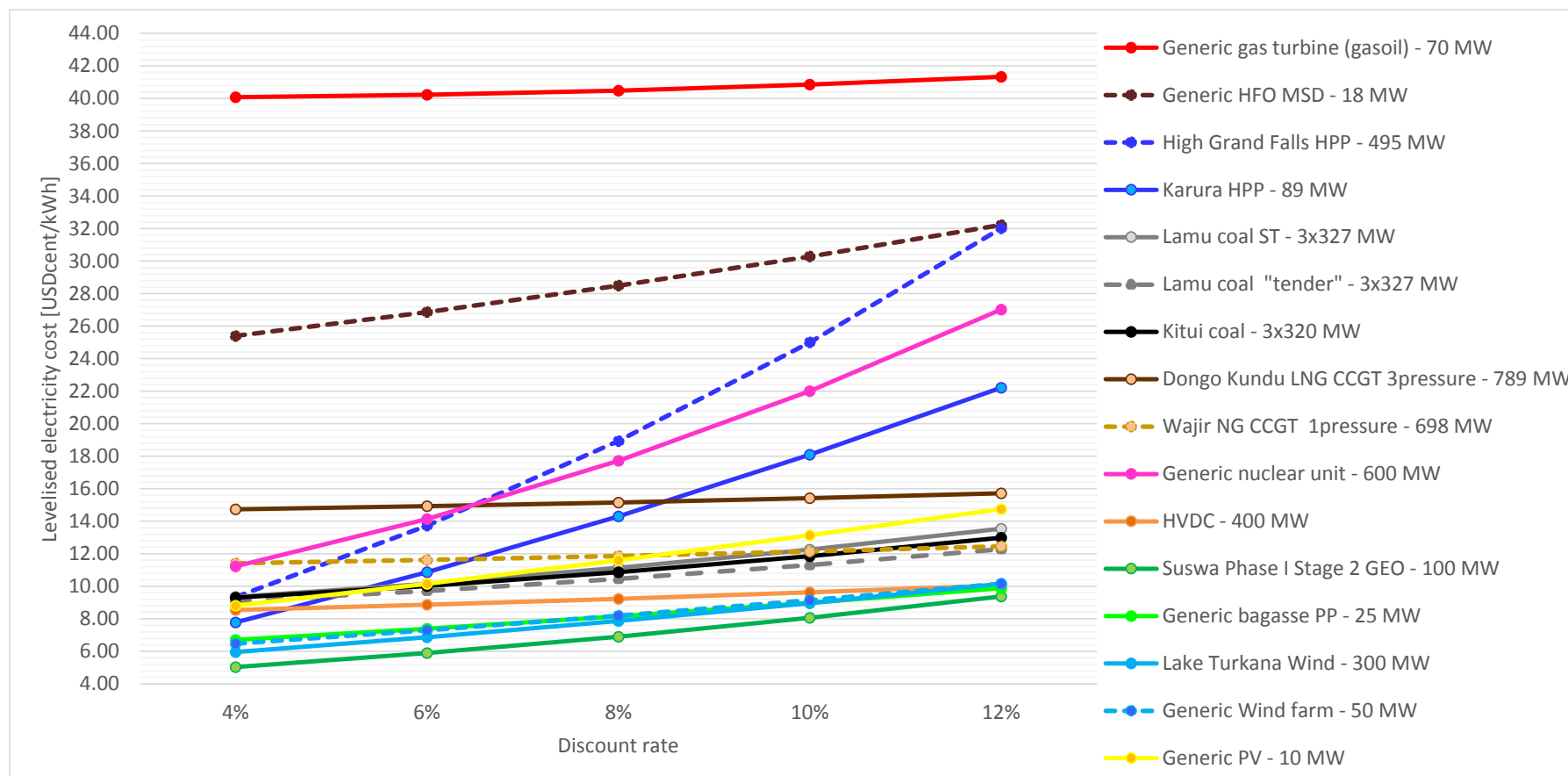
The following table and graphs present the LEC of selected power plant candidates as a function of discount rate considering grid integration cost and the high fuel price scenario.

Annex Table 68: Ranking of peaking, intermediate, base load and intermittent units, Sc2b incl. transmission link, high fuel price

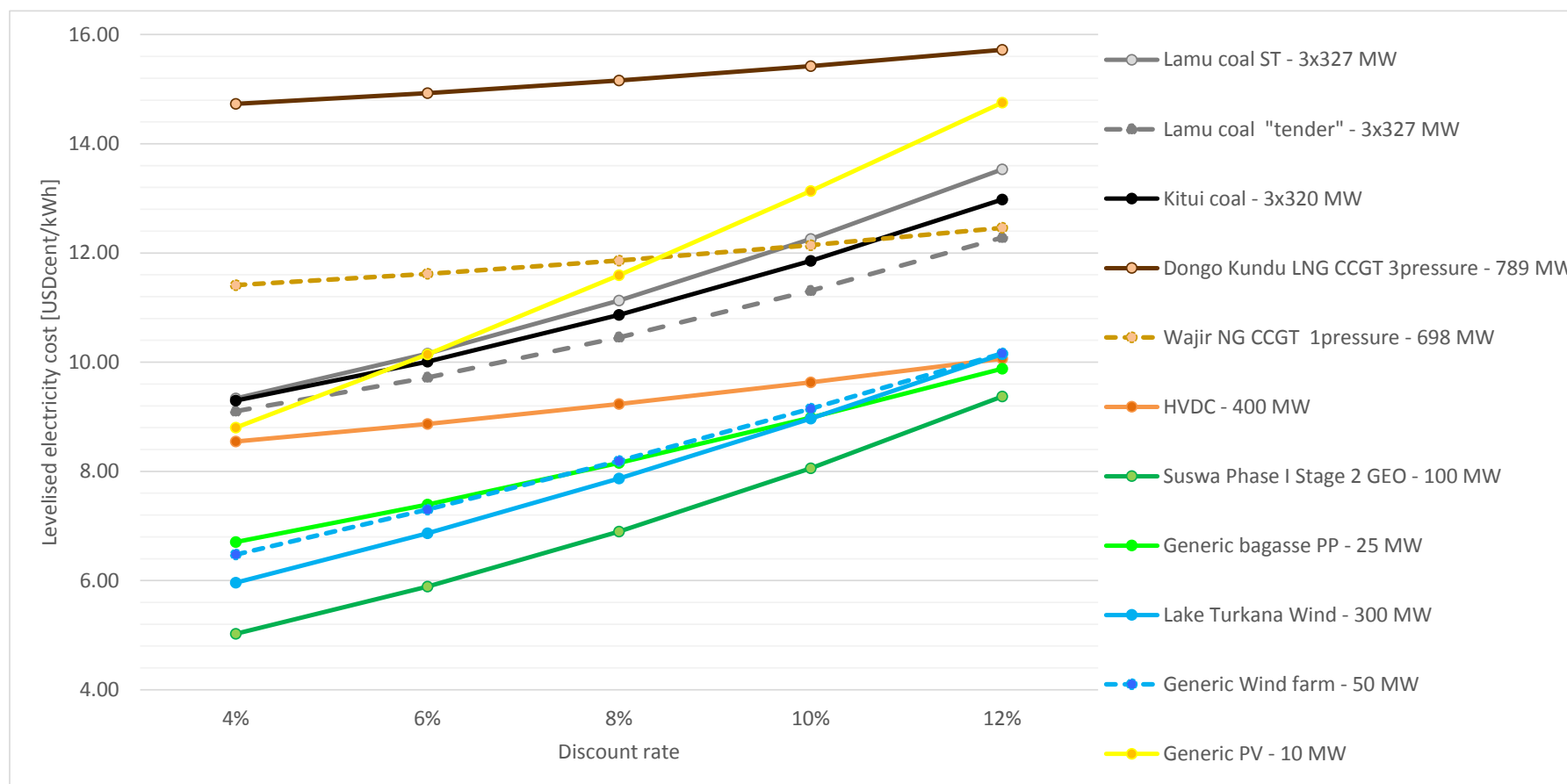
	Reserve units	Peaking units		Intermediate load units			Base load units	Intermittent capacity
Discount rate range	4-12%	4-10%	12%	4-8%	10%	12%	4-12%	4-12%
Ranking:								
1	Generic gas turbine (gasoil) – 70 MW	Karura HPP – 89 MW	Karura HPP – 89 MW	Lamu “tender” coal - 3x327 MW	Lamu “tender” coal - 3x327 MW	Lamu “tender” coal - 3x327 MW	Suswa Phase I Stage 2 GEO – 100 MW	Lake Turkana wind farm – 300 MW
2	Generic MSD (HFO) – 18 MW	High Grand Falls HPP – 495 MW	Generic MSD (HFO) – 18 MW	Kitui coal - 3x320 MW	Kitui coal - 3x320 MW	Wajir NG-CCGT 1 pressure – 698 MW	Generic bagasse plant -25 MW	Generic wind farm – 50 MW
3		Generic MSD (HFO) – 18 MW	High Grand Falls HPP – 495 MW	Lamu coal - 3x327 MW	Wajir NG-CCGT 1 pressure – 698 MW	Kitui coal - 3x320 MW	HVDC – 400 MW	Generic PV power station – 10 MW
4		Generic gas turbine (gasoil) – 70 MW	Generic gas turbine (gasoil) – 70 MW	Wajir NG-CCGT 1 pressure – 698 MW	Lamu coal - 3x327 MW	Lamu coal - 3x327 MW	(intermediate load units)	
5				Dongo Kundu LNG-CCGT 3 pressure – 789 MW	Dongo Kundu LNG-CCGT 3 pressure – 789 MW	Dongo Kundu LNG-CCGT 3 pressure – 789 MW	Nuclear unit – 600 MW	

Annex Table 69: LEC as a function of discount factor for various candidates, Sc2b: incl. transmission link, high fuel scenario

Discount Rate	Unit	Lamu coal ST - 3x327 MW	Lamu coal "tender" - 3x327 MW	Kitui coal - 3x320 MW	Dongo Kundu LNG CCGT 3pressure - 789 MW	Wajir NG CCGT 1pressure - 698 MW	Generic nuclear unit - 600 MW	Suswa Phase I Stage 2 GEO - 100 MW	Generic bagasse PP - 25 MW	Generic HFO MSD - 18 MW	Generic gas turbine (gasoil) - 70 MW	High Grand Falls HPP - 495 MW	Karura HPP - 89 MW	Lake Turkana Wind - 300 MW	Generic Wind farm - 50 MW	Generic PV - 10 MW	HVDC - 400 MW
4%	USDcent/kWh	9.34	9.10	9.29	14.73	11.41	11.22	5.03	6.71	25.40	40.08	9.33	7.78	5.96	6.48	8.80	8.55
6%		10.16	9.72	10.01	14.93	11.62	14.14	5.89	7.39	26.86	40.23	13.73	10.86	6.87	7.30	10.14	8.87
8%		11.13	10.45	10.86	15.16	11.86	17.72	6.90	8.15	28.49	40.49	18.93	14.31	7.87	8.19	11.59	9.23
10%		12.26	11.31	11.85	15.42	12.14	22.00	8.06	8.98	30.28	40.86	25.00	18.10	8.96	9.15	13.13	9.63
12%		13.53	12.28	12.98	15.72	12.46	27.02	9.37	9.88	32.22	41.34	32.02	22.22	10.15	10.16	14.75	10.06



Annex Figure 47: LEC as a function of discount rate for various candidates, Sc2b: incl. transmission link, high fuel scenario



Annex Figure 48: LEC as a function of discount rate for various candidates, extract, Sc2b: incl. transmission link, high fuel scenario

Varying capacity factors

LEC of selected candidates are calculated for varying capacity factors considering a constant discount rate of 10%, grid integration cost and the high fuel price scenario.

The results can be summarised as follows:

- There are only slight changes in the ranking compared to the reference fuel price scenario.
- Since RE candidates and the HVDC are not affected by higher fuel prices, Suswa Phase I Stage 2, the generic bagasse fuelled power plant and the HVDC show the lowest LEC at maximum utilisation.
- For capacity factors above 70%, there are slight changes in the ranking of coal and gas fuelled CCGT power plants. The higher fuel prices leads to minor cost advantages of coal power plants compared to gas fuelled power plants (e.g. assuming a capacity factor of 70%, Lamu coal “tender” and Kitui coal show lower LEC than the Wajir NG-CCGT candidate in the high fuel price scenario).
- Due to the high specific investment costs, the economic performance of the nuclear power plant option will worsen considerably if the capacity factor falls below its maximum availability. Even at maximum availability, however, the nuclear power plant continues to be less economical compared to the coal and the CCGT plant candidates.
- For a capacity factor of 50%, the Wajir NG-CCGT candidate appears to be the preferred option, followed by the generic bagasse power plant and the Lamu coal “tender” candidate.
- Due to its low investment costs, Wajir NG-CCGT candidate shows the lowest LEC for a capacity factor of 20% as well. Similar to the reference fuel price scenario, this candidate is followed by Dongo Kundu LNG-CCGT, and the Lamu coal “tender” option.

Annex Table 70: Ranking of selected candidates for different capacity factors, Sc2a incl. transmission link, high fuel scenario

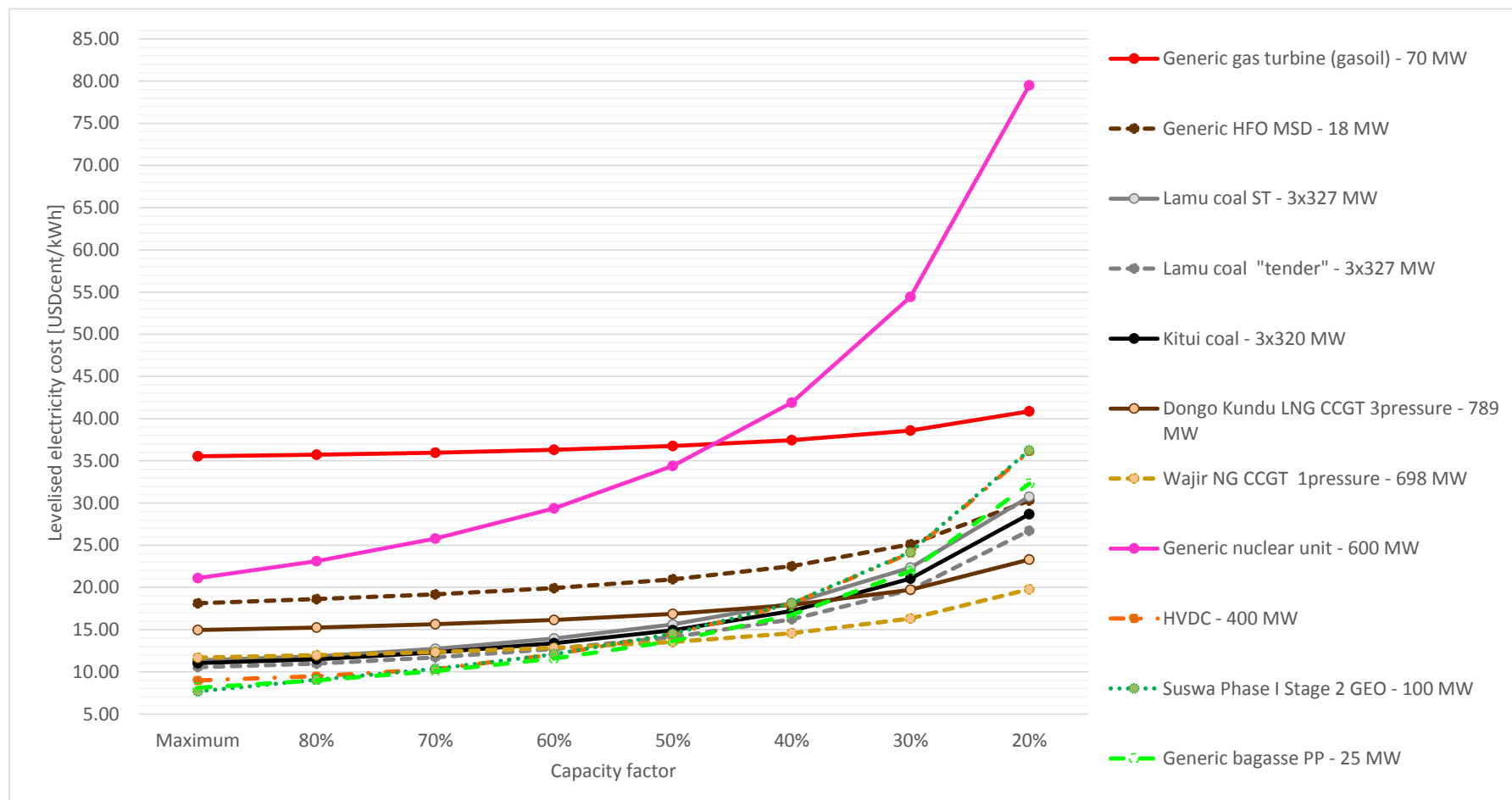
Capacity factor	Maximum ⁸³	70%	50%	20%
1	Suswa Phase I Stage 2 GEO – 100 MW	Generic bagasse plant -25 MW	Wajir NG-CCGT 1 pressure – 698 MW	Wajir NG-CCGT 1 pressure – 698 MW
2	Generic bagasse plant - 25 MW	HVDC – 400 MW	Generic bagasse plant -25 MW	Dongo Kundu LNG-CCGT 3 pressure – 789 MW
3	HVDC – 400 MW	Suswa Phase I Stage 2 GEO – 100 MW	Lamu “tender” coal - 3x327 MW	Lamu “tender” coal - 3x327 MW
4	Lamu “tender” coal - 3x327 MW	Lamu “tender” coal - 3x327 MW	HVDC – 400 MW	Kitui coal - 3x320 MW
5	Kitui coal - 3x320 MW	Kitui coal - 3x320 MW	Suswa Phase I Stage 2 GEO – 100 MW	Generic MSD (HFO) – 18 MW
6	Lamu coal - 3x327 MW	Wajir NG-CCGT 1 pressure – 698 MW	Kitui coal - 3x320 MW	Lamu coal - 3x327 MW
7	Wajir NG-CCGT 1 pressure – 698 MW	Lamu coal - 3x327 MW	Lamu coal - 3x327 MW	Generic bagasse plant -25 MW
8	Dongo Kundu LNG-CCGT 3 pressure – 789 MW	Dongo Kundu LNG-CCGT 3 pressure – 789 MW	Dongo Kundu LNG-CCGT 3 pressure – 789 MW	HVDC – 400 MW
9	Generic MSD (HFO) – 18 MW	Generic MSD (HFO) – 18 MW	Generic MSD (HFO) – 18 MW	Suswa Phase I Stage 2 GEO – 100 MW
10	Nuclear unit – 600 MW	Nuclear unit – 600 MW	Nuclear unit – 600 MW	Generic gas turbine (Kerosene) – 70 MW
11	Generic gas turbine (Kerosene) – 70 MW	Generic gas turbine (Kerosene) – 70 MW	Generic gas turbine (Kerosene) – 70 MW	Nuclear unit – 600 MW

The following table and graphs present the LEC of selected power plant candidates for various capacity factors considering grid integration cost and the high fuel price scenario.

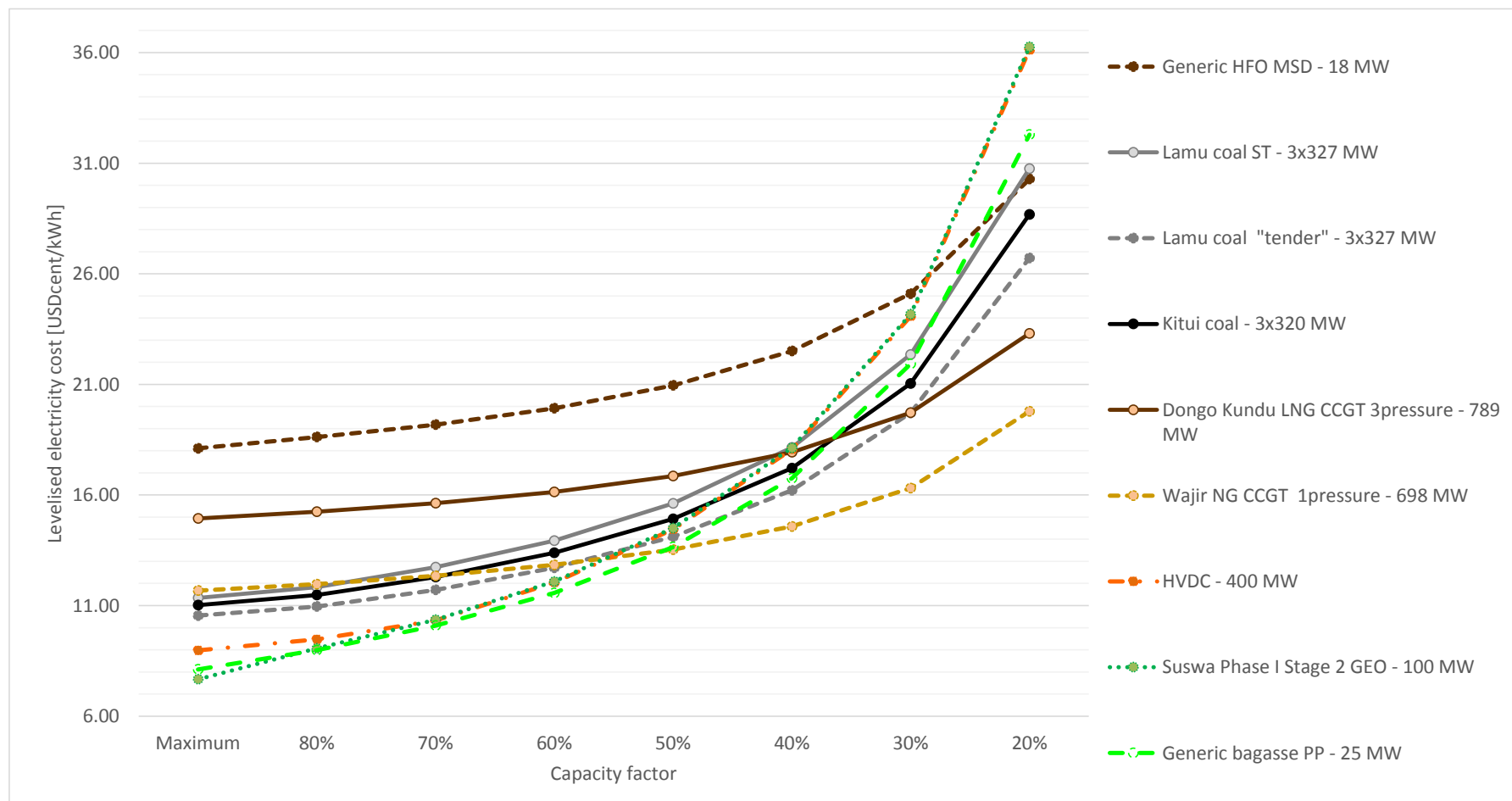
⁸³ Considering effective availability of the power plant candidates

Annex Table 71: LEC as a function of capacity factor for various candidates, Sc2b: incl. transmission link, high fuel scenario

Capacity factor	Unit	Lamu coal ST - 3x327 MW	Lamu coal "tender" - 3x327 MW	Kitui coal - 3x320 MW	Dongo Kundu LNG CCGT 3pressure - 789 MW	Wajir NG CCGT 1pressure - 698 MW	Generic nuclear unit 600 MW	Suswa Phase I Stage 2 GEO - 100 MW	Generic bagasse PP - 25 MW	Generic HFO MSD - 18 MW	Generic gas turbine (gasoil) - 70 MW	HVDC - 400 MW
Maximum	USDcent/kWh	11.34	10.55	11.02	14.94	11.68	21.11	7.67	8.12	18.11	35.55	8.97
80%		11.84	10.96	11.47	15.25	11.97	23.11	9.06	8.98	18.62	35.73	9.47
70%		12.74	11.71	12.29	15.63	12.34	25.80	10.36	10.09	19.18	35.97	10.32
60%		13.94	12.71	13.38	16.14	12.84	29.38	12.09	11.57	19.92	36.30	12.04
50%		15.62	14.11	14.91	16.86	13.53	34.39	14.50	13.65	20.95	36.75	14.45
40%		18.14	16.21	17.21	17.93	14.57	41.91	18.13	16.75	22.51	37.44	18.06
30%		22.35	19.71	21.03	19.72	16.31	54.44	24.17	21.93	25.10	38.58	24.08
20%		30.75	26.72	28.68	23.30	19.78	79.51	36.26	32.29	30.28	40.86	36.12



Annex Figure 49: LEC as a function of capacity factor for various candidates, Sc2b: incl. transmission link, high fuel scenario



Annex Figure 50: LEC as a function of capacity factor for various candidates, extract, Sc2b: incl. transmission link, high fuel scenario

Annex 6.C.6 Fuel conversion candidates ranking scenarios

The power plants Tsavo, Kipevu 3 and Rabai are analysed with regard to fuel conversion of the existing diesel engines to burn natural gas instead of heavy fuel oil⁸⁴.

For the conversion case additional costs have to be considered including costs for the conversion measure as well as proportional investment and O&M costs for the required LNG terminal and pipeline infrastructure corresponding to the cost estimates for the Dongo Kundu CCGT options.

The following table provides an overview of the techno-economic parameters considered in the assessment.

⁸⁴ Power plants fuelled with heavy fuel oil and located in the Nairobi area are not considered in this analysis, because the construction of a natural gas pipeline from Mombasa to Nairobi is not foreseen. Kipevu 1 is also not considered in this analysis, since it is expected that the power plant will be phased out before LNG is available.

Annex Table 72: Techno-economic parameters of fuel conversion candidates

Techno-economic parameters	Unit	Tsavo – HFO	Tsavo – LNG	Kipevu 3 – HFO	Kipevu 3 – LNG	Rabai - HFO	Rabai - LNG
Location		Mombasa	Mombasa	Mombasa	Mombasa	Kilifi	Kilifi
Commissioning year		2001	2001	2011	2011	2009	2009
Year of conversion ⁸⁵					2020		
Residual lifetime in conversion year		1	6	11	16	9	14
Net capacity (sent-out)	MW	74	74	115	115	90	90
Units		7 x Wärtsilä 18V38		7 x Wärtsilä 18V46		5 x Wärtsilä 18V46 + 1 x ST	
Residual value of CAPEX	MUSD	5.6	5.6	88.6	88.6	68.9	68.9
Conversion Costs	MUSD	na	15.4	na	24.0	na	17.7
Proportionate CAPEX for LNG terminal and infrastructure ⁸⁶	MUSD	na	42.5	na	68.2	na	51.1
CAPEX total	MUSD	5.6	63.5	88.6	180.8	68.9	137.7
Fixed O&M costs	USD/kW/a	31.0	31.0	31.0	31.0	31.0	31.0
Proportional O&M costs for LNG terminal	USD/kW/a	na	16	na	17	na	13
Fixed O&M total		31.0	47.6	31.0	48.1	31.0	44.0
Variable O&M costs	USD/MWh	8.7	8.7	8.7	8.7	8.7	8.7
Fuel		HFO	LNG	HFO	LNG	HFO	LNG

⁸⁵ In accordance to the results of the PESTEL analysis (see Section 6.5) it is expected that LNG supply will not be available before 2020. Thus, 2020 is considered as base year for the calculation of the residual lifetime of the power plants.

⁸⁶ Considering cost sharing of pipeline infrastructure for Tsavo and Kipevu III

Tsavo and Kipevu 3 plants are located in close proximity, hence cost sharing of the required pipeline infrastructure from the LNG terminal to the plant sites is presumed⁸⁷. Nevertheless, the analysis reveals that for all power plants fuel conversion from HFO to LNG is not profitable in neither reference nor high fuel price scenario. As depicted in the following tables and figures, the conversion of these power plants would lead to an LEC increase of 16-39%. This is mainly a result of the partial allocation of investment costs for the required LNG infrastructure and the conversion measures compared to the remaining residual lifetime of the power plants.

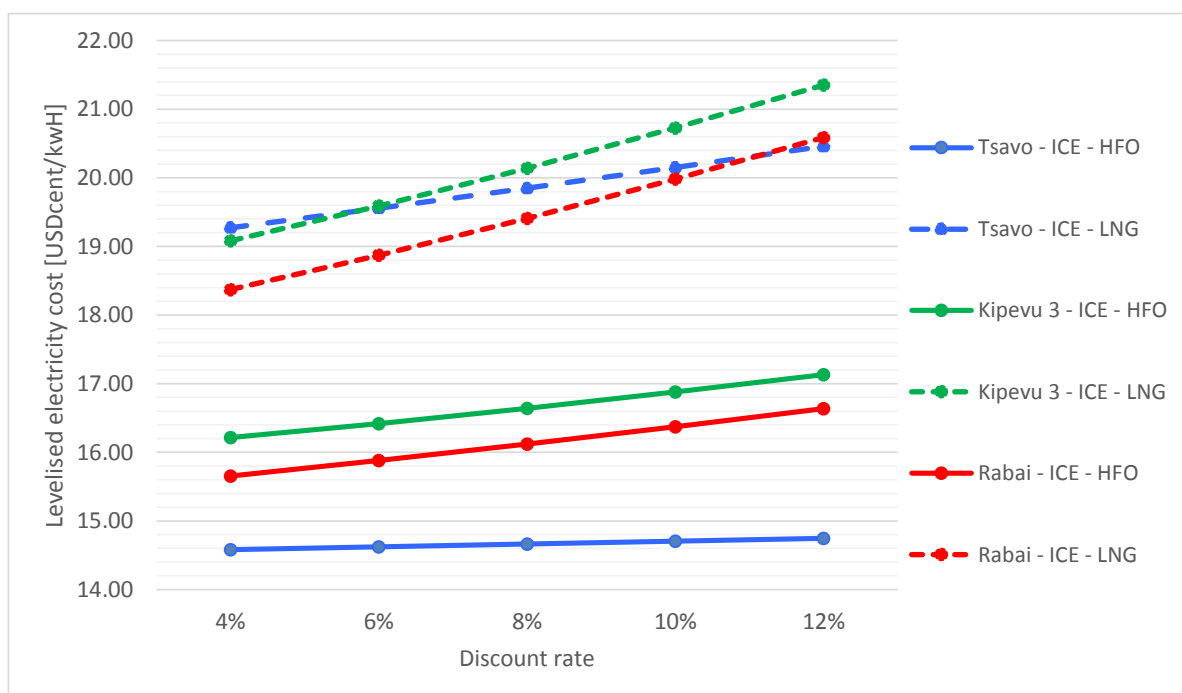
Annex Table 73: LEC for fuel conversion candidates, Sc1a: no transmission link, reference fuel scenario

Discount Rate	Unit	Tsavo – HFO	Tsavo – LNG	Kipevu 3 – HFO	Kipevu 3 – LNG	Rabai - HFO	Rabai - LNG
4%	USDcent /kWh	14.58	19.27	16.21	19.08	15.65	18.37
6%		14.62	19.56	16.42	19.59	15.88	18.87
8%		14.67	19.85	16.64	20.14	16.12	19.41
10%		14.71	20.15	16.88	20.73	16.37	19.98
12%		14.75	20.46	17.13	21.35	16.63	20.59
LEC increase	%		+32-39%		+18-25%		+17-24%

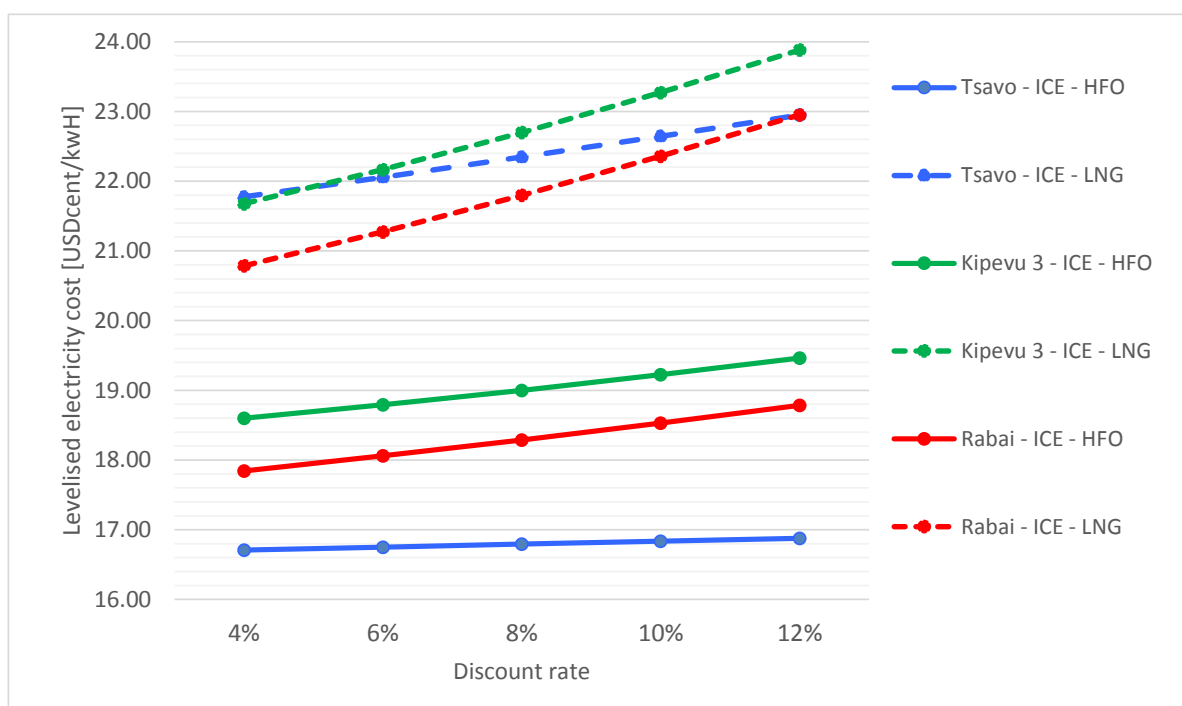
Annex Table 74: LEC for fuel conversion candidates, Sc1b: no transmission link, high fuel scenario

Discount Rate	Unit	Tsavo – HFO	Tsavo – LNG	Kipevu 3 – HFO	Kipevu 3 – LNG	Rabai - HFO	Rabai - LNG
4%	USDcent /kWh	16.71	21.78	18.60	21.68	17.84	20.79
6%		16.75	22.06	18.79	22.17	18.06	21.27
8%		16.79	22.35	19.00	22.70	18.29	21.80
10%		16.84	22.64	19.22	23.27	18.53	22.36
12%		16.88	22.95	19.46	23.88	18.79	22.95
LEC increase	%		+30-36%		+17-23%		+16-22%

⁸⁷ Rabai is located in Kilifi county around 15 km away from the centre of Mombasa. For this power plant a separate pipeline from the LNG terminal to the plant site is considered.



Annex Figure 51: LEC for fuel conversion candidates Sc1a: no transmission link, reference fuel scenario



Annex Figure 52: LEC for fuel conversion candidates Sc1b: no transmission link, high fuel scenario

Annex 6.D Candidates evaluation and description (PESTEL)

This chapter contains for each relevant candidate the summary of analyses results (based on PESTEL approach), a brief description and further power plant or site specific information referring to technical and economic parameters applied in the economic assessment.

Annex 6.D.1 Coal power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

Due to its widespread deposits, production experience as well as relatively low costs, coal is an important fuel option for expansion planning but the negative environmental impact have to be factored in. Coal is differentiated by import coal (South African coal for Lamu) and domestic coal (Mui Basin mainly for Kitui). Details on coal resources is provided in section 5.2.3.1)

Candidate technology and site description and assumptions

1) Lamu coal power plant candidate

The Lamu coal power plant (as a so called anchor plant) is part of a wider regional initiative whereby the Lamu County is to be developed as a trade and commercial hub to service the coastal part of Kenya along with the neighbouring countries through the Lamu development initiative. The project is located at the Indian Ocean at Manda Bay in the Lamu archipelago. The site has direct sea access which allows for coal delivery by ship initially to be imported from South Africa (a planned shift to domestic coal is commented in section 5.2.3.1 and below), and allows for seawater cooling as well. The foreseen installed capacity is approximately 1,000 MW consisting of three units (other configurations detailed below).

In the techno-economic assessment three options are analysed:

- a) Lamu Coal ST 4x245 MW
- b) Lamu Coal ST 3x327 MW
- c) Lamu Coal ST 3x327 MW “tender”⁸⁸

For the first two options, Lamu Coal ST 4x245 MW and Lamu Coal ST 3x327 MW, the following main technical components are chosen (and are also reflected in the respective investment cost estimates):

- Once through boilers with pulverised coal combustion system
- Single reheat steam turbines
- Once-through sea water cooling system

⁸⁸ Assumptions based on information received from MoEP

- Sea-water flue gas desulphurisation (FGD)
- Generator and step-up transformer for power evacuation
- Information, control and monitoring systems (i.e. particulate and mercury control, nitrogen oxide control)
- Sufficient loading and logistic infrastructure (e.g. unloading facilities at sea such as harbour/jetty and conveyers as well as fuel storage for at least 30 days).

The first two options are compared with the regionally priced power plants for the investment cost under the assumption of regional market prices. The regional market prices are based on the average data of the nearest market where sufficient data is available, i.e. Egypt. They are budget prices covering the above listed plant components. The overall investment costs of these options are estimated at 2,432 MUS\$ (3 x 327 MW configuration) or 2,571 MUS\$ (4 x 245 MW configuration) including 5% contingencies and owner's and site supervision costs. Costs for the required infrastructure as harbour/jetty and storage facilities are estimated at 360 MUS\$ which are already included in the overall investment costs.

The investment cost of the third option, Lamu Coal ST 3x327 MW "tender", is estimated at 1,800 MUS\$ as based on information received from MoEP⁸⁹. Fixed O&M cost and efficiency of the power plant are also derived from information as illustrated in the tender document.

For the fuel supply hard coal with an assumed net calorific value of 21 MJ/kg imported from South Africa is foreseen, with respective international transport costs considered (cif (cost insurance freight) basis).

2) Kitui coal power plant candidate

The Kitui power plant with a total capacity of 1,000 MW is intended to be located inland near the Mui Basin close to Kenya's coal deposits. Once domestic coal is commercially available for power generation, the project's detailed design including the definite site location may be determined. At present, planning is in an early stage with limited information available. A critical aspect will be the availability of required cooling water for this remote location.

For the Kitui coal power plant, two unit configurations are considered in the techno-economic assessment:

- a) Four units of 240 MW net capacity each
- b) Three units of 320 MW net capacity each

The following main technical components are chosen (and are also reflected in the respective investment cost estimates):

- Once through boilers with pulverised coal combustion system
- Single reheat steam turbines
- Air-cooled condenser

⁸⁹ The cost figure could not be verified by the Consultant, since further details were not provided.

- Dry flue gas desulphurisation (FGD)
- Generator and step-up transformer for power evacuation
- Information, control and monitoring systems (i.e. particulate and mercury control, nitrogen oxide control)
- Sufficient loading and logistic infrastructure (e.g. conveyers and fuel storage for at least 30 days).

The essential difference to the design of the Lamu plant candidate is the application of an air-cooled condenser, because sufficient cooling water is not available at the Kitui site. With the same life steam parameters, the electric gross power output of the steam turbine by using an air-cooled condenser is lower in comparison to the once through sea water cooling system, as the sea water at Lamu site has a lower temperature compared to the dry air at Kitui site. Consequently, the condensation pressure at Kitui site is higher resulting in a lower efficiency.

In order to allow the comparison of the different expansion candidates with regionally priced power plants for the investment cost regional market prices are assumed. They are based on the average data of the nearest market where sufficient data is available, i.e. Egypt. They are budget prices covering the above listed plant components.

The overall investment costs are estimated at 2,293 MUSD (3 x 320 MW configuration) or 2,439 MUSD (4 x 240 MW configuration) including 5% contingencies and owner's and site supervision costs. Costs for storage facilities and conveyers required for the coal transportation from the coal mines to the plant site are estimated at 52 MUSD and are also included in the overall investment costs.

For the fuel supply domestic coal from the Mui Basin is foreseen. Coal resources are confirmed, though the extraction is not developed yet, hence a low risk for the fuel supply exists. Fuel costs are assumed similar to internationally traded coal on a per energy basis (i.e. USD/GJ) accounting for opportunity costs (fob (free on board) basis). This provides a slight cost advantage compared to imported coal equivalent to the international transport costs.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 75: PESTEL evaluation – Coal projects

No.	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	P	E	S	T	E	L
1	Lamu Coal Plant – Unit 1	327	2021	+	+	--	o	--	-
2	Lamu Coal Plant – Unit 2	327	2022	+	+	--	o	--	-
3	Lamu Coal Plant – Unit 3	327	2023	+	+	--	o	--	-
4	Kitui Coal Plant – Unit 1	320	2025	+	o	--	-	--	o
5	Kitui Coal Plant – Unit 2	320	2026	+	o	--	-	--	o
6	Kitui Coal Plant – Unit 3	320	2027	+	o	--	-	--	o

Political force

Coal power projects are given a high profile in Kenya. There is strong political willingness to diversify the country's energy mix towards coal. Since coal power is base load capable and can supply a large number of consumers due to its large-scale characteristics and fuel supply is diverse and relatively cheap, coal projects are strongly supported. However, international financing institutions such as the World Bank are increasingly opposing the use of coal energy worldwide and also in Kenya.⁹⁰

1) Lamu Coal Plant

The supply of the Lamu coal power plant with import coal from South Africa might result in a potential fuel supply dependency. However, given the vast amount of coal deposits worldwide as well as high number of coal exporting countries a potential fuel supply dependency is considered minimal. Moreover, the coal price level in 2015 is trading at a minimum (see fuel price forecast in section 5.2.5) and is considered insignificant.

2) Kitui Coal Plant

Taking into account the ongoing development of coal deposits in the Mui Basin, coal could play an important role as domestic energy source for future power generation. The use of domestic coal on a large scale would contribute positively to Kenya's security of power supply and introduce a new power generation technology in the country.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

Generally, coal-based power generation is considered a competitive form of electricity generation. Due to the large size of the units, economies of scale can be achieved which further reduces cost. However, considerable infrastructure costs accrue for the coal supply (e.g. via railroad and port), and the evacuation of electricity to the load centres via transmission lines may be costly as well.

Moreover, the waste treatment of by-products during power plant operation (such as ash and gypsum) may increase operating costs as well.

1) Lamu Coal Plant

Due to direct sea access, cooling water is available and related costs are reasonable. However, the long distance between Lamu and the load centre in Nairobi requires the construction of a long-distance high voltage transmission line. Respective costs are estimated to be considerable and have to be factored in regarding overall project feasibility.

⁹⁰ Source: <http://www.standardmedia.co.ke/business/article/2000169404/world-bank-warns-kenya-on-coal-energy>; dated 16 July 2015

2) Kitui Coal Plant

Costs of the required water availability for cooling purposes are considered crucial for the inland site in Kitui County. However, plans are in very early stages. According to the MOEP, it is envisaged to build a dam on a nearby river to retain the required cooling water. Another feasible option would be the implementation of a closed circuit dry cooling tower. However, a tall cooling tower, either dry or wet cooling, would be required which results in additional cost. Cost estimates are not available yet but considered significant which imply a negative impact on the project's economic viability.

Social force

1) Lamu Coal Plant

- Works on the Lamu coal power plant face considerable delay due to the environmental and social impact assessment (ESIA) study. It captures potential effects the plant will have on the environment as well as on livelihoods. Its preparation has also been delayed by an ongoing Resettlement Action Plan for the project, which will sit on 880 acres of land at Manda Bay, Lamu County. According to media reports⁹¹ the study was rejected in August 2016 by the Lamu County Assembly but approved in September 2016 by the National Environment Management Authority (NEMA).
- Violent conflicts in Kenya's Coast Province, including the planning zone of the Lamu coal project, and its potential impact on the development of large-scale projects in the area should be observed carefully. Different residential groups are protesting against the construction of the plant, including the filing of court proceedings. A relocation of the Lamu coal project may be necessary in the worst case due to security reasons.

2) Kitui Coal Plant

- The inland site in Kitui County requires an opencast mining area for extracting the coal resource in the Mui Basin, which implies a large-scale resettlement of up to 30,000 households. A concrete resettlement or compensation plan is not existent yet. However, the Chinese developer, Fenxi Mining Industry Company, is obliged to conduct a resettlement action plan meeting World Bank Standards.
- The interests of local population are, amongst others, represented by the Kenya National Resources Alliance (KeNRA), an alliance dealing with natural resources issues.
- Representatives of the Mui Basin community obtained court orders restraining the government from entering into any agreement with the Chinese developer, Fenxi Mining Industry Company, which had been awarded the contract to extract coal. The government intends to start negotiations with Mui Basin residents to resolve disputes that delay the commencement of operations.

⁹¹ Source: <http://www.nation.co.ke/counties/County-puts-coal-fired-power-plant-on-hold/1107872-3338788-xea0y3z/index.html>; <https://moneyandmarkets.co.ke/kirubi-backed-firm-gets-nema-nod-to-build-lamu-coal-power-plant> (accessed 18 October 2016)

- Further, the required construction of a tall cooling tower for the Kitui coal power plant project results in a widely visible and thus adverse impact on the local population.

Technical force

Coal power plants represent a worldwide proven technology with an extensive technical experience in the industry. However, in particular water availability is crucial for the operation of coal power plants in Kenya. As an approximate indicator for the high cooling water consumption, a 1,000 MW coal power plant will use around 100,000 m³/h with a Δt of 5°C for once-through cooling at the sea.

1) Lamu Coal Plant

- Regarding water availability, the Lamu site is considered advantageous when compared to the Kitui site inland due to its direct sea access.
- The required long-distance transmission line from Lamu to the demand centre in Nairobi must be implemented before commissioning of the project which is considered critical along the timeline. Potential wayleave issues have to be factored in as well that frequently delay transmission line projects.
- The planned fuel switch from South African import coal to domestic coal from the Mui Basin at a later point in time is not recommended from a technical viewpoint, as the power plant will then operate with a lower efficiency. Generally, a coal power plant should be operated with the specific coal type for which the plant is designed (e.g. South African import coal).

2) Kitui Coal Plant

- Water availability at the inland site in Kitui County is considered critical, since planning is not far developed yet. The potential damming of a river is technically demanding, costly and time consuming which has to be factored in regarding overall project feasibility. Another feasible option is the implementation of a closed circuit dry cooling system, resulting in a lower efficiency though.
- Regarding coal resource availability, it has been confirmed that the coal resource development is economically viable. However, no coal is actually extracted to date (see also section on Social Force). The timely development of the coal resource in the Mui Basin is an inevitable requirement for the operation of the Kitui coal plant and should be prioritised.

Environmental force

Coal is one of the dirtiest fuels for power generation. Therefore, not only the overall emissions of harmful greenhouse gases will grow but also the share of pollutants with strong adverse impact (e.g. heavy metals). Hence, the negative impact on the region and its population and environment will grow considerably. A strong negative effect on the Coast Region can be expected from the large water cooling systems on the maritime ecosystem. Both, the effect of airborne and water pollution depend on the kind and quality of coal (e.g. its ash, heavy metal and sulphur content) and

the treatment measures. It is recommended to further study the environmental impact for selection of suitable generation technology, the site selection and mitigation measures such as flue gas treatment. Coal power plant with the latest technologies should be preferred due to their higher efficiencies. This will result in lower emissions due to lower fuel consumption. The higher investment cost can be compensated by the lower fuel cost.

Compared to other generation technologies and fuels coal fired power plants emit more quantities and a wider range of harmful substances such as sulphur, nitrogen, carbon dioxides, mercury and other heavy metals and ash. Therefore, additional treatment facilities, in particular DeSox, DeNox and ash treatment should be considered to reduce the environmental and social impact.

1) Lamu Coal Plant

- At the Lamu site, the environmental impact due to the required sea cooling water is considered high. Damages to highly fragile coral reefs due to the reinjection of (warmer) treated cooling water are expected with direct negative impacts on the fish population and finally local fishermen. An environmental initiative has already been established and is actively opposing the project. See Social Force for the status of the the environmental and social impact assessment (ESIA) study.
- Imported coal from South Africa has no direct negative impact on the immediate environment of the power plant site. But, transporting and storing the imported coal in stockyards on site will result in noise and dust pollution particularly depending on local wind conditions.

2) Kitui Coal Plant

- At the Kitui site, water availability is considered critical due to its scarcity inland in combination with the large amount of water consumption required. Another feasible option would be the implementation of a closed circuit dry cooling system.
- The domestic coal resource in the Mui basin can only be extracted with large negative impacts on the direct environment through an opencast mining area and the corresponding loss of land.

Legal force

For the tendering process no difficulties are expected since there is strong competition in the coal industry, and experienced EPC contractors and manufacturers are available to implement large-scale coal power plant projects worldwide.

1) Lamu Coal Plant

- The Lamu coal power plant project has been awarded to a Kenya-led consortium and is currently still in preparation of the construction works. Gulf Energy and Centum Investment have established the Amu Power Company Ltd which is responsible for the implementation of the Lamu coal power plant. The PPA (with KPLC) as well as the contract for the power plant con-

struction with Power Construction Corporation of China (“Powerchina”) have been negotiated and signed.

- However, the winning Gulf Energy Consortium, including Centum Investment and three Chinese contractors, is facing several challenges which delay project progress. For instance, it had been temporarily stopped after the High Court of Kenya put the project implementation on hold due to tender evaluation disputes.
- In parallel, the consortium is still in charge of raising funds for the Lamu coal power plant with a total investment volume of approximately 2 billion USD, of which 500 mUSD are equity capital. Financial close of the project has still not been achieved yet at the time of this report.
- Also, the consortium has to solve issues of land in order to secure an adequate site (some 880 hectares) for the power plant, which is not already in use by local farmers. Further delays are highly probable due to unsolved issues with Lamu County regarding impact on the environment, employment of locals as well as resettlement and compensation for people who will be displaced as a result of the project (see Social Force).
- Taking into account above critical developments and based on the Consultant’s experience with the implementation time of coal power plants in the region, the commissioning of the Lamu coal power plant project is not expected before 2021⁹². This COD shall still be regarded as a very optimistic scenario where no further delays are occurring. No considerable progress on the project (in particular commencement of construction) could be observed during the preparation of this study. Hence, the schedule for a commissioning until 2021 is very tight and a commissioning afterwards (e.g. until 2022) becomes more realistic. The potential impact of such later commissioning is mirrored by a separate scenario in the generation expansion planning in chapter 7.

2) Kitui Coal Plant

- The Kitui power plant is still in its very early planning stage and only little official information is available.
- According to MOEP, the plant shall be constructed under a long-term PPA with KPLC. The development will be based either on a build own operate (BOO) or build own operate transfer (BOOT) scheme. The investor will be required to purchase coal from the deposits developed by the Chinese contractors mining in blocks A, B, C and D of the Mui Basin.
- The commissioning of the Kitui coal power plant project is not expected before 2025. This is resultant from the unclarified issue of cooling water availability, the early stage of the coal resource development in the Mui Basin and the Consultant’s experience with the implementation time of coal power plants in the region.

⁹² The consortium expected in the past a construction period of only 21 months (starting on 30 September 2015) but they have also already stated a two-year delay (Source: The Star dated 12 November 2015; <http://www.the-star.co.ke/news/centum-sees-two-year-delay-revenues-lamu-coal-station>)

Annex 6.D.2 Natural gas (CCGT) power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

Due to the early stage of exploration, it is assumed that domestic natural gas will not be a potential energy source for power generation. If it were available in the long term, power generation based on domestic natural gas would have to compete (in terms of finite resources and price) with other consumers such as industry and households (e.g. for cooking).

LNG is recommended as an alternative fuel option to allow for the diversification of fuels used in power generation and its environmental advantage compared to more harmful fossil fuels. The import of LNG would also provide economic benefits for other consumers, such as in the industry, households or transport sector. If domestic gas resources were available imported LNG would most probably not be a competitive source.

Candidate technology and site description and assumptions

1) Dongo Kundu LNG CCGT

The Dongo Kundu power plant is envisioned to be fuelled by natural gas imported in form of LNG from Qatar. It will be designed as combined cycle power plant with approximately 750 MW installed capacity subject to final plant design. The plant shall be located near Mombasa with direct sea access. However, the GoK in 2016 suspended⁹³ the project (including negotiations on importing LNG from Qatar) due to potential access supply in the system and the discovery of domestic natural gas in Wajir County. Planning is in an early stage.

In the economic assessment both a 2x(2+1) and a 1x(2+1) unit configuration is considered for the Dongo Kundu plant site. The latter one is also distinguished by a one pressure and a triple pressure heat recovery steam generator system resulting in three different options for the Dongo Kundu plant candidate:

- a) 2x(2+1) configuration with a total gross capacity of 770 MW (one pressure)
- b) 1x(2+1) configuration with a total gross capacity of 785 MW (one pressure)
- c) 1x(2+1) configuration with a total net capacity of 808 MW (triple pressure)

The 2x(2+1) configuration plant option comprises the following main equipment:

- Four gas turbines of 115 MW gross capacity each⁹⁴
- Two steam turbines of 155 MW gross capacity each

⁹³ <http://www.businessdailyafrica.com/Ministry-drops-plans-for-700MW-gas-power-plant/-/539546/3180852/-/10rg3kh/-/index.html> (accessed 6.5.2016)

⁹⁴ The combined cycle power plant candidates are based on generic plant designs. Hence, they are not limited to any manufacturer or model. For the technical simulation the gas turbine type GE GT-9E.03 has been chosen.

- Four one pressure heat recovery steam generators
- Two once-through sea water cooling system
- Generator and step-up transformer for power evacuation
- Information, control and monitoring systems (i.e. particulate and mercury control, nitrogen oxide control)
- Other equipment as i.e. pumps, storage facilities and fuel gas compressors

For the 1x(2+1) configuration plant options the following main components are anticipated:

- Two gas turbines of 265 MW gross capacity each⁹⁵
- One steam turbine of 254 MW gross capacity for the one pressure design option and 277 MW for the triple pressure design option
- Two one or triple pressure heat recovery steam generators
- One once-through sea water cooling system
- Generator and step-up transformer for power evacuation
- Information, control and monitoring systems (i.e. particulate and mercury control, nitrogen oxide control)
- Other equipment as i.e. pumps, storage facilities and fuel gas compressors

For the fuel supply liquefied natural gas (LNG) imported through a newly built LNG terminal located next to the plant site is foreseen.

In order to allow for the comparison of the different expansion candidates with regionally priced power plants for the investment cost regional market prices are assumed. They are based on the average data of the nearest market where sufficient data is available, i.e. Egypt. They are budget prices covering the above listed plant components.

Additionally, the Dongo Kundu plant candidate also requires the construction of a new LNG terminal assumed to be located next to the plant site. The proportional investment and O&M costs are included in the capital expenditure and annual O&M costs of each option.

The cost estimates for the LNG terminal are derived from the feasibility study “Consultants’ Services for Liquefied Natural Gas Study” carried out by Mott MacDonald on behalf of the Ministry of Energy and Petroleum in 2010. The least-cost option presented in this study is an onshore terminal located at Dongo Kundu site. For the two-tank configuration with 1 million t per year throughput the investment costs (base year 2014) for the regasification plant, jetty structure, geotechnical work and 10% engineering and project management also considering price escalation is estimated at 527 MUSD. The O&M costs are estimated at 15.92 MUSD (base year: 2014). On this basis and considering the annual fuel consumption for each power plant option (with an assumed capacity

⁹⁵ The combined cycle power plant candidates are based on generic plant designs. Hence, they are not limited to any manufacturer or model. For the technical simulation the gas turbine type Siemens SGT5-4000F has been chosen.

factor of 75%) the proportional investment and O&M costs for the LNG terminal are calculated. The results are presented in the following table.

Annex Table 76: Costs estimates for LNG infrastructure for Dongo Kundu CCGT options

Techno-economic parameters	Unit	Dongo Kundu 2x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 1pressure	Dongo Kundu 1x(2+1) – 3pressure
Power plant CAPEX	MUSD	607	514	551
Proportional CAPEX for LNG terminal	MUSD	399	375	375
CAPEX total	MUSD	1,006	889	926
Power plant O&M costs	MUSD/a	20.4	19.9	19.5
Proportional O&M costs for LNG terminal	MUSD/a	12.1	11.3	11.3
O&M costs total	MUSD/a	32.5	31.2	30.8

2) Wajir NG CCGT

The Wajir power plant would be located in Wajir County in the vicinity of the recently discovered gas field. As these resources still to be confirmed and developed this power plant is in a conceptual stage only to assess the possibility of utilising domestic natural gas in a large-scale power plant.

The following plant options are considered for Wajir in the economic assessment:

- 2x(2+1) configuration with a total gross capacity of 770 MW (one pressure)
- 1x(2+1) configuration with a total gross capacity of 785 MW (one pressure)
- 1x(2+1) configuration with a total gross capacity of 720 MW (triple pressure)

The 2x(2+1) configuration plant option comprises the following main equipment:

- Four gas turbines of 97 MW gross capacity each⁹⁶
- Two steam turbines of 181 MW gross capacity each
- Four one pressure heat recovery steam generators
- One air-cooled condenser
- Generator and step-up transformer for power evacuation
- Information, control and monitoring systems (i.e. particulate and mercury control, nitrogen oxide control)

⁹⁶ The combined cycle power plant candidates are based on generic plant designs. Hence, they are not limited to any manufacturer or model. For the technical simulation the gas turbine type GE GT-9E.03 has been chosen.

- Other equipment as i.e. pumps, storage facilities and fuel gas compressors

For the 1x(2+1) configuration plant option the following main components are foreseen:

- Two gas turbines of 270 MW gross capacity each⁹⁷
- One steam turbine of 236 MW gross capacity
- Two one pressure heat recovery steam generators
- One air-cooled condenser
- Generator and step-up transformer for power evacuation
- Information, control and monitoring systems (i.e. particulate and mercury control, nitrogen oxide control)
- Other equipment as i.e. pumps and fuel gas compressors

The essential difference to the design of the Dongo Kundu plant candidate is the application of an air-cooled condenser, because sufficient cooling water is not available at the Wajir site. With the same life steam parameters, the electric gross power output of the steam turbine by using an air-cooled condenser is lower in comparison to the once through sea water cooling system, as the sea water at Dongo Kundu site has a lower temperature in comparison to the dry air at Wajir site. Consequently, the condensation pressure at Wajir site is higher resulting in a lower efficiency.

For the fuel supply domestic natural gas (NG) from nearby gas field is foreseen. However resources are still to be confirmed and developed, hence sufficient fuel supply is rather uncertain (in comparison with LNG at Dongo Kundu).

In order to allow the comparison of the different expansion candidates with the regionally priced power plants for the investment cost regional market prices are assumed. They are based on the average data of the nearest market where sufficient data is available, i.e. Egypt. They are budget prices covering the above listed plant components.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 77: PESTEL evaluation – Natural gas projects

No.	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	P	E	S	T	E	L
1	Dongo Kundu CCGT	789	2021	o	+	o	++	+	o
2	Wajir CCGT	698	2025	+	+	o	++	+	o

⁹⁷ The combined cycle power plant candidates are based on generic plant designs. Hence, they are not limited to any manufacturer or model. For the technical simulation the gas turbine type Mitsubishi 701 F5 has been chosen.

Political force

For the diversification of Kenya's energy mix, there is political willingness to promote the use of natural gas for electricity generation. However, taking into account the ongoing exploration activities in the country, the stalled negotiations of LNG supply from Qatar and the suspension of the Dongo Kundu project by GoK, natural gas projects are currently delayed and do not attract the same political attention as coal projects.

1) Dongo Kundu LNG Plant

- The possible conclusion of a long-term fuel supply agreement with Qatar to supply the proposed LNG plant in Dongo Kundu, Mombasa, would result in a potential fuel supply dependency. Natural gas prices are particularly vulnerable to the state of the world economy and thus volatile by nature. However, the current price of natural gas trades at a minimum level compared to recent years (see fuel price forecast in section 5.2.5).

2) Wajir County Gas Plant

- The recent discovery of gas deposits in Wajir County offers an alternative solution, and may result in a new location for a gas power plant operated with a domestic resource. Natural gas could play an important role as domestic energy source for future power generation. The use of domestic gas on a large scale contributes positively to Kenya's security of power supply as well. However, it would have to compete (in terms of finite resources and price) with other consumers such as industry and households.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

The investment costs of a gas-fired combined cycle power plant (CCGT) typically amount to only one third of a coal power plant of the same size. In addition, the shorter construction time requires less financing costs.

1) Dongo Kundu LNG Plant

- The economic viability of the LNG plant will depend particularly on the ability to obtain a fuel supply contract at favourable price terms below world market level.
- Related infrastructure costs for a LNG processing terminal, pipelines and the grid connection to the Mombasa – Nairobi transmission line have to be factored in.

2) Wajir County Gas Plant

- By contrast, if the domestic gas resource is priced at world market level (to mirror the competition with other domestic consumers such as industry and households), the monetary advantage in terms of the plant's operating costs in comparison to LNG is for the saved LNG processing costs.

- The related fuel supply and transmission line infrastructure is considered expensive (as share of total investment costs), which may stress the economics of the project: if the plant is to be located in Wajir County, the pipeline system will be small in size but the transmission line to the load centre in Nairobi will be long and costly. If the plant is to be located close to the demand centre in Nairobi, the costs for the required grid connection will be insignificant but the pipeline costs for transporting natural gas from the gas field to the power plant will be considerable.

Social force

There are no social issues known to the Consultant yet.

Technical force

Gas power plants represent a proven technology and produce electricity with high efficiency. The plant sizing is flexible and can be adapted to local requirements. Water consumption for cooling purposes only amounts to one third of a comparable coal unit: for once-through cooling at the sea, a 1,000 MW coal power plant will use around 100,000 m³/h and a similar CCGT power plant will use only around 35,000 m³/h with a Δt of 5°C.

Gas power plants can be operated over the complete load range and have quick start-up times, hence ideal for providing standby capacity. Gas power plants can be built close to the demand centre due to the grid-based fuel supply (if pipelines are available). However, the required transmission line infrastructure has to be implemented before commissioning of the power plant which is considered critical on the timeline.

1) Dongo Kundu LNG Plant

- For the LNG option in Dongo Kundu, the transmission line project to Mariakani did not receive finance. It must be implemented before commissioning of the project which is considered critical along the timeline, in particular under consideration of the early planning stage as well as potential wayleave issues.
- Also, the construction of the required LNG terminal and related processing facilities have to be taken into account in view of a realistic implementation timeline. It is considered as most critical infrastructure component of any gas-fired power plant.

2) Wajir County Gas Plant

- For the potential gas power plant in Wajir County, the related infrastructure both for power evacuation and natural gas transport via a pipeline network is considered critical along the timeline. In fact, Ketraco has been assigned to prepare a conceptual transmission line study. However, more advanced planning has not taken place yet. Plans for the required pipeline system are non-existent.

- In addition, water availability for the operation of a gas-fired power plant in the remote Wajir County is critical. No information has been available on how water supply for cooling purposes will be provided to the site. A closed circuit dry cooling system should be foreseen.

Environmental force

Gas-based power generation emits less greenhouse gas (GHG) emissions than all other fossil fuels. There is no waste produced during the operation of a gas power plant. Less water consumption is required than for a comparable coal power plant (about one third). Gas-based power generation can thus be considered most environmental-friendly among all fossil fuels.

Legal force

For the tendering process, no difficulties are expected since there is strong competition in the gas turbine industry. Experienced EPC contractors and original equipment manufacturers (OEMs) are available to implement large-scale gas power plants worldwide.

From a regulatory perspective, a potential capacity charge for the operation of a gas power plant with typically lower operating hours than a coal power plant will increase the cost of power supply. Ultimately, capacity charges have to be borne by the electricity consumers. However, a gas power plant is able to provide precious intermediate and peaking load capability.

1) Dongo Kundu LNG Plant

- Particularly based on the deadlocked government-to-government negotiations between Qatar and Kenya about a long-term LNG supply and the suspension of the project by the GoK in 2016, the commissioning of the Dongo Kundu LNG power plant project is not expected before 2021, if at all.
- Private sector interest in the construction of a gas-fired power plant is still high and seems to be waiting in their starting blocks. However, the assumption of responsibility of and active support through the Government of Kenya (GoK) in the fields of (i) the PPA process, (ii) the fuel contract, (iii) land and right-of-way acquisition, (iv) community relations, and (v) power evacuation is essential to successfully implement such project.⁹⁸
- In this context, a LNG power plant is considered as valuable expansion candidate for the Kenyan electricity system that provides precious backup capacity to balance volatile generators such as wind power. If the project and negotiations e.g. with Qatar are resumed and contractual issues solved, LNG supply could be available to Kenya towards the end of the medium term period.

2) Wajir County Gas Plant

- Based on the very early project planning stage, the unexplored gas resource and the complex and time-consuming infrastructure requirements (including gas pipeline system, transmission

⁹⁸ Required governmental support demanded from the private sector, i.e. large project developers and OEMs in Kenya. First-hand information obtained from discussions with private sector players.

line infrastructure and cooling water availability), the commissioning of a gas power plant fueled with domestic natural gas is not expected before 2030. In short, such power plant concept seems unrealistic in the medium to long term since the domestic gas resource has to be developed first.

Annex 6.D.3 Geothermal power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

Already today, geothermal power contributes significantly to the Kenyan generation mix. Considering the tremendous potential of 8,000 to 12,000 MW along the Kenyan Rift Valley, it can be expected that geothermal power will play an essential role in the future Kenyan power system. Deep knowledge and expertise in geothermal exploration, drilling, power plant implementation and operation is already present in the country today. However, drilling risks, high upfront costs and a rather long implementation period have to be taken into account in the planning.

Candidate technology and site description and assumptions

In order to allow for an economic assessment, cost assumptions were derived from cost estimates of recent international geothermal projects which have been adjusted to the Kenyan case and considering the applied technology. The overall investment costs of the power plants include cost for exploration, studies, boreholes, piping system and separators, mechanical equipment (hot and cold end), electrical equipment, civil works and buildings as well as contingencies and cost for design, supervision and management. O&M costs are also derived from recent international projects which have been adjusted to the Kenyan case and considering the applied technology.

1) Olkaria

Geothermal power is currently mainly being utilised in the Greater Olkaria Field located in the Hell's Gate National Park 120 km north-west of Nairobi. Further plants are currently under implementation in the same area at different stages of development (Olkaria 1 Unit 6, Olkaria 5 to 9).

2) Eburru

The Eburru 2 plant will be located about 10 km north-west of Lake Naivasha in the Eburru field. The power plant is supposed to be equipped with one single flash unit rated at 25 MW and will be owned and operated by KenGen.

3) Menengai

The first stage on the Menengai field will comprise three units with an overall net capacity of 102.5 MW. The three units will be owned and operated by three IPPs, namely Quantum Power East

Africa, Sosian Energy and Orpower Twenty Two (which is a consortium of Symbion, Civicon and Ormat). The construction of the steam gathering system is already on-going. Further phases are foreseen comprising more than 500 MW.

4) **Suswa**

The geothermal green field Suswa is located in the southern part of the Kenyan Rift Valley. At least 450 MW of geothermal capacity is proposed to be implemented in this area. Similar to Menengai, the power plants will be developed in various stages. It is expected that they will be owned and operated by IPPs. The review of the conceptual model is currently on-going.

5) **Baringo-Silali**

The Baringo-Silali prospect is located in the northern part of the Kenyan Rift Valley. It comprises the fields Silali, Korosi and Paka. At least 600 MW of geothermal capacity are planned to be implemented in various stages. The power plants shall be owned and operated by IPPs.

6) **Akiira field**

The Akiira field is situated south of Lake Naivasha and 70 km north-east of Nairobi. It is planned to construct at least two single-flash units rated at 35 MW each. The power plant will be owned and operated by Marine Power. A second phase of similar size is foreseen.

7) **Agil-Longonot**

Next to Mount Longonot it is envisaged to implement at least 70 MW of geothermal capacity. The power plant will be owned and operated by African Geothermal International (AGIL). A second phase of similar size is foreseen.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 78: PESTEL evaluation – geothermal projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	Project COD	P	E	S	T	E	L
1	Olkaria topping unit	60	2019	End 2018	++	+	o	+	o	-
2	KenGen Wellheads Olkaria	20	2016	May 2016	++	+	o	+	o	-
3	Menengai 1 Phase I - Stage 1	103	2019	End 2018	++	+	o	+	o	-
4	Olkaria 1 - Unit 6	70	2019	Dec. 2018	++	+	o	+	o	-
5	Olkaria 5	140	2019	Mid 2019	++	+	o	+	o	-
6	Olkaria 6	140	2021	2 nd half 2020	++	+	o	+	o	-
7	Olkaria 7	140	2021	beyond MTP	++	+	o	+	o	-
8	Olkaria 8	140	2022	beyond MTP	++	+	o	+	o	-
9	Olkaria 9	140	2023	beyond MTP	++	+	o	+	o	-
10	Menengai 2 Phase I - Stage 2	60	2021	beyond MTP	++	+	o	+	o	-

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	Project COD	P	E	S	T	E	L
11	Menengai 2 Phase I - Stage 3	100	2023	beyond MTP	++	+	o	+	o	-
12	Eburru 2	25	2023	beyond MTP	++	+	o	+	o	-
13	Marine Power Akiira Stage 1	70	2024	beyond MTP	++	+	o	+	o	-
14	AGIL Longonot Stage 1	70	2024	beyond MTP	++	+	o	+	o	-
15	Suswa Phase I - Stage 1	50	2026	beyond MTP	++	+	o	+	o	-
16	Suswa Phase I - Stage 2	100	2027	beyond MTP	++	+	o	+	o	-
17	Baringo Silali Phase I, Stage 1	100	2025	beyond MTP	++	+	o	+	o	-
18	Baringo Silali Phase I, Stage 2	100	2026	beyond MTP	++	+	o	+	o	-
19	Menengai 2 Phase I - Stage 4	200	2028	beyond MTP	++	+	o	+	o	-
20	Menengai 3 Phase II - Stage 1	100	2029	beyond MTP	++	+	o	+	o	-
21	Suswa 2 Phase II - Stage 1	100	2029	beyond MTP	++	+	o	+	o	-
22	AGIL Longonot Stage 2	70	2030	beyond MTP	++	+	o	+	o	-
23	Marine Power Akiira Stage 2	70	2030	beyond MTP	++	+	o	+	o	-
24	Baringo Silali Phase I - Stage 3	200	2031	beyond MTP	++	+	o	+	o	-
25	Menengai 4 Phase II - Stage 2	100	2031	beyond MTP	++	+	o	+	o	-
26	Suswa 2 Phase II - Stage 2	100	2031	beyond MTP	++	+	o	+	o	-
27	Baringo Silali Phase I - Stage 4	100	2033	beyond MTP	++	+	o	+	o	-
28	Menengai 4 Phase II - Stage 3	100	2034	beyond MTP	++	+	o	+	o	-
29	Suswa 2 Phase II - Stage 3	100	2034	beyond MTP	++	+	o	+	o	-
30	Baringo Silali Phase II - Stage 1	100	2035	beyond MTP	++	+	o	+	o	-
31	Baringo Silali Phase II - Stage 2	100	beyond LTP	beyond MTP	++	+	o	+	o	-
32	Baringo Silali Phase II - Stage 1	300	beyond LTP	beyond MTP	++	+	o	+	o	-
33	Baringo Silali Phase II - Stage 2	300	beyond LTP	beyond MTP	++	+	o	+	o	-
34	Baringo Silali Phase II - Stage 3	300	beyond LTP	beyond MTP	++	+	o	+	o	-
35	Baringo Silali Phase III - Stage 1	300	beyond LTP	beyond MTP	++	+	o	+	o	-
36	Baringo Silali Phase III - Stage 2	300	beyond LTP	beyond MTP	++	+	o	+	o	-
37	Baringo Silali Phase III - Stage 3	300	beyond LTP	beyond MTP	++	+	o	+	o	-
38	Baringo Silali Phase III - Stage 4	300	beyond LTP	beyond MTP	++	+	o	+	o	-
39	Baringo Silali Phase III - Stage 5	200	beyond LTP	beyond MTP	++	+	o	+	o	-
40	Menengai 4 Phase II - Stage 4	100	beyond LTP	beyond MTP	++	+	o	+	o	-
41	Menengai 5 Phase I - Stage 1	300	beyond LTP	beyond MTP	++	+	o	+	o	-
42	Menengai 5 Phase I - Stage 2	300	beyond LTP	beyond MTP	++	+	o	+	o	-
43	Suswa 2 Phase II - Stage 4	100	beyond LTP	beyond MTP	++	+	o	+	o	-
44	Suswa 2 Phase II - Stage 5	200	beyond LTP	beyond MTP	++	+	o	+	o	-

Political force

Geothermal energy is considered as domestic energy resource, which is abundantly available and contributes positively to the diversification of Kenya's energy mix. It is reducing or avoiding potential dependencies on foreign fuel supply. Moreover, the base load operation capability (approximately 8,400 hours of operation per year) improves security of power supply.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4. Geothermal energy is considered as a competitive form of electricity generation based on a sustainable renewable energy resource. Upfront costs for the development of the required infrastructure are high (e.g. drilling), and required transmission infrastructure depend on the sometimes remote generation sites to the demand centres. This is however not the case for most sites in Kenya where the transmission share of overall investment costs is rather small. The skid-mounted design of the equipment enables the exploitation of economies of scale. Pre-assembled components further reduce the costs, for instance utilising flash steam plants with binary add-ons.

Social force

Upon confirmation of the geothermal resource, the project developer needs to negotiate with the landowner for using the land for the power plant activities and come to a solution on royalties to the owner. Production permits, land use and licences are in the hands of the community and are dependent on an agreement with them and the laws and regulations in the respective area. However, failure to conduct adequate consultation with the local community has been the case in the past for geothermal projects in Kenya.

Technical force

Due to the rather small unit sizes compared to conventional power plants, the system integration of geothermal plants is considered not critical. Geothermal energy is traditionally used to provide base load power. Considering flash steam power plants, flexible operation is only rarely possible due to technical reasons. With regard to binary standalone technology, however, flexible operation is feasible. . The implementation time schedule for a geothermal plant is different, depending on the technology used for the electrical production. A typical flash power plant is in the range of 8 - 10 years ranging from 30 - 100 MW and a typical binary power plant implementation is in the range of 5 - 7 years according to common industry practice. This implementation schedule has been applied in this analysis.

Environmental force

Electricity generation based on geothermal energy is emitting both CO₂ and H₂S gases to the environment and are therefore contributing to global warming.

Drilling activities impact the environment during drilling and testing of the drilled wells mainly through disposal of brine and steam in the testing area, although this activity is limited in time (10 - 30 days for testing). Required equipment (i.e. steam/brine gathering system) may have negative impacts on the immediate environment. The proximity of the geothermal sites to protected land areas (e.g. national parks) has to be considered carefully with the local authorities. That includes all aspects of the site and the development of it, i.e. the construction of the power plant, pipelines and transmission lines.

Legal force

With regard to funding of geothermal projects, financial constraints exist since commercial banks are not willing to finance a project, while the owner is taking the upfront risk of drilling. Therefore, the project finance is either achieved through borrowing on the balance sheet or financed upfront by equity.

Based on the overall geothermal project pipeline, the current project development status⁹⁹ and a generic project timeline for the implementation of geothermal power plants, the Consultant has determined the timeline for completion and thus the expected COD for each geothermal plant of concern.

Assumptions on implementation timelines

The project developer GDC has seven (7) drilling rigs in operation today. GDC has plans to either buy or rent additional rigs. The Consultant has taken into account additional rigs by decreasing the time needed for drilling at GDC's three major geothermal fields (i.e. Menengai, Baringo-Silali, Suswa), and that one drill at each location will exclusively perform the exploration drilling.

The assumed schedule of the drilling rigs is shown in the table below. One drilling rig is drilling the exploration wells in Menengai, Baringo-Silali and Suswa.

Annex Table 79: Assumed schedule of drilling rigs

	1.1.2016	1.1.2017	1.1.2020
Olkaria	3	2	0
Longonot	1	1	1
Akiira	1	1	1
Baringo-Silali	1	1	3
Menengai	4	3	3
Suswa	1	1	3
<i>Exploration</i>	1	1	1
Total number of drills	12	10	12

Longonot

Africa Geothermal International Ltd (AGIL) invited proposals for the provision of drilling services and drilling materials for four (4) geothermal wells in the Longonot geothermal field in April 2015. The assumed starting date is set to 1.1.2016. There is one drilling rig assumed on site.

Akiira

In August 2015 German insurer Munich Re announced to provide risk insurance for the geothermal exploration works at the 140 MW Akiira geothermal power project in the Kenyan Rift Valley. The assumed starting date is set to 1.1.2016. There is one drilling rig assumed on site.

⁹⁹ According to first-hand information from geothermal project developers in Kenya

Baringo-Silali

It is assumed that two (2) drills are drilling production wells and an additional drill is added in 2020. Stage 1 and Stage 2 have been combined and will commence in February 2016.

Menengai

It is assumed that three (3) drills are running continuously to drill the productions wells. Drilling will start for subsequent stages when drilling has finished for earlier stages.

Suswa

It is assumed that two (2) drills are drilling production wells and an additional drill is added in 2020. Exploration drilling for Stage 1 is expected to begin in July 2016. Drilling will start for subsequent stages when drilling has finished for earlier stages.

Annex 6.D.4 Hydropower plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

Beyond the existing schemes, Kenya still has substantial hydropower potential. This is reflected by current plans to develop large hydro projects in Karura and High Grand Falls (both in the Tana area), Nandi Forest and Magwagwa (in the Lake Victoria area), and Aror (in the Rift Valley area). This development could lead to additional hydropower capacity of over 800 MW in the long term.

Candidate technology and site description and assumptions

1) High Grand Falls

The construction of the High Grand Falls multipurpose dam is aimed to provide irrigation and to supply drinking and commercial/industrial water in the Ukambani and Tana River regions in addition to electricity generation. The power plant is envisaged to house five hydroelectric units amounting to a total installed capacity of 500 MW in its first stage. It is expected that the power plant will provide 1,213 GWh annually, resulting in a capacity factor of about 28%. It is also planned to increase the capacity by two units rated at 100 MW each in a second stage.

2) Karura

Karura HPP is a proposed hydropower scheme located on the Tana River 15 km downstream of the already existing Kindaruma hydropower station. The power plant is planned to be used solely for power generation and will be embedded in the existing Seven Forks cascade between the Kindaruma and Kiambere hydropower station. The power house will comprise of two Kaplan turbines

rated at 45 MW each. It is expected that Karura HPP will provide annually 235 GWh of electricity resulting in a capacity factor of about 30%.

3) Nandi Forest

Nandi Forest Dam is planned to be located on the Yala River in the western part of the country. The multipurpose project will be used for water supply, irrigation and power generation. The power plant will have an installed capacity of 50 MW providing 190 GWh of electricity annually.

4) Arror

Arror Dam is planned to be situated on the Arror River about 75 km north-east of Eldoret. The feasibility study of the project is already complete. The scheme will be designed for irrigation, water supply and power generation. The power station will have an installed capacity of 60 MW and will provide 190 GWh annually resulting in a capacity factor of about 36%.

5) Magwagwa

Magwagwa is a potential multipurpose scheme planned to be located on the Sondu River in the upstream of the existing Sondu Miriu hydropower plant. The hydropower plant will have an installed capacity of 120 MW and will provide annual energy estimated at 510 GWh. It is also expected that the dam will stabilize the flow of the Sondu River which has positive effects on the existing Sondo Miriu and Sang'oro power stations.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 80: PESTEL evaluation – hydropower projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	P	E	S	T	E	L
1	Karura	89	2023	+	+	-	++	-	o
2	Arror	59	2024	+	+	-	++	-	o
3	Magwagwa	119	2024	+	+	-	++	-	o
4	Nandi Forest	49.5	2025	+	+	-	++	-	o
5	High Grand Falls -Stage 1	495	2026	+	+	-	++	-	o
6	High Grand Falls -Stage 2	198	2028	+	+	-	++	-	o

Political force

In the past hydropower had the largest share in Kenya's energy mix and the government seeks to continue diversifying away from hydropower mainly due to varying hydrological conditions, which frequently result in load shedding. However, hydropower constitutes a domestic renewable energy source. In combination with a storage reservoir, hydropower plants contribute positively to increasing power supply security in the country.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

Whereas investment costs of hydropower plants are high, operating costs are comparatively low. Economies of scale can be leveraged and no fuel supply infrastructure is required. Due to the remote location of hydropower sites, however, the power evacuation can be costly.

Social force

The social impact of large hydropower projects is considerable with direct negative effects for the local community. In particular resettlement issues and land compensation is crucial for the local population and can bring the development of any hydropower project to a complete stop. Community participation and engagement is key in order to successfully implement any large-scale hydropower project.

Technical force

Hydropower plants are a proven technology and highly reliable. In combination with a storage reservoir, hydropower plants may serve as stand-by capacity by providing most flexible load. Hydropower plants are thus important generators for supporting power system stability. From the power system perspective, hydropower plants thus play a most important role to ensure overall stability.

Environmental force

Large hydropower has a high impact on the immediate environment. Land use for creating the reservoir can be considerable by flooding land. Moreover, dammed reservoirs can have a major impact on wildlife, such as aquatic ecosystems, forests and habitats.

However, dammed reservoirs may be used for multiple purposes beside the mere power generation, such as agricultural irrigation and flood control.

Legal force

For the tendering process, no difficulties are expected since there is strong competition in the hydropower plant industry. Experienced EPC contractors and original equipment manufacturers (OEMs) are available to implement large-scale hydropower plants.

Several hydropower projects appear in official planning documents for the medium to long term planning. Official information about the projects has been made available to the Consultant by the Ministry of Water and Irrigation (MWI). The feasibility studies of the projects are already completed. However, the projects' financial close has not been achieved yet. Based on its long track record with large hydropower plants as well as industry best practice, the Consultant has assumed the most realistic CODs.

For instance, the High Grand Falls hydropower project is in the detailed design stage. Acquisition of rights-of-way is assumed to start in 2016 and lasts about 4 years, followed by a 6-year construction

period (time-consuming due to large dam construction). The implementation time then accumulates to approximately 10 years in total. Thus, the commissioning of the High Grand Falls hydro-power project is not expected before 2026.

Annex 6.D.5 Wind power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

A considerable potential for wind power development exists in Kenya (e.g. high-level and remote resource assessment indicates a total technical potential of 4,600 MW). The present pipeline under the FIT scheme of projects going through PPA negotiations shows an overall proposed capacity of 550 MW. Taking into account additional planned projects the wind power capacity could reach almost 2,500 MW in the long term. Regardless of the economic implications, the utilisation of this potential might have significant impacts on the operation of the power system in future years.

Candidate technology and site description and assumptions

1) Lake Turkana Wind Power

The Lake Turkana Wind Power project aims to provide 300 MW of wind power to the Kenyan national grid. The project is of significant strategic benefit to Kenya, covering 40,000 acres in north-eastern Kenya. The project will comprise of 365 wind turbines, each with a capacity of 850 kW, and an associated overhead electric grid connection system and a high voltage substation. In accordance to official documents it is expected that the wind farm will have a considerable high capacity factor estimated at 55%. It is envisaged to later expand the plant by further phases to a total of up to 1,000 MW.

Ketraco is constructing a 400 kV double circuit transmission line with a total length of 428 km to deliver the electricity to the national grid. The power produced will be bought at a fixed price by KPLC over a 20-year period in accordance with the signed PPA.

2) Ngong

Further developments are foreseen close to the existing wind farm in Ngong hills owned and operated by KenGen. They include the committed Phase III of the Ngong wind farm with 10 MW.

3) Kinangop – Aeolus Wind

The Kinangop wind farm has been initially developed by project developer Aeolus Kenya and was supposed to be constructed by Iberdrola Engineering with an installed capacity of 60.8 MW though a total of 38 wind turbines, each with a unit capacity of 1.6 MW, manufacture by US firm General Electric (GE).

The wind farm was under construction. However, heavy protests in Kinangop, Nyandarua County, took place due to disputes between local farmers. These developments led to the suspension of the wind farm construction works by the Kenyan Supreme Court and the cancellation of the project. At the time of this report no information on the future of the project and the use of the imported assets was available.

4) Kipeto Wind

The Kipeto Wind Farm with an installed capacity of 100 MW is developed by Kipeto Energy Ltd, which is majority-owned by GE. Kipeto thus becomes the second largest wind power project after the 300 MW Lake Turkana Wind Power project. It will comprise a total of 63 GE wind turbines, each with a unit capacity of 1.6 MW.

The wind farm will be developed on a 70 km² piece of land, leased from local land owners in Kajiado County, approximately 70 kilometres south-west of Nairobi. Turbines will be supplied by American company General Electric. A 20-year fixed PPA with the offtaker KPLC has already been signed.

5) Prunus Wind

The Prunus Wind Project is being developed in the Ngong hills with an installed capacity of 50 MW. Prunus is financed through IPS, the financial arm of the Aga Khan Fund.

However, the required land for Prunus in the Ngong hills belongs to Kenya Forest Service. There are critical land ownership disputes ongoing which are hindering progress on project development.

6) Meru Wind

The Meru Wind Project is being developed by KenGen with an installed capacity of 80 MW in the first phase, as the utility seeks to increase the proportion of renewable energy in its production mix. The feasibility study is complete land acquisition in progress and financing committed by international development banks. It is envisaged to later expand the plant to a total of up to 400 MW.

In the meantime, Nairobi-based Bluesea Energy also disclosed intention to put up a 40 MW wind power plant in Meru, making it the second firm to target the county.

7) Generic wind farm

In the economic assessment a generic wind farm with an overall capacity of 50 MW is considered. Investment and O&M costs are derived from similar projects in the region. A capacity factor of 36%

is taken into account which reflects the average capacity factor of the existing wind farm Ngong I Phase 1 from 2011 to 2013.

Further planned wind farms comprise Ol-Danyat Energy, Malindi, Limuru Wind – Transcentury, Kajiado Wind - Chagem Power, and Marsabit.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 81: PESTEL evaluation – wind projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	Project COD	P	E	S	T	E	L
1	Lake Turkana Phase I, Stage 1	100	2017	Mid 2017	++	+	o	-	+	+
2	Kipeto Wind - Phase I	50	2018	End 2017	++	+	o	o	+	+
3	Lake Turkana Phase I, Stage 2	100	2018	Mid 2017	++	+	o	-	+	+
4	Ol-Danyat Energy	10	2019	Na	++	+	o	o	+	+
5	Ngong 1 - Phase III	10	2019	End 2018	++	+	o	o	+	+
6	Aeolus Kinangop	60	2019	End 2018	++	+	o	o	+	+
7	Kipeto Wind - Phase II	50	2019	End 2018	++	+	o	o	+	+
8	Lake Turkana Phase I, Stage 3	100	2019	Mid 2017	++	+	o	-	+	+
9	Meru Phase I	80	2020	2 nd half 2019	++	+	o	o	+	+
10	Prunus Wind	51	2021	beyond MTP	++	+	o	o	+	+
11	Limuru Wind – Transcentury	50	2022	beyond MTP	++	+	o	o	+	+
12	Kajiado Wind - Chagem Power	50	2022	beyond MTP	++	+	o	o	+	+
13	Malindi	50	2024	beyond MTP	++	+	o	o	+	+
14	Meru Phase II	320	2024	beyond MTP	++	+	o	o	+	+
15	Marsabit Phase I	300	2025	beyond MTP	++	+	o	-	+	+
16	Lake Turkana Phase II, Stage 1	100	2025	beyond MTP	++	+	o	-	+	+
17	Lake Turkana Phase II, Stage 2	100	2026	beyond MTP	++	+	o	-	+	+
18	Marsabit Phase II	300	2027	beyond MTP	++	+	o	-	+	+
29	Lake Turkana Phase II, Stage 3	150	2027	beyond MTP	++	+	o	-	+	+
20	Lake Turkana Phase III, Stage 1	100	2030	beyond MTP	++	+	o	-	+	+
21	Lake Turkana Phase III, Stage 2	100	2031	beyond MTP	++	+	o	-	+	+
22	Lake Turkana Phase III, Stage 3	150	2032	beyond MTP	++	+	o	-	+	+

Political force

Being a domestic renewable energy source, wind power projects are given a high profile in Kenya by both the government and private sector. Due to their positive contribution to the country's sustainable socio-economic development, wind power is greatly accepted by international donors as well. Wind power development will diversify Kenya's energy mix without relying on any foreign fuel supply agreements.

Lake Turkana Wind Project

- In particular, the large-scale Lake Turkana Wind Project (LTWP) is considered a high priority project, which will result in the largest wind farm to be installed in Africa to date. The Kenyan government and international donors, including major development banks such as the African Development Bank and the European Investment Bank, strongly support and promote this African flagship project.
- It is expected that Lake Turkana will pave the way for following large-scale wind power projects in Kenya, including the Kipeto Wind Project co-developed by GE Power & Water as well as the Meru Wind Project developed by KenGen.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

Due to the ongoing market consolidation the specific investment costs for wind turbine generators (WTG) are decreasing, but operating costs remain comparatively high.

Furthermore, stand-by capacity for power system support is required due to the intermittent power output of WTGs. These capacity costs have to be considered appropriately in the overall power system development.

Lake Turkana Wind Project

- In addition, the costs for connecting the remotely located wind farm sites to the national grid can be significant. For Lake Turkana, a 428 km long 400 kV high voltage transmission line has to be built. These costs have to be accounted for in the project's economic viability as well as financial feasibility.

Social force

Typically, social issues arise due to noise and shadow pollution of the local community. Potential land disputes on the proposed sites are common and have to be considered accordingly.

In Kenya, the Kinangop Wind Project has sadly become famous for its unresolved social issues: it has been completely halted after violent protests opposing the project caused fatalities. The engagement and acceptance of the local community is again key to achieve successful project implementation.

Technical force

Due to the considerable technical development in the last two decades, wind turbine generators are a proven technology today.

However, wind turbine generators require backup capacity to support the power system in case no wind resource is available. Analysis on the required infrastructure shows that the transmission lines

have to be implemented before commissioning of the wind power projects, which can be complex and time-consuming due to the remote location of the sites.

Lake Turkana Wind Project

- For committed large-scale wind parks such as Lake Turkana, the requirement of backup capacity is significant. Being concentrated on a single site, LTWP can be considered as one single power generation unit in the system. The intermittent electricity production pattern of the LTWP – connected to the electricity system via a long-distance dead-end line – may cause an electricity grid blackout in case of a wind farm failure.
- Regarding actual grid connection, the required 400 kV transmission line for LTWP is already under construction. The length is 428 km. The contract for the line has been awarded to a Spanish contractor. The timely completion of the transmission line is considered ambitious but possible, if no wayleave issues arise.

Environmental force

Electricity generation based on wind energy is not emitting any harming greenhouse gases and thus mitigating global warming.

However, potential routes of bird migration close to a wind farm site have to be considered during planning. A detailed environmental impact assessment (EIA) according to international standards is common practice and shall address mainly cumulative impacts on biodiversity and landscape.

Legal force

For the WTG procurement, no difficulties are expected since there is strong international competition in the wind power industry. Experienced original equipment manufacturers (OEMs) and EPC contractors are available to implement large-scale wind parks. Due to their positive contribution to a country's socio-economic development, the funding of wind power projects by international development banks is common practice.

Lake Turkana Wind Project

- Procurement for the LTWP has been arranged already. Vestas has signed a USD 756 million agreement with LTWP to supply the WTGs, already partly delivered during the time of this study. The site will comprise of 365 Vestas V52 wind turbines, each with a capacity of 850 kW. Although ambitious, it is expected that all or part of the LTWP will be commissioned in 2017 as originally planned. However, due to various external factors it is assumed that the system integration of the whole wind farm will be stagewise (assumed to last into 2018 and 2019).

Next large-scale wind farms: Meru and Kipeto Wind Projects

- The Meru Wind Project is being developed by KenGen with an overall installed capacity of 400 MW, as the utility seeks to increase the proportion of renewable energy in its electricity generation portfolio. The project is divided into consecutive phases, phase I with 80 MW,

phase II with 320 MW. A wind measurement campaign and full feasibility study has already been completed. Land acquisition and financial negotiations are underway. AFD from France and KfW from Germany committed finance for the project.

- The Kipeto Wind Project is developed by the American company GE Power & Water with an installed capacity of 100 MW in Kajiado County. GE initially held a share in the project development company as co-investor in order to push the works. The PPA was signed with KPLC, and financial close is assumed to exist. Kipeto Power Ltd – the project implementation unit – has received USD 233 million financing from the Overseas Private Investment Corporation (OPIC), the development finance institution of the US government. Kipeto Wind will be the second committed large-scale wind project following Lake Turkana.
- Though the Kinangop wind farm is cancelled for the particular location imported assets (e.g. turbines) are assumed to be utilised in the country. However, future project location and actual project set-up are not decided which results in an assumed commissioning of the assets by 2019.

Annex 6.D.6 Biomass power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

Biomass can appear as a rather modest potential at present, but could increase significantly with the agro industrial development and mainly through sugar mills revamping and future concentration of other agro industries.

Candidate technology and site description and assumptions

Kwale Cogeneration Plant / generic biomass plant

The existing Kwale plant can be seen as a representative for further similar plants and is used as such (e.g. analysed as generic biomass plants within this study). To some extent this assessment may also represent biomass based generation in other agricultural sectors.

The Mauritian sugar manufacturer Omnicane, which owns a 25% share of the Kwale International Sugar Company Ltd (KISCOL), started to generate electricity in 2015 using sugarcane bagasse: an 18 MW bagasse-fired power plant providing under Kenya's feed-in tariff scheme a capacity of 10 MW to the national grid. At the time of this study this plant provided only own supply. It is assumed that supply to the grid is possible from 2017 onwards with ramping up of sugar cane production.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 82: PESTEL evaluation – biomass projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	P	E	S	T	E	L
1	Generic bagasse power plant (cogeneration)	25	2020	+	+	o	o	+	o

Political force

Cogeneration of electricity in sugar cane milling factories still has a decent – yet untapped – potential in the Western and Coastal areas of Kenya. Given its role as niche product within the overall power sector, governmental support is to date limited for this particular renewable energy source.

It strongly relies on a satisfying performance of sugar sector which gets political attention but suffers from considerable structural problems amid strong international competition. The resulting shut down of factories, the neglect of sugar cane plantings and respective uncertainties also limit a profitable operation of bagasse based power plants.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

Bagasse-based cogeneration of electricity is considered a cheap source of electricity generation, mainly since bagasse is an agricultural waste product, which is available at low cost for the power generator. The fuel is available at site and costly infrastructure for fuel transportation is mostly not required.

Compared to other well-established sugar cane producing countries, such as Brazil, the price level in Kenya is higher. The existing Mumias bagasse-based cogeneration plant suffers from low electricity tariffs and fuel supply problems. Due to this case private sector interest in electricity generation from biomass could be limited until an economic operation is proven. However, currently valid FIT tariffs are considerably higher and should allow for a profitable operation.

Social force

There are no major adverse social issues known to the Consultant in relation to bagasse-based power generation. Optimised traffic management plans to reduce the noise and dust impact on the local community should be in place. For existing sugar mills foreseen to provide electricity in cogeneration mode, the involuntary resettlement of people is not considered to be applicable since the land is already in use for cane farming.

Technical force

Electricity generation from sugar mills has to be considered as by-product only. The cogeneration plants are first and foremost operated to fulfil the requirements of the sugar cane production process. From an electricity system perspective, bagasse-based electricity generation can be considered as supplementary generation source only. However, depending on the concept of the power plant, it is possible to contribute to grid stability.

A reliable power generation also depends on the availability and quality of fuel. This has to be carefully considered in the dimensioning of the power plant. For instance, for Mumias the available amounts are not sufficient. A further challenge is the local quality of bagasse, which is not fully adequate for power generation: the sugar cane is harvested in an early stage of its growth cycle, resulting in a high humidity of the corresponding bagasse. The early harvest thus affects in a negative way the quantity and quality of sugar production. The limited quantity of cane results in a loss of operating time and insufficient amount of power output. This circumstance limits the suitability of Kenyan bagasse for electricity generation.

Environmental force

Sugar mills upgraded in cogeneration plants may benefit the environment by reducing the emissions of greenhouse gases in the atmosphere in terms of the usage of biomass as fuel. Bagasse is an almost carbon neutral renewable energy source, and can play an important role in substituting fossil fuels for future power generation in Kenya.

Regarding the environmental-friendly use of required resources, the availability and treatment of water consumed in the sugar mill's cogeneration plant is considered sensitive. Typically, it has to be extracted from nearby surface water, wetland by tanker or from boreholes on-site. Water-related aspects have to be examined thoroughly and impacts assessed.

Legal force

As stated by Mumias management the current PPA for bagasse-based cogeneration is not cost-covering. Also, the contractually agreed output of electricity could not be fulfilled in recent years due to a lack of adequate bagasse for power generation (see section on "Technical Force"). It resulted in longer downtimes of the cogeneration plants than originally anticipated. This example is in part the result of the structural problems within the sugar sector. A reform of the already partly privatised sugar sector as well as a stronger regulatory framework is probably needed to help bagasse-based cogeneration of electricity realise its potential.

Annex 6.D.7 Solar (photovoltaic) power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

The total solar energy potential in Kenya is several thousand times the expected Kenyan electricity demand. At present, the project pipeline under the FiT scheme with feasibility studies, partly going through PPA negotiations, amounts to an overall capacity of 500 MW of solar photovoltaic (PV) power distributed amongst some 20 projects.

Candidate technology and site description and assumptions

PV power plants are of modular nature (e.g. modules, inverter stations) and are therefore scalable in size. Hence, a generic PV power plant of 10 MW is chosen as a candidate which also represents plants currently in the FiT project pipe line (see examples below).

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 83: PESTEL evaluation – solar photovoltaic projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	P	E	S	T	E	L
1	Generic PV power plant	10	2019	+	+	+	+	o	o

Political force

Since no fuel is required for their operation, solar photovoltaic (PV) power plants contribute to both the security of supply and diversification of energy sources. Compared to other renewable energy sources in Kenya, solar PV applications do not play a considerable role yet in the country's integrated electricity supply system. However, solar PV is widely used in off-grid applications, e.g. for solar home systems.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

Historically, solar PV was developed as suitable technology for isolated grids and/or rural electrification due to its modularity and applicability for smaller applications. Its development in this type of application has contributed to the maturity of the technology and facilitated its adoption on a large scale for grid connection.

As a result, current large-scale grid-connected solar PV systems are cost-competitive with conventional thermal energy sources with regard to their levelised cost of electricity. The most competitive utility-scale solar PV projects are now regularly delivering electricity for just USD 0.08 per kWh without any financial support. Even lower costs are being realised, down to USD 0.06 per kWh, where an excellent solar resource and low-cost finance is available.

Social force

As for all utility-scale power plant projects, typical social issues related to their construction and operation arise due to land use, resettlement and compensation. However, compared to conventional energy sources the impact of social issues is regarded as non-critical. There is no noise and/or dust pollution during the operation of solar PV plant.

Technical Force

Solar PV is a mature technology possessing of high reliability and long technical lifetimes. Today the power output warranties of solar PV modules are commonly granted for a period of 25 years.

Solar PV has a seasonal variation in electricity production, with the peaks generally following months with the highest solar irradiation. A major drawback of PV plants is the intermittent generation pattern, since the electricity production occurs based on the availability of the solar resource during daytime. There is no possibility to use solar PV plants as base or peak load generator. In addition, the injection of large capacities of fluctuating solar PV units can constitute a challenge to the overall stability of the electrical grid.

Environmental Force

Compared to conventional energy sources, solar PV plants have a rather low environmental impact. They do not emit any global warming emissions nor other pollutants during their operation. Depending on their location, larger utility-scale solar facilities can raise concerns about land degradation and habitat loss. Total land area requirements vary depending on the technology, the topography of the site and the intensity of the solar resource.

Further, the solar PV cell manufacturing process includes a number of hazardous materials (e.g. hydrochloric acid, sulfuric acid, nitric acid, hydrogen fluoride and acetone), most of which are used to clean and purify the semiconductor surface. The amount and type of chemicals used depends on the type of the solar PV cell, the amount of cleaning that is needed and the size of the silicon wafer.

Legal Force

At present, there is a project pipeline under the FiT scheme with feasibility studies, partly going through PPA negotiations. Though usually easy to implement the implementation experience in Kenya is limited. A pilot rooftop solar PV project by the Strathmore University has been recently implemented under the FiT scheme with an installed capacity of 0.6 MW. Further projects of this size exists mainly for captive supply (e.g. in the tea sector).

Based on their advanced project development stage, the implementation of various large-scale solar PV plants could be achieved. However, details of the power plants such as status of financing remain undisclosed. Based on common industry practice, the earliest COD for such plants is assumed for the year 2019.

Annex 6.D.8 Nuclear power plants

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

At current consumption levels worldwide uranium reserves would last more than 100 years. Nuclear energy is not a renewable energy. Compared to fossil fuels and the technology and investment to build and operate a nuclear power plant (NPP), the fuel supply is of minor importance for the evaluation of nuclear power as an expansion candidate. However, the relatively low costs for fuel as well as the considerably lower amounts of fuel to be replaced, stored and transported are advantages of nuclear power in terms of supply dependency and fluctuation of fuel cost.

Candidate technology and site description and assumptions

Beside conventional and renewable energy sources in Kenya, the Consultant also analysed the potential use of nuclear energy, which is not available in Kenya yet. At the same time, the Government of Kenya is contemplating to launch a nuclear power programme planning for the operation of a first nuclear power plant with an installed capacity of 1,000 MW by 2025.

In the framework of the techno-economic analysis a 600 MW nuclear power plant unit is considered. This size was selected due to

- The expected size of the overall system (i.e. peak demand and installed capacity) restricting the maximum size of a single unit: Generally, the single largest unit in the system must not exceed a maximum of 10% of the total installed capacity in the interconnected system. Also the single largest unit in the system requires spinning and cold reserve back-up of the same size or at least share such a reserve with one other plant of the same capacity to make up for any corresponding unforeseen downtime. In this regard, 600 MW is considered as suitable size for a nuclear unit in the Kenyan power system in the long term and will be considered in the economic assessment.
- The availability of unit sizes on the market limits the minimum size of a unit: the typical unit sizes of the latest technology are in the range of 1,000 to 1,400 MW. Unit sizes of around 300 MW are in operation, but they are old and have not been further developed for decades. Reactor units of around 600 MW are also in operation. Their age and technology status is superior compared to smaller unit sizes. However, as readily available units are not based on the latest technology, reengineering is required which results in higher investment costs as described below.

In the following, the economic cost of a potential nuclear power plant shall be assessed from an overall point of view taking into account international price levels. Nowadays, 600 MW nuclear power plants of the latest technology are not as readily available on the world market as larger units. A plant of this size would have to be re-engineered. Further, the investment costs for auxiliaries which do not vary much with the unit size will have a larger share of the specific investment costs. As a consequence of both the total costs (capex) and the specific investment costs expressed

in USD/kW would increase considerably. In accordance with the corresponding literature the specific investment costs for a smaller 600 MW unit would be required to be scaled in line with the following formula, given for the case of a scaled down NPP:

$$\text{Specific capex small NPP} = \text{specific capex large NPP} * (\text{capacity large NPP} / \text{capacity small NPP})^{0.55}$$

For the analysis, price estimations are derived from a study dated March 2011¹⁰⁰ undertaken in relation to a planned 1,400 MW nuclear power plant development. On this basis specific investment costs of 4,770 USD/kW¹⁰¹ have been quoted, translating into an EPC related total capital expenditure of 6,680 MUSD. Applying the above formula and considering year on year price escalation to adapt for a smaller 600 MW unit results in specific investment costs of 8,068 USD/kW.

The following nuclear power plant related costs and issues are not considered in the calculations:

- A core catcher as a potential additional safety measure against a nuclear meltdown through the power plant's foundation and corresponding capital expenditure;
- Decommissioning / demolition costs (Germany: EUR 40 billion¹⁰² for demolition of 20,000 MW);
- Cost of fuel import and waste disposal / management / long term deposits;
- Costs for extra cold and spinning reserve to back up the nuclear plant in comparison with largest alternative candidate unit;
- Costs for the required overall framework including regulatory issues and development of human capital.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 84: PESTEL evaluation – nuclear projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	P	E	S	T	E	L
1	Nuclear Power Plant	1,000/600	2030	o	o	--	o	--	--

Political Force

The introduction of nuclear power to a national generation portfolio means a diversification of energy sources. This may support the security of supply and a reduction of dependency (e.g. on fuels and/or energy imports). This rationale is supported by the fact that nuclear fuel has to be usually replaced on an annual basis, and large amounts of fuel can be stored at the facility. Compared to fossil fuel based generation this is an advantage as the typical fuel storage for these fuels are considerably smaller and may cover only a fraction of the annual fuel consumption. Further,

¹⁰⁰ In the study a wide range of nuclear projects were stated and analysed. The derived specific investment costs are thus a result of a range of possible and actual costs for nuclear power plants.

¹⁰¹ Base year 2011

¹⁰² USD 46 billion

domestic and international fuel supply might be interrupted for technical, political or economic reasons that can be beyond the control of the plant operator or the government.

However, the fuel supply is only one dependency of a power plant, though important. Access to technology and expertise constitutes another dependency. This can be considerably higher for nuclear power plants compared to common fossil fuel based generators due to the more sophisticated technology and limited number of possible suppliers.

Economic Force

The levelised electricity costs of the candidates are provided in section 6.4.

Nuclear power offers economic opportunities compared to alternative technologies, in particular conventional fossil fuel based generation. In comparison with almost any fossil fuel based generation, nuclear power is often advocated as a low generation cost technology for base load generation. The fuel and other operating costs are low, resulting in relatively low sensitivities of the overall costs with regard to potential fuel price changes. Further, the high capital costs can be credited against an ideally long lifetime of nuclear power plants; given that efficiency improvements do not play such an important role as for other thermal power plants.

These cost advantages have to be seen in relation to the various risks inherent to nuclear technology, which can increase the project costs, lead to external costs or reduce the lifetime of the plant (e.g. for security concerns). On the other hand, nuclear power can avoid certain external costs if compared with alternative generation technologies, e.g. with regard to the flue gas and other emissions of fossil fuel based generation (see Environmental Force).

Social Force

Further to assessing the viability of any nuclear power generation programme, the issue of radioactive waste management requires to be addressed from very early on at the highest national level as this is one of the key issues for a nuclear programme becoming sustainable, if at all.

Based on the German experience and elsewhere, identifying and constructing suitable mineral deposits is an extremely difficult process, takes decades to identify and is very costly in any case. After 40-50 years of nuclear power generation worldwide governments have still not been able to decide on appropriate geological repositories while spending billions on investigations. However, interim management solutions for the nuclear waste management exist and are utilised worldwide.

Technical Force

Prior to establishing the economic feasibility of a nuclear power generation programme a suitable nuclear unit size needs to be identified to fit the power generation system in order to ensure that grid stability is safeguarded rather than jeopardised.

The sizing of the unit also depends on its operational flexibility with regard to partial load and ramping rates. In particular during periods of low load, for instance during night, a base load plant might be forced to operate in partial load to allow the operation of several other power plants'

units to stabilize the network. With regard to this, NPP are rather inflexible compared to for instance coal fired power plants of the same size. The NPP units' ability to increase or decrease load is rather slow with extensive requirements to keep the reduced or increased load for several hours. Hence, NPPs optimal and typical area of application within a power system is to provide continuous base load power at their highest capacity throughout the year with no or only very limited variation of the load.

This application is recommended from the technical but also economic point of view to achieve the desired low economic generation costs and reduce the wear and tear of the sophisticated technical equipment.

Environmental Force

Nuclear power does not cause harm through typical pollutants of fossil fuel based generation such as greenhouse gas emissions, sulphur and nitrogen oxides, particulate matter, heavy metals and ash. However, nuclear power does cause emissions of radiation during operation. However, these emissions are usually at a very low level much below the natural background sources of radiation. The probability of higher emission of radioactive radiation is low, but if released to the environment the impact can be catastrophic.

Legal Force

A considerable and sustained national effort has to go into the development of a nuclear power programme supported by appropriate outside international public and private bodies such as the International Atomic Energy Agency (IAEA) and capable nuclear power contractors. Key issues to be addressed include the establishment of a legal and regulatory framework and a corresponding regulator capable of overseeing the complex development process including but not limited to project design, licensing authority, tender documentation, environmental impact assessment and mitigation, the locating of plant and the award of construction and operation concessions. The education of a domestic human resource base capable of supporting the complex development process is of essence as well. Again, a national nuclear development programme cannot be undertaken against but has to campaign for political as well as technical support of the outside world.

In Kenya the Kenya Nuclear Electricity Board (KNEB) has initiated various steps¹⁰³ of the nuclear programme including capacity building, legal and regulatory framework among others.

Given the extremely long lead times for nuclear power development which are specified in the following and that action is to be taken up to 20 years ahead of commissioning of a first NPP, the Kenyan government would be required to take further actions very soon if it was to develop a nuclear power plant before 2035, i.e. the end of the study period. A typical time schedule for the implementation and commissioning of a nuclear power plant requiring 15 – 20 years looks as follows:

- Establishment of legal framework and regulatory body: 3 years
- Project definition and decision-making: 5-7 years

¹⁰³ The status of the nuclear power programme is summarised in a recently submitted pre-feasibility study (KNEB, *Kenya's Nuclear Power Programme Pre-Feasibility Study Report*)

- Implementation and commissioning: 7-10 years

Typically, a nuclear power plant is operated for a period of 40 to 50 years and decommissioning and demolition requires another 5 – 50 years.

Annex 6.D.9 Interconnectors

This section provides a brief description of the candidate technology and assumptions, primary energy source (resources) and the prioritisation assessment results (PESTEL).

Resources (fuel, primary energy)

Interconnections with neighbouring countries provide mutual benefits (sources of energy and power, the provision of ancillary services and overall higher security of supply). For supply of power to the Kenyan system only Ethiopia as a source is secured. This may be extended to other countries as the network develops but is not foreseeable at present.

Candidate technology and site description and assumptions

The construction of a 500 kV bipolar HVDC interconnection transmission line between Ethiopia and Kenya is already under development (see Section 5.4.2). The transmission line is designed for the transfer of 2 GW. However, only 400 MW are currently contracted.

Prioritisation assessment (PESTEL)

The PESTEL results are summarised in the following table and detailed below.

Annex Table 85: PESTEL evaluation – interconnector projects

No	Power Plant Name	Net Capacity Addition [MW]	Earliest year for system integration	Project COD	P	E	S	T	E	L
1	HVDC Ethiopia-Kenya inter-connector import - Stage 1	400	2019	End 2018	+	+	o	++	o	o
2	HVDC Ethiopia-Kenya inter-connector import - Stage 2	400	2019	End 2018	+	+	o	++	o	o

Political force

For the establishment of an interconnected electricity system in East Africa, the planned 500 kV high voltage direct current (HVDC) transmission line from Ethiopia to Kenya and later on to Tanzania is considered most useful. It will lead to a more efficient utilisation of resources in the region and increase security of power supply among the interconnected countries.

Economic force

The levelised electricity costs of the candidates are provided in section 6.4.

The investment costs of the planned HVDC interconnector are high. However, once implemented and in operation the HVDC line is envisaged to transmit cheap hydroelectricity from Ethiopia to the South with low operating costs. The line's total capacity of 2,000 MW is not fully utilised at the beginning. A step-by-step increase is foreseen starting with an initial transmission capacity of 400 MW, which may be increased to a capacity of up to 1,000 MW in the long term. However, the extension of the utilisation of the transmission capacity (e.g. stage 2 for Kenya) depends on available capacity from Ethiopian hydropower plants and potential alternative importers (such as Tanzania).

The PPA has already been signed between Ethiopia and Kenya. No price escalation is included in the PPA. It covers both an energy charge for transmitting electricity as well as a take-or-pay clause, i.e. a capacity charge accrues for the Kenyan offtaker KPLC. However, the PPA only allows domestic consumption in Kenya. In case Kenya uses the line to export electricity e.g. to Tanzania (a capacity of 200 MW is currently discussed), KPLC has to pay an additional fee to Ethiopia. However, a corresponding wheeling charge would be invoiced to Tanzania.

Social force

A "Coordinating Committee" (consisting of KETRACO, KPLC and Ethiopian entities) for the project exists to manage all entities involved. The committee is also handling potential social issues during construction, in particular with regard to land compensation or right-of-way disputes.

Technical force

HVDC lines provide low-loss transmission of electricity over long distances. The foreseen regional interconnector with Ethiopia has a total length of 1,000 km, and serves as power system support capacity by supplying quickly available hydroelectricity. The transmission line is only used for one-way electricity import to Kenya.

Due to the transmission line there is no need to implement a comparable large-scale power plant in Kenya itself. Operation and maintenance of the line is in the responsibility of the Ethiopian operator. Moreover, the interconnector marks the beginning of an East African integrated grid.

Environmental force

The HVDC transmission line is not emitting any greenhouse gases in Kenya. Since it is envisaged to transmit Ethiopian hydroelectricity to Kenya, probably little or no greenhouse gas emissions will occur in Ethiopia – the country of origin – as well (depending on the preparation of the reservoir of the plant).

However, the construction of the Gibe III Dam required for hydropower generation in Ethiopia will have a significant, not yet fully foreseeable, downstream impact on the Omo River as well as Lake Turkana in Kenya. A negative environmental impact is thus highly probable.

Legal force

The interconnector with Ethiopia has achieved financial close and is mainly funded by international donors. The total value of the project, which is being financed in large parts by the World Bank and the African Development Bank, is worth approximately USD 450 million. Tendering took place for the procurement of the transmission lines and converter stations. In a consortium with the Spanish construction company Isolux Corsan, Siemens is constructing the 1,000 kilometres-long HVDC transmission line and will link two converter stations in Suswa (Kenya) and Sodo (Ethiopia).¹⁰⁴ Siemens is supplying the core components for the HVDC transmission technology, such as converter valves, converter transformers, smoothing reactors, protection and control equipment as well as AC and DC filters. Isolux Corsan is responsible for the construction, installation and equipment of the converter and AC substations.

From a legal perspective, wayleave issues (i.e. carrying out works on privately-owned land) are considered critical for a timely project implementation of transmission line projects in Kenya, i.e. a delay of the construction period may be probable. Recent experience demonstrated that land issues of the 400 kV Mombasa – Nairobi transmission line delayed this project significantly.

However, the HVDC link is strongly supported by the GoK, which will help to solve possible challenges. Given the ambitious timeframe, a commercial operation in 2019 is assumed feasible in case no wayleave issues arise and the converter stations – which are the time-sensitive components – will be implemented on time.

¹⁰⁴ Source: Siemens AG dated 28 October 2015;
[http://www.siemens.com/press/en/pressrelease/?press=/en/pressrelease/2015/energymanagement/pr2015100050emen.htm&content\[\]=EM](http://www.siemens.com/press/en/pressrelease/?press=/en/pressrelease/2015/energymanagement/pr2015100050emen.htm&content[]=EM)



ANNEX 7 GENERATION EXPANSION PLANNING – ANNEXES

Annex 7.A Modelling assumptions

Annex 7.A.1 Secondary reserve requirement for operational purposes

While RES necessitate the system to provide primary reserve capacities for covering short term fluctuations in their power output due to short term meteorological effects, they also require the system to provide secondary reserve capacities.

For setting up the dispatch schedule, information is needed on how much power will be available to the system based on RES. For this purpose, forecasts are needed. However, it is obvious that a forecast is only a forecast and cannot predict the actual future power generation based on different renewable resources with 100% precision. Even the best forecast is prone to errors.

The consequence for unit dispatching in the currently typical unit commitment schedule is that RES generate either too little or too much power. In the case of too much power, the system has several possibilities for coping with this situation, which are described in more details below. A more difficult condition arises in case the RES power output is less than forecasted. In the worst case, the committed units are not able to ramp up to the extent of the RES power deficit, and system operation might get unstable and/or load would have to be shed for operating the system in a secure way.

For this reason, the forecast error has to be known by the unit scheduler and dispatcher in order to cater for adequate reserve capacity provision that can fill a potential gap between forecasted and available RES power.

In the absence of an established RES forecasting system in Kenya, the Consultant utilises the persistence approach in order to forecast the RES power 2h (for wind) and 24 hours (for PV)¹⁰⁵ ahead. The persistence approach implies

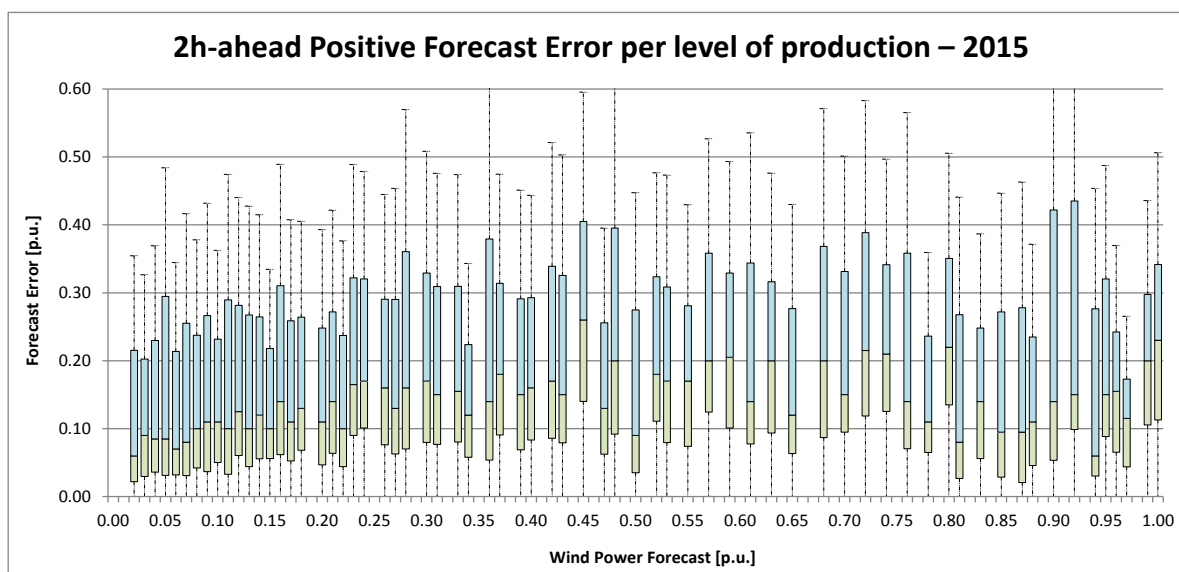
$$P(t + \Delta t) = P(t)$$

Based on literature, this is valid for smaller time periods. The forecast error based on the persistence model is not essentially larger compared to actual wind forecasting models.¹⁰⁶

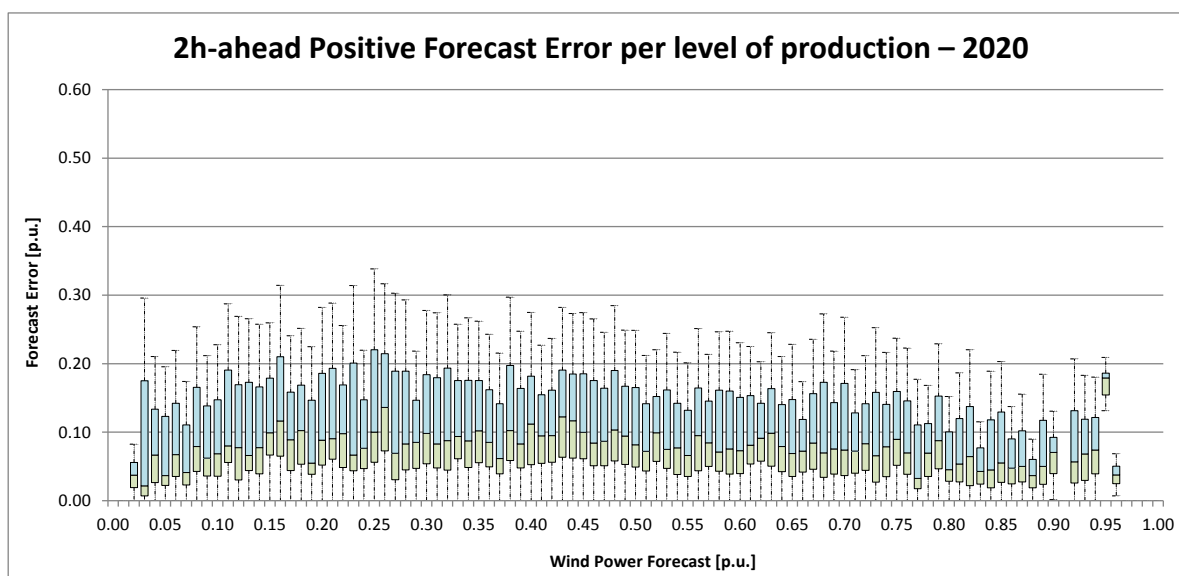
Based on the persistence approach the Consultant analysed the forecasting error of the wind power and the PV power forecast. The resulting positive forecast errors per level of production of the wind and PV power forecasts for selected years are shown in the following figures.

¹⁰⁵ Due to the strong day/night PV generation profile a 2h ahead forecast approach would not be meaningful. As a result a 24h ahead forecast approach is applied.

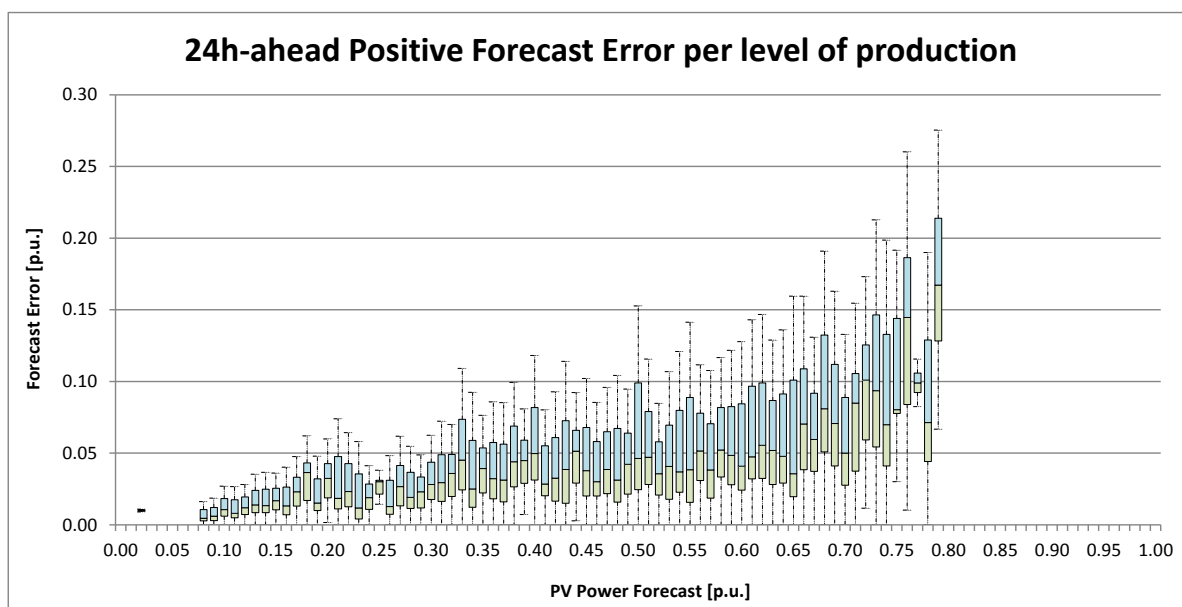
¹⁰⁶ See Landberg et al. (2003): „Short-term prediction – An overview“ and Giebel, Sørensen, Holttinen for EWEA (2007): “Forecast error of aggregated wind power”



Annex Figure 53: 2h-ahead positive wind forecast error per level of production for 2015



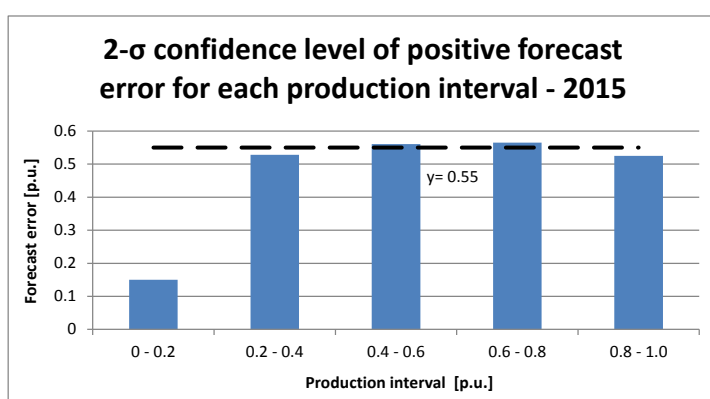
Annex Figure 54: 2h-ahead positive wind forecast error per level of production for 2020



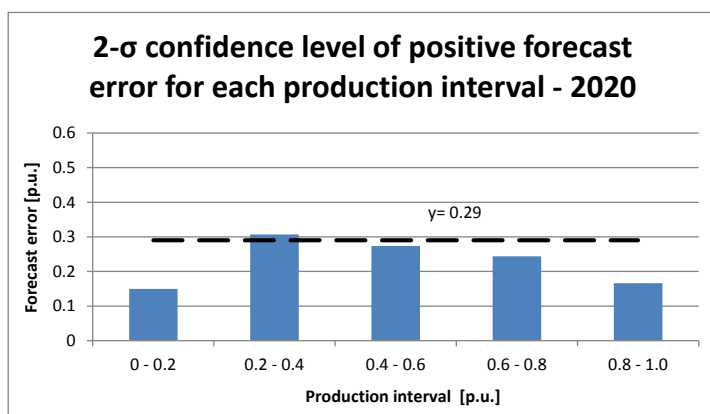
Annex Figure 55: 24h-ahead positive PV forecast error per level of production for the LTP period

The boxplots in the figure above show the median, the upper quartile, the lower quartile as well as the upper and lower 5% percentiles of the wind power forecast error for every level of production.

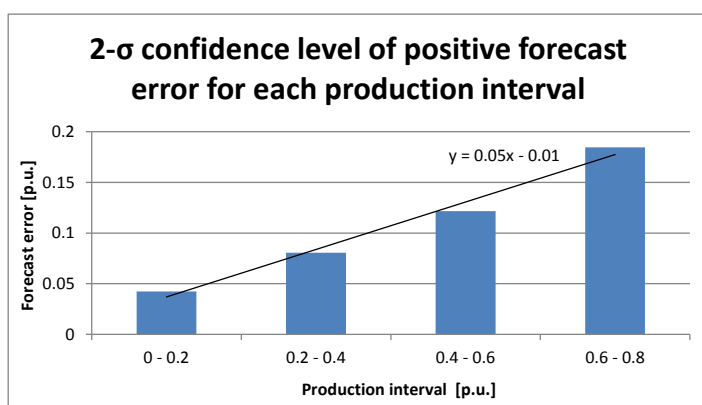
So, for example, if in 2020 wind power is forecasted to produce 40.0% of its rated capacity, the median forecast error will be 11.2% of its rated capacity. Furthermore, with a probability of 25%, the forecast error will be between 5.3% and 11.2% of rated wind power capacity. Also, with a probability of another 25%, the forecast error will be between 11.2% and 18.2% of rated wind power capacity. Finally, the forecast error will be below 27.5% of the installed wind power capacity with a probability of 95%.



Annex Figure 56: 2-σ forecast error classification of wind power forecast errors for the year 2015 (2h-ahead)



Annex Figure 57: 2- σ forecast error classification of wind power forecast errors for the year 2020 (2h-ahead)



Annex Figure 58: 24- σ forecast error classification of PV power forecast errors for planning period (24h-ahead)

Annex 7.B Scenario analysis – low hydrology case

Annex Table 86: Low hydrology – annual data consumption and generation

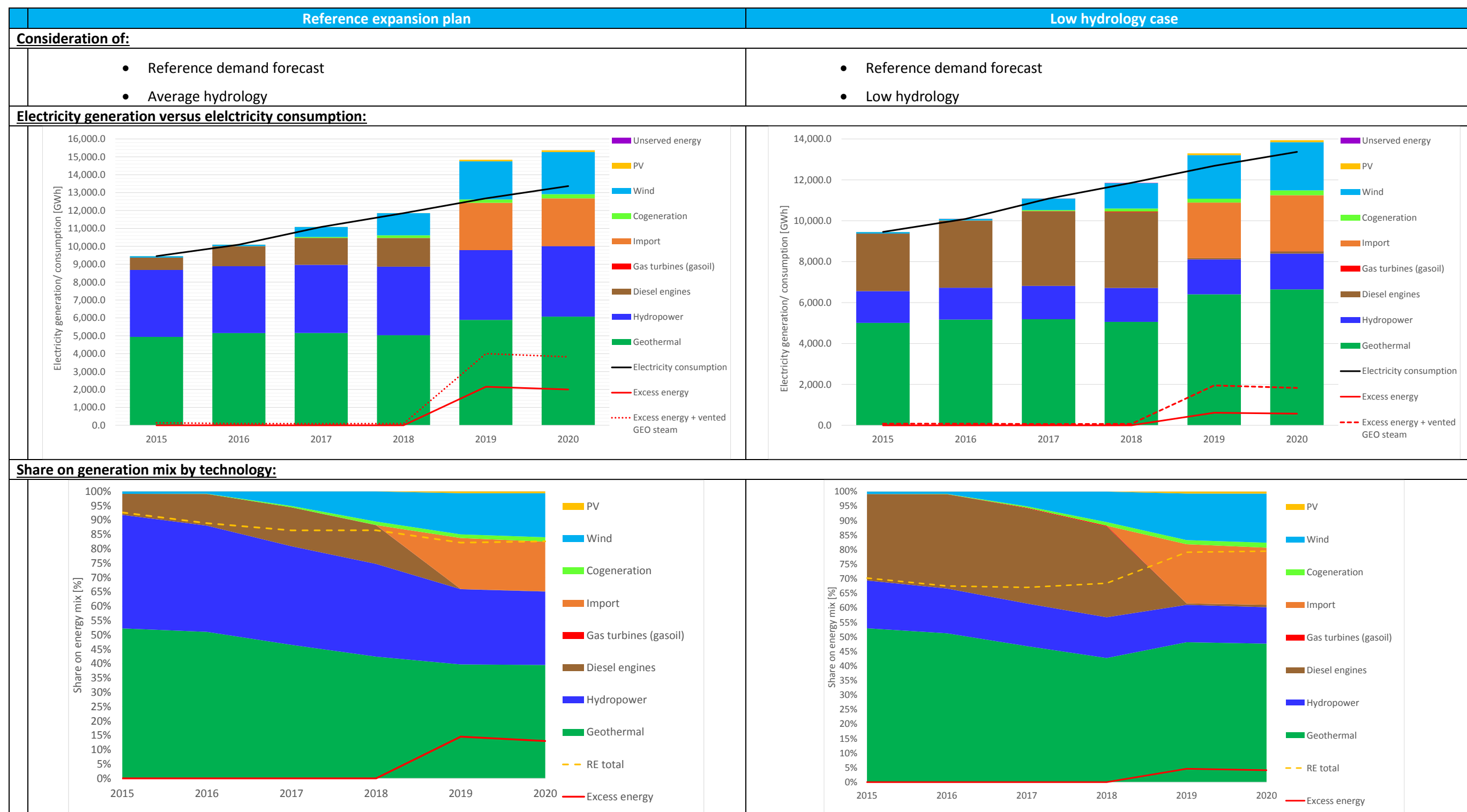
	Unit	2015	2016	2017	2018	2019	2020
Electricity consumption	GWh	9,453	10,093	11,084	11,856	12,683	13,367
Electricity generation:	GWh						
Geothermal	GWh	5,007	5,172	5,189	5,059	6,405	6,645
Hydropower	GWh	1,555	1,555	1,626	1,661	1,709	1,748
Diesel engines	GWh	2,812	3,276	3,634	3,699	65	114
Gas turbines (gasoil)	GWh	0	2	20	33	0	0
Import	GWh					2,710	2,743
Cogeneration	GWh		9	53	145	188	237
Wind	GWh	78	78	560	1,243	2,132	2,357
PV	GWh	1	1	1	1	87	96
Total	GWh	9,453	10,093	11,082	11,841	13,297	13,939
Unserved energy	GWh	0	0	2	16	0	0
Excess energy	GWh	0	0	0	1	613	572
<i>Share on total generation</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>5%</i>	<i>4%</i>
Spilled water	GWh	4	4	7	4	4	4
<i>Share on potential generation of HPPs with dams</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>1%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>
Vented GEO steam*	GWh	77	78	61	69	1,335	1,255
<i>Share on potential maximum GEO generation</i>	<i>%</i>	<i>2%</i>	<i>1%</i>	<i>1%</i>	<i>1%</i>	<i>17%</i>	<i>16%</i>
LOLE	h/a	5	28	88	170	0	0

* assuming that all geothermal power plants are equipped with single-flash technology (no flexible handling of geothermal steam possible)

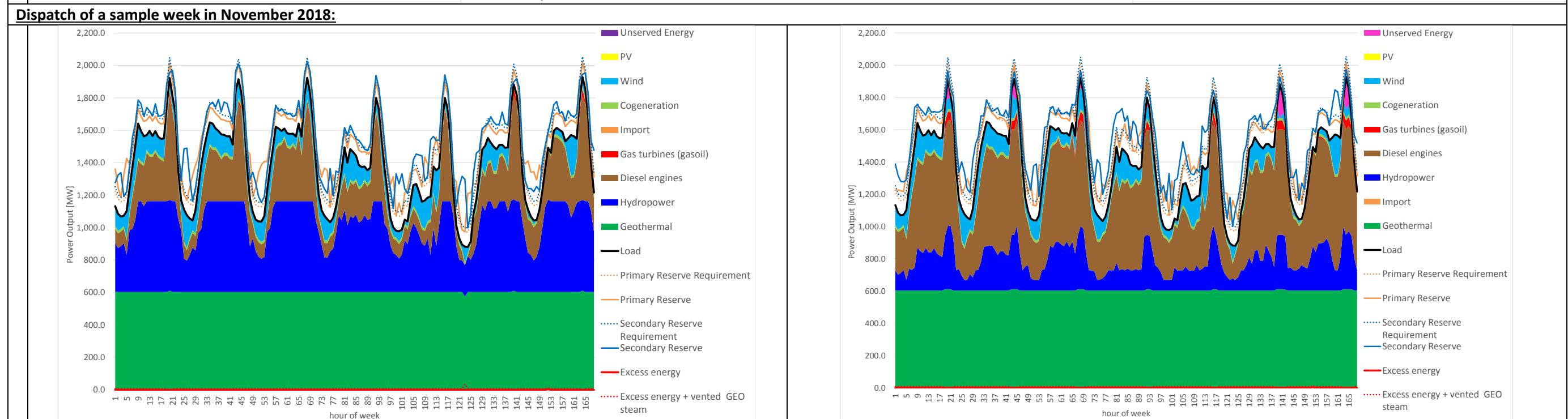
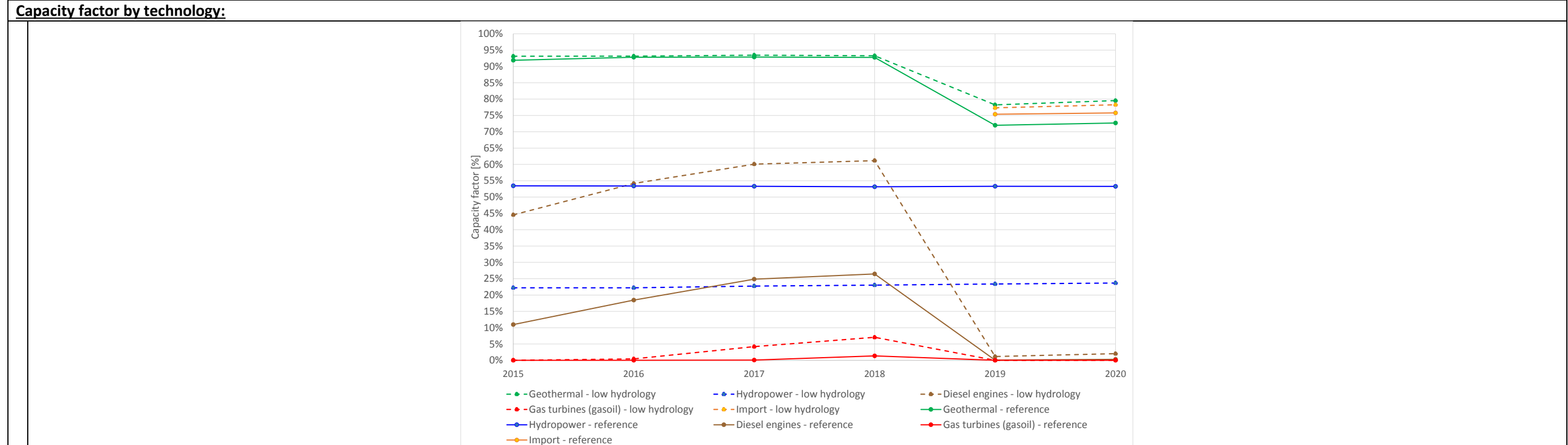
Annex Table 87: Low hydrology case – cost summary

	Unit	NPV	2015	2016	2017	2018	2019	2020
Capital cost (Investment & rehabilitation)								
Geothermal	MUSD	3,127	249	256	256	256	395	404
Hydropower	MUSD	2,009	272	272	278	203	207	211
Coal	MUSD	910	0	0	0	0	0	0
Diesel engines	MUSD	880	149	149	137	137	124	124
Gas turbines (gasoil)	MUSD	42	9	9	9	9	9	9
Import	MUSD	285	0	0	0	0	63	63
Cogeneration	MUSD	182	0	1	5	13	16	21
Generic back-up capacity	MUSD	147	0	0	0	0	0	0
Wind	MUSD	861	7	7	34	74	133	154
PV	MUSD	84	0	0	0	0	11	12
Total	MUSD	8,527	686	693	717	691	958	997
O&M fixed								
Geothermal	MUSD	1,089	87	90	90	88	131	134
Hydropower	MUSD	191	22	22	22	23	23	23
Coal	MUSD	385						
Diesel engines	MUSD	139	28	22	22	22	20	20
Gas turbines (gasoil)	MUSD	6	1	1	1	1	1	1
Import	MUSD	72					10	10
Cogeneration	MUSD	80		0	2	5	6	8
Generic back-up capacity	MUSD	87						
Wind	MUSD	246	2	2	10	21	38	44
PV	MUSD	11	0	0	0	0	1	1
Total	MUSD	2,022	140	137	147	159	231	242
O&M variable (other than fuel)								
Geothermal	MUSD	0	0	0	0	0	0	0
Hydropower	MUSD	3	1	1	1	1	1	1
Diesel engines	MUSD	89	25	29	32	33	1	1
Gas turbines (gasoil)	MUSD	0	0	0	0	0	0	0
Import	MUSD	322					190	192
Cogeneration	MUSD	3		0	0	1	2	2
Wind	MUSD	0	0	0	0	0	0	0
PV	MUSD	0	0	0	0	0	0	0
Total	MUSD	301	25	30	33	35	193	196
Fuel cost								
Diesel engines	MUSD	753	182	232	281	310	6	11
Gas turbines (gasoil)	MUSD	7	0	0	4	7	0	0
Total	MUSD	761	182	233	285	317	6	11
Unserviced energy cost	MUSD	18	0	0	3	25	0	0
Total cost	MUSD	4,935	1,033	1,092	1,185	1,227	1,387	1,445
System LEC	USDcent/kWh		10.93	10.82	10.69	10.35	10.94	10.81

Annex Table 88: Comparison of results: reference expansion plan versus low hydrology case



Reference expansion plan	Low hydrology case





Annex 7.C Scenario analysis - vision expansion and low expansion scenarios

Annex Table 89: Vision expansion scenario – annual data demand, capacity, reliability criteria

	Unit	2015	2016	2017	2018	2019	2020
Peak load	MW	1,570	1,770	2,056	2,291	2,545	2,845
Peak load + reserve margin	MW	1,853	2,051	2,337	2,571	2,839	3,185
Reserve margin		283	281	281	280	294	340
<i>Share on peak load</i>	<i>%</i>	<i>18%</i>	<i>16%</i>	<i>14%</i>	<i>12%</i>	<i>12%</i>	<i>12%</i>
<u>Installed capacity:</u>							
Geothermal	MW	614	634	634	619	934	1,014
Hydropower	MW	799	799	816	823	834	843
Diesel engines	MW	721	691	691	691	635	635
Gas turbines (gasoil)	MW	54	54	54	54	54	54
Import	MW					400	400
Cogeneration	MW		2	12	33	43	54
Generic back-up capacity	MW						280
Wind	MW	26	26	126	276	496	576
PV	MW	1	1	1	1	51	56
Total	MW	2,213	2,205	2,332	2,496	3,446	3,910
<u>Firm capacity:</u>							
Geothermal	MW	614	634	634	619	934	1,014
Hydropower	MW	627	627	631	633	635	638
Diesel engines	MW	721	691	691	691	635	635
Gas turbines (gasoil)	MW	54	54	54	54	54	54
Import	MW					400	400
Cogeneration	MW		1	6	17	22	27
Generic back-up capacity	MW						280
Wind	MW	6	6	28	61	124	144
PV	MW	0	0	0	0	0	0
Total	MW	2,021	2,012	2,043	2,073	2,804	3,191
LOLE	h/a	0	11	118	372	3	3

Annex Table 90: Vision expansion scenario – annual data consumption and generation

	Unit	2015	2016	2017	2018	2019	2020
Electricity consumption	GWh	9,453	10,591	12,229	13,560	15,002	16,668
Electricity generation:	GWh						
Geothermal	GWh	4,966	5,166	5,172	5,054	6,322	7,125
Hydropower	GWh	3,742	3,742	3,809	3,844	3,889	3,935
Diesel engines	GWh	666	1,595	2,614	3,204	172	403
Gas turbines (gasoil)	GWh	0	0	21	41	2	1
Import	GWh					2,742	2,843
Cogeneration	GWh		9	53	145	188	237
Generic back-up capacity	GWh						6
Wind	GWh	78	78	560	1,243	2,133	2,357
PV	GWh	1	1	1	1	87	96
Total	GWh	9,453	10,591	12,229	13,531	15,535	17,004
Unserved energy	GWh	0	0	1	30	0	0
Excess energy	GWh	0	0	0	1	533	336
<i>Share on total generation</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>3%</i>	<i>2%</i>
Spilled water	GWh	9	9	16	13	16	9
<i>Share on potential generation of HPPs with dams</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>1%</i>	<i>0%</i>	<i>1%</i>	<i>0%</i>
Vented GEO steam*	GWh	118	84	78	75	1,418	1,272
<i>Share on potential maximum GEO generation</i>	<i>%</i>	<i>2%</i>	<i>2%</i>	<i>1%</i>	<i>1%</i>	<i>18%</i>	<i>15%</i>

** assuming that all geothermal power plants are equipped with single-flash technology (no flexible handling of geothermal steam possible)*

Annex Table 91: Vision expansion scenario – cost summary

	Unit	NPV	2015	2016	2017	2018	2019	2020
Capital cost (Investment & rehabilitation)								
Geothermal	MUSD	4,092	249	256	256	256	395	425
Hydropower	MUSD	2,131	272	272	278	203	207	211
Diesel engines	MUSD	880	149	149	137	137	124	124
Gas turbines (gasoil)	MUSD	42	9	9	9	9	9	9
Import	MUSD	285	0	0	0	0	63	63
Cogeneration	MUSD	182	0	1	5	13	16	21
Generic back-up capacity	MUSD	357	0	0	0	0	0	31
Wind	MUSD	861	7	7	34	74	133	154
PV	MUSD	84	0	0	0	0	11	12
Total	MUSD	10,069	686	693	717	691	958	1,049
O&M fixed								
Geothermal	MUSD	1,427	87	90	90	88	131	143
Hydropower	MUSD	195	22	22	22	23	23	23
Diesel engines	MUSD	139	28	22	22	22	20	20
Gas turbines (gasoil)	MUSD	6	1	1	1	1	1	1
Import	MUSD	72					10	10
Cogeneration	MUSD	80		0	2	5	6	8
Generic back-up capacity	MUSD	120						6
Wind	MUSD	246	2	2	10	21	38	44
PV	MUSD	11	0	0	0	0	1	1
Total	MUSD	2,460	140	137	147	159	231	257
O&M variable (other than fuel)								
Geothermal	MUSD	0	0	0	0	0	0	0
Hydropower	MUSD	8	2	2	2	2	2	2
Diesel engines	MUSD	53	6	14	23	28	2	4
Gas turbines (gasoil)	MUSD	1	0	0	0	1	0	0
Import	MUSD	330					192	199
Cogeneration	MUSD	3		0	0	1	2	2
Generic back-up capacity	MUSD	0						0
Wind	MUSD	0	0	0	0	0	0	0
PV	MUSD	0	0	0	0	0	0	0
Total	MUSD	274	8	16	26	32	197	207
Fuel cost								
Diesel engines	MUSD	460	41	109	197	265	15	39
Gas turbines (gasoil)	MUSD	9	0	0	4	8	0	0
Generic back-up capacity	MUSD	1						2
Total	MUSD	470	41	109	202	274	15	41
Unserved energy cost	MUSD	30	0	0	1	46	0	0
Total cost	MUSD	4,664	874	954	1,092	1,201	1,401	1,553
System LEC	USDcent/kWh		9.24	9.01	8.93	8.86	9.34	9.32

Annex Table 92: Low expansion scenario – annual data demand, capacity, reliability criteria

	Unit	2015	2016	2017	2018	2019	2020
Peak load	MW	1,570	1,669	1,808	1,916	2,025	2,116
Peak load + reserve margin	MW	1,853	1,951	2,089	2,196	2,320	2,411
Reserve margin		283	281	281	280	294	296
<i>Share on peak load</i>	<i>%</i>	<i>18%</i>	<i>17%</i>	<i>16%</i>	<i>15%</i>	<i>15%</i>	<i>14%</i>
Installed capacity:							
Geothermal	MW	614	634	634	619	934	954
Hydropower	MW	799	799	816	823	834	843
Diesel engines	MW	721	691	691	691	635	635
Gas turbines (gasoil)	MW	54	54	54	54	54	54
Import	MW					400	400
Cogeneration	MW		2	12	33	43	54
Wind	MW	26	26	126	276	496	576
PV	MW	1	1	1	1	51	56
Total	MW	2,213	2,205	2,332	2,496	3,446	3,570
Firm capacity:							
Geothermal	MW	614	634	634	619	934	954
Hydropower	MW	627	627	631	633	635	638
Diesel engines	MW	721	691	691	691	635	635
Gas turbines (gasoil)	MW	54	54	54	54	54	54
Import	MW					400	400
Cogeneration	MW		1	6	17	22	27
Wind	MW	6	6	28	61	124	144
PV	MW	0	0	0	0	0	0
Total	MW	2,021	2,012	2,043	2,073	2,804	2,851
LOLE	h/a	0	3	8	15	0	0

Annex Table 93: Low expansion scenario – annual data consumption and generation

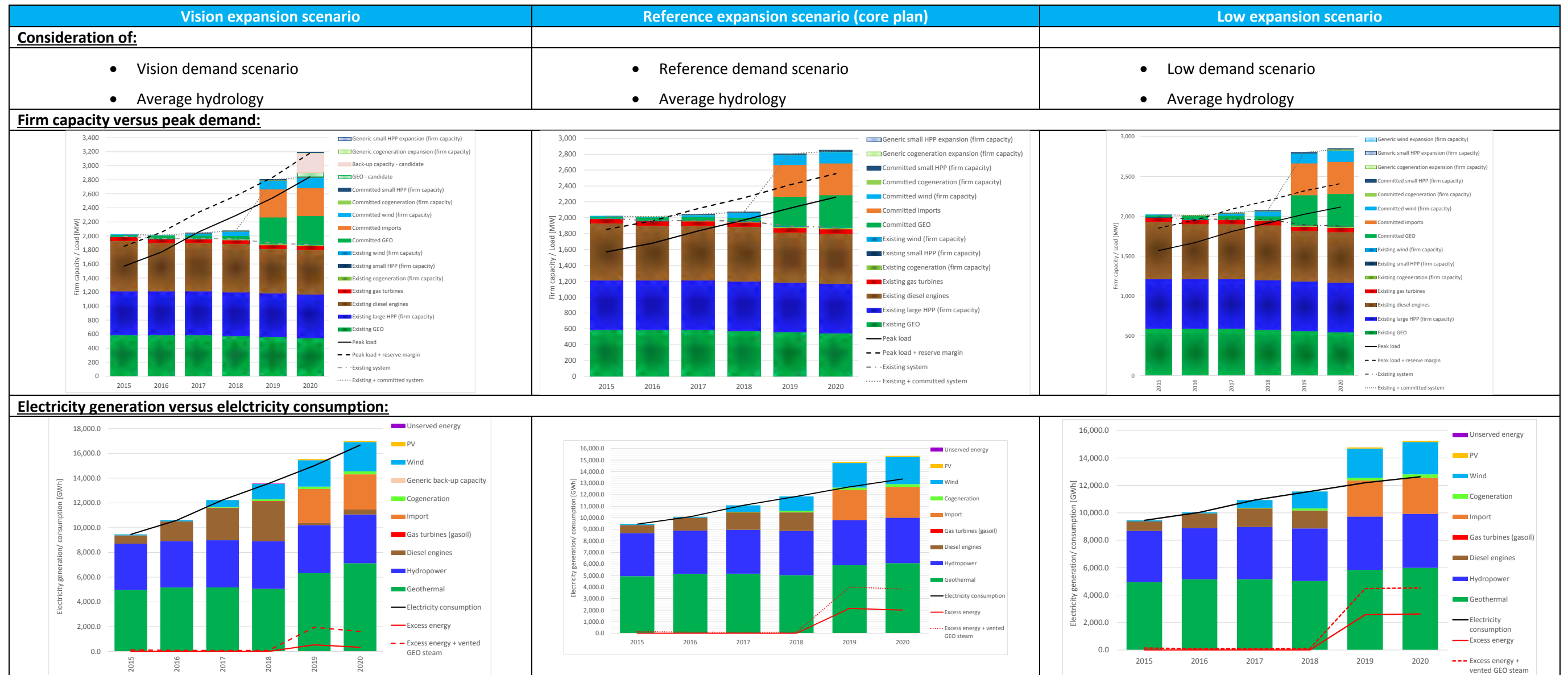
	Unit	2015	2016	2017	2018	2019	2020
Electricity consumption	GWh	9,453	10,035	10,932	11,560	12,194	12,632
Electricity generation:	GWh						
Geothermal	GWh	4,941	5,154	5,157	5,024	5,844	5,992
Hydropower	GWh	3,741	3,742	3,816	3,840	3,885	3,935
Coal	GWh						
Diesel engines	GWh	692	1,051	1,346	1,305	2	1
Gas turbines (gasoil)	GWh	0	0	0	4	0	0
Import	GWh					2,632	2,638
Cogeneration	GWh		9	53	145	188	237
Generic back-up capacity	GWh						
Wind	GWh	78	78	560	1,243	2,133	2,357
PV	GWh	1	1	1	1	87	96
Total	GWh	9,453	10,035	10,932	11,562	14,771	15,256
Unserved energy	GWh	0	0	0	0	0	0
Excess energy	GWh	0	0	0	1	2,575	2,624
<i>Share on total generation</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>17%</i>	<i>17%</i>
Spilled water	GWh	10	10	9	16	19	9
<i>Share on potential generation of HPPs with dams</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>1%</i>	<i>1%</i>	<i>0%</i>
Vented GEO steam*	GWh	143	95	93	104	1,896	1,908
<i>Share on potential maximum GEO generation</i>	<i>%</i>	<i>3%</i>	<i>2%</i>	<i>2%</i>	<i>2%</i>	<i>25%</i>	<i>24%</i>

* assuming that all geothermal power plants are equipped with single-flash technology (no flexible handling of geothermal steam possible)

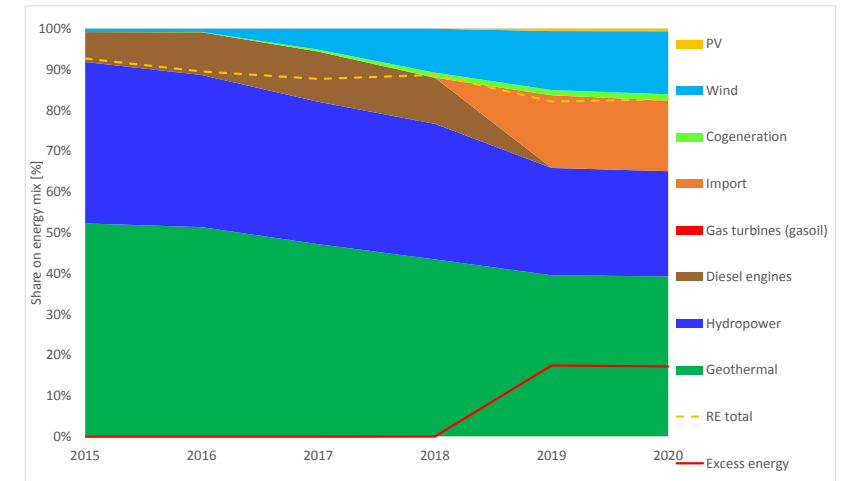
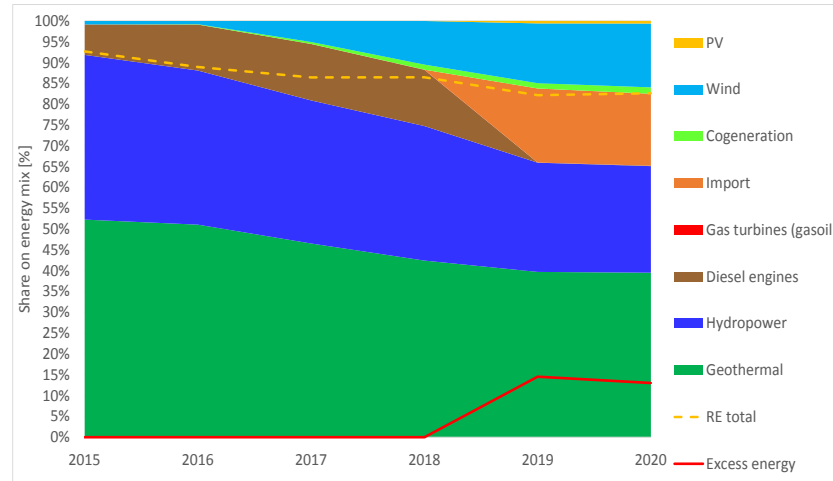
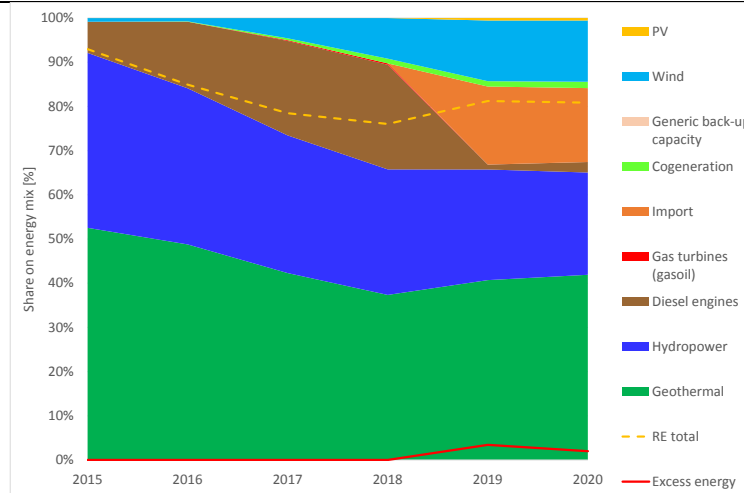
Annex Table 94: Low expansion scenario – cost summary

	Unit	NPV	2015	2016	2017	2018	2019	2020
Capital cost (Investment & rehabilitation)								
Geothermal	MUSD	2,793	249	256	256	256	395	404
Hydropower	MUSD	1,881	272	272	278	203	207	211
Diesel engines	MUSD	880	149	149	137	137	124	124
Gas turbines (gasoil)	MUSD	42	9	9	9	9	9	9
Import	MUSD	285	0	0	0	0	63	63
Cogeneration	MUSD	182	0	1	5	13	16	21
Wind	MUSD	861	7	7	34	74	133	154
PV	MUSD	84	0	0	0	0	11	12
Total	MUSD	7,974	686	693	717	691	958	997
O&M fixed								
Geothermal	MUSD	971	87	90	90	88	131	134
Hydropower	MUSD	185	22	22	22	23	23	23
Diesel engines	MUSD	139	28	22	22	22	20	20
Gas turbines (gasoil)	MUSD	6	1	1	1	1	1	1
Import	MUSD	72					10	10
Cogeneration	MUSD	80		0	2	5	6	8
Wind	MUSD	246	2	2	10	21	38	44
PV	MUSD	11	0	0	0	0	1	1
Total	MUSD	1,882	140	137	147	159	231	242
O&M variable (other than fuel)								
Geothermal	MUSD	0	0	0	0	0	0	0
Hydropower	MUSD	8	2	2	2	2	2	2
Diesel engines	MUSD	29	6	9	12	11	0	0
Gas turbines (gasoil)	MUSD	0	0	0	0	0	0	0
Import	MUSD	312					184	185
Cogeneration	MUSD	3		0	0	1	2	2
Wind	MUSD	0	0	0	0	0	0	0
PV	MUSD	0	0	0	0	0	0	0
Total	MUSD	237	8	11	14	15	188	189
Fuel cost								
Diesel engines	MUSD	231	43	71	99	104	0	0
Gas turbines (gasoil)	MUSD	1	0	0	0	1	0	0
Total	MUSD	232	43	71	99	105	0	0
Unserved energy cost	MUSD	0	0	0	0	0	0	0
Total cost	MUSD	4,325	876	911	977	970	1,377	1,428
System LEC	USDcent/kWh		9.26	9.08	8.94	8.39	11.29	11.30

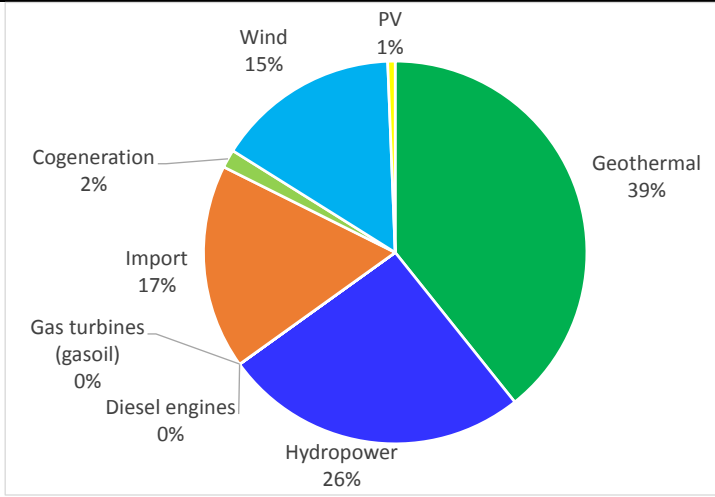
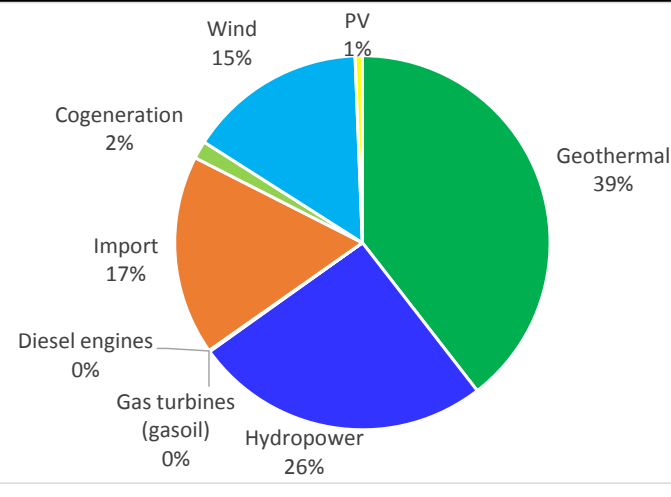
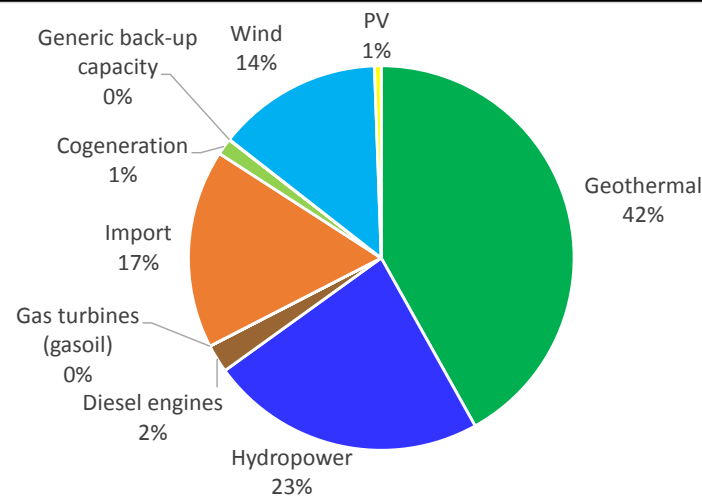
Annex Table 95: Comparison of results: reference, vision and low demand scenario



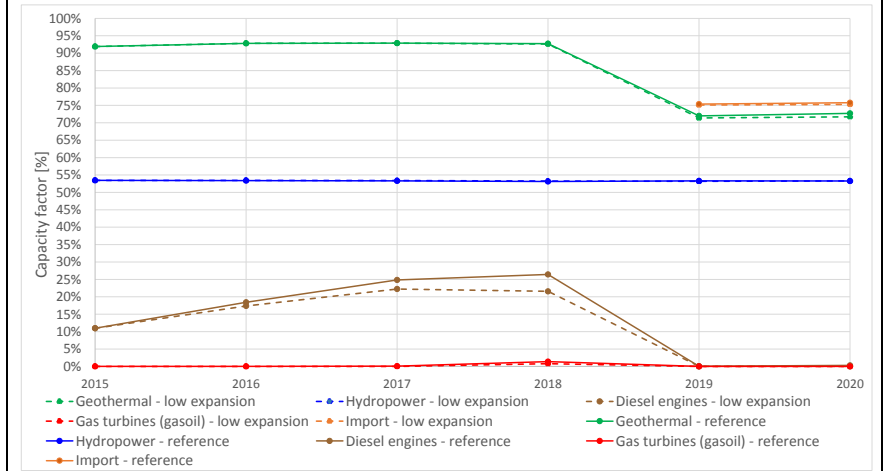
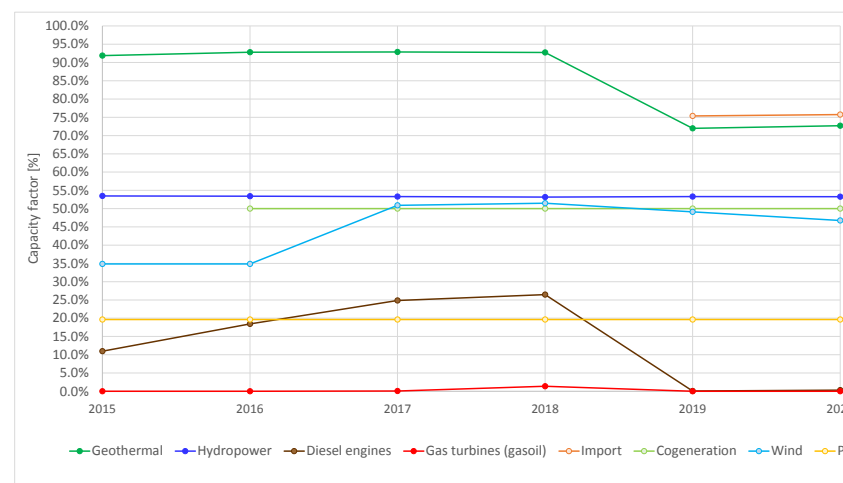
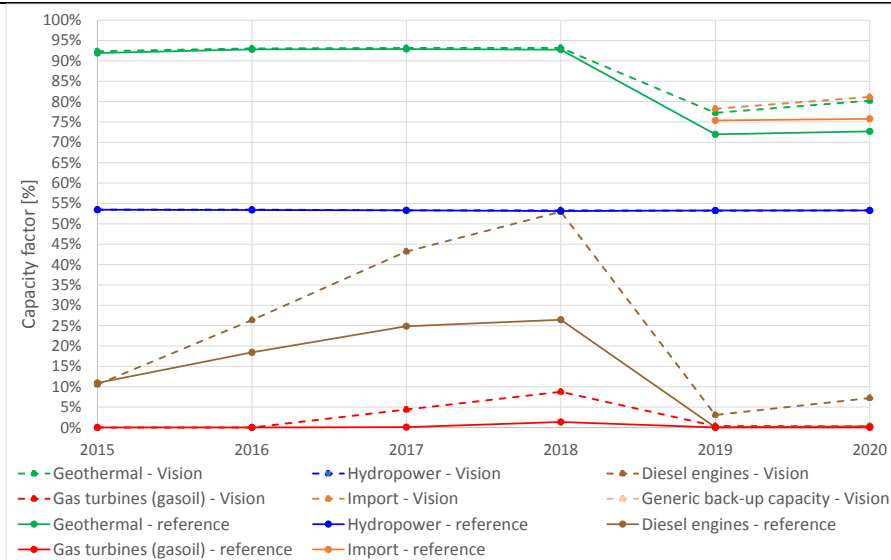
Share on generation mix by technology:



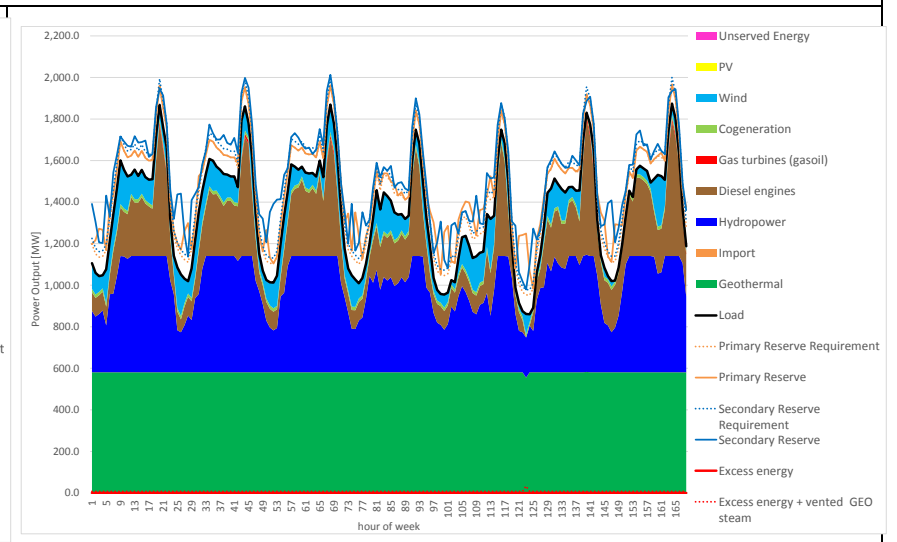
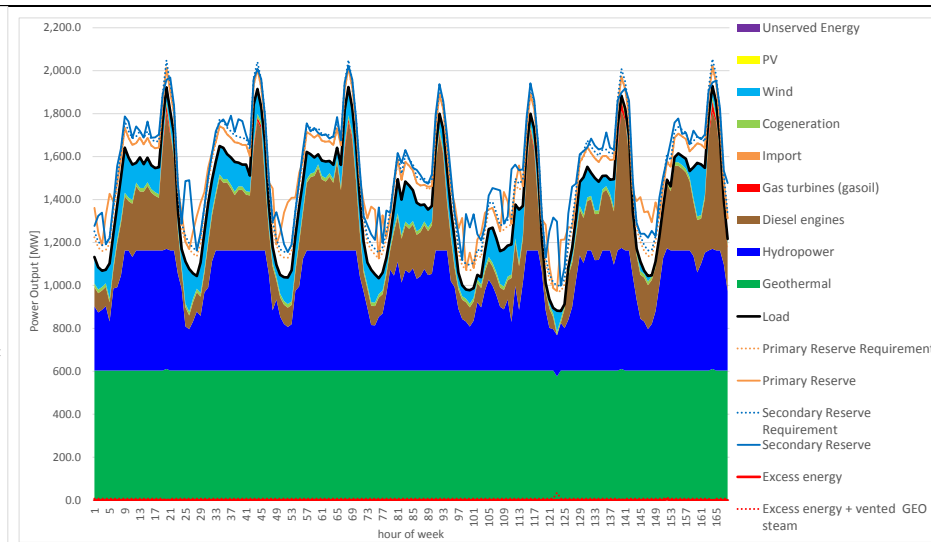
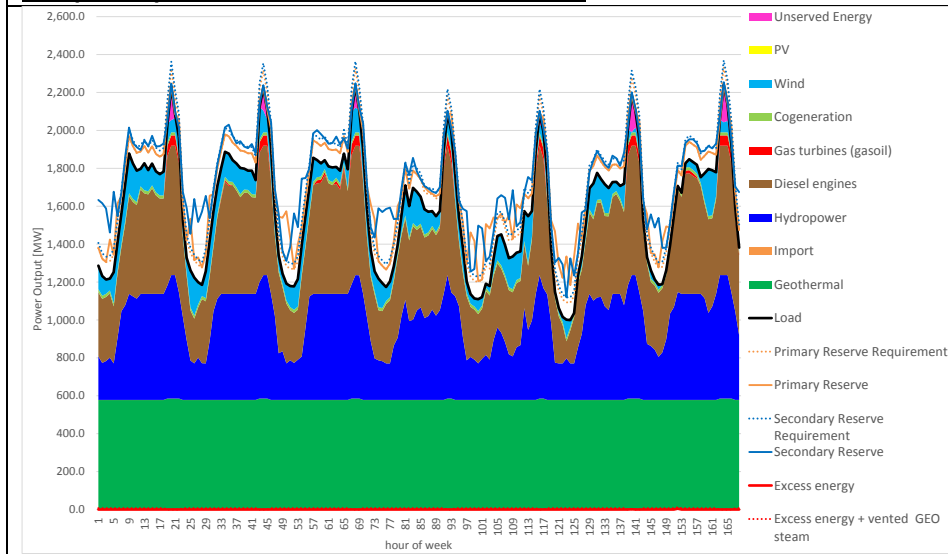
Share on generation mix by technology in 2020:



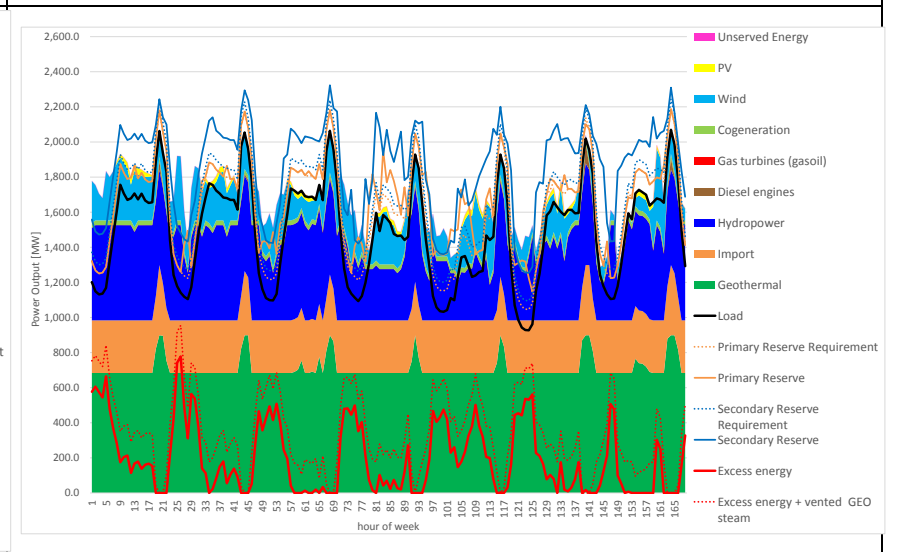
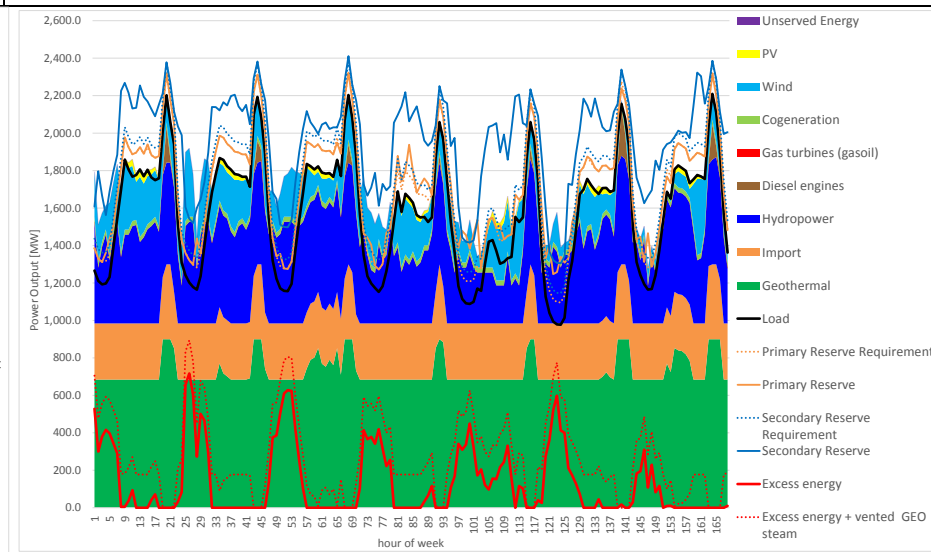
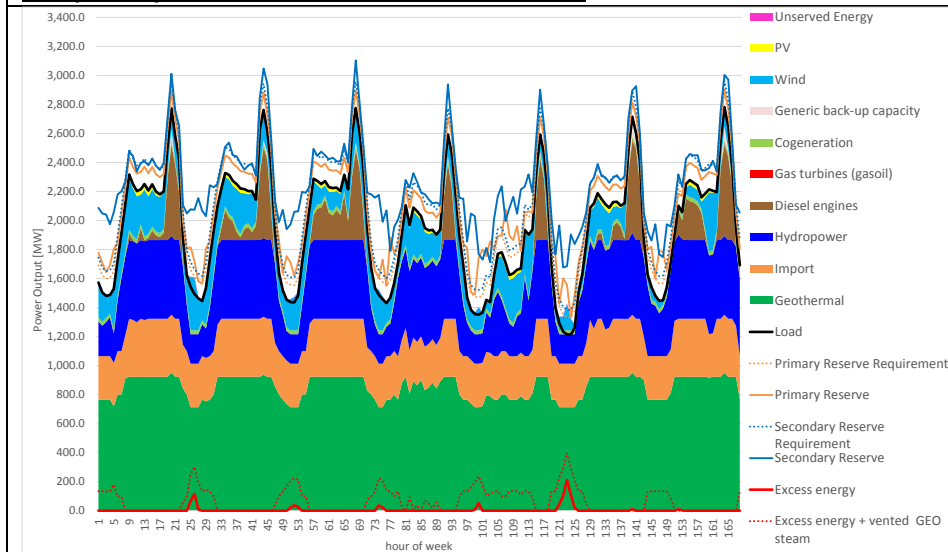
Capacity factor by technology:



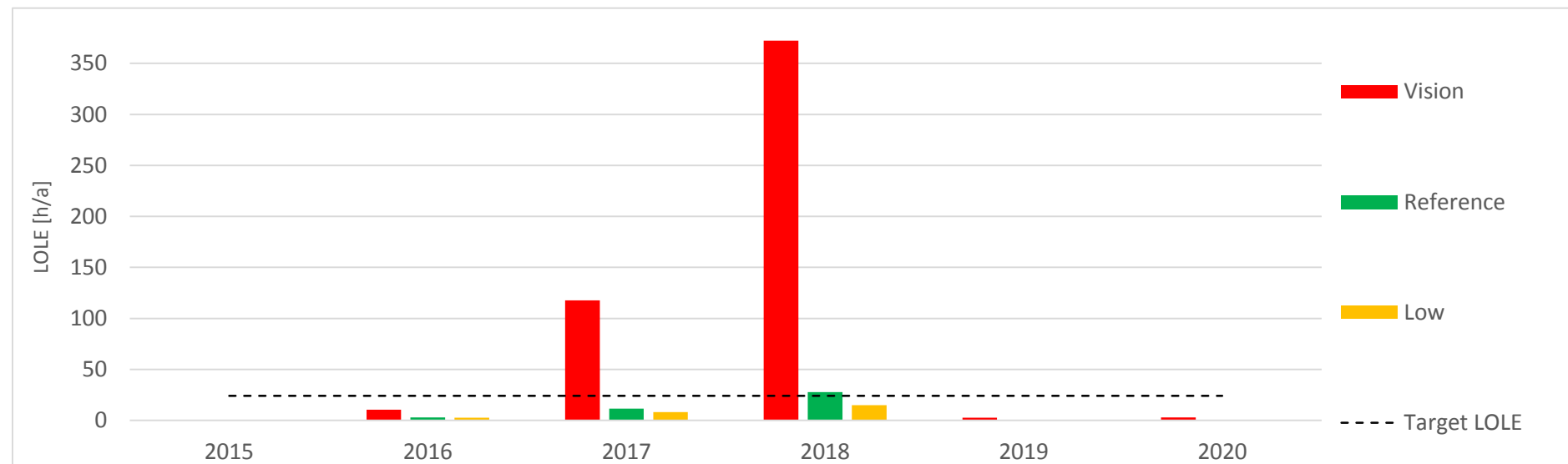
Sample dispatch of a week in November 2018:



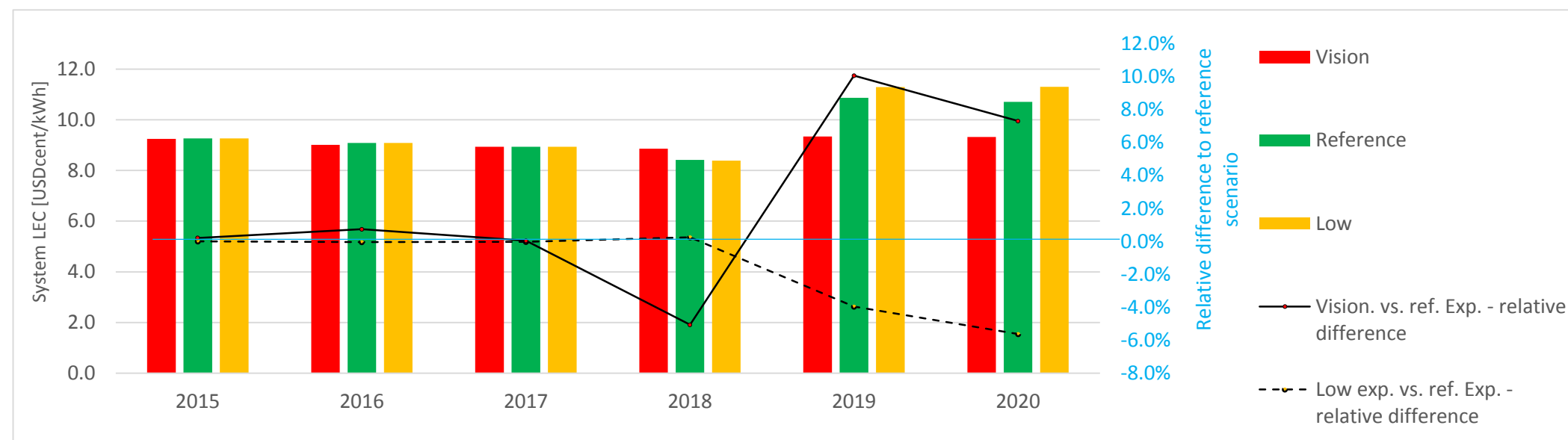
Sample dispatch of a week in November 2020:



LOLE comparison:



Comparison of LEC:



Annex 7.D Scenario analysis –Risk scenario: delay projects

Annex Table 96: Risk scenario – annual data demand, capacity, reliability criteria

	Unit	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Peak load	MW	1,570	1,679	1,834	1,972	2,120	2,259	2,451	2,633	2,823	3,022
Peak load + reserve margin	MW	1,853	1,960	2,115	2,252	2,392	2,555	2,737	3,224	3,460	3,705
Reserve margin		283	281	281	280	272	296	285	591	637	683
Share on peak load	%	18%	17%	15%	14%	13%	13%	12%	22%	23%	23%
Installed capacity:											
Geothermal	MW	614	634	634	619	621	954	954	1,094	1,094	1,094
Hydropower	MW	799	799	799	816	823	834	843	852	861	870
Coal	MW								327	654	981
Diesel engines	MW	721	691	691	691	635	635	561	561	502	449
Gas turbines (gasoil)	MW	54	54	54	54	54	54	54	27	27	
Import	MW						400	400	400	400	400
Cogeneration	MW		2	2	7	17	33	54	65	76	87
Wind	MW	26	26	26	126	276	436	576	601	601	626
PV	MW	1	1	1	1	1	56	56	61	61	71
Total	MW	2,213	2,205	2,205	2,313	2,426	3,400	3,496	3,986	4,274	4,577
Firm capacity:											
Geothermal	MW	614	634	634	619	621	954	954	1,094	1,094	1,094
Hydropower	MW	627	627	627	631	633	635	638	640	642	644
Coal	MW								327	654	981
Diesel engines	MW	721	691	691	691	635	635	561	561	502	449
Gas turbines (gasoil)	MW	54	54	54	54	54	54	54	27	27	
Import	MW						400	400	400	400	400
Cogeneration	MW		1	1	4	9	17	27	33	38	44
Wind	MW	6	6	6	28	69	109	144	150	150	156
PV	MW	0	0	0	0	0	0	0	0	0	0
Total	MW	2,021	2,012	2,012	2,026	2,020	2,803	2,777	3,231	3,507	3,768
Firm capacity surplus/gap:	MW	168	51	-104	-226	-372	248	40	7	47	63
LOLE	h/a	0	3	25	66	187	0	1	0	1	1

Annex Table 97: Risk scenario – annual data consumption and generation

	Unit	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Electricity consumption	GWh	9,453	10,093	11,084	11,856	12,683	13,367	14,433	15,467	16,555	17,699
Electricity generation:	GWh										
Geothermal	GWh	4,974	5,156	5,171	5,049	5,063	6,109	6,233	7,273	7,317	7,369
Hydropower	GWh	3,737	3,742	3,742	3,807	3,841	3,889	3,934	3,595	3,721	3,867
Coal	GWh								512	1,099	1,601
Diesel engines	GWh	664	1,107	2,083	2,396	2,427	25	79	51	29	29
Gas turbines (gasoil)	GWh	0	0	1	13	27	0	0	0	0	
Import	GWh						2,664	2,698	2,678	2,666	2,660
Cogeneration	GWh		9	9	31	74	145	237	285	333	381
Generic back-up capacity	GWh										
Wind	GWh	78	78	78	560	1,243	1,957	2,357	2,444	2,444	2,531
PV	GWh	1	1	1	1	1	96	96	104	104	122
Total	GWh	9,453	10,093	11,084	11,857	12,677	14,883	15,634	16,942	17,712	18,559
Unserviced energy	GWh	0	0	0	0	7	0	0	0	0	0
Excess energy	GWh	0	0	0	0	1	1,516	1,201	1,475	1,158	860
<i>Share on total generation</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>10%</i>	<i>8%</i>	<i>9%</i>	<i>7%</i>	<i>5%</i>
Spilled water*	GWh	15	9	9	18	16	16	10	388	302	195
<i>Share on potential generation of HPPs with dams</i>	<i>%</i>	<i>0%</i>	<i>0%</i>	<i>0%</i>	<i>1%</i>	<i>1%</i>	<i>1%</i>	<i>0%</i>	<i>13%</i>	<i>10%</i>	<i>6%</i>
Vented GEO steam**	GWh	110	94	79	79	84	1,792	1,667	1,787	1,743	1,691
<i>Share on potential maximum GEO generation</i>	<i>%</i>	<i>2%</i>	<i>2%</i>	<i>2%</i>	<i>2%</i>	<i>2%</i>	<i>23%</i>	<i>21%</i>	<i>20%</i>	<i>19%</i>	<i>19%</i>

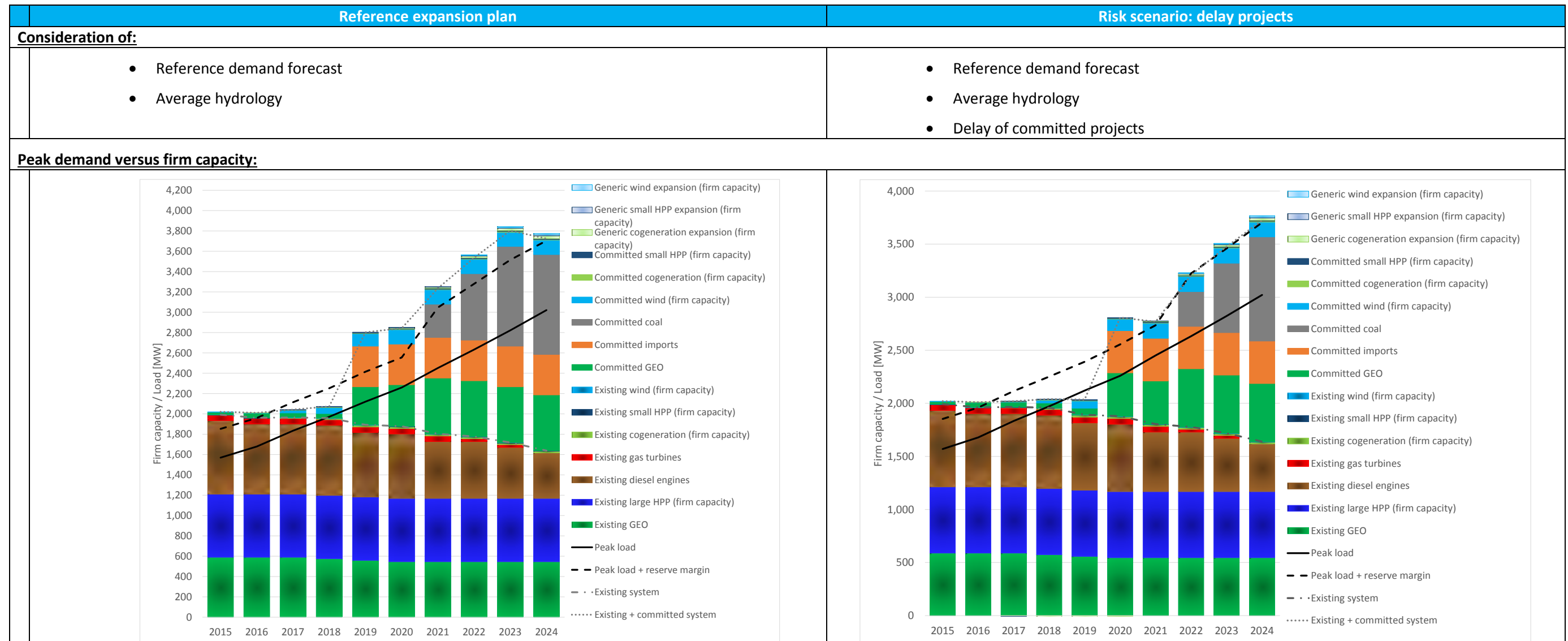
* for provision of reserve capacity

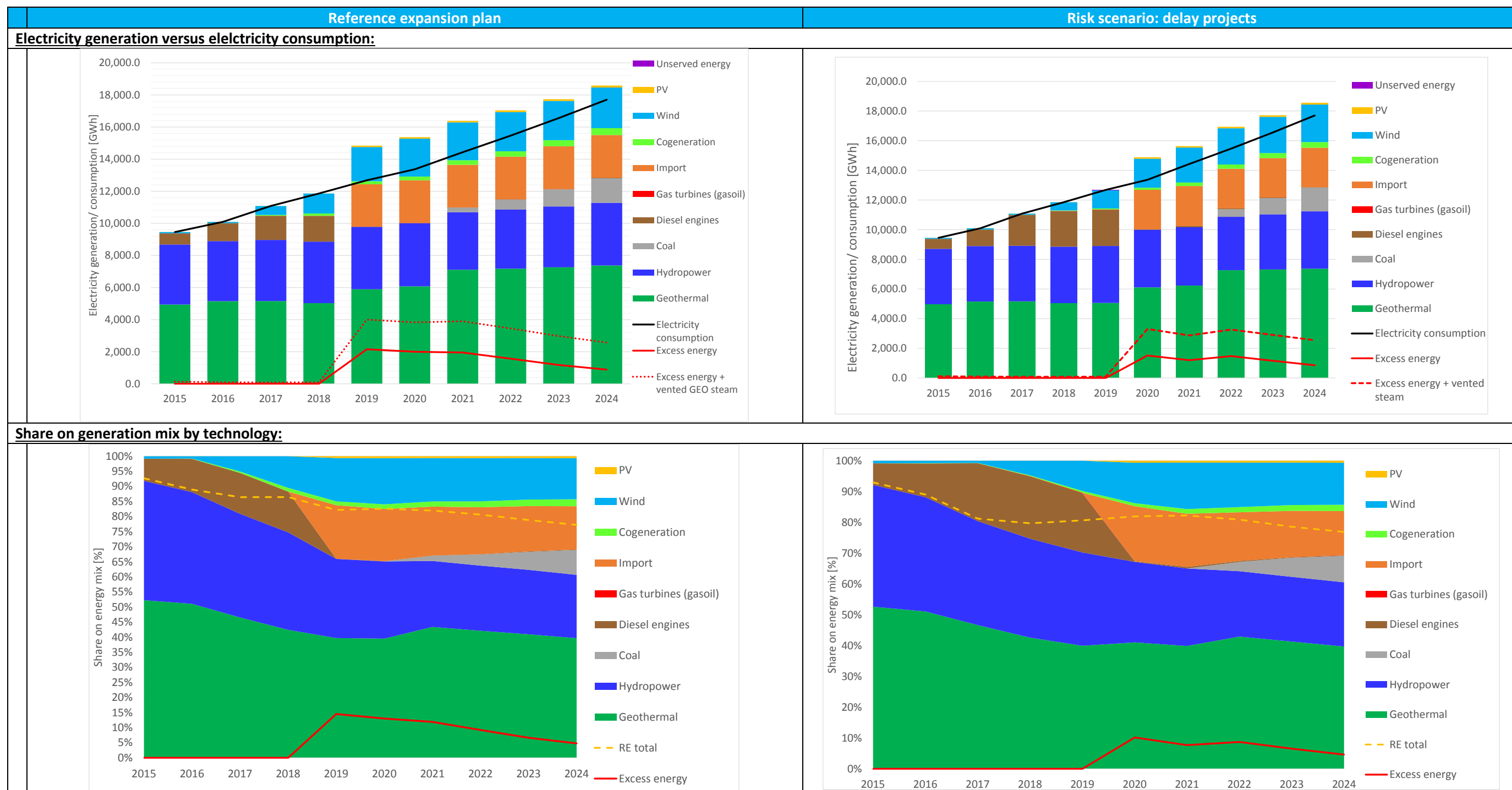
** assuming that all geothermal power plants are equipped with single-flash technology (no flexible handling of geothermal steam possible)

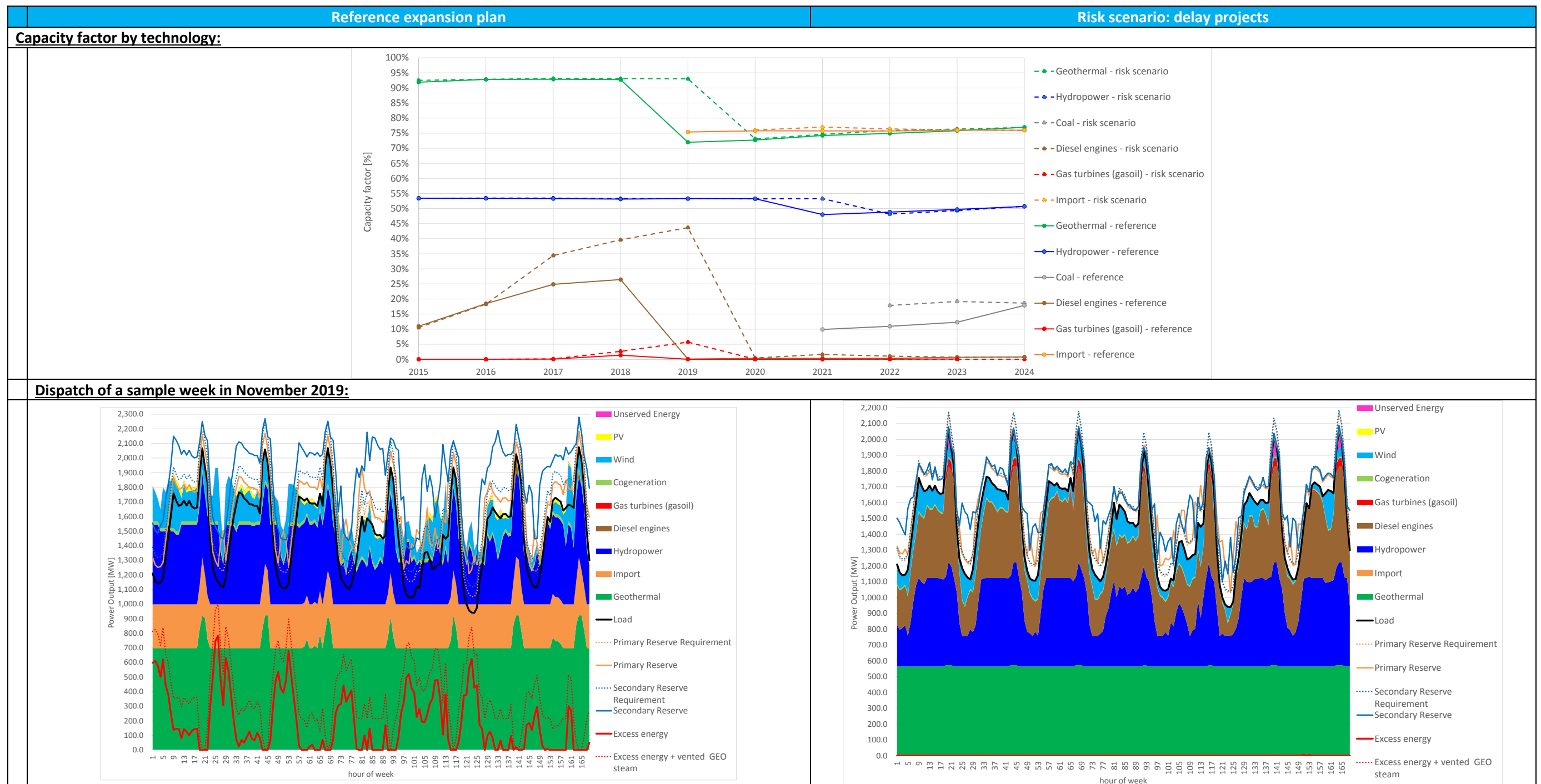
Annex Table 98: Risk scenario – cost summary

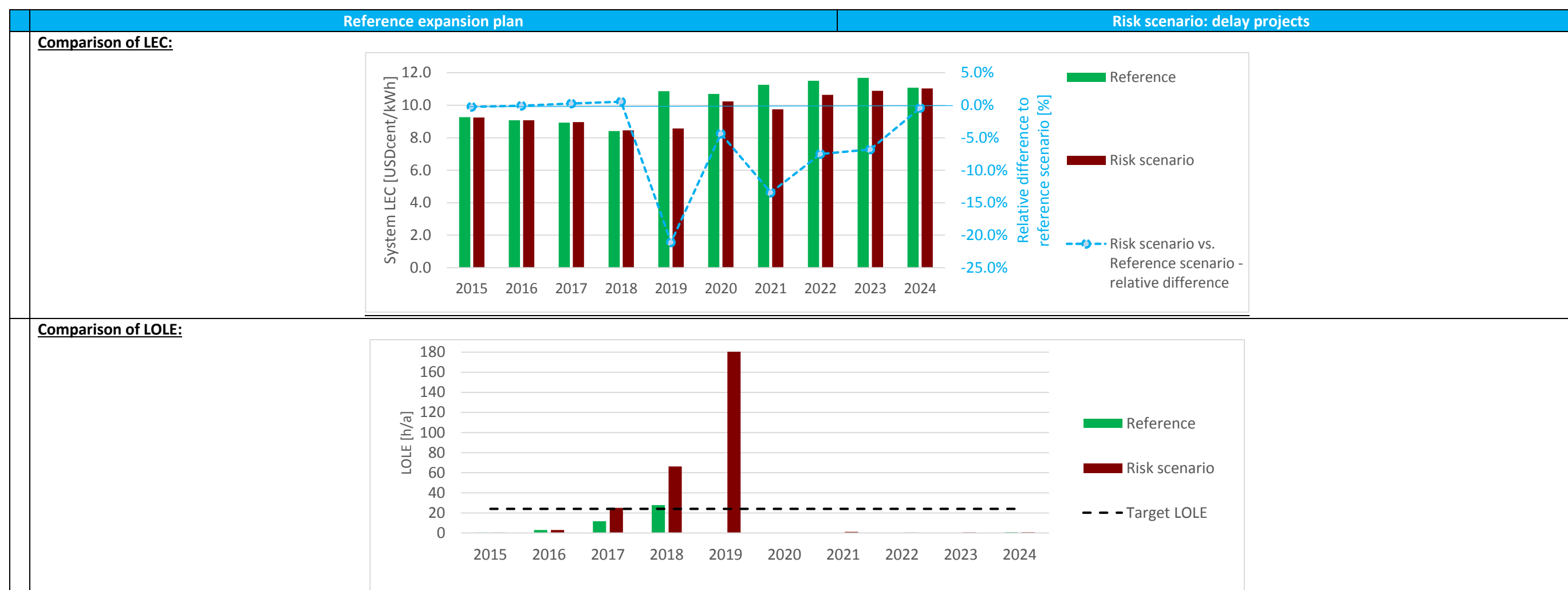
	Unit	NPV	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Capital cost (Investment & rehabilitation)												
Geothermal	MUSD	1,944	249	256	256	256	260	404	404	464	464	464
Hydropower	MUSD	1,381	272	272	272	201	203	207	196	200	203	206
Coal	MUSD	297	0	0	0	0	0	0	0	101	201	302
Diesel engines	MUSD	762	149	149	137	137	124	124	109	109	109	98
Gas turbines (gasoil)	MUSD	42	9	9	9	9	9	9	9	4	4	0
Import	MUSD	147	0	0	0	0	0	63	63	63	63	63
Cogeneration	MUSD	64	0	1	1	3	7	13	21	25	29	33
Wind	MUSD	431	7	7	7	34	74	116	153	160	160	166
PV	MUSD	30	0	0	0	0	0	12	12	13	13	15
Total	MUSD	5,104	686	693	681	638	677	948	966	1,138	1,246	1,347
O&M fixed												
Geothermal	MUSD	665	87	90	90	88	88	134	134	156	156	156
Hydropower	MUSD	134	22	22	22	22	23	23	23	23	24	24
Coal	MUSD	141								22	43	65
Diesel engines	MUSD	122	28	22	22	22	20	20	18	18	16	14
Gas turbines (gasoil)	MUSD	6	1	1	1	1	1	1	1	1	1	
Import	MUSD	42						10	10	10	10	10
Cogeneration	MUSD	28		0	0	1	3	5	8	10	11	13
Wind	MUSD	123	2	2	2	10	21	33	44	46	46	48
PV	MUSD	4	0	0	0	0	0	1	1	2	2	2
Total	MUSD	1,167	140	137	137	144	155	228	240	286	308	331
O&M variable (other than fuel)												
Geothermal	MUSD	0	0	0	0	0	0	0	0	0	0	0
Hydropower	MUSD	10	2	2	2	2	2	2	2	2	2	2
Coal	MUSD	3								1	1	2
Diesel engines	MUSD	52	6	10	18	21	21	0	1	0	0	0
Gas turbines (gasoil)	MUSD	0	0	0	0	0	0	0	0	0	0	
Import	MUSD	675						186	189	187	187	186
Cogeneration	MUSD	6		0	0	0	1	1	2	2	3	3
Wind	MUSD	0	0	0	0	0	0	0	0	0	0	0
PV	MUSD	0	0	0	0	0	0	0	0	0	0	0
Total	MUSD	452	8	12	20	23	24	190	193	193	193	194
Fuel cost												
Coal	MUSD	121								25	54	79
Diesel engines	MUSD	460	41	75	155	195	214	2	8	5	3	3
Gas turbines (gasoil)	MUSD	5	0	0	0	3	6	0	0	0	0	
Total	MUSD	520	41	75	155	198	220	2	8	30	57	82
Unserviced energy cost	MUSD	6	0	0	0	0	11	0	0	0	0	0
Total cost	MUSD	6,745	874	916	993	1,003	1,087	1,368	1,407	1,646	1,803	1,954
System LEC	USDcent/kWh		9.24	9.07	8.96	8.46	8.57	10.23	9.75	10.64	10.89	11.04

Annex Table 99: Comparison of results: reference expansion plan versus risk scenario









ANNEX 8 TRANSMISSION EXPANSION PLANNING – ANNEXES

Annex 8.A Methodology and assumptions details - transmission expansion planning

This section provides information on the methodology applied for all network simulations conducted for the Power Generation and Transmission Master Plan, with details on data situation, assumptions and definitions. It complements section 8.2 of the transmission planning chapter.

The transmission network analysis was conducted along the following overall approach:



Annex Figure 59: Approach network performance analysis

- 1) Data collection
- 2) Development of a network model in PowerFactory (DigSilent GmbH) containing suitable collected data for the transmission network and – on an aggregated level at medium voltage – for distribution network.
- 3) Scenario definition for the long term case (2020 peak and off-peak load)
- 4) Analysis / calculations and results

Reaching the limits of the transmission system at a certain load level means that if a bigger total load needs to be supplied in a certain region of the country, other investments in the network infrastructure have to be addressed. Such investments could be:

- New generation plants;
- New transmission lines (single or double circuit) across the country;
- New substations.

The analysis is focused on the medium term case - 2020 (future power system in the medium term); however, It also considers the previous MTP (2014-2019) as well as long term view gained in the preparation of the LTP (2015-2035).

They focus on two tasks:

- Getting a better understanding of the Kenyan transmission system identifying weaknesses; and

- Providing mitigation measures in order to improve the system according to national load growth with planned generation- and transmission - extensions.

These simulations are conducted for:

- Load Flow Analysis: transmission circuit identification and reactive power requirements;
- Short Circuit Analysis: calculation of prospective short circuit currents and thereby identify the switchgear rating requirements;
- Small Signal Stability (Eigenvalues);
- Transient Stability.

Below the most important definitions (taken in this report and the element identification code for analysis and simulation results are provided. It further details the input data utilised.

A list of substation names and codes is attached in Annex 8.B.

- Normal operating conditions (N-0): the transmission system is entirely available (no equipment has been forced out of service).
- Contingency operating conditions (N-1): one element of the transmission system (line or transformer) is out of service ("N": intact network and "1": power system element suffering an outage). Only outages of equipment at the bulk transmission levels will be considered.

The applied numbering system for buses has been adopted from the existing PSS/E files provided to LI during data collection.

The study detailed in this chapter was conducted using the most recent system data¹⁰⁷ provided by ERC, KPLC, KETRACO and KENGEN. This data was reviewed by LI and updated based on various discussions with the Client's experts in order to achieve a validation of the model by KETRACO.

The plans, latest study reports provided during the data collection phase as well information gained during discussions held in Kenya, are used as a source of information regarding the network extension, reinforcement and changes to the system within the period to be analysed. Studies completed in association with these documents were reviewed in order to extract information necessary to the proposed studies.

The transmission system is represented by the load flow data; including the active and reactive power capability of power stations, transmission lines and transformers, reactive compensation equipment (as applicable) and substation (S/S) loads. The drawings given in Annex 8.C show the single line diagram with the main topology data considered for the network calculations. The table

¹⁰⁷ This section details the data and information collected during the site visits in Nairobi and by email as well as LI internal sources from other projects in Kenya and the respective reference documents.

below summarises the requested and utilised data by category and provides a brief description on the quality (complete, up-to-date, and reliable) and related uncertainties.

Annex Table 100: Data requested and utilised for network's performance analysis

Data category	Source	Description	Data quality and uncertainties
Power Generation Facilities	KPLC KETRACO KENGEN	Technical specification of existing and committed plants and historic generation	Data nearly complete and reliable with very few and small variations between different sources. Uncertainty for committed plants due to uncertain fuel supply and financing.
PSS/E Network Model 2015	KPLC KETRACO	Network Model for the year 2015 as PSS/E File	The provided PSS/E file for the year 2015 has been uploaded on PowerFactory through the relevant import function; Preliminary steady-states and dynamic simulations have been conducted in order to verify the consistency of the results and to resolve possible convergence issues.
Electrical Network	KPLC KETRACO KENGEN	Technical specifications of existing and committed/planned power lines and substations; losses (historic development and future plans), grid code	Data nearly complete and largely reliable with few variations between different sources. Uncertainty for future projects due to uncertainty of financing.
Electricity consumption present / planned projects / demand forecast	KPLC KETRACO	Peak load data by area. Expansion of transmission network, potential future projects (planned projects and current captive suppliers)	Expansion plan for transmission network complete and up-to-date on aggregated level. Information on future projects and captive suppliers incomplete and partly unreliable limiting the possibility to include in bottom-up approach (considered in the demand forecast).

Annex 8.A.1 Network system model and description of the power system

The present section describes the established model for simulation and its analyses. The network modelling and analyses have been conducted using the network software Power Factory Version 15.1 from DigSilent. The model was built as present case for 2014/2015; reinforcements and network extension will be described in the concerned sections.

At present, the national electrical system of Kenya operates on the transmission level with standard voltages of 66 kV, 132 kV, 220 kV and 400 kV; furthermore on the distribution levels the standard voltages of 11 kV and 33 kV have been implemented in the networks scheme. The nominal fundamental system frequency is 50 Hz.

Existing loads are generally modelled as aggregated loads at the relevant MV-distribution busbars connected to the transmission network. System data and calculated parameters have been used to

model existing generation and all existing transmission lines and load centres. Where appropriate committed and proposed generation has been modelled using available and typical data.

The range of variation (long duration) for system voltage during normal conditions at any connection point are required to be in the limits of 95% and 105% of the nominal voltage at its root-mean-square value (RMS).

In terms of frequency, the limits are 49.5 Hz and 50.5 Hz (i.e. +/- 1% around the nominal frequency) under normal conditions. The electricity authorities foresee that system voltage and frequency are and will remain under the monitoring and control of the grid owner / system operator, i.e. KETRA-CO/KPLC.

A brief description of the existing transmission grid can be found under section 3.3. Planning criteria applied in the study are illustrated in Chapter 8.2.2.

Annex 8.A.2 Topology and equipment configuration in the Kenyan electricity system

Annex Table 101: Standard substation layout used and recommended by KETRA-CO

#	Voltage Level	Type
1	400 KV	Air insulated outdoor Breaker and a half
2	220 KV	Air insulated outdoor Breaker and a half
3	132 KV	Air insulated outdoor Single Busbar, single breaker Double Busbar, single breaker
4	33 KV	Indoor Single bus

Recommendations for substation configurations

It is recommended to follow the previous substation layouts as far as possible. In a first step, double busbar/single breaker or complete breaker and a half layouts could be realised as single bus systems or “line to transformer bay” schemes, but should be configured for later extension.

400 kV and 220 kV

Due to the importance of the 220 kV and 400 kV power transmission level, double busbar systems or breaker and a half systems are recommended (standard at KETRACO).

132 kV

This voltage level is widely used in the power transmission network of Kenya; single and double busbar types are in use.

- Smaller substations are of the single busbar type or line to transformer type;
- Important substations are of double busbar/ single breaker.

33 kV and 11kV

These networks are used for the supply of the surrounding region or urban districts of the substation. Fault in these switchgears has normally low impact on the national power supply level. For this reason, more economic solutions are satisfactory. It is proposed to use single busbar systems, but two bus sections with bus-sectionalizer between them in the case of two feeding transformers. The standard of KETRACO is conventional AIS type (air insulated outdoor substation). As an option installation of SF6 gas insulated (GIS) type indoor cubicles should be considered. The advantages are high reliability, installation height has no impact on the insulation, low maintenance, dust proof and low space requirements.

Recommendations with regard to suitable transformer ratings by voltage level in the long term is provided in Chapter 8.3.2. The ratings of new transformers implemented in the LTP network model are presented in the respective tables of the Chapters 8.3.3 to 8.3.6. The detailed configuration of substations has to be evaluated on a project-by-project basis considering further relevant details such as distances to new load centres, location and free space for new equipment at the respective substation etc.

Ampacity of phase conductors

The phase conductors used by KETRACO are all of ACSR type. For the network modelling of this study the conductor types LYNX, CONDOR, CANARY and HAWK are applied¹⁰⁸ (for details see section 8.3.2). Therefore, the calculation of ampacity focusses on these conductors where sufficient information was available:

Annex Table 102: Conductors used by KETRACO

Code	Cross Section			
	Total [mm ²]	AL [mm ²]	ST [mm ²]	Diam. [mm]
LYNX	226.20	183.40	42.77	19.53
HAWK	281.14	241.65	39.49	21.80
CANARY	515.43	456.28	59.15	29.52
CONDOR	454.48	402.33	52.15	27.72

The calculation of the ampacity of the conductor is performed according to the IEEE 738-2006 “Standard for Calculating the Current-Temperature of Bare Overhead Conductors” and IEC 61597 “Overhead electrical conductors –Calculation methods for stranded bare conductors”.

¹⁰⁸ Further conductors used or considered in the Kenyan network are among others WOLF, STARLING, 300/50, Goat, Bear.

The values given in the standards are based on an ambient temperature of 35°C, wind velocity of 0.61m/s and geographical latitude of Europe.

The basic input data for the ampacity calculation in Kenya are:

Annex Table 103: Input data for ampacity calculation

Line latitude	2°	Altitude above sea level	2000 m
Line azimuth	43°	Wind velocity	0,5 m/s
Hour of the day	noon	Wind perpendicular to line direction	90°
Day of year	21.06	Emissivity factor	0.4
Atmosphere (clear or polluted)	Clear	Absorptivity factor	0.6

Based on the previous input data the following results are achieved for the conductor ampacity.

Annex Table 104: Conductor ampacity results

Ambient Temp. [°C]	Ampacity of the Conductor in [A]							
	LYNX [A]	[%]	HAWK [A]	[%]	CONDOR [A]	[%]	CANARY [A]	[%]
20	502	128	593	152	817	209	911	233
25	477	122	564	144	776	198	865	221
30	451	115	532	136	731	187	815	208
35	422	108	498	127	683	175	761	195
40	391	100	461	118	631	161	703	180

The electrical parameters of the line are dependent on the conductor data (dimensions, material), the geometrical distances between the conductors and to ground), the resistivity of the soil conditions and frequency. A detailed model of the overhead line, based on the geometry of the tower and the characteristics of the conductor has been used to calculate the electrical parameters for different conductor types and line configurations. The software calculate the values of the line based on the reciprocal interaction among conductors and the earth and taking into account the selected type of conductors.

The values are listed in the following table.

Annex Table 105: Line parameters

Conductor Type	Positive seq. resistance [Ω / km]	Positive seq. reactance [Ω / km]	Positive seq. capacitance [nF / km]	Zero seq. resistance [Ω / km]	Zero seq. reactance [Ω / km]	Zero seq. capacitance [nF / km]
132kV single circuit line, one earth wire						
1xLYNX	0,158	0.420	8.696	0.335	1.139	5.7438
1xHAWK	0,120	0.408	9.014	0.303	1.114	5.399
132kV double circuit line, values per circuit, two earth wires						
1xLYNX	0,158	0.412	8.658	0.325	1.129	6.233
1xHAWK	0,120	0.408	8.974	0.289	1.181	5.723
400kV double circuit line, values per circuit, two earth wires						
3xCANARY	0,022	0.290	12.923	0.158	0.868	7.261
3xCONDOR	0,025	0.291	12.853	0.145	0.853	7.301

Sample tower profiles of the transmission system are provided in Annex 8.E.

Annex 8.A.3 Transmission candidates overview

The following table provides an overview of transmission projects defined by KETRACO. The list served as basis to identify suitable projects to form the core network within the Master Plan.

Annex Table 106: KETRACO transmission line projects

#	Project name	Description
1	Mombasa - Nairobi Line	482 km 220/400 kV double circuit line with substation works at Rabai and Embakasi
2	Loiyangalani - Suswa Line	430 km 400 kV double circuit line, 440/220 kV substations in Loiyangalani and Suswa
3	Nairobi Ring 220kV substations at Koma Rock, Athi River, Isinya and Ngong	substation works at Athi River, Isinya, Ngong, Koma Rock
4	Suswa-Isinya line	100 km Suswa - Isinya 400 kV double circuit line
5	Eastern Electricity Highway (Ethiopia – Kenya)	612 km, 500 kV HVDC bipolar; converter substation and 400/220 kV substation
6	Olkaria I- Suswa & Olkaria IV- Suswa	30 km 220 kV line and 25 km 220 kV line
7	KEEP: Kisii – Awendo	44 km 132 kV line, 23 MVA substation
8	Olkaria – Lessos – Kisumu	300 km, 400 / 220 kV double circuit line, substation works at Olkaria, Lessos & Kisumu
9	Nanyuki – (Rumuruti) Nyahururu	79 km 132 kV single circuit line; 132/33 kV 23MVA substations at Nyahururu (Rumuruti)
10	Lessos – Kabarnet (PTSIP)	65 km 132 kV single circuit line
11	Olkaria – Narok (PTSIP)	68 km 132 kV line
12	Bomet – Sotik (PTSIP)	33 km 132 kV line
13	Mwingi- Kitui- Wote- Sultan Hamud (PTSIP)	153 km 132 kV line
14	Ishiara -Kieni (PTSIP)	33 km 132 kV line

15	Lessos-Tororo	132.5 km, 400 kV double circuit
16	Meru-Isiolo-Nanyuki	96 km 132 kV single circuit line, 132/33 kV, and 23 MVA substation at Isiolo
17	Turkwel – Ortum – Kitale	90 km 220 kV single circuit line and 23 MVA substation
18	Machakos- Konza and Kajiado-Namanga	153 km 132 kV line
19	Sondu -Homa Bay -Ndhiwa- Awendo	100 km 132 kV single circuit line, substation at Homa Bay
20	Kenya System reinforcement	
21	Kenya - Tanzania Interconnector	100 km, 400 kV double circuit line section between Isinya and Namanga
22	Menengai -Soilo	15 km 132 kV double circuit overhead line and substation extensions at Menengai and Soilo
23	Mariakani substation	400/220 kV substation at Mariakani
24	Silali - Rongai	150 km 400 kV double circuit line
25	Menengai -Rongai	Construction of 32 km 400 kV double circuit line
26	Lamu- Kitui - Nairobi East	520 km 400 kV double circuit, power evacuation of Lamu coal power plant
27	Isinya - Nairobi East	110 km 400 kV double circuit line
28	Rongai-Kilgoris-Mwanza (Part of Lake Victoria Ring)	235 km 400 kV double circuit line with possible interconnection to Tanzania to complete Lake Victoria Ring with 400/132 kV
29	Kisumu-Mwanza (part of Lake Victoria Ring)	
30	Makindu 4x200MVA 400/132kV SS.(LILO) on 400kV Mombasa Nairobi.	
31	Gilgil Substation 400/220kV SS.	
32	Lessos 400/220kV SS	
33	Meru -Maua Line	50km 132kV Line and 1 Substation at Maua
34	Nyahururu (Rumuruti) -Maralal Line	148km 132kV Line and Sub-station at Maralal
35	Rabai- Bamburi-Shanzu-Kilifi line	60km, 132kV double circuit line with associated substations
36	Voi - Taveta Line	107km, 132KV single circuit transmission line, with substation at Taveta.
37	Garsen -HOLA -Garissa Line	240km 220kV single circuit Line and Sub-station at HOLA and Bura
38	Garissa -Wajir Line	330km 220kV single circuit Line through Habaswein and 1 No. 23MVA Sub-station at Wajir and a future SS at Habaswein is also proposed
39	Awendo -Isebania Line	50km 132kV single circuit Line through Migori and Substations at Isebania
40	Galu - Lunga Lunga Line	60km 132kV single circuit Line and 23MVA Sub-stations at Lunga Lunga
41	Ishiara - Chogoria Line	40km 132kV single circuit Line through Nkubu and 1x23 MVA Sub-station at Chogoria
42	Narok- Bomet Line	88km 132kV double circuit Line
43	Sultan Hamud- Loitoktok	88km 132kV double circuit Line
44	Kabarnet - Nyahururu Line	111km 132kV double circuit Line
45	Kamburu - Embu - Thika	196km, 220kV d/c line with bay extension at Kamburu and establishment of 1x150MVA 220/132kV substation at Embu, Kiganjo & Thika

46	Isinya – Konza (Techno City)	38km 400kV d/c line, with 3x350MVA 400/132kV & 5x45 MVA 132/33kV substations at Konza and bay extensions at Isinya
47	Longonot/Gilgil - Thika - Kangundo - Konza	205km, 400kV d/c line with 1x350MVA 400/220kV & 2x90MVA 220/33kV at Thika, 1x350MVA 400/132kV & 2x45MVA 132/33kV at Kangundo and bay extensions at Longonot and Konza.
48	Kitui - Mutomo - Kibwezi	144 km, 132kV d/c line with bay extensions at Kitui and establishment of 2x45MVA 132/33kV substations at Mutomo & Kibwezi.
49	Ngong - Magadi	84km, 220kV Line and new substation at Magadi
50	Lessos-Juja Tee -Uplands	Establishment of 2x60 MVA substations at Uplands off the existing Lessos-Juja 132kV line.
51	Menengai-Nyahururu (Ol Kalau) - Rumuruti	Approximately 70km of 132kV and establishment of 132/33kV substation at Ol Kalau and bay extensions at Menengai and Rumuruti
52	Rabai - Galu T-off - Likoni	15km 132kV double circuit line substation at Likoni
53	Kisumu - Kakamega – Musaga*	73 km, 220kV line with 220/132/33kV 2x150MVA substation at Kakamega and bay extensions at Kisumu and Musaga.
54	Webuye - Kimilili – Kitale*	73km, 132kV d/c Line, s/c strung with establishment of 132/33kV substations; 2x23MVA at Webuye, 2x23MVA at Kimilili and bay extension at Kitale.
55	Sotik – Kilgoris*	48km, 132kV d/c Line, s/c strung with a new 2x23MVA 132/33kV substation at Kilgoris
56	Rongai - Kilgoris - Lake Victoria Ring	235 km, 400kV d/c Line with possible interconnection to Tanzania to complete the Lake Victoria Ring with 400/132kV
57	Lessos/Tororo Tee off at Myanga - Busia	41km 132kV d/c Line, s/c strung with new 132/33kV 2x23MVA substations at Myanga and Busia.
58	Rangala - Bondo - Ndigwa	72km, 132kV d/c Line, s/c strung, bay extensions at Rangala & establishment of 1x23MVA 132/33kV substations at Bondo and Ndigwa.
59	Homa Bay – Sindo/Karungo	72km, 132kV d/c line, s/c strung from Homa Bay to Sindo through Karungo, bay extensions at Homabay and establishment of 1x23MVA 132/33kV substation at Sindo.
60	Kiambere - Maua - Isiolo	145 km, 220kV d/c line with bay extensions at Kiambere and establishment of 2x90MVA 220/132kV substations at Maua and Isiolo.
61	Isiolo - Maralal	165 km, 132kV d/c line with bay extension at Isiolo and Maralal.
62	Isiolo - Marsabit	240 km, 220kV d/c line with bay extension at Isiolo and establishment of 2x90MVA 220/33kV substation at Marsabit
63	Turkwel - Lodwar - Lokichoggio	330 km 220 d/c line with establishment of 2x45MVA substations at Lodwar and Lokichoggio, bay extension of substations at Turkwel.
64	Loiyangalani - Marsabit	136 km, 220kV d/c line with establishment/extension of substations at Loiyangalani and 1x25 MVAR bus reactor at Marsabit.

65 Reinforcement/ Support of 132kV Juja - Rabai line and XX/25kV substations for SGR Electrification	Provide points of coupling the 400kV and 132kV systems. The following strategic points along From Mombasa to Nairobi along Juja-Rabai 132kV are proposed. Provision of Nine (9) HV supply points along the MSA-NRB SGR. 1. Athi River 66/25kV 2. Konza 132/25kV 3. Sultan Hamud 132/25kV 4. Makindu 400/132/25kV 5. Ndalasyani 132/25kV 6. Tsavo 132/25kV 7. Voi 400/132/25kV 8. Mackinnon Rd 132/25kV 9. Mariakani 400/132/25kV
66 Mariakani –Kwale	Approx 45km of 220KV d/c (initially operated at 132kV
67 Makutano/ Lanet Tee-Off – Soilo (2nd Line)	LILO works on circuit-2 of Makutano (Lessos) –Lanet (Ju-ja) 132kV line
68 LAPSSET Corridor Transmission Line	1420km 220 kV Lamu-Garissa-Isiolo-Baringo- Lodwar double circuit line,Lodwar – Lokichoggio (FS complete)
69 Dongo Kundu-Mariakani	Approximately 25km of 400kV (or 220kV) TL from Mariakani to Dongo Kundu.

Annex 8.B Substation names and codes

SUBSTATION NAMES AND CODES KENYA MASTERPLAN MTP Upd. 2020					
Name	Grid	Zone ElmZone	Nom.L-L Volt. kV	Station/Name	Node Name
BB 11 EMBAKASIGT1 (PSS/E 1014)	1 KENYA	2_NAIROBI	11	BB 11 EMBAKASIGT1 (PSS/E 1014)	BB 11 EMBAKASIGT1 (PSS/E 1014)
BB 11 EMBAKASIGT2 (PSS/E 1015)	1 KENYA	2_NAIROBI	11	BB 11 EMBAKASIGT2 (PSS/E 1015)	BB 11 EMBAKASIGT2 (PSS/E 1015)
BB 11 JUJCOND (PSS/E 1021)	1 KENYA	2_NAIROBI	11	BB 11 JUJCOND (PSS/E 1021)	BB 11 JUJCOND (PSS/E 1021)
BB 11 JUJCOND (PSS/E 1022)	1 KENYA	2_NAIROBI	11	BB 11 JUJCOND (PSS/E 1022)	BB 11 JUJCOND (PSS/E 1022)
BB 11 NBISTH11 (PSS/E 1026)	1 KENYA	2_NAIROBI	11	BB 11 NBISTH11 (PSS/E 1026)	BB 11 NBISTH11 (PSS/E 1026)
BB 11 NSOUTH4 (PSS/E 1027)	1 KENYA	2_NAIROBI	11	BB 11 NSOUTH4 (PSS/E 1027)	BB 11 NSOUTH4 (PSS/E 1027)
BB 11 IBERAG1 (PSS/E 1032)	1 KENYA	2_NAIROBI	11	BB 11 IBERAG1 (PSS/E 1032)	BB 11 IBERAG1 (PSS/E 1032)
BB 11 IBERAG2 (PSS/E 1033)	1 KENYA	2_NAIROBI	11	BB 11 IBERAG2 (PSS/E 1033)	BB 11 IBERAG2 (PSS/E 1033)
BB 11 IBERAG2 (PSS/E 1034)	1 KENYA	2_NAIROBI	11	BB 11 IBERAG2 (PSS/E 1034)	BB 11 IBERAG2 (PSS/E 1034)
BB 11 EPZ MSD (PSS/E 1047)	1 KENYA	2_NAIROBI	11	BB 11 EPZ MSD (PSS/E 1047)	BB 11 EPZ MSD (PSS/E 1047)
BB 11 MSA RD MSD (PSS/E 1049)	1 KENYA	2_NAIROBI	11	BB 11 MSA RD MSD (PSS/E 1049)	BB 11 MSA RD MSD (PSS/E 1049)
BB 11 AGGREKO3-1 (PSS/E 1071)	1 KENYA	2_NAIROBI	11	BB 11 AGGREKO3-1 (PSS/E 1071)	BB 11 AGGREKO3-1 (PSS/E 1071)
BB 11 MSA ROAD (PSS/E 1072)	1 KENYA	2_NAIROBI	11	BB 11 MSA ROAD (PSS/E 1072)	BB 11 MSA ROAD (PSS/E 1072)
BB 11 AGGREKO4-1 (PSS/E 1073)	1 KENYA	2_NAIROBI	11	BB 11 AGGREKO4-1 (PSS/E 1073)	BB 11 AGGREKO4-1 (PSS/E 1073)
BB 11 AGGREKO2-1 (PSS/E 1074)	1 KENYA	2_NAIROBI	11	BB 11 AGGREKO2-1 (PSS/E 1074)	BB 11 AGGREKO2-1 (PSS/E 1074)
BB 11 AGGREKO2-3 (PSS/E 1076)	1 KENYA	2_NAIROBI	11	BB 11 AGGREKO2-3 (PSS/E 1076)	BB 11 AGGREKO2-3 (PSS/E 1076)
BB 11 AGGREKO3-2 (PSS/E 1077)	1 KENYA	2_NAIROBI	11	BB 11 AGGREKO3-2 (PSS/E 1077)	BB 11 AGGREKO3-2 (PSS/E 1077)
BB 11 MUHORONI EG (PSS/E 1078)	1 KENYA	2_NAIROBI	11	BB 11 MUHORONI EG (PSS/E 1078)	BB 11 MUHORONI EG (PSS/E 1078)
BB 11 AGGREKO1-2 (PSS/E 1079)	1 KENYA	2_NAIROBI	11	BB 11 AGGREKO1-2 (PSS/E 1079)	BB 11 AGGREKO1-2 (PSS/E 1079)
BB 11 TANGEN1 (PSS/E 1080)	1 KENYA	2_NAIROBI	11	BB 11 TANGEN1 (PSS/E 1080)	BB 11 TANGEN1 (PSS/E 1080)
BB 11 NGONG WIND (PSS/E 1090)	1 KENYA	2_NAIROBI	11	BB 11 NGONG WIND (PSS/E 1090)	BB 11 NGONG WIND (PSS/E 1090)
BB 11 KIPETO (PSS/E 1095)	1 KENYA	2_NAIROBI	11	BB 11 KIPETO (PSS/E 1095)	BB 11 KIPETO (PSS/E 1095)
BB 11 KIPETO (PSS/E 1096)	1 KENYA	2_NAIROBI	11	BB 11 KIPETO (PSS/E 1096)	BB 11 KIPETO (PSS/E 1096)
BB 132 MANGU (PSS/E 1116)	1 KENYA	2_NAIROBI	132	BB 132 MANGU (PSS/E 1116)	BB 132 MANGU (PSS/E 1116)
BB 132 JUJA RD (PSS/E 1117)	1 KENYA	2_NAIROBI	132	BB 132 JUJA RD (PSS/E 1117)	BB 132 JUJA RD (PSS/E 1117)
BB 132 DANDORA (PSS/E 1121)	1 KENYA	2_NAIROBI	132	BB 132 DANDORA (PSS/E 1121)	BB 132 DANDORA (PSS/E 1121)
BB 132 SULTAN HAMUD (PSS/E 1143)	1 KENYA	2_NAIROBI	132	BB 132 SULTAN HAMUD (PSS/E 1143)	BB 132 SULTAN HAMUD (PSS/E 1143)
BB 132 RUARAKA TEE (PSS/E 1150)	1 KENYA	2_NAIROBI	132	BB 132 RUARAKA TEE (PSS/E 1150)	BB 132 RUARAKA TEE (PSS/E 1150)
BB 132 RUARAKA (PSS/E 1151)	1 KENYA	2_NAIROBI	132	BB 132 RUARAKA (PSS/E 1151)	BB 132 RUARAKA (PSS/E 1151)
BB 132 KONZA (PSS/E 1168)	1 KENYA	2_NAIROBI	132	BB 132 KONZA (PSS/E 1168)	BB 132 KONZA (PSS/E 1168)
BB 132 KAJIADO (PSS/E 1170)	1 KENYA	2_NAIROBI	132	BB 132 KAJIADO (PSS/E 1170)	BB 132 KAJIADO (PSS/E 1170)
BB 132 ISINYA (PSS/E 1175)	1 KENYA	2_NAIROBI	132	BB 132 ISINYA (PSS/E 1175)	BB 132 ISINYA (PSS/E 1175)
BB 132 GATUNDU (PSS/E 1181)	1 KENYA	2_NAIROBI	132	BB 132 GATUNDU (PSS/E 1181)	BB 132 GATUNDU (PSS/E 1181)
BB 132 MACHAKOS (PSS/E 1192)	1 KENYA	2_NAIROBI	132	BB 132 MACHAKOS (PSS/E 1192)	BB 132 MACHAKOS (PSS/E 1192)
BB 220 MATASIA (PSS/E 1204)	1 KENYA	2_NAIROBI	220	BB 220 MATASIA (PSS/E 1204)	BB 220 MATASIA (PSS/E 1204)
BB 220 DANDORA (PSS/E 1221)	1 KENYA	2_NAIROBI	220	BB 220 DANDORA (PSS/E 1221)	BB 220 DANDORA (PSS/E 1221)
BB 220 KOMOROCK (PSS/E 1222)	1 KENYA	2_NAIROBI	220	BB 220 KOMOROCK (PSS/E 1222)	BB 220 KOMOROCK (PSS/E 1222)
BB 220 EMBAKASI (PSS/E 1223)	1 KENYA	2_NAIROBI	220	BB 220 EMBAKASI (PSS/E 1223)	BB 220 EMBAKASI (PSS/E 1223)
BB 220 NBNORTH (PSS/E 1224)	1 KENYA	2_NAIROBI	220	BB 220 NBNORTH (PSS/E 1224)	BB 220 NBNORTH (PSS/E 1224)
BB 220 KIPETO (PSS/E 1245)	1 KENYA	2_NAIROBI	220	BB 220 KIPETO (PSS/E 1245)	BB 220 KIPETO (PSS/E 1245)
BB 220 THIKA RD (PSS/E 1282)	1 KENYA	2_NAIROBI	220	BB 220 THIKA RD (PSS/E 1282)	BB 220 THIKA RD (PSS/E 1282)
BB 220 NGONG (PSS/E 1284)	1 KENYA	2_NAIROBI	220	BB 220 NGONG (PSS/E 1284)	BB 220 NGONG (PSS/E 1284)
BB 220 ATHI RIVER (PSS/E 1286)	1 KENYA	2_NAIROBI	220	BB 220 ATHI RIVER (PSS/E 1286)	BB 220 ATHI RIVER (PSS/E 1286)
BB 33 ATHIR33 (PSS/E 1333)	1 KENYA	2_NAIROBI	33	BB 33 ATHIR33 (PSS/E 1333)	BB 33 ATHIR33 (PSS/E 1333)
BB 33 THIKA (PSS/E 1335)	1 KENYA	2_NAIROBI	33	BB 33 THIKA (PSS/E 1335)	BB 33 THIKA (PSS/E 1335)
BB 33 GATUNDU (PSS/E 1358)	1 KENYA	2_NAIROBI	33	BB 33 GATUNDU (PSS/E 1358)	BB 33 GATUNDU (PSS/E 1358)
BB 33 KAJIADO (PSS/E 1362)	1 KENYA	2_NAIROBI	33	BB 33 KAJIADO (PSS/E 1362)	BB 33 KAJIADO (PSS/E 1362)
BB 33 RUIRU 33 (PSS/E 1371)	1 KENYA	2_NAIROBI	33	BB 33 RUIRU 33 (PSS/E 1371)	BB 33 RUIRU 33 (PSS/E 1371)
BB 33 LOYANGALANI (PSS/E 1390)	1 KENYA	2_NAIROBI	33	BB 33 LOYANGALANI (PSS/E 1390)	BB 33 LOYANGALANI (PSS/E 1390)
BB 33 LOYANGALANI (PSS/E 1391)	1 KENYA	2_NAIROBI	33	BB 33 LOYANGALANI (PSS/E 1391)	BB 33 LOYANGALANI (PSS/E 1391)
BB 33 LOYANGALANI (PSS/E 1393)	1 KENYA	2_NAIROBI	33	BB 33 LOYANGALANI (PSS/E 1393)	BB 33 LOYANGALANI (PSS/E 1393)
BB 33 MACHAKOS (PSS/E 1394)	1 KENYA	2_NAIROBI	33	BB 33 MACHAKOS (PSS/E 1394)	BB 33 MACHAKOS (PSS/E 1394)
BB 33 KAJIADO (PSS/E 1395)	1 KENYA	2_NAIROBI	33	BB 33 KAJIADO (PSS/E 1395)	BB 33 KAJIADO (PSS/E 1395)
BB 33 NAMANGA (PSS/E 1396)	1 KENYA	2_NAIROBI	33	BB 33 NAMANGA (PSS/E 1396)	BB 33 NAMANGA (PSS/E 1396)
BB 400 ISINYA (PSS/E 1403)	1 KENYA	2_NAIROBI	400	BB 400 ISINYA (PSS/E 1403)	BB 400 ISINYA (PSS/E 1403)
BB 66 RUARAKA (PSS/E 1601)	1 KENYA	2_NAIROBI	66	BB 66 RUARAKA (PSS/E 1601)	BB 66 RUARAKA (PSS/E 1601)
BB 66 RUAKITI (PSS/E 1602)	1 KENYA	2_NAIROBI	66	BB 66 RUAKITI (PSS/E 1602)	BB 66 RUAKITI (PSS/E 1602)
BB 66 RUAZIJU (PSS/E 1603)	1 KENYA	2_NAIROBI	66	BB 66 RUAZIJU (PSS/E 1603)	BB 66 RUAZIJU (PSS/E 1603)
BB 66 RUARAKA (PSS/E 1604)	1 KENYA	2_NAIROBI	66	BB 66 RUARAKA (PSS/E 1604)	BB 66 RUARAKA (PSS/E 1604)
BB 66 KITTEE (PSS/E 1605)	1 KENYA	2_NAIROBI	66	BB 66 KITTEE (PSS/E 1605)	BB 66 KITTEE (PSS/E 1605)
BB 66 KITISUR (PSS/E 1606)	1 KENYA	2_NAIROBI	66	BB 66 KITISUR (PSS/E 1606)	BB 66 KITISUR (PSS/E 1606)
BB 66 LIMURU (PSS/E 1607)	1 KENYA	2_NAIROBI	66	BB 66 LIMURU (PSS/E 1607)	BB 66 LIMURU (PSS/E 1607)
BB 66 KIKUYU (PSS/E 1608)	1 KENYA	2_NAIROBI	66	BB 66 KIKUYU (PSS/E 1608)	BB 66 KIKUYU (PSS/E 1608)
BB 66 KAREN (PSS/E 1609)	1 KENYA	2_NAIROBI	66	BB 66 KAREN (PSS/E 1609)	BB 66 KAREN (PSS/E 1609)
BB 66 NBIWEST (PSS/E 1610)	1 KENYA	2_NAIROBI	66	BB 66 NBIWEST (PSS/E 1610)	BB 66 NBIWEST (PSS/E 1610)
BB 66 CATHTEE (PSS/E 1611)	1 KENYA	2_NAIROBI	66	BB 66 CATHTEE (PSS/E 1611)	BB 66 CATHTEE (PSS/E 1611)
BB 66 CATHD (PSS/E 1612)	1 KENYA	2_NAIROBI	66	BB 66 CATHD (PSS/E 1612)	BB 66 CATHD (PSS/E 1612)
BB 66 EMBTEE1 (PSS/E 1613)	1 KENYA	2_NAIROBI	66	BB 66 EMBTEE1 (PSS/E 1613)	BB 66 EMBTEE1 (PSS/E 1613)
BB 66 FIRETEE (PSS/E 1614)	1 KENYA	2_NAIROBI	66	BB 66 FIRETEE (PSS/E 1614)	BB 66 FIRETEE (PSS/E 1614)
BB 66 FIRESTO (PSS/E 1615)	1 KENYA	2_NAIROBI	66	BB 66 FIRESTO (PSS/E 1615)	BB 66 FIRESTO (PSS/E 1615)
BB 66 INDUST (PSS/E 1616)	1 KENYA	2_NAIROBI	66	BB 66 INDUST (PSS/E 1616)	BB 66 INDUST (PSS/E 1616)
BB 66 JUJA RD (PSS/E 1617)	1 KENYA	2_NAIROBI	66	BB 66 JUJA RD (PSS/E 1617)	BB 66 JUJA RD (PSS/E 1617)
BB 66 1THIKA1 (PSS/E 1620)	1 KENYA	2_NAIROBI	66	BB 66 1THIKA1 (PSS/E 1620)	BB 66 1THIKA1 (PSS/E 1620)
BB 66 THIKA2 (PSS/E 1621)	1 KENYA	2_NAIROBI	66	BB 66 THIKA2 (PSS/E 1621)	BB 66 THIKA2 (PSS/E 1621)
BB 66 JEEVANJEE 1 (PSS/E 1622)	1 KENYA	2_NAIROBI	66	BB 66 JEEVANJEE 1 (PSS/E 1622)	BB 66 JEEVANJEE 1 (PSS/E 1622)
BB 66 EMCOTEE (PSS/E 1623)	1 KENYA	2_NAIROBI	66	BB 66 EMCOTEE (PSS/E 1623)	BB 66 EMCOTEE (PSS/E 1623)
BB 66 PARKS (PSS/E 1624)	1 KENYA	2_NAIROBI	66	BB 66 PARKS (PSS/E 1624)	BB 66 PARKS (PSS/E 1624)
BB 66 EMBAKASI (PSS/E 1625)	1 KENYA	2_NAIROBI	66	BB 66 EMBAKASI (PSS/E 1625)	BB 66 EMBAKASI (PSS/E 1625)
BB 66 NRBSTH1 (PSS/E 1626)	1 KENYA	2_NAIROBI	66	BB 66 NRBSTH1 (PSS/E 1626)	BB 66 NRBSTH1 (PSS/E 1626)
BB 66 NRBSTH2 (PSS/E 1627)	1 KENYA	2_NAIROBI	66	BB 66 NRBSTH2 (PSS/E 1627)	BB 66 NRBSTH2 (PSS/E 1627)
BB 66 NRBSTH3 (PSS/E 1628)	1 KENYA	2_NAIROBI	66	BB 66 NRBSTH3 (PSS/E 1628)	BB 66 NRBSTH3 (PSS/E 1628)
BB 66 TANA (PSS/E 1629)	1 KENYA	2_NAIROBI	66	BB 66 TANA (PSS/E 1629)	BB 66 TANA (PSS/E 1629)
BB 66 KPC LUNGA (PSS/E 1630)	1 KENYA	2_NAIROBI	66	BB 66 KPC LUNGA (PSS/E 1630)	BB 66 KPC LUNGA (PSS/E 1630)
BB 66 AIRPORT1 (PSS/E 1631)	1 KENYA	2_NAIROBI	66	BB 66 AIRPORT1 (PSS/E 1631)	BB 66 AIRPORT1 (PSS/E 1631)

SUBSTATION NAMES AND CODES KENYA MASTERPLAN MTP Upd. 2020					
Name	Grid	Zone ElmZone	Norm.L-L Volt. kV	Station/Name	Node Name
BB 66 PARK266 (PSS/E 1632)	1 KENYA	2_NAIROBI	66	BB 66 PARK266 (PSS/E 1632)	BB 66 PARK266 (PSS/E 1632)
BB 66 THKTEE2 (PSS/E 1633)	1 KENYA	2_NAIROBI	66	BB 66 THKTEE2 (PSS/E 1633)	BB 66 THKTEE2 (PSS/E 1633)
BB 66 THKTEE1 (PSS/E 1634)	1 KENYA	2_NAIROBI	66	BB 66 THKTEE1 (PSS/E 1634)	BB 66 THKTEE1 (PSS/E 1634)
BB 66 EMBAKASI (PSS/E 1635)	1 KENYA	2_NAIROBI	66	BB 66 EMBAKASI (PSS/E 1635)	BB 66 EMBAKASI (PSS/E 1635)
BB 66 KIKUYU (PSS/E 1636)	1 KENYA	2_NAIROBI	66	BB 66 KIKUYU (PSS/E 1636)	BB 66 KIKUYU (PSS/E 1636)
BB 66 INDTEE1 (PSS/E 1637)	1 KENYA	2_NAIROBI	66	BB 66 INDTEE1 (PSS/E 1637)	BB 66 INDTEE1 (PSS/E 1637)
BB 66 INDTEE2 (PSS/E 1638)	1 KENYA	2_NAIROBI	66	BB 66 INDTEE2 (PSS/E 1638)	BB 66 INDTEE2 (PSS/E 1638)
BB 66 JEEVA2 (PSS/E 1639)	1 KENYA	2_NAIROBI	66	BB 66 JEEVA2 (PSS/E 1639)	BB 66 JEEVA2 (PSS/E 1639)
BB 66 NBNOR66 (PSS/E 1640)	1 KENYA	2_NAIROBI	66	BB 66 NBNOR66 (PSS/E 1640)	BB 66 NBNOR66 (PSS/E 1640)
BB 66 RUIRUST (PSS/E 1641)	1 KENYA	2_NAIROBI	66	BB 66 RUIRUST (PSS/E 1641)	BB 66 RUIRUST (PSS/E 1641)
BB 66 KILETEE (PSS/E 1642)	1 KENYA	2_NAIROBI	66	BB 66 KILETEE (PSS/E 1642)	BB 66 KILETEE (PSS/E 1642)
BB 66 KILELES (PSS/E 1643)	1 KENYA	2_NAIROBI	66	BB 66 KILELES (PSS/E 1643)	BB 66 KILELES (PSS/E 1643)
BB 66 NBIWEST2 (PSS/E 1645)	1 KENYA	2_NAIROBI	66	BB 66 NBIWEST2 (PSS/E 1645)	BB 66 NBIWEST2 (PSS/E 1645)
BB 66 KPCNGEM (PSS/E 1646)	1 KENYA	2_NAIROBI	66	BB 66 KPCNGEM (PSS/E 1646)	BB 66 KPCNGEM (PSS/E 1646)
BB 66 AIRTEE1 (PSS/E 1647)	1 KENYA	2_NAIROBI	66	BB 66 AIRTEE1 (PSS/E 1647)	BB 66 AIRTEE1 (PSS/E 1647)
BB 66 AIRTEE2 (PSS/E 1648)	1 KENYA	2_NAIROBI	66	BB 66 AIRTEE2 (PSS/E 1648)	BB 66 AIRTEE2 (PSS/E 1648)
BB 66 ATHTEE1 (PSS/E 1649)	1 KENYA	2_NAIROBI	66	BB 66 ATHTEE1 (PSS/E 1649)	BB 66 ATHTEE1 (PSS/E 1649)
BB 66 ATHTEE3 (PSS/E 1651)	1 KENYA	2_NAIROBI	66	BB 66 ATHTEE3 (PSS/E 1651)	BB 66 ATHTEE3 (PSS/E 1651)
BB 66 ATHTEES (PSS/E 1652)	1 KENYA	2_NAIROBI	66	BB 66 ATHTEES (PSS/E 1652)	BB 66 ATHTEES (PSS/E 1652)
BB 66 BABTEE2 (PSS/E 1654)	1 KENYA	2_NAIROBI	66	BB 66 BABTEE2 (PSS/E 1654)	BB 66 BABTEE2 (PSS/E 1654)
BB 66 BABTEE1 (PSS/E 1655)	1 KENYA	2_NAIROBI	66	BB 66 BABTEE1 (PSS/E 1655)	BB 66 BABTEE1 (PSS/E 1655)
BB 66 BAMBURI (PSS/E 1656)	1 KENYA	2_NAIROBI	66	BB 66 BAMBURI (PSS/E 1656)	BB 66 BAMBURI (PSS/E 1656)
BB 66 EPZ S/S (PSS/E 1657)	1 KENYA	2_NAIROBI	66	BB 66 EPZ S/S (PSS/E 1657)	BB 66 EPZ S/S (PSS/E 1657)
BB 66 PORTLAND (PSS/E 1658)	1 KENYA	2_NAIROBI	66	BB 66 PORTLAND (PSS/E 1658)	BB 66 PORTLAND (PSS/E 1658)
BB 66 ATHI RIVER (PSS/E 1659)	1 KENYA	2_NAIROBI	66	BB 66 ATHI RIVER (PSS/E 1659)	BB 66 ATHI RIVER (PSS/E 1659)
BB 66 CIANDA66 (PSS/E 1660)	1 KENYA	2_NAIROBI	66	BB 66 CIANDA66 (PSS/E 1660)	BB 66 CIANDA66 (PSS/E 1660)
BB 66 EMCO (PSS/E 1662)	1 KENYA	2_NAIROBI	66	BB 66 EMCO (PSS/E 1662)	BB 66 EMCO (PSS/E 1662)
BB 66 STBILL1 (PSS/E 1663)	1 KENYA	2_NAIROBI	66	BB 66 STBILL1 (PSS/E 1663)	BB 66 STBILL1 (PSS/E 1663)
BB 66 STBILL1 (PSS/E 1664)	1 KENYA	2_NAIROBI	66	BB 66 STBILL1 (PSS/E 1664)	BB 66 STBILL1 (PSS/E 1664)
BB 66 TANAZ (PSS/E 1666)	1 KENYA	2_NAIROBI	66	BB 66 TANAZ (PSS/E 1666)	BB 66 TANAZ (PSS/E 1666)
BB 66 ATHI MSD (PSS/E 1667)	1 KENYA	2_NAIROBI	66	BB 66 ATHI MSD (PSS/E 1667)	BB 66 ATHI MSD (PSS/E 1667)
BB 66 JUJA RD (PSS/E 1668)	1 KENYA	2_NAIROBI	66	BB 66 JUJA RD (PSS/E 1668)	BB 66 JUJA RD (PSS/E 1668)
BB 66 GIGIRI (PSS/E 1670)	1 KENYA	2_NAIROBI	66	BB 66 GIGIRI (PSS/E 1670)	BB 66 GIGIRI (PSS/E 1670)
BB 66 FIRESTO (PSS/E 1671)	1 KENYA	2_NAIROBI	66	BB 66 FIRESTO (PSS/E 1671)	BB 66 FIRESTO (PSS/E 1671)
BB 66 EMBAKASI (PSS/E 1672)	1 KENYA	2_NAIROBI	66	BB 66 EMBAKASI (PSS/E 1672)	BB 66 EMBAKASI (PSS/E 1672)
BB 66 INDUS2 (PSS/E 1674)	1 KENYA	2_NAIROBI	66	BB 66 INDUS2 (PSS/E 1674)	BB 66 INDUS2 (PSS/E 1674)
BB 66 MATASIA (PSS/E 1675)	1 KENYA	2_NAIROBI	66	BB 66 MATASIA (PSS/E 1675)	BB 66 MATASIA (PSS/E 1675)
BB 66 MORRIS (PSS/E 1677)	1 KENYA	2_NAIROBI	66	BB 66 MORRIS (PSS/E 1677)	BB 66 MORRIS (PSS/E 1677)
BB 66 POLYPIPE (PSS/E 1678)	1 KENYA	2_NAIROBI	66	BB 66 POLYPIPE (PSS/E 1678)	BB 66 POLYPIPE (PSS/E 1678)
BB 66 BREWERIES (PSS/E 1679)	1 KENYA	2_NAIROBI	66	BB 66 BREWERIES (PSS/E 1679)	BB 66 BREWERIES (PSS/E 1679)
BB 66 BABADOGO (PSS/E 1680)	1 KENYA	2_NAIROBI	66	BB 66 BABADOGO (PSS/E 1680)	BB 66 BABADOGO (PSS/E 1680)
BB 66 BABADOGO2 (PSS/E 1681)	1 KENYA	2_NAIROBI	66	BB 66 BABADOGO2 (PSS/E 1681)	BB 66 BABADOGO2 (PSS/E 1681)
BB 66 ATHITEE (PSS/E 1682)	1 KENYA	2_NAIROBI	66	BB 66 ATHITEE (PSS/E 1682)	BB 66 ATHITEE (PSS/E 1682)
BB 66 KIMATHI 2 (PSS/E 1683)	1 KENYA	2_NAIROBI	66	BB 66 KIMATHI 2 (PSS/E 1683)	BB 66 KIMATHI 2 (PSS/E 1683)
BB 66 KIMATHI 1 (PSS/E 1684)	1 KENYA	2_NAIROBI	66	BB 66 KIMATHI 1 (PSS/E 1684)	BB 66 KIMATHI 1 (PSS/E 1684)
BB 66 WESTLANDS (PSS/E 1685)	1 KENYA	2_NAIROBI	66	BB 66 WESTLANDS (PSS/E 1685)	BB 66 WESTLANDS (PSS/E 1685)
BB 66 NGONG ROAD (PSS/E 1687)	1 KENYA	2_NAIROBI	66	BB 66 NGONG ROAD (PSS/E 1687)	BB 66 NGONG ROAD (PSS/E 1687)
BB 66 NSSF TEE (PSS/E 1688)	1 KENYA	2_NAIROBI	66	BB 66 NSSF TEE (PSS/E 1688)	BB 66 NSSF TEE (PSS/E 1688)
BB 66 NSSF (PSS/E 1689)	1 KENYA	2_NAIROBI	66	BB 66 NSSF (PSS/E 1689)	BB 66 NSSF (PSS/E 1689)
BB 66 RUIRU (PSS/E 1690)	1 KENYA	2_NAIROBI	66	BB 66 RUIRU (PSS/E 1690)	BB 66 RUIRU (PSS/E 1690)
BB 66 MSA TEE (PSS/E 1691)	1 KENYA	2_NAIROBI	66	BB 66 MSA TEE (PSS/E 1691)	BB 66 MSA TEE (PSS/E 1691)
BB 66 MSA CEMENT (PSS/E 1692)	1 KENYA	2_NAIROBI	66	BB 66 MSA CEMENT (PSS/E 1692)	BB 66 MSA CEMENT (PSS/E 1692)
BB 66 ATHI TEE (PSS/E 1693)	1 KENYA	2_NAIROBI	66	BB 66 ATHI TEE (PSS/E 1693)	BB 66 ATHI TEE (PSS/E 1693)
BB 66 SILVERWOOD (PSS/E 1694)	1 KENYA	2_NAIROBI	66	BB 66 SILVERWOOD (PSS/E 1694)	BB 66 SILVERWOOD (PSS/E 1694)
BB 66 DEVKI CEMENT (PSS/E 1695)	1 KENYA	2_NAIROBI	66	BB 66 DEVKI CEMENT (PSS/E 1695)	BB 66 DEVKI CEMENT (PSS/E 1695)
BB 66 STEEL MAKERS (PSS/E 1696)	1 KENYA	2_NAIROBI	66	BB 66 STEEL MAKERS (PSS/E 1696)	BB 66 STEEL MAKERS (PSS/E 1696)
BB 66 RHINO CEMENT (PSS/E 1697)	1 KENYA	2_NAIROBI	66	BB 66 RHINO CEMENT (PSS/E 1697)	BB 66 RHINO CEMENT (PSS/E 1697)
BB 66 KAPA OIL (PSS/E 1698)	1 KENYA	2_NAIROBI	66	BB 66 KAPA OIL (PSS/E 1698)	BB 66 KAPA OIL (PSS/E 1698)
BB 66 EPZ MSD (PSS/E 1699)	1 KENYA	2_NAIROBI	66	BB 66 EPZ MSD (PSS/E 1699)	BB 66 EPZ MSD (PSS/E 1699)
BB 66 NGONG (PSS/E 1701)	1 KENYA	2_NAIROBI	66	BB 66 NGONG (PSS/E 1701)	BB 66 NGONG (PSS/E 1701)
BB 66 THIKA RD (PSS/E 1702)	1 KENYA	2_NAIROBI	66	BB 66 THIKA RD (PSS/E 1702)	BB 66 THIKA RD (PSS/E 1702)
BB 66 KOMOROCK (PSS/E 1703)	1 KENYA	2_NAIROBI	66	BB 66 KOMOROCK (PSS/E 1703)	BB 66 KOMOROCK (PSS/E 1703)
BB 66 ATHI RIVER (PSS/E 1704)	1 KENYA	2_NAIROBI	66	BB 66 ATHI RIVER (PSS/E 1704)	BB 66 ATHI RIVER (PSS/E 1704)
BB 66 RUAI (PSS/E 1706)	1 KENYA	2_NAIROBI	66	BB 66 RUAI (PSS/E 1706)	BB 66 RUAI (PSS/E 1706)
BB 66 KILE TEE (PSS/E 1707)	1 KENYA	2_NAIROBI	66	BB 66 KILE TEE (PSS/E 1707)	BB 66 KILE TEE (PSS/E 1707)
BB 66 UPPER HILL (PSS/E 1708)	1 KENYA	2_NAIROBI	66	BB 66 UPPER HILL (PSS/E 1708)	BB 66 UPPER HILL (PSS/E 1708)
BB 66 UHILL TEE (PSS/E 1709)	1 KENYA	2_NAIROBI	66	BB 66 UHILL TEE (PSS/E 1709)	BB 66 UHILL TEE (PSS/E 1709)
BB 66 UHILL 2 (PSS/E 1710)	1 KENYA	2_NAIROBI	66	BB 66 UHILL 2 (PSS/E 1710)	BB 66 UHILL 2 (PSS/E 1710)
BB 66 GEN MOTORS (PSS/E 1711)	1 KENYA	2_NAIROBI	66	BB 66 GEN MOTORS (PSS/E 1711)	BB 66 GEN MOTORS (PSS/E 1711)
BB 66 LUNGA LUNGA (PSS/E 1712)	1 KENYA	2_NAIROBI	66	BB 66 LUNGA LUNGA (PSS/E 1712)	BB 66 LUNGA LUNGA (PSS/E 1712)
BB 66 MSA ROAD (PSS/E 1713)	1 KENYA	2_NAIROBI	66	BB 66 MSA ROAD (PSS/E 1713)	BB 66 MSA ROAD (PSS/E 1713)
BB 66 KOMOROCK (PSS/E 1714)	1 KENYA	2_NAIROBI	66	BB 66 KOMOROCK (PSS/E 1714)	BB 66 KOMOROCK (PSS/E 1714)
BB 66 NAT CEMENT (PSS/E 1715)	1 KENYA	2_NAIROBI	66	BB 66 NAT CEMENT (PSS/E 1715)	BB 66 NAT CEMENT (PSS/E 1715)
BB 66 SYOKIMAU (PSS/E 1716)	1 KENYA	2_NAIROBI	66	BB 66 SYOKIMAU (PSS/E 1716)	BB 66 SYOKIMAU (PSS/E 1716)
BB 66 TONONOKA (PSS/E 1717)	1 KENYA	2_NAIROBI	66	BB 66 TONONOKA (PSS/E 1717)	BB 66 TONONOKA (PSS/E 1717)
BB 66 MAI MAHIU (PSS/E 1718)	1 KENYA	2_NAIROBI	66	BB 66 MAI MAHIU (PSS/E 1718)	BB 66 MAI MAHIU (PSS/E 1718)
BB 66 SAVANNAH CMT (PSS/E 1720)	1 KENYA	2_NAIROBI	66	BB 66 SAVANNAH CMT (PSS/E 1720)	BB 66 SAVANNAH CMT (PSS/E 1720)
BB 66 ATR MINING (PSS/E 1721)	1 KENYA	2_NAIROBI	66	BB 66 ATR MINING (PSS/E 1721)	BB 66 ATR MINING (PSS/E 1721)
BB 66 ORBIT (PSS/E 1722)	1 KENYA	2_NAIROBI	66	BB 66 ORBIT (PSS/E 1722)	BB 66 ORBIT (PSS/E 1722)
BB 132 KAMBTFR (PSS/E 1723)	1 KENYA	2_NAIROBI	132	BB 132 KAMBTFR (PSS/E 1723)	BB 132 KAMBTFR (PSS/E 1723)
BB 66 LANGATA (PSS/E 1724)	1 KENYA	2_NAIROBI	66	BB 66 LANGATA (PSS/E 1724)	BB 66 LANGATA (PSS/E 1724)
BB 66 KOM TEE (PSS/E 1725)	1 KENYA	2_NAIROBI	66	BB 66 KOM TEE (PSS/E 1725)	BB 66 KOM TEE (PSS/E 1725)
BB 132 1RABTRF (PSS/E 1726)	1 KENYA	2_NAIROBI	132	BB 132 1RABTRF (PSS/E 1726)	BB 132 1RABTRF (PSS/E 1726)
BB 132 RABAITRF (PSS/E 1727)	1 KENYA	2_NAIROBI	132	BB 132 RABAITRF (PSS/E 1727)	BB 132 RABAITRF (PSS/E 1727)
BB 66 ATHI MSD2 (PSS/E 1728)	1 KENYA	2_NAIROBI	66	BB 66 ATHI MSD2 (PSS/E 1728)	BB 66 ATHI MSD2 (PSS/E 1728)

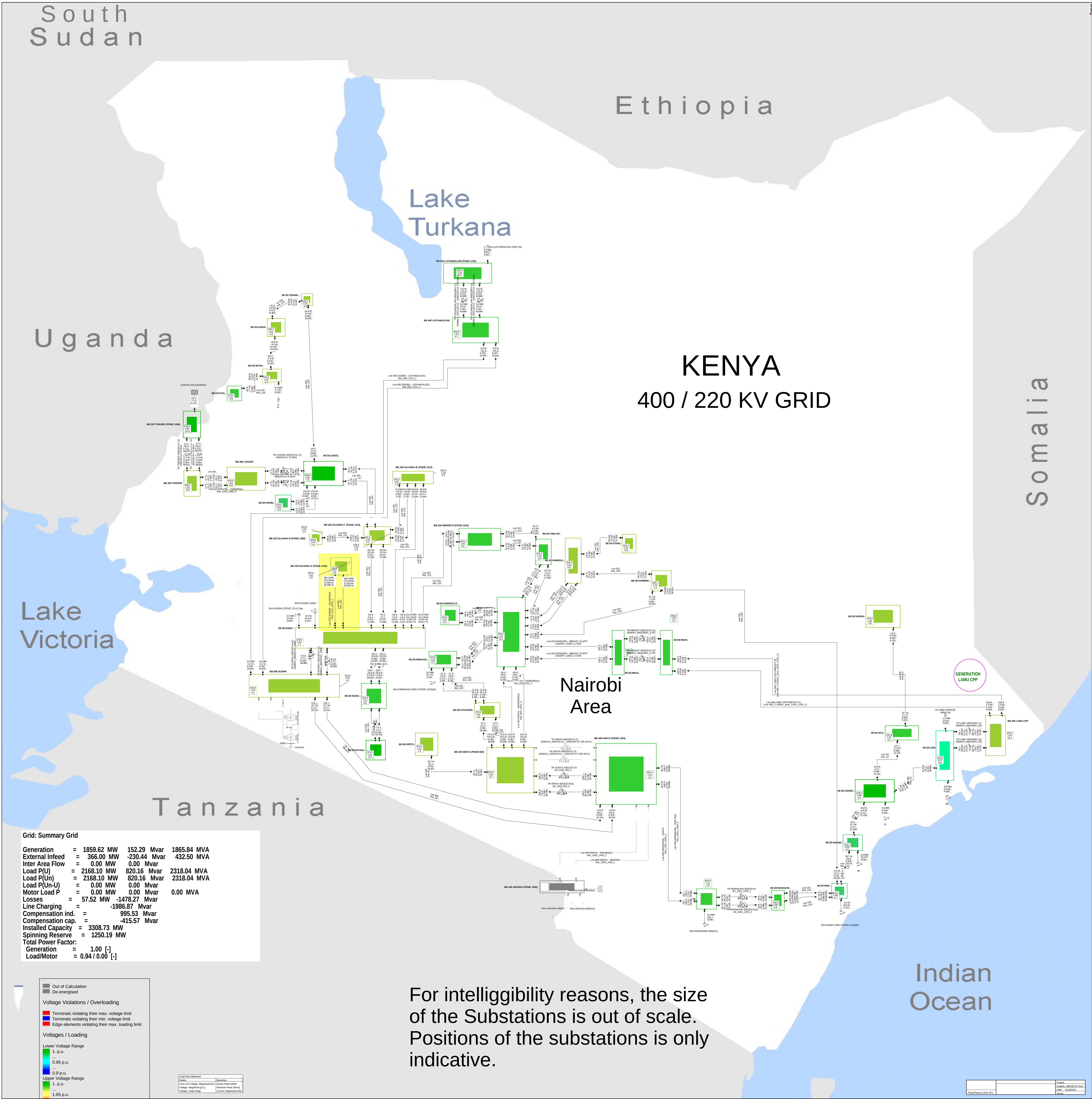
SUBSTATION NAMES AND CODES KENYA MASTERPLAN MTP Upd. 2020					
Name	Grid	Zone ElmZone	Nom.L-L Volt. kV	Station/Name	Node Name
BB 66 NGONG (PSS/E 1730)	1 KENYA	2_NAIROBI	66	BB 66 NGONG (PSS/E 1730)	BB 66 NGONG (PSS/E 1730)
BB 66 ACCURATE ST (PSS/E 1731)	1 KENYA	2_NAIROBI	66	BB 66 ACCURATE ST (PSS/E 1731)	BB 66 ACCURATE ST (PSS/E 1731)
BB 66 EASTLEIGH (PSS/E 1732)	1 KENYA	2_NAIROBI	66	BB 66 EASTLEIGH (PSS/E 1732)	BB 66 EASTLEIGH (PSS/E 1732)
BB 66 DELTA STEEL (PSS/E 1733)	1 KENYA	2_NAIROBI	66	BB 66 DELTA STEEL (PSS/E 1733)	BB 66 DELTA STEEL (PSS/E 1733)
BB 66 KOMOROCK (PSS/E 1734)	1 KENYA	2_NAIROBI	66	BB 66 KOMOROCK (PSS/E 1734)	BB 66 KOMOROCK (PSS/E 1734)
BB 66 KABETE (PSS/E 1737)	1 KENYA	2_NAIROBI	66	BB 66 KABETE (PSS/E 1737)	BB 66 KABETE (PSS/E 1737)
BB 66 KIAMBU RD (PSS/E 1738)	1 KENYA	2_NAIROBI	66	BB 66 KIAMBU RD (PSS/E 1738)	BB 66 KIAMBU RD (PSS/E 1738)
BB 66 NGONG (PSS/E 1741)	1 KENYA	2_NAIROBI	66	BB 66 NGONG (PSS/E 1741)	BB 66 NGONG (PSS/E 1741)
BB 66 LAVINGTON (PSS/E 1742)	1 KENYA	2_NAIROBI	66	BB 66 LAVINGTON (PSS/E 1742)	BB 66 LAVINGTON (PSS/E 1742)
BB 66 LOWER KABETE (PSS/E 1743)	1 KENYA	2_NAIROBI	66	BB 66 LOWER KABETE (PSS/E 1743)	BB 66 LOWER KABETE (PSS/E 1743)
BB 66 UPLANDS (PSS/E 1744)	1 KENYA	2_NAIROBI	66	BB 66 UPLANDS (PSS/E 1744)	BB 66 UPLANDS (PSS/E 1744)
BB 66 CITY SQUARE (PSS/E 1745)	1 KENYA	2_NAIROBI	66	BB 66 CITY SQUARE (PSS/E 1745)	BB 66 CITY SQUARE (PSS/E 1745)
BB 66 LIKONI (PSS/E 1746)	1 KENYA	2_NAIROBI	66	BB 66 LIKONI (PSS/E 1746)	BB 66 LIKONI (PSS/E 1746)
BB 66 LIKONI (PSS/E 1747)	1 KENYA	2_NAIROBI	66	BB 66 LIKONI (PSS/E 1747)	BB 66 LIKONI (PSS/E 1747)
BB 66 LIKONI RD (PSS/E 1748)	1 KENYA	2_NAIROBI	66	BB 66 LIKONI RD (PSS/E 1748)	BB 66 LIKONI RD (PSS/E 1748)
BB 66 LIKONI RD (PSS/E 1749)	1 KENYA	2_NAIROBI	66	BB 66 LIKONI RD (PSS/E 1749)	BB 66 LIKONI RD (PSS/E 1749)
BB 66 VILLA FRANCA (PSS/E 1750)	1 KENYA	2_NAIROBI	66	BB 66 VILLA FRANCA (PSS/E 1750)	BB 66 VILLA FRANCA (PSS/E 1750)
BB 66 VILLA FRANCA (PSS/E 1751)	1 KENYA	2_NAIROBI	66	BB 66 VILLA FRANCA (PSS/E 1751)	BB 66 VILLA FRANCA (PSS/E 1751)
BB 66 DRIVE IN (PSS/E 1752)	1 KENYA	2_NAIROBI	66	BB 66 DRIVE IN (PSS/E 1752)	BB 66 DRIVE IN (PSS/E 1752)
BB 66 MUTHURWA (PSS/E 1753)	1 KENYA	2_NAIROBI	66	BB 66 MUTHURWA (PSS/E 1753)	BB 66 MUTHURWA (PSS/E 1753)
BB 66 MUTHURWA (PSS/E 1754)	1 KENYA	2_NAIROBI	66	BB 66 MUTHURWA (PSS/E 1754)	BB 66 MUTHURWA (PSS/E 1754)
BB 66 ATHI MP (PSS/E 1755)	1 KENYA	2_NAIROBI	66	BB 66 ATHI MP (PSS/E 1755)	BB 66 ATHI MP (PSS/E 1755)
BB 66 MATASIA BSP (PSS/E 1756)	1 KENYA	2_NAIROBI	66	BB 66 MATASIA BSP (PSS/E 1756)	BB 66 MATASIA BSP (PSS/E 1756)
BB 11 RUARAK1 (PSS/E 1801)	1 KENYA	2_NAIROBI	11	BB 11 RUARAK1 (PSS/E 1801)	BB 11 RUARAK1 (PSS/E 1801)
BB 11 RUARAK2 (PSS/E 1802)	1 KENYA	2_NAIROBI	11	BB 11 RUARAK2 (PSS/E 1802)	BB 11 RUARAK2 (PSS/E 1802)
BB 11 KILELE1 (PSS/E 1810)	1 KENYA	2_NAIROBI	11	BB 11 KILELE1 (PSS/E 1810)	BB 11 KILELE1 (PSS/E 1810)
BB 11 INDUST1 (PSS/E 1816)	1 KENYA	2_NAIROBI	11	BB 11 INDUST1 (PSS/E 1816)	BB 11 INDUST1 (PSS/E 1816)
BB 11 INDUST2 (PSS/E 1817)	1 KENYA	2_NAIROBI	11	BB 11 INDUST2 (PSS/E 1817)	BB 11 INDUST2 (PSS/E 1817)
BB 11 EPZ (PSS/E 1833)	1 KENYA	2_NAIROBI	11	BB 11 EPZ (PSS/E 1833)	BB 11 EPZ (PSS/E 1833)
BB 11 CIANDA11 (PSS/E 1840)	1 KENYA	2_NAIROBI	11	BB 11 CIANDA11 (PSS/E 1840)	BB 11 CIANDA11 (PSS/E 1840)
BB 11 RUIRU1 11 (PSS/E 1841)	1 KENYA	2_NAIROBI	11	BB 11 RUIRU1 11 (PSS/E 1841)	BB 11 RUIRU1 11 (PSS/E 1841)
BB 11 RUIRU2 11 (PSS/E 1842)	1 KENYA	2_NAIROBI	11	BB 11 RUIRU2 11 (PSS/E 1842)	BB 11 RUIRU2 11 (PSS/E 1842)
BB 11 BABADOGO (PSS/E 1850)	1 KENYA	2_NAIROBI	11	BB 11 BABADOGO (PSS/E 1850)	BB 11 BABADOGO (PSS/E 1850)
BB 11 BABADOGO 2 (PSS/E 1851)	1 KENYA	2_NAIROBI	11	BB 11 BABADOGO 2 (PSS/E 1851)	BB 11 BABADOGO 2 (PSS/E 1851)
BB 11 KIMATHI 2 (PSS/E 1853)	1 KENYA	2_NAIROBI	11	BB 11 KIMATHI 2 (PSS/E 1853)	BB 11 KIMATHI 2 (PSS/E 1853)
BB 11 KIMATHI 1 (PSS/E 1854)	1 KENYA	2_NAIROBI	11	BB 11 KIMATHI 1 (PSS/E 1854)	BB 11 KIMATHI 1 (PSS/E 1854)
BB 11 WESTLANDS2 (PSS/E 1855)	1 KENYA	2_NAIROBI	11	BB 11 WESTLANDS2 (PSS/E 1855)	BB 11 WESTLANDS2 (PSS/E 1855)
BB 11 WESTLANDS1 (PSS/E 1856)	1 KENYA	2_NAIROBI	11	BB 11 WESTLANDS1 (PSS/E 1856)	BB 11 WESTLANDS1 (PSS/E 1856)
BB 11 NGONG RD (PSS/E 1857)	1 KENYA	2_NAIROBI	11	BB 11 NGONG RD (PSS/E 1857)	BB 11 NGONG RD (PSS/E 1857)
BB 11 NGONG RD (PSS/E 1858)	1 KENYA	2_NAIROBI	11	BB 11 NGONG RD (PSS/E 1858)	BB 11 NGONG RD (PSS/E 1858)
BB 11 NSSF (PSS/E 1859)	1 KENYA	2_NAIROBI	11	BB 11 NSSF (PSS/E 1859)	BB 11 NSSF (PSS/E 1859)
BB 11 KIAMBU RD (PSS/E 1860)	1 KENYA	2_NAIROBI	11	BB 11 KIAMBU RD (PSS/E 1860)	BB 11 KIAMBU RD (PSS/E 1860)
BB 11 KABETE (PSS/E 1861)	1 KENYA	2_NAIROBI	11	BB 11 KABETE (PSS/E 1861)	BB 11 KABETE (PSS/E 1861)
BB 11 NGONG (PSS/E 1862)	1 KENYA	2_NAIROBI	11	BB 11 NGONG (PSS/E 1862)	BB 11 NGONG (PSS/E 1862)
BB 11 UHILL1 (PSS/E 1863)	1 KENYA	2_NAIROBI	11	BB 11 UHILL1 (PSS/E 1863)	BB 11 UHILL1 (PSS/E 1863)
BB 11 UHILL2 (PSS/E 1864)	1 KENYA	2_NAIROBI	11	BB 11 UHILL2 (PSS/E 1864)	BB 11 UHILL2 (PSS/E 1864)
BB 11 KOMOROCK (PSS/E 1865)	1 KENYA	2_NAIROBI	11	BB 11 KOMOROCK (PSS/E 1865)	BB 11 KOMOROCK (PSS/E 1865)
BB 11 RUAI (PSS/E 1866)	1 KENYA	2_NAIROBI	11	BB 11 RUAI (PSS/E 1866)	BB 11 RUAI (PSS/E 1866)
BB 11 MAI MAHIU (PSS/E 1867)	1 KENYA	2_NAIROBI	11	BB 11 MAI MAHIU (PSS/E 1867)	BB 11 MAI MAHIU (PSS/E 1867)
BB 11 LANGATA (PSS/E 1868)	1 KENYA	2_NAIROBI	11	BB 11 LANGATA (PSS/E 1868)	BB 11 LANGATA (PSS/E 1868)
BB 11 THIKA RD (PSS/E 1869)	1 KENYA	2_NAIROBI	11	BB 11 THIKA RD (PSS/E 1869)	BB 11 THIKA RD (PSS/E 1869)
BB 11 NGONG (PSS/E 1870)	1 KENYA	2_NAIROBI	11	BB 11 NGONG (PSS/E 1870)	BB 11 NGONG (PSS/E 1870)
BB 11 KITENGELA (PSS/E 1871)	1 KENYA	2_NAIROBI	11	BB 11 KITENGELA (PSS/E 1871)	BB 11 KITENGELA (PSS/E 1871)
BB 11 G3EN MOTORS (PSS/E 1872)	1 KENYA	2_NAIROBI	11	BB 11 G3EN MOTORS (PSS/E 1872)	BB 11 G3EN MOTORS (PSS/E 1872)
BB 11 GEN MOTORS (PSS/E 1873)	1 KENYA	2_NAIROBI	11	BB 11 GEN MOTORS (PSS/E 1873)	BB 11 GEN MOTORS (PSS/E 1873)
BB 11 LUNGA LUNGA (PSS/E 1874)	1 KENYA	2_NAIROBI	11	BB 11 LUNGA LUNGA (PSS/E 1874)	BB 11 LUNGA LUNGA (PSS/E 1874)
BB 11 LUNGA LUNGA (PSS/E 1875)	1 KENYA	2_NAIROBI	11	BB 11 LUNGA LUNGA (PSS/E 1875)	BB 11 LUNGA LUNGA (PSS/E 1875)
BB 11 EASTLEIGH (PSS/E 1876)	1 KENYA	2_NAIROBI	11	BB 11 EASTLEIGH (PSS/E 1876)	BB 11 EASTLEIGH (PSS/E 1876)
BB 11 LAVINGTON (PSS/E 1877)	1 KENYA	2_NAIROBI	11	BB 11 LAVINGTON (PSS/E 1877)	BB 11 LAVINGTON (PSS/E 1877)
BB 11 LOWER KABETE (PSS/E 1878)	1 KENYA	2_NAIROBI	11	BB 11 LOWER KABETE (PSS/E 1878)	BB 11 LOWER KABETE (PSS/E 1878)
BB 11 UPLANDS (PSS/E 1879)	1 KENYA	2_NAIROBI	11	BB 11 UPLANDS (PSS/E 1879)	BB 11 UPLANDS (PSS/E 1879)
BB 11 CITY SQUARE (PSS/E 1880)	1 KENYA	2_NAIROBI	11	BB 11 CITY SQUARE (PSS/E 1880)	BB 11 CITY SQUARE (PSS/E 1880)
BB 11 LIKONI RD (PSS/E 1881)	1 KENYA	2_NAIROBI	11	BB 11 LIKONI RD (PSS/E 1881)	BB 11 LIKONI RD (PSS/E 1881)
BB 11 VILLA FRANCA (PSS/E 1882)	1 KENYA	2_NAIROBI	11	BB 11 VILLA FRANCA (PSS/E 1882)	BB 11 VILLA FRANCA (PSS/E 1882)
BB 11 DRIVE IN (PSS/E 1883)	1 KENYA	2_NAIROBI	11	BB 11 DRIVE IN (PSS/E 1883)	BB 11 DRIVE IN (PSS/E 1883)
BB 11 MUTHURWA (PSS/E 1884)	1 KENYA	2_NAIROBI	11	BB 11 MUTHURWA (PSS/E 1884)	BB 11 MUTHURWA (PSS/E 1884)
BB 11 MUTHURWA (PSS/E 1885)	1 KENYA	2_NAIROBI	11	BB 11 MUTHURWA (PSS/E 1885)	BB 11 MUTHURWA (PSS/E 1885)
BB 11 SYOKIMAU (PSS/E 1886)	1 KENYA	2_NAIROBI	11	BB 11 SYOKIMAU (PSS/E 1886)	BB 11 SYOKIMAU (PSS/E 1886)
BB 11 1DAND11 (PSS/E 1921)	1 KENYA	2_NAIROBI	11	BB 11 1DAND11 (PSS/E 1921)	BB 11 1DAND11 (PSS/E 1921)
BB 220 ISINYA (PSS/E 820)	1 KENYA	2_NAIROBI	220	BB 220 ISINYA (PSS/E 820)	BB 220 ISINYA (PSS/E 820)
BB 220 NBEAST (MTP)	1 KENYA	2_NAIROBI	220	BB 220 NBEAST (MTP)	BB 220 NBEAST (MTP)
BB 400 NBEAST (MTP)	1 KENYA	2_NAIROBI	400	BB 400 NBEAST (MTP)	BB 400 NBEAST (MTP)
BB 11 1KIPE6 (PSS/E 1012)	1 KENYA	4_COAST	11	BB 11 1KIPE6 (PSS/E 1012)	BB 11 1KIPE6 (PSS/E 1012)
BB 11 1KIPE7 (PSS/E 1013)	1 KENYA	4_COAST	11	BB 11 1KIPE7 (PSS/E 1013)	BB 11 1KIPE7 (PSS/E 1013)
BB 11 1KIPD I (PSS/E 1016)	1 KENYA	4_COAST	11	BB 11 1KIPD I (PSS/E 1016)	BB 11 1KIPD I (PSS/E 1016)
BB 11 2KIPD I (PSS/E 1017)	1 KENYA	4_COAST	11	BB 11 2KIPD I (PSS/E 1017)	BB 11 2KIPD I (PSS/E 1017)
BB 11 3KIPD I (PSS/E 1018)	1 KENYA	4_COAST	11	BB 11 3KIPD I (PSS/E 1018)	BB 11 3KIPD I (PSS/E 1018)
BB 11 1KIPD II (PSS/E 1019)	1 KENYA	4_COAST	11	BB 11 1KIPD II (PSS/E 1019)	BB 11 1KIPD II (PSS/E 1019)
BB 11 2KIPD II (PSS/E 1020)	1 KENYA	4_COAST	11	BB 11 2KIPD II (PSS/E 1020)	BB 11 2KIPD II (PSS/E 1020)
BB 11 KIPEVU III (PSS/E 1023)	1 KENYA	4_COAST	11	BB 11 KIPEVU III (PSS/E 1023)	BB 11 KIPEVU III (PSS/E 1023)
BB 11 KIPEVU III (PSS/E 1024)	1 KENYA	4_COAST	11	BB 11 KIPEVU III (PSS/E 1024)	BB 11 KIPEVU III (PSS/E 1024)
BB 11 RABAI POWER (PSS/E 1056)	1 KENYA	4_COAST	11	BB 11 RABAI POWER (PSS/E 1056)	BB 11 RABAI POWER (PSS/E 1056)
BB 11 RABAI POWER (PSS/E 1057)	1 KENYA	4_COAST	11	BB 11 RABAI POWER (PSS/E 1057)	BB 11 RABAI POWER (PSS/E 1057)
BB 11 KWALE SUGAR (PSS/E 1062)	1 KENYA	4_COAST	11	BB 11 KWALE SUGAR (PSS/E 1062)	BB 11 KWALE SUGAR (PSS/E 1062)
BB 11 MARK GN1 (PSS/E 1081)	1 KENYA	4_COAST	11	BB 11 MARK GN1 (PSS/E 1081)	BB 11 MARK GN1 (PSS/E 1081)

SUBSTATION NAMES AND CODES KENYA MASTERPLAN MTP Upd. 2020					
Name	Grid	Zone ElmZone	Norm.L-L Volt. kv	Station/Name	Node Name
BB 11 MARKN GN2 (PSS/E 1082)	1 KENYA	4_COAST	11	BB 11 MARKN GN2 (PSS/E 1082)	BB 11 MARKN GN2 (PSS/E 1082)
BB 132 ULU (PSS/E 1113)	1 KENYA	4_COAST	132	BB 132 ULU (PSS/E 1113)	BB 132 ULU (PSS/E 1113)
BB 132 KIPEVU (PSS/E 1114)	1 KENYA	4_COAST	132	BB 132 KIPEVU (PSS/E 1114)	BB 132 KIPEVU (PSS/E 1114)
BB 132 MANYANI (PSS/E 1115)	1 KENYA	4_COAST	132	BB 132 MANYANI (PSS/E 1115)	BB 132 MANYANI (PSS/E 1115)
BB 132 SAMBURU (PSS/E 1118)	1 KENYA	4_COAST	132	BB 132 SAMBURU (PSS/E 1118)	BB 132 SAMBURU (PSS/E 1118)
BB 132 KIPEVU DII (PSS/E 1119)	1 KENYA	4_COAST	132	BB 132 KIPEVU DII (PSS/E 1119)	BB 132 KIPEVU DII (PSS/E 1119)
BB 132 KOKOTONI (PSS/E 1122)	1 KENYA	4_COAST	132	BB 132 KOKOTONI (PSS/E 1122)	BB 132 KOKOTONI (PSS/E 1122)
BB 132 MTWAPA (PSS/E 1123)	1 KENYA	4_COAST	132	BB 132 MTWAPA (PSS/E 1123)	BB 132 MTWAPA (PSS/E 1123)
BB 132 RABAI (PSS/E 1126)	1 KENYA	4_COAST	132	BB 132 RABAI (PSS/E 1126)	BB 132 RABAI (PSS/E 1126)
BB 132 KILIFI (PSS/E 1134)	1 KENYA	4_COAST	132	BB 132 KILIFI (PSS/E 1134)	BB 132 KILIFI (PSS/E 1134)
BB 132 BAMBURI (PSS/E 1136)	1 KENYA	4_COAST	132	BB 132 BAMBURI (PSS/E 1136)	BB 132 BAMBURI (PSS/E 1136)
BB 132 KIBOKO (PSS/E 1144)	1 KENYA	4_COAST	132	BB 132 KIBOKO (PSS/E 1144)	BB 132 KIBOKO (PSS/E 1144)
BB 132 MTITO ANDEI (PSS/E 1145)	1 KENYA	4_COAST	132	BB 132 MTITO ANDEI (PSS/E 1145)	BB 132 MTITO ANDEI (PSS/E 1145)
BB 132 MAUNGU (PSS/E 1147)	1 KENYA	4_COAST	132	BB 132 MAUNGU (PSS/E 1147)	BB 132 MAUNGU (PSS/E 1147)
BB 132 MARIKANI (PSS/E 1148)	1 KENYA	4_COAST	132	BB 132 MARIKANI (PSS/E 1148)	BB 132 MARIKANI (PSS/E 1148)
BB 132 GALU (PSS/E 1156)	1 KENYA	4_COAST	132	BB 132 GALU (PSS/E 1156)	BB 132 GALU (PSS/E 1156)
BB 132 WAJIR (PSS/E 1169)	1 KENYA	4_COAST	132	BB 132 WAJIR (PSS/E 1169)	BB 132 WAJIR (PSS/E 1169)
BB 132 TAVETA (PSS/E 1171)	1 KENYA	4_COAST	132	BB 132 TAVETA (PSS/E 1171)	BB 132 TAVETA (PSS/E 1171)
BB 132 GARISSA (PSS/E 1187)	1 KENYA	4_COAST	132	BB 132 GARISSA (PSS/E 1187)	BB 132 GARISSA (PSS/E 1187)
BB 132 LUNGA LUNGA (PSS/E 1197)	1 KENYA	4_COAST	132	BB 132 LUNGA LUNGA (PSS/E 1197)	BB 132 LUNGA LUNGA (PSS/E 1197)
BB 220 RABAI (PSS/E 1226)	1 KENYA	4_COAST	220	BB 220 RABAI (PSS/E 1226)	BB 220 RABAI (PSS/E 1226)
BB 220 MARIKANI (PSS/E 1250)	1 KENYA	4_COAST	220	BB 220 MARIKANI (PSS/E 1250)	BB 220 MARIKANI (PSS/E 1250)
BB 220 MALINDI (PSS/E 1254)	1 KENYA	4_COAST	220	BB 220 MALINDI (PSS/E 1254)	BB 220 MALINDI (PSS/E 1254)
BB 220 GARSEN (PSS/E 1255)	1 KENYA	4_COAST	220	BB 220 GARSEN (PSS/E 1255)	BB 220 GARSEN (PSS/E 1255)
BB 220 LAMU (PSS/E 1256)	1 KENYA	4_COAST	220	BB 220 LAMU (PSS/E 1256)	BB 220 LAMU (PSS/E 1256)
BB 220 GARISSA (PSS/E 1295)	1 KENYA	4_COAST	220	BB 220 GARISSA (PSS/E 1295)	BB 220 GARISSA (PSS/E 1295)
BB 220 HOLA (PSS/E 1296)	1 KENYA	4_COAST	220	BB 220 HOLA (PSS/E 1296)	BB 220 HOLA (PSS/E 1296)
BB 33 1KIP33 (PSS/E 1314)	1 KENYA	4_COAST	33	BB 33 1KIP33 (PSS/E 1314)	BB 33 1KIP33 (PSS/E 1314)
BB 33 SULTAN HAMUD (PSS/E 1317)	1 KENYA	4_COAST	33	BB 33 SULTAN HAMUD (PSS/E 1317)	BB 33 SULTAN HAMUD (PSS/E 1317)
BB 33 RABAI33 (PSS/E 1325)	1 KENYA	4_COAST	33	BB 33 RABAI33 (PSS/E 1325)	BB 33 RABAI33 (PSS/E 1325)
BB 33 RABAI33 (PSS/E 1326)	1 KENYA	4_COAST	33	BB 33 RABAI33 (PSS/E 1326)	BB 33 RABAI33 (PSS/E 1326)
BB 33 KILIFI (PSS/E 1345)	1 KENYA	4_COAST	33	BB 33 KILIFI (PSS/E 1345)	BB 33 KILIFI (PSS/E 1345)
BB 33 GALU (PSS/E 1346)	1 KENYA	4_COAST	33	BB 33 GALU (PSS/E 1346)	BB 33 GALU (PSS/E 1346)
BB 33 WAJIR (PSS/E 1347)	1 KENYA	4_COAST	33	BB 33 WAJIR (PSS/E 1347)	BB 33 WAJIR (PSS/E 1347)
BB 33 MAKANDE (PSS/E 1355)	1 KENYA	4_COAST	33	BB 33 MAKANDE (PSS/E 1355)	BB 33 MAKANDE (PSS/E 1355)
BB 33 BAMBURI (PSS/E 1364)	1 KENYA	4_COAST	33	BB 33 BAMBURI (PSS/E 1364)	BB 33 BAMBURI (PSS/E 1364)
BB 33 MTWAPA (PSS/E 1365)	1 KENYA	4_COAST	33	BB 33 MTWAPA (PSS/E 1365)	BB 33 MTWAPA (PSS/E 1365)
BB 33 HOLA (PSS/E 1366)	1 KENYA	4_COAST	33	BB 33 HOLA (PSS/E 1366)	BB 33 HOLA (PSS/E 1366)
BB 33 MALINDI (PSS/E 1378)	1 KENYA	4_COAST	33	BB 33 MALINDI (PSS/E 1378)	BB 33 MALINDI (PSS/E 1378)
BB 33 GARSEN (PSS/E 1379)	1 KENYA	4_COAST	33	BB 33 GARSEN (PSS/E 1379)	BB 33 GARSEN (PSS/E 1379)
BB 33 LAMU (PSS/E 1380)	1 KENYA	4_COAST	33	BB 33 LAMU (PSS/E 1380)	BB 33 LAMU (PSS/E 1380)
BB 33 GARISSA (PSS/E 1383)	1 KENYA	4_COAST	33	BB 33 GARISSA (PSS/E 1383)	BB 33 GARISSA (PSS/E 1383)
BB 33 LUNGA (PSS/E 1399)	1 KENYA	4_COAST	33	BB 33 LUNGA (PSS/E 1399)	BB 33 LUNGA (PSS/E 1399)
BB 400 MARIKANI (PSS/E 1401)	1 KENYA	4_COAST	400	BB 400 MARIKANI (PSS/E 1401)	BB 400 MARIKANI (PSS/E 1401)
BB 66 INDTEE2 (PSS/E 1618)	1 KENYA	4_COAST	66	BB 66 INDTEE2 (PSS/E 1618)	BB 66 INDTEE2 (PSS/E 1618)
BB 66 EMBTEE2 (PSS/E 1619)	1 KENYA	4_COAST	66	BB 66 EMBTEE2 (PSS/E 1619)	BB 66 EMBTEE2 (PSS/E 1619)
BB 11 1RAB11 (PSS/E 1926)	1 KENYA	4_COAST	11	BB 11 1RAB11 (PSS/E 1926)	BB 11 1RAB11 (PSS/E 1926)
BB 400 LAMU CPP	1 KENYA	4_COAST	400	BB 400 LAMU CPP	BB 400 LAMU CPP
BB 220 LAMU CPP	1 KENYA	4_COAST	220	BB 220 LAMU CPP	BB 220 LAMU CPP
BB 132 VOI (PSS/E 1146)	1 KENYA	4_COAST	132	BB 132 VOI (PSS/E 1146)	BB 132 VOI (PSS/E 1146)
BB 132 MERU WF	1 KENYA	5_MT KENYA	132	WF/BB 132 MERU WF	WF _1
BB 11 1KINDAG (PSS/E 1001)	1 KENYA	5_MT KENYA	11	BB 11 1KINDAG (PSS/E 1001)	BB 11 1KINDAG (PSS/E 1001)
BB 15 GITARU 1&2 (PSS/E 1002)	1 KENYA	5_MT KENYA	15	BB 15 GITARU 1&2 (PSS/E 1002)	BB 15 GITARU 1&2 (PSS/E 1002)
BB 11 KAMBURU (PSS/E 1003)	1 KENYA	5_MT KENYA	11	BB 11 KAMBURU (PSS/E 1003)	BB 11 KAMBURU (PSS/E 1003)
BB 11 MASINGA (PSS/E 1004)	1 KENYA	5_MT KENYA	11	BB 11 MASINGA (PSS/E 1004)	BB 11 MASINGA (PSS/E 1004)
BB 11 KIAMBERE (PSS/E 1005)	1 KENYA	5_MT KENYA	11	BB 11 KIAMBERE (PSS/E 1005)	BB 11 KIAMBERE (PSS/E 1005)
BB 15 GITARU3 (PSS/E 1009)	1 KENYA	5_MT KENYA	15	BB 15 GITARU3 (PSS/E 1009)	BB 15 GITARU3 (PSS/E 1009)
BB 11 THIKA PP (PSS/E 1085)	1 KENYA	5_MT KENYA	11	BB 11 THIKA PP (PSS/E 1085)	BB 11 THIKA PP (PSS/E 1085)
BB 11 THIKA PP (PSS/E 1086)	1 KENYA	5_MT KENYA	11	BB 11 THIKA PP (PSS/E 1086)	BB 11 THIKA PP (PSS/E 1086)
BB 132 KINDARUMA (PSS/E 1101)	1 KENYA	5_MT KENYA	132	BB 132 KINDARUMA (PSS/E 1101)	BB 132 KINDARUMA (PSS/E 1101)
BB 132 GITARU (PSS/E 1102)	1 KENYA	5_MT KENYA	132	BB 132 GITARU (PSS/E 1102)	BB 132 GITARU (PSS/E 1102)
BB 132 KAMBURU (PSS/E 1103)	1 KENYA	5_MT KENYA	132	BB 132 KAMBURU (PSS/E 1103)	BB 132 KAMBURU (PSS/E 1103)
BB 132 MASINGA (PSS/E 1104)	1 KENYA	5_MT KENYA	132	BB 132 MASINGA (PSS/E 1104)	BB 132 MASINGA (PSS/E 1104)
BB 132 THIKA (PSS/E 11160)	1 KENYA	5_MT KENYA	132	BB 132 THIKA (PSS/E 11160)	BB 132 THIKA (PSS/E 11160)
BB 132 KIGANJO (PSS/E 1132)	1 KENYA	5_MT KENYA	132	BB 132 KIGANJO (PSS/E 1132)	BB 132 KIGANJO (PSS/E 1132)
BB 132 NANYUKI (PSS/E 1133)	1 KENYA	5_MT KENYA	132	BB 132 NANYUKI (PSS/E 1133)	BB 132 NANYUKI (PSS/E 1133)
BB 132 CHOGORIA (PSS/E 1135)	1 KENYA	5_MT KENYA	132	BB 132 CHOGORIA (PSS/E 1135)	BB 132 CHOGORIA (PSS/E 1135)
BB 132 KYENI (PSS/E 1158)	1 KENYA	5_MT KENYA	132	BB 132 KYENI (PSS/E 1158)	BB 132 KYENI (PSS/E 1158)
BB 132 ISHIARA (PSS/E 1159)	1 KENYA	5_MT KENYA	132	BB 132 ISHIARA (PSS/E 1159)	BB 132 ISHIARA (PSS/E 1159)
BB 132 KUTUS (PSS/E 1162)	1 KENYA	5_MT KENYA	132	BB 132 KUTUS (PSS/E 1162)	BB 132 KUTUS (PSS/E 1162)
BB 132 MERU (PSS/E 1163)	1 KENYA	5_MT KENYA	132	BB 132 MERU (PSS/E 1163)	BB 132 MERU (PSS/E 1163)
BB 132 GITHAMBO (PSS/E 1182)	1 KENYA	5_MT KENYA	132	BB 132 GITHAMBO (PSS/E 1182)	BB 132 GITHAMBO (PSS/E 1182)
BB 132 MWINGI (PSS/E 1184)	1 KENYA	5_MT KENYA	132	BB 132 MWINGI (PSS/E 1184)	BB 132 MWINGI (PSS/E 1184)
BB 132 WOTE (PSS/E 1186)	1 KENYA	5_MT KENYA	132	BB 132 WOTE (PSS/E 1186)	BB 132 WOTE (PSS/E 1186)
BB 132 ISIOLO (PSS/E 1189)	1 KENYA	5_MT KENYA	132	BB 132 ISIOLO (PSS/E 1189)	BB 132 ISIOLO (PSS/E 1189)
BB 132 KITUI (PSS/E 1190)	1 KENYA	5_MT KENYA	132	BB 132 KITUI (PSS/E 1190)	BB 132 KITUI (PSS/E 1190)
BB 132 MAUA (PSS/E 1198)	1 KENYA	5_MT KENYA	132	BB 132 MAUA (PSS/E 1198)	BB 132 MAUA (PSS/E 1198)
BB 220 KAMBURU (PSS/E 1203)	1 KENYA	5_MT KENYA	220	BB 220 KAMBURU (PSS/E 1203)	BB 220 KAMBURU (PSS/E 1203)
BB 220 KIAMBERE (PSS/E 1205)	1 KENYA	5_MT KENYA	220	BB 220 KIAMBERE (PSS/E 1205)	BB 220 KIAMBERE (PSS/E 1205)
BB 220 GITARU (PSS/E 1209)	1 KENYA	5_MT KENYA	220	BB 220 GITARU (PSS/E 1209)	BB 220 GITARU (PSS/E 1209)
BB 33 KAMBURU (PSS/E 1303)	1 KENYA	5_MT KENYA	33	BB 33 KAMBURU (PSS/E 1303)	BB 33 KAMBURU (PSS/E 1303)
BB 33 CHOGORIA (PSS/E 1318)	1 KENYA	5_MT KENYA	33	BB 33 CHOGORIA (PSS/E 1318)	BB 33 CHOGORIA (PSS/E 1318)
BB 33 TANATX1 (PSS/E 1334)	1 KENYA	5_MT KENYA	33	BB 33 TANATX1 (PSS/E 1334)	BB 33 TANATX1 (PSS/E 1334)
BB 33 TANATX2 (PSS/E 1336)	1 KENYA	5_MT KENYA	33	BB 33 TANATX2 (PSS/E 1336)	BB 33 TANATX2 (PSS/E 1336)
BB 33 KIGA33 (PSS/E 1352)	1 KENYA	5_MT KENYA	33	BB 33 KIGA33 (PSS/E 1352)	BB 33 KIGA33 (PSS/E 1352)

SUBSTATION NAMES AND CODES KENYA MASTERPLAN MTP Upd. 2020					
Name	Grid	Zone ElmZone	Nom.L-L Volt. kV	Station/Name	Node Name
BB 33 NANYU33 (PSS/E 1353)	1 KENYA	5_MT KENYA	33	BB 33 NANYU33 (PSS/E 1353)	BB 33 NANYU33 (PSS/E 1353)
BB 33 KINDARUMA (PSS/E 1354)	1 KENYA	5_MT KENYA	33	BB 33 KINDARUMA (PSS/E 1354)	BB 33 KINDARUMA (PSS/E 1354)
BB 33 GITHAMBO (PSS/E 1357)	1 KENYA	5_MT KENYA	33	BB 33 GITHAMBO (PSS/E 1357)	BB 33 GITHAMBO (PSS/E 1357)
BB 33 MERU (PSS/E 1360)	1 KENYA	5_MT KENYA	33	BB 33 MERU (PSS/E 1360)	BB 33 MERU (PSS/E 1360)
BB 33 THIKA IND (PSS/E 1361)	1 KENYA	5_MT KENYA	33	BB 33 THIKA IND (PSS/E 1361)	BB 33 THIKA IND (PSS/E 1361)
BB 33 ISIOLO (PSS/E 1367)	1 KENYA	5_MT KENYA	33	BB 33 ISIOLO (PSS/E 1367)	BB 33 ISIOLO (PSS/E 1367)
BB 33 MAUA (PSS/E 1373)	1 KENYA	5_MT KENYA	33	BB 33 MAUA (PSS/E 1373)	BB 33 MAUA (PSS/E 1373)
BB 33 MWINGI (PSS/E 1381)	1 KENYA	5_MT KENYA	33	BB 33 MWINGI (PSS/E 1381)	BB 33 MWINGI (PSS/E 1381)
BB 33 KITUI (PSS/E 1387)	1 KENYA	5_MT KENYA	33	BB 33 KITUI (PSS/E 1387)	BB 33 KITUI (PSS/E 1387)
BB 33 WOTE (PSS/E 1388)	1 KENYA	5_MT KENYA	33	BB 33 WOTE (PSS/E 1388)	BB 33 WOTE (PSS/E 1388)
BB 33 KYENI (PSS/E 1389)	1 KENYA	5_MT KENYA	33	BB 33 KYENI (PSS/E 1389)	BB 33 KYENI (PSS/E 1389)
BB 33 KUTUS (PSS/E 1392)	1 KENYA	5_MT KENYA	33	BB 33 KUTUS (PSS/E 1392)	BB 33 KUTUS (PSS/E 1392)
BB 66 MANGU1 (PSS/E 1673)	1 KENYA	5_MT KENYA	66	BB 66 MANGU1 (PSS/E 1673)	BB 66 MANGU1 (PSS/E 1673)
BB 66 MANGU 2 (PSS/E 1686)	1 KENYA	5_MT KENYA	66	BB 66 MANGU 2 (PSS/E 1686)	BB 66 MANGU 2 (PSS/E 1686)
BB 66 THIKA IND (PSS/E 1735)	1 KENYA	5_MT KENYA	66	BB 66 THIKA IND (PSS/E 1735)	BB 66 THIKA IND (PSS/E 1735)
BB 66 THIKA IND (PSS/E 1736)	1 KENYA	5_MT KENYA	66	BB 66 THIKA IND (PSS/E 1736)	BB 66 THIKA IND (PSS/E 1736)
BB 11 1KAM11 (PSS/E 1903)	1 KENYA	5_MT KENYA	11	BB 11 1KAM11 (PSS/E 1903)	BB 11 1KAM11 (PSS/E 1903)
BB 132 KILIMAMBOGO	1 KENYA	5_MT KENYA	132	BB 132 KILIMAMBOGO	BB 132 KILIMAMBOGO
BB 33 MERU WPP-S/S (1)	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP-S/S (1)	BB 33 MERU WPP-S/S (1)
BB 33 MERU WPP-S/S (2)	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP-S/S (2)	BB 33 MERU WPP-S/S (2)
BB 33 MERU WPP F1	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP F1	BB 33 MERU WPP F1
BB 33 MERU WPP F4	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP F4	BB 33 MERU WPP F4
BB 0.69 MERU WPP F4	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F4	BB 0.69 MERU WPP F4
BB 0.69 MERU WPP F1	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F1	BB 0.69 MERU WPP F1
BB 33 MERU WPP F3	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP F3	BB 33 MERU WPP F3
BB 0.69 MERU WPP F2	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F2	BB 0.69 MERU WPP F2
BB 0.69 MERU WPP F3	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F3	BB 0.69 MERU WPP F3
BB 33 MERU WPP F5	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP F5	BB 33 MERU WPP F5
BB 33 MERU WPP F6	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP F6	BB 33 MERU WPP F6
BB 33 MERU WPP F7	1 KENYA	5_MT KENYA	33	BB 33 MERU WPP F7	BB 33 MERU WPP F7
BB 0.69 MERU WPP F5	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F5	BB 0.69 MERU WPP F5
BB 0.69 MERU WPP F6	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F6	BB 0.69 MERU WPP F6
BB 0.69 MERU WPP F7	1 KENYA	5_MT KENYA	0.69	BB 0.69 MERU WPP F7	BB 0.69 MERU WPP F7
BB 11 OLKARIA 1 (PSS/E 1008)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA 1 (PSS/E 1008)	BB 11 OLKARIA 1 (PSS/E 1008)
BB 11 DOMES (PSS/E 1010)	1 KENYA	6_C RIFT	11	BB 11 DOMES (PSS/E 1010)	BB 11 DOMES (PSS/E 1010)
BB 11 OLKNEG1 (PSS/E 1040)	1 KENYA	6_C RIFT	11	BB 11 OLKNEG1 (PSS/E 1040)	BB 11 OLKNEG1 (PSS/E 1040)
BB 11 OLKNEG2 (PSS/E 1041)	1 KENYA	6_C RIFT	11	BB 11 OLKNEG2 (PSS/E 1041)	BB 11 OLKNEG2 (PSS/E 1041)
BB 11 OLKNEG3 (PSS/E 1043)	1 KENYA	6_C RIFT	11	BB 11 OLKNEG3 (PSS/E 1043)	BB 11 OLKNEG3 (PSS/E 1043)
BB 11 OLKNEG4 (PSS/E 1044)	1 KENYA	6_C RIFT	11	BB 11 OLKNEG4 (PSS/E 1044)	BB 11 OLKNEG4 (PSS/E 1044)
BB 11 OLKAIII (PSS/E 1046)	1 KENYA	6_C RIFT	11	BB 11 OLKAIII (PSS/E 1046)	BB 11 OLKAIII (PSS/E 1046)
BB 11 OLKARIA III (PSS/E 1051)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA III (PSS/E 1051)	BB 11 OLKARIA III (PSS/E 1051)
BB 11 OLKARIA IV (PSS/E 1052)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA IV (PSS/E 1052)	BB 11 OLKARIA IV (PSS/E 1052)
BB 11 OLKARIA 1E (PSS/E 1053)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA 1E (PSS/E 1053)	BB 11 OLKARIA 1E (PSS/E 1053)
BB 11 OLKARIA IV (PSS/E 1054)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA IV (PSS/E 1054)	BB 11 OLKARIA IV (PSS/E 1054)
BB 11 AG NAIVASHA (PSS/E 1063)	1 KENYA	6_C RIFT	11	BB 11 AG NAIVASHA (PSS/E 1063)	BB 11 AG NAIVASHA (PSS/E 1063)
BB 11 AG NAIVASHA2 (PSS/E 1064)	1 KENYA	6_C RIFT	11	BB 11 AG NAIVASHA2 (PSS/E 1064)	BB 11 AG NAIVASHA2 (PSS/E 1064)
BB 11 AG NAIVASHA3 (PSS/E 1065)	1 KENYA	6_C RIFT	11	BB 11 AG NAIVASHA3 (PSS/E 1065)	BB 11 AG NAIVASHA3 (PSS/E 1065)
BB 11 MENENGAI (PSS/E 1087)	1 KENYA	6_C RIFT	11	BB 11 MENENGAI (PSS/E 1087)	BB 11 MENENGAI (PSS/E 1087)
BB 11 AEOLUS W (PSS/E 1098)	1 KENYA	6_C RIFT	11	BB 11 AEOLUS W (PSS/E 1098)	BB 11 AEOLUS W (PSS/E 1098)
BB 132 OLKARIA 1 (PSS/E 1108)	1 KENYA	6_C RIFT	132	BB 132 OLKARIA 1 (PSS/E 1108)	BB 132 OLKARIA 1 (PSS/E 1108)
BB 132 DOMES (PSS/E 1110)	1 KENYA	6_C RIFT	132	BB 132 DOMES (PSS/E 1110)	BB 132 DOMES (PSS/E 1110)
BB 132 OLKARIA 1A (PSS/E 1111)	1 KENYA	6_C RIFT	132	BB 132 OLKARIA 1A (PSS/E 1111)	BB 132 OLKARIA 1A (PSS/E 1111)
BB 132 OLKARIA IE (PSS/E 1112)	1 KENYA	6_C RIFT	132	BB 132 OLKARIA IE (PSS/E 1112)	BB 132 OLKARIA IE (PSS/E 1112)
BB 132 LANET (PSS/E 1141)	1 KENYA	6_C RIFT	132	BB 132 LANET (PSS/E 1141)	BB 132 LANET (PSS/E 1141)
BB 132 NAIVASHA (PSS/E 1142)	1 KENYA	6_C RIFT	132	BB 132 NAIVASHA (PSS/E 1142)	BB 132 NAIVASHA (PSS/E 1142)
BB 132 AEOLUS (PSS/E 1152)	1 KENYA	6_C RIFT	132	BB 132 AEOLUS (PSS/E 1152)	BB 132 AEOLUS (PSS/E 1152)
BB 132 NYAHURURU (PSS/E 1165)	1 KENYA	6_C RIFT	132	BB 132 NYAHURURU (PSS/E 1165)	BB 132 NYAHURURU (PSS/E 1165)
BB 132 KABARNET (PSS/E 1166)	1 KENYA	6_C RIFT	132	BB 132 KABARNET (PSS/E 1166)	BB 132 KABARNET (PSS/E 1166)
BB 132 NAKURU WEST (PSS/E 1172)	1 KENYA	6_C RIFT	132	BB 132 NAKURU WEST (PSS/E 1172)	BB 132 NAKURU WEST (PSS/E 1172)
BB 132 RUMURUTI (PSS/E 1177)	1 KENYA	6_C RIFT	132	BB 132 RUMURUTI (PSS/E 1177)	BB 132 RUMURUTI (PSS/E 1177)
BB 132 MAKUTANO (PSS/E 1183)	1 KENYA	6_C RIFT	132	BB 132 MAKUTANO (PSS/E 1183)	BB 132 MAKUTANO (PSS/E 1183)
BB 132 NAROK (PSS/E 1185)	1 KENYA	6_C RIFT	132	BB 132 NAROK (PSS/E 1185)	BB 132 NAROK (PSS/E 1185)
BB 220 OLKARIA II (PSS/E 1210)	1 KENYA	6_C RIFT	220	BB 220 OLKARIA II (PSS/E 1210)	BB 220 OLKARIA II (PSS/E 1210)
BB 220 SUSWA (PSS/E 1211)	1 KENYA	6_C RIFT	220	BB 220 SUSWA (PSS/E 1211)	BB 220 SUSWA (PSS/E 1211)
BB 220 OLKARIA IE (PSS/E 1212)	1 KENYA	6_C RIFT	220	BB 220 OLKARIA IE (PSS/E 1212)	BB 220 OLKARIA IE (PSS/E 1212)
BB 220 OLKARIA IV (PSS/E 1243)	1 KENYA	6_C RIFT	220	BB 220 OLKARIA IV (PSS/E 1243)	BB 220 OLKARIA IV (PSS/E 1243)
BB 220 OLKARIA III (PSS/E 1280)	1 KENYA	6_C RIFT	220	BB 220 OLKARIA III (PSS/E 1280)	BB 220 OLKARIA III (PSS/E 1280)
BB 33 MAKUTANO (PSS/E 1316)	1 KENYA	6_C RIFT	33	BB 33 MAKUTANO (PSS/E 1316)	BB 33 MAKUTANO (PSS/E 1316)
BB 33 LESSO33 (PSS/E 1340)	1 KENYA	6_C RIFT	33	BB 33 LESSO33 (PSS/E 1340)	BB 33 LESSO33 (PSS/E 1340)
BB 33 LANET33 (PSS/E 1341)	1 KENYA	6_C RIFT	33	BB 33 LANET33 (PSS/E 1341)	BB 33 LANET33 (PSS/E 1341)
BB 33 LANET33 (PSS/E 1342)	1 KENYA	6_C RIFT	33	BB 33 LANET33 (PSS/E 1342)	BB 33 LANET33 (PSS/E 1342)
BB 33 NAIVA33 (PSS/E 1343)	1 KENYA	6_C RIFT	33	BB 33 NAIVA33 (PSS/E 1343)	BB 33 NAIVA33 (PSS/E 1343)
BB 33 NAIVA33 (PSS/E 1344)	1 KENYA	6_C RIFT	33	BB 33 NAIVA33 (PSS/E 1344)	BB 33 NAIVA33 (PSS/E 1344)
BB 33 NAKURU WEST (PSS/E 1359)	1 KENYA	6_C RIFT	33	BB 33 NAKURU WEST (PSS/E 1359)	BB 33 NAKURU WEST (PSS/E 1359)
BB 33 NYAHURURU33 (PSS/E 1370)	1 KENYA	6_C RIFT	33	BB 33 NYAHURURU33 (PSS/E 1370)	BB 33 NYAHURURU33 (PSS/E 1370)
BB 33 MARALAL (PSS/E 1372)	1 KENYA	6_C RIFT	33	BB 33 MARALAL (PSS/E 1372)	BB 33 MARALAL (PSS/E 1372)
BB 33 KABARNET (PSS/E 1384)	1 KENYA	6_C RIFT	33	BB 33 KABARNET (PSS/E 1384)	BB 33 KABARNET (PSS/E 1384)
BB 33 NAROK (PSS/E 1385)	1 KENYA	6_C RIFT	33	BB 33 NAROK (PSS/E 1385)	BB 33 NAROK (PSS/E 1385)
BB 220 LOYANGALANI (PSS/E 1410)	1 KENYA	6_C RIFT	220	BB 220 LOYANGALANI (PSS/E 1410)	BB 220 LOYANGALANI (PSS/E 1410)
BB 11 LESSOS (PSS/E 1940)	1 KENYA	6_C RIFT	11	BB 11 LESSOS (PSS/E 1940)	BB 11 LESSOS (PSS/E 1940)
BB 11 LESSOS (PSS/E 1941)	1 KENYA	6_C RIFT	11	BB 11 LESSOS (PSS/E 1941)	BB 11 LESSOS (PSS/E 1941)
BB 132MENENGAI	1 KENYA	6_C RIFT	132	BB 132MENENGAI	BB 132MENENGAI
BB 400 LOIYANGALANI	1 KENYA	6_C RIFT	400	BB 400 LOIYANGALANI	BB 400 LOIYANGALANI
BB 400 SUSWA	1 KENYA	6_C RIFT	400	BB 400 SUSWA	BB 400 SUSWA
BB 11 MENENGAI	1 KENYA	6_C RIFT	11	BB 11 MENENGAI	BB 11 MENENGAI

SUBSTATION NAMES AND CODES KENYA MASTERPLAN MTP Upd. 2020					
Name	Grid	Zone ElmZone	Norm.L-L Volt. kV	Station/Name	Node Name
BB 11 OLKARIA VI (N)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA VI (N)	BB 11 OLKARIA VI (N)
BB 11 OLKARIA OW914/ 915/905(N)	1 KENYA	6_C RIFT	11	BB 11 OLKARIA OW914/ 915/905(N)	BB 11 OLKARIA OW914/ 915/905(N)
BB 11 MUMIAS (PSS/E 1058)	1 KENYA	7_W REGION	11	BB 11 MUMIAS (PSS/E 1058)	BB 11 MUMIAS (PSS/E 1058)
BB 11 SONDU (PSS/E 1059)	1 KENYA	7_W REGION	11	BB 11 SONDU (PSS/E 1059)	BB 11 SONDU (PSS/E 1059)
BB 11 SONDU1 (PSS/E 1060)	1 KENYA	7_W REGION	11	BB 11 SONDU1 (PSS/E 1060)	BB 11 SONDU1 (PSS/E 1060)
BB 11 SANGORO (PSS/E 1061)	1 KENYA	7_W REGION	11	BB 11 SANGORO (PSS/E 1061)	BB 11 SANGORO (PSS/E 1061)
BB 132 MUHORONI (PSS/E 1128)	1 KENYA	7_W REGION	132	BB 132 MUHORONI (PSS/E 1128)	BB 132 MUHORONI (PSS/E 1128)
BB 132 KISUMU (PSS/E 1129)	1 KENYA	7_W REGION	132	BB 132 KISUMU (PSS/E 1129)	BB 132 KISUMU (PSS/E 1129)
BB 132 CHEMOSIT (PSS/E 1130)	1 KENYA	7_W REGION	132	BB 132 CHEMOSIT (PSS/E 1130)	BB 132 CHEMOSIT (PSS/E 1130)
BB 132 WEBUYE (PSS/E 1131)	1 KENYA	7_W REGION	132	BB 132 WEBUYE (PSS/E 1131)	BB 132 WEBUYE (PSS/E 1131)
BB 132 MUSAGA (PSS/E 1139)	1 KENYA	7_W REGION	132	BB 132 MUSAGA (PSS/E 1139)	BB 132 MUSAGA (PSS/E 1139)
BB 132 MUMIAS (PSS/E 1155)	1 KENYA	7_W REGION	132	BB 132 MUMIAS (PSS/E 1155)	BB 132 MUMIAS (PSS/E 1155)
BB 132 SONDU (PSS/E 1160)	1 KENYA	7_W REGION	132	BB 132 SONDU (PSS/E 1160)	BB 132 SONDU (PSS/E 1160)
BB 132 SANGORO (PSS/E 1161)	1 KENYA	7_W REGION	132	BB 132 SANGORO (PSS/E 1161)	BB 132 SANGORO (PSS/E 1161)
BB 132 BOMET (PSS/E 1164)	1 KENYA	7_W REGION	132	BB 132 BOMET (PSS/E 1164)	BB 132 BOMET (PSS/E 1164)
BB 132 KISII (PSS/E 1167)	1 KENYA	7_W REGION	132	BB 132 KISII (PSS/E 1167)	BB 132 KISII (PSS/E 1167)
BB 132 SOTIK (PSS/E 1173)	1 KENYA	7_W REGION	132	BB 132 SOTIK (PSS/E 1173)	BB 132 SOTIK (PSS/E 1173)
BB 132 AWENDO (PSS/E 1174)	1 KENYA	7_W REGION	132	BB 132 AWENDO (PSS/E 1174)	BB 132 AWENDO (PSS/E 1174)
BB 132 RANGALA (PSS/E 1178)	1 KENYA	7_W REGION	132	BB 132 RANGALA (PSS/E 1178)	BB 132 RANGALA (PSS/E 1178)
BB 132 HOMABAY (PSS/E 1194)	1 KENYA	7_W REGION	132	BB 132 HOMABAY (PSS/E 1194)	BB 132 HOMABAY (PSS/E 1194)
BB 132 NDHIWA (PSS/E 1195)	1 KENYA	7_W REGION	132	BB 132 NDHIWA (PSS/E 1195)	BB 132 NDHIWA (PSS/E 1195)
BB 220 TORORO (PSS/E 1260)	1 KENYA	7_W REGION	220	BB 220 TORORO (PSS/E 1260)	BB 220 TORORO (PSS/E 1260)
BB 220 KISUMU (PSS/E 1288)	1 KENYA	7_W REGION	220	BB 220 KISUMU (PSS/E 1288)	BB 220 KISUMU (PSS/E 1288)
BB 33 KISU33 (PSS/E 1329)	1 KENYA	7_W REGION	33	BB 33 KISU33 (PSS/E 1329)	BB 33 KISU33 (PSS/E 1329)
BB 33 KISU33 (PSS/E 1330)	1 KENYA	7_W REGION	33	BB 33 KISU33 (PSS/E 1330)	BB 33 KISU33 (PSS/E 1330)
BB 33 MUSAGA (PSS/E 1339)	1 KENYA	7_W REGION	33	BB 33 MUSAGA (PSS/E 1339)	BB 33 MUSAGA (PSS/E 1339)
BB 33 CHEMO33 (PSS/E 1350)	1 KENYA	7_W REGION	33	BB 33 CHEMO33 (PSS/E 1350)	BB 33 CHEMO33 (PSS/E 1350)
BB 33 CHEMO33 (PSS/E 1351)	1 KENYA	7_W REGION	33	BB 33 CHEMO33 (PSS/E 1351)	BB 33 CHEMO33 (PSS/E 1351)
BB 33 KISII33 (PSS/E 1356)	1 KENYA	7_W REGION	33	BB 33 KISII33 (PSS/E 1356)	BB 33 KISII33 (PSS/E 1356)
BB 33 SONDU MIRIU (PSS/E 1363)	1 KENYA	7_W REGION	33	BB 33 SONDU MIRIU (PSS/E 1363)	BB 33 SONDU MIRIU (PSS/E 1363)
BB 33 MUHORONI (PSS/E 1375)	1 KENYA	7_W REGION	33	BB 33 MUHORONI (PSS/E 1375)	BB 33 MUHORONI (PSS/E 1375)
BB 33 RANGALA (PSS/E 1376)	1 KENYA	7_W REGION	33	BB 33 RANGALA (PSS/E 1376)	BB 33 RANGALA (PSS/E 1376)
BB 33 AWENDO (PSS/E 1377)	1 KENYA	7_W REGION	33	BB 33 AWENDO (PSS/E 1377)	BB 33 AWENDO (PSS/E 1377)
BB 33 BOMET (PSS/E 1386)	1 KENYA	7_W REGION	33	BB 33 BOMET (PSS/E 1386)	BB 33 BOMET (PSS/E 1386)
BB 33 HOMABAY (PSS/E 1397)	1 KENYA	7_W REGION	33	BB 33 HOMABAY (PSS/E 1397)	BB 33 HOMABAY (PSS/E 1397)
BB 33 ISIBENIA (PSS/E 1398)	1 KENYA	7_W REGION	33	BB 33 ISIBENIA (PSS/E 1398)	BB 33 ISIBENIA (PSS/E 1398)
BB 400 TORORO	1 KENYA	7_W REGION	400	BB 400 TORORO	BB 400 TORORO
BB 11 TURKWEL (PSS/E 1007)	1 KENYA	8_N RIFT	11	BB 11 TURKWEL (PSS/E 1007)	BB 11 TURKWEL (PSS/E 1007)
BB 132 ELDORET (PSS/E 1127)	1 KENYA	8_N RIFT	132	BB 132 ELDORET (PSS/E 1127)	BB 132 ELDORET (PSS/E 1127)
BB 132 LESSOS (PSS/E 1140)	1 KENYA	8_N RIFT	132	BB 132 LESSOS (PSS/E 1140)	BB 132 LESSOS (PSS/E 1140)
BB 132 KITALE (PSS/E 1179)	1 KENYA	8_N RIFT	132	BB 132 KITALE (PSS/E 1179)	BB 132 KITALE (PSS/E 1179)
BB 220 TURKWEL (PSS/E 1207)	1 KENYA	8_N RIFT	220	BB 220 TURKWEL (PSS/E 1207)	BB 220 TURKWEL (PSS/E 1207)
BB 220 KAINUK (PSS/E 1208)	1 KENYA	8_N RIFT	220	BB 220 KAINUK (PSS/E 1208)	BB 220 KAINUK (PSS/E 1208)
BB 220 LESSOS (PSS/E 1240)	1 KENYA	8_N RIFT	220	BB 220 LESSOS (PSS/E 1240)	BB 220 LESSOS (PSS/E 1240)
BB 220 ORTUM (PSS/E 1290)	1 KENYA	8_N RIFT	220	BB 220 ORTUM (PSS/E 1290)	BB 220 ORTUM (PSS/E 1290)
BB 220 KITALE (PSS/E 1292)	1 KENYA	8_N RIFT	220	BB 220 KITALE (PSS/E 1292)	BB 220 KITALE (PSS/E 1292)
BB 33 KAPSABET (PSS/E 1315)	1 KENYA	8_N RIFT	33	BB 33 KAPSABET (PSS/E 1315)	BB 33 KAPSABET (PSS/E 1315)
BB 33 ELD33 (PSS/E 1327)	1 KENYA	8_N RIFT	33	BB 33 ELD33 (PSS/E 1327)	BB 33 ELD33 (PSS/E 1327)
BB 33 ELD33 (PSS/E 1328)	1 KENYA	8_N RIFT	33	BB 33 ELD33 (PSS/E 1328)	BB 33 ELD33 (PSS/E 1328)
BB 33 KITALE (PSS/E 1382)	1 KENYA	8_N RIFT	33	BB 33 KITALE (PSS/E 1382)	BB 33 KITALE (PSS/E 1382)
BB 132 LESSTRF (PSS/E 1740)	1 KENYA	8_N RIFT	132	BB 132 LESSTRF (PSS/E 1740)	BB 132 LESSTRF (PSS/E 1740)
BB 66 KAINUK (PSS/E 1757)	1 KENYA	8_N RIFT	66	BB 66 KAINUK (PSS/E 1757)	BB 66 KAINUK (PSS/E 1757)
BB 400 LESSOS	1 KENYA	8_N RIFT	400	BB 400 LESSOS	BB 400 LESSOS

Annex 8.C Single line diagram



Annex 8.D Load flow results MTP

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DiGSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

Load Flow Calculation				Busbars/Terminals	
AC Load Flow, balanced, positive sequence		Yes	Automatic Model Adaptation for Convergence		No
Automatic Tap Adjust of Transformers			Max. Acceptable Load Flow Error for		
Consider Reactive Power Limits			Nodes Model Equations		1.00 kVA 0.10 %

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 1				
rated Voltage [kV]		Bus-voltage [p.u.] [kV]		[deg]	Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
.																
BB 33 MERU.00		0.98 32.45		-6.23												
Cub_1 /Lne		Lne 33UGC F2			1.40	-0.01	1.00	0.02	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km	
Cub_1 /Tr2		TR 33kV/0.69kV MER			-1.40	0.01	-1.00	0.02	9.15	Tap:	0.00	Min:	-2	Max:	2	
WPP-S/S MERU (HV)																
BB 132 MERU.00		0.98 129.40		-6.74												
Cub_1 /Svs		Static Var System								Qtcr:		Qtsc:		nCap:	0	
Cub_1 /Lne		Lne 132 MERU WF -			5.00	1.37	0.96	0.02	3.42	Pv:	2.59 kW	cLod:	0.96 Mvar	L:	20.00 km	
Cub_1 /Lne		Lne 132 MERU WF -			5.00	1.37	0.96	0.02	3.42	Pv:	2.59 kW	cLod:	0.96 Mvar	L:	20.00 km	
Cub_1 /Tr2		TR MERU-WPP 132kV/			-5.00	-1.37	-0.96	0.02	7.05	Tap:	0.00	Min:	-10	Max:	14	
Cub_1 /Tr2		TR MERU-WPP 132kV/			-5.00	-1.37	-0.96	0.02	7.05	Tap:	0.00	Min:	-10	Max:	14	
BB 0.69 MERU WPP F1																
0.69		0.98 0.68		-155.91												
Cub_1 /Asm		DFIG_2MW(F1)			1.40	0.00	1.00	1.19	9.00	Slip:		xm:				
Cub_4 /Tr2		TR 33kV/0.69kV MER			1.40	0.00	1.00	1.19	9.15	Tap:	0.00	Min:	-2	Max:	2	
BB 0.69 MERU WPP F2																
0.69		0.98 0.68		-155.91												
Cub_1 /Asm		DFIG_2MW(F2)			1.40	0.00	1.00	1.19	9.00	Slip:		xm:				
Cub_4 /Tr2		TR 33kV/0.69kV MER			1.40	0.00	1.00	1.19	9.15	Tap:	0.00	Min:	-2	Max:	2	
BB 0.69 MERU WPP F3																
0.69		0.98 0.68		-155.91												
Cub_1 /Asm		DFIG_2MW(F3)			1.40	0.00	1.00	1.19	9.00	Slip:		xm:				
Cub_4 /Tr2		TR 33kV/0.69kV MER			1.40	0.00	1.00	1.19	9.15	Tap:	0.00	Min:	-2	Max:	2	

Grid: 1 KENYA		System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 2	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 0.69 MERU WPP F4													
0.69		0.98 0.68 -155.91											
Cub_1	/Asm	DFIG_2MW(F4)		1.40	0.00	1.00	1.19	9.00	Slip:		xm:		
Cub_4	/Tr2	TR 33kV/0.69kV MER		1.40	0.00	1.00	1.19	9.15	Tap:	0.00	Min:	-2	Max: 2
BB 0.69 MERU WPP F5													
0.69		0.98 0.68 -155.91											
Cub_1	/Asm	DFIG_2MW(F5)		1.40	0.00	1.00	1.19	9.00	Slip:		xm:		
Cub_4	/Tr2	TR 33kV/0.69kV MER		1.40	0.00	1.00	1.19	9.15	Tap:	0.00	Min:	-2	Max: 2
BB 0.69 MERU WPP F6													
0.69		0.98 0.68 -155.91											
Cub_1	/Asm	DFIG_2MW(F6)		1.40	0.00	1.00	1.19	9.00	Slip:		xm:		
Cub_4	/Tr2	TR 33kV/0.69kV MER		1.40	0.00	1.00	1.19	9.15	Tap:	0.00	Min:	-2	Max: 2
BB 0.69 MERU WPP F7													
0.69		0.98 0.68 -155.90											
Cub_1	/Asm	DFIG_2MW(F7)		1.60	0.00	1.00	1.36	9.00	Slip:		xm:		
Cub_4	/Tr2	TR 33kV/0.69kV MER		1.60	0.00	1.00	1.36	9.15	Tap:	0.00	Min:	-2	Max: 2
BB 11 1DAND11 (PSS/E 1921)													
11.00		1.01 11.10 -3.44											
Cub_1	/Lod	Ld_1DANDA11 (PSS/E		6.30	2.49	0.93	0.35		Pl0:	1.00 MW	Ql0:	0.40 Mvar	
trf_112/Tr2		TR DANDORA 132/11		-3.15	-1.24	-0.93	0.18	14.60	Tap:	0.00	Min:	-2	Max: 1
trf_112/Tr2		TR DANDORA 132/11		-3.15	-1.24	-0.93	0.18	14.60	Tap:	0.00	Min:	-2	Max: 1
BB 11 1KAM11 (PSS/E 1903)													
11.00		0.00 0.00 0.00											
trf_172/Tr2		TR KAMBTRF 132/11							Tap:	0	Min:	-2	Max: 1
BB 11 1KINDAG (PSS/E 1001)													
11.00		1.04 11.44 5.59											
sym_100/Sym		Sym 1KINDAG -11 kV							Typ:	PV			
sym_100/Sym		Sym 1KINDAG -11 kV		50.47	5.38	0.99	2.56	56.40	Typ:	PV			
trf_110/Tr2		TR KINDARUMA 132/1		16.64	0.96	1.00	0.84	64.12	Tap:	0.00	Min:	-2	Max: 3
trf_110/Tr2		TR KINDARUMA 132/1		16.64	0.96	1.00	0.84	64.12	Tap:	0.00	Min:	-2	Max: 3
trf_110/Tr2		TR KINDARUMA 132/1		16.58	3.21	0.98	0.85	64.97	Tap:	0.00	Min:	-2	Max: 3
trf_135/Tr2		TR KINDARUMA 33/11		0.60	0.24	0.93	0.03	8.30	Tap:	0.00	Min:	-7	Max: 10

Grid: 1 KENYA		System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 3	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 1KIPD I (PSS/E 1016)									Typ: PV Typ: PV Tap: -6.00	Min: -16	Max: 9		
11.00		1.00 10.98 0.16											
sym_101/Sym		Sym 1KIPD I -11 kV											
sym_101/Sym		Sym 1KIPD I -11 kV											
trf_111/Tr2		TR KIPEVU 132/11 k		-0.00	0.00	-1.00	0.00	0.00					
BB 11 1KIPD II (PSS/E 1019)									Typ: PV Typ: PV Typ: PV Tap: 0.00	Min: -2	Max: 1		
11.00		0.98 10.80 1.74											
sym_101/Sym		Sym 1KIPD II -11 k											
sym_101/Sym		Sym 1KIPD II -11 k											
sym_101/Sym		Sym 1KIPD II -11 k		20.00	14.00	0.82	1.31	89.95					
trf_111/Tr2		TR KIPEVU 132/11 k		20.00	14.00	0.82	1.31	33.60					
BB 11 1KIP6 (PSS/E 1012)									Tap: 0	Min: -8	Max: 5		
11.00		0.00 0.00 0.00											
trf_131/Tr2		TR 1KIP33 33/11 kV											
BB 11 1KIP7 (PSS/E 1013)									Tap: 0	Min: -8	Max: 5		
11.00		0.00 0.00 0.00											
trf_131/Tr2		TR 1KIP33 33/11 kV											
BB 11 1RAB11 (PSS/E 1926)									Tap: 0.00	Min: -2	Max: 1		
11.00		1.01 11.10 -0.48											
shntswt/Shnt		Shnt 1RAB11 11kV		0.00	0.00	1.00	0.00						
trf_172/Tr2		TR 1RABTRF 132/11		-0.00	0.00	-1.00	0.00						
BB 11 2KIPD I (PSS/E 1017)									Typ: PV Typ: PV Tap: 0.00	Min: -1	Max: 1		
11.00		1.01 11.10 0.16											
sym_101/Sym		Sym 2KIPD I -11 kV											
sym_101/Sym		Sym 2KIPD I -11 kV											
trf_111/Tr2		TR KIPEVU 132/11 k		-0.00	0.00	-1.00	0.00	0.00					
BB 11 2KIPD II (PSS/E 1020)									Typ: PV Typ: PV Typ: PV Typ: PV Tap: 0.00	Min: -2	Max: 1		
11.00		0.99 10.92 3.27											
sym_102/Sym		Sym 2KIPD II -11 k											
sym_102/Sym		Sym 2KIPD II -11 k											
sym_102/Sym		Sym 2KIPD II -11 k		40.00	22.40	0.87	2.42						
sym_102/Sym		Sym 2KIPD II -11 k											
trf_111/Tr2		TR KIPEVU 132/11 k		40.00	22.40	0.87	2.42	62.41					

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 4	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 3KIPD I (PSS/E 1018)									Typ: PV Tap: 0.00	Min: -1	Max: 1		
11.00		1.01 11.10 0.16											
sym_101/Sym		Sym 3KIPD I -11 kV											
sym_101/Sym		Sym 3KIPD I -11 kV											
trf_111/Tr2		TR KIPEVU 132/11 k		-0.00	0.00	-1.00	0.00	0.00					
BB 11 AEOLUS W (PSS/E 1098)									Typ: PV Tap: 0.00	Min: -3	Max: 3		
11.00		1.00 11.00 -0.39											
sym_109/Sym		Sym AEOLUS W -11 k		19.66	-8.56	0.92	1.13	32.00					
trf_115/Tr2		TR AEOLOUS 132/11		19.66	-8.56	0.92	1.13	17.87					
BB 11 AG NAIVASHA (PSS/E 1063)									Tap: 0	Min: -12	Max: 5		
11.00		0.00 0.00 0.00											
trf_114/Tr2		TR NAIVASHA 132/11											
BB 11 AG NAIVASHA2 (PSS/E 1064)									Tap: 0	Min: -12	Max: 5		
11.00		0.00 0.00 0.00											
trf_114/Tr2		TR NAIVASHA 132/11											
BB 11 AG NAIVASHA3 (PSS/E 1065)									Tap: 0	Min: -12	Max: 5		
11.00		0.00 0.00 0.00											
trf_114/Tr2		TR NAIVASHA 132/11											
BB 11 AGGREK01-2 (PSS/E 1079)									Typ: PV Tap: 0	Min: -10	Max: 7		
11.00		0.00 0.00 0.00											
sym_107/Sym		Sym AGGREK01-2 -11											
trf_162/Tr2		TR EMBAKASI 66/11											
BB 11 AGGREK02-1 (PSS/E 1074)									Typ: PV Tap: 0	Min: -13	Max: 3		
11.00		0.00 0.00 0.00											
sym_107/Sym		Sym AGGREK02-1 -11											
trf_167/Tr2		TR EMBAKASI 66/11											
BB 11 AGGREK02-2 (PSS/E 1075)									Typ: PV Tap: 0	Min: -10	Max: 7		
11.00													
sym_107/Sym		Sym AGGREK02-2 -11											
trf_162/Tr2		TR EMBAKASI 66/11											
BB 11 AGGREK02-3 (PSS/E 1076)									Typ: PV Tap: 0	Min: -16	Max: 1		
11.00		0.00 0.00 0.00											
sym_107/Sym		Sym AGGREK02-3 -11											
trf_162/Tr2		TR EMBAKASI 66/11											

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 5	
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
BB 11 AGGREK03-1 (PSS/E 1071) 11.00 0.00 0.00 0.00 sym_107/Sym Sym AGGREK03-1 -11 trf_167/Tr2 TR EMBAKASI 66/11										Typ: PV	0	Min: -12	Max: 5		
BB 11 AGGREK03-2 (PSS/E 1077) 11.00 0.00 0.00 0.00 sym_107/Sym Sym AGGREK03-2 -11 trf_162/Tr2 TR EMBAKASI 66/11										Typ: PV	0	Min: -8	Max: 9		
BB 11 AGGREK04-1 (PSS/E 1073) 11.00 0.00 0.00 0.00 sym_107/Sym Sym AGGREK04-1 -11 trf_167/Tr2 TR EMBAKASI 66/11										Typ: PV	0	Min: -16	Max: 0		
BB 11 AIRPOR1 (PSS/E 1828) 11.00 shntswt/Shnt Shnt AIRPOR1 11kV lne_182/Lne Lne 11 AIRPOR1 - trf_163/Tr2 TR AIRPORT1 66/11										Pv: Tap:	0	cLod: Min: -8	L: Max: 1.00 8	km	
BB 11 AIRPORT2 (PSS/E 1829) 11.00 shntswt/Shnt Shnt AIRPORT2 11kV lne_182/Lne Lne 11 AIRPOR1 - trf_164/Tr2 TR AIRTEE2 66/11 k										Pv: Tap:	0	cLod: Min: -7	L: Max: 1.00 9	km	
BB 11 ATHIR1 (PSS/E 1830) 11.00 shntswt/Shnt Shnt ATHIR1 11kV lne_183/Lne Lne 11 ATHIR1 - A trf_165/Tr2 TR ATHI 66/BB kV(1										Pv: Tap:	0	cLod: Min: -5	L: Max: 1.00 11	km	
BB 11 ATHIR2 (PSS/E 1831) 11.00 shntswt/Shnt Shnt ATHIR2 11kV lne_183/Lne Lne 11 ATHIR1 - A lne_183/Lne Lne 11 ATHIR2 - A trf_165/Tr2 TR ATHI 66/BB kV(2										Pv: Tap:	0	cLod: Min: -5	L: Max: 1.00 11	km	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001		/ 6	
rated Voltage [kV] [p.u.] Bus-voltage [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]									Additional Data			
BB 11 ATHIR3 (PSS/E 1832) 11.00 shntswt/Shnt Shnt ATHIR3 11kV lne_183/Lne Lne 11 ATHIR2 - A trf_165/Tr2 TR ATHI 66/BB kV(3)									Pv: Tap: 0 cLod: L: 1.00 km Min: 0 Max: 16			
BB 11 BABADOGO (PSS/E 1850) 11.00 0.00 0.00 0.00 trf_168/Tr2 TR BABADOGO 66/11									Tap: 0 Min: -8 Max: 8			
BB 11 BABADOGO 2 (PSS/E 1851) 11.00 0.00 0.00 0.00 trf_168/Tr2 TR BABADOGO2 66/11									Tap: 0 Min: -7 Max: 9			
BB 11 CATHED1 (PSS/E 1814) 11.00 shntswt/Shnt Shnt CATHED1 11kV lne_181/Lne Lne 11 CATHED1 - trf_161/Tr2 TR CATHD 66/11 kV									Pv: Tap: 0 cLod: L: 1.00 km Min: -8 Max: 9			
BB 11 CATHED2 (PSS/E 1815) 11.00 shntswt/Shnt Shnt CATHED2 11kV lne_181/Lne Lne 11 CATHED1 - trf_161/Tr2 TR CATHD 66/11 kV(									Pv: Tap: 0 cLod: L: 1.00 km Min: -7 Max: 10			
BB 11 CIANDA11 (PSS/E 1840) 11.00 0.00 0.00 0.00 trf_166/Tr2 TR CIANDA66 66/11 trf_166/Tr2 TR CIANDA66 66/11									Tap: 0 Min: -8 Max: 9 Tap: 0 Min: -9 Max: 8			
BB 11 CITY SQUARE (PSS/E 1880) 11.00 0.00 0.00 0.00 trf_174/Tr2 TR CITY 66/11 kV trf_174/Tr2 TR CITY 66/11 kV(1									Tap: 0 Min: -7 Max: 10 Tap: 0 Min: -7 Max: 10			
BB 11 DOMES (PSS/E 1010) 11.00 1.02 11.22 1.84 sym_101/Sym Sym DOMES -11 kV- trf_111/Tr2 TR DOMES 132/11 kV trf_111/Tr2 TR DOMES 132/11 kV									Typ: PV Tap: 0.00 Min: -11 Max: 6 Tap: 0.00 Min: -11 Max: 6			

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 7		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 11 DRIVE IN (PSS/E 1883)														
11.00		1.02 11.17 -4.76												
trf_175/Tr2		TR DRIVE 66/11 kV		-0.00	0.00	-1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max:	9
trf_175/Tr2		TR DRIVE 66/11 kV(		-0.00	0.00	-1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max:	9
BB 11 EASTLEIGH (PSS/E 1876)														
11.00		1.02 11.21 -4.76												
trf_173/Tr2		TR EASTLEIGH 66/11		-0.00	0.00	-1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max:	8
trf_173/Tr2		TR EASTLEIGH 66/11		-0.00	0.00	-1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max:	8
BB 11 EBUURU GEN (N)														
11.00														
sym_100/Sym		Sym EBUURU -11 kV-							Typ:	PV				
trf_110/Tr2		TR EBUURU GEN 132/							Tap:	0	Min:	-4	Max:	3
BB 11 EMBAKASIGT1 (PSS/E 1014)														
11.00		1.03 11.30 -5.49												
sym_101/Sym		Sym EMBAKASIGT1 -1							Typ:	PV				
trf_162/Tr2		TR EMBAKASI 66/11		-0.00	0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-3	Max:	4
BB 11 EMBAKASIGT2 (PSS/E 1015)														
11.00		1.02 11.24 -5.49												
sym_101/Sym		Sym EMBAKASIGT2 -1							Typ:	PV				
trf_167/Tr2		TR EMBAKASI 66/11		-0.00	-0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-3	Max:	4
BB 11 EPZ (PSS/E 1833)														
11.00		0.00 0.00 0.00												
trf_165/Tr2		TR EPZ 66/BB kV(1)							Tap:	0	Min:	-7	Max:	9
trf_165/Tr2		TR EPZ 66/BB kV(2)							Tap:	0	Min:	-6	Max:	11
BB 11 EPZ MSD (PSS/E 1047)														
11.00		1.04 11.44 -2.16												
sym_104/Sym		Sym EPZ MSD -11 kV		8.00	19.14	0.39	1.05	41.50	Typ:	PV				
sym_104/Sym		Sym EPZ MSD -11 kV							Typ:	PV				
trf_169/Tr2		TR EPZ 66/11 kV		4.00	9.57	0.39	0.52	17.27	Tap:	-1.00	Min:	-4	Max:	3
trf_169/Tr2		TR EPZ 66/11 kV(1)		4.00	9.57	0.39	0.52	17.27	Tap:	-1.00	Min:	-4	Max:	3
BB 11 G3EN MOTORS (PSS/E 1872)														
11.00		0.00 0.00 0.00												
trf_171/Tr2		TR GEN 66/11 kV							Tap:	0	Min:	-7	Max:	10

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 8		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 11 GEN MOTORS (PSS/E 1873)														
11.00		0.00 0.00 0.00							Tap:	0	Min:	-7	Max:	10
trf_171/Tr2		TR GEN 66/11 kV(1)												
BB 11 IBERAG1 (PSS/E 1032)														
11.00		1.02 11.23 -4.67							Typ:	PV				
sym_103/Sym		Sym IBERAG1 -11 kV							Typ:	PV				
sym_103/Sym		Sym IBERAG1 -11 kV							Typ:	PV				
sym_103/Sym		Sym IBERAG1 -11 kV							Pv:		cLod:		L:	1.00 km
lne_102/Lne		Lne 11 NBISTH11 -							Tap:	0.00	Min:	-11	Max:	6
trf_162/Tr2		TR NRBSTH2 66/11 k		0.02	0.62	0.04	0.03	1.53	Tap:	0.00	Min:	-9	Max:	5
trf_162/Tr2		TR NRBSTH2 66/11 k		-0.02	-0.62	-0.04	0.03	2.03						
BB 11 IBERAG2 (PSS/E 1033)														
11.00		1.02 11.23 -4.30							Typ:	PV				
sym_103/Sym		Sym IBERAG2 -11 kV		3.36	-12.00	0.27	0.64	49.07	Typ:	PV				
sym_103/Sym		Sym IBERAG2 -11 kV							Typ:	PV				
lne_102/Lne		Lne 11 NFIATGT -							Pv:		cLod:		L:	1.00 km
lne_103/Lne		Lne 11 IBERAG2 -							Pv:		cLod:		L:	1.00 km
trf_162/Tr2		TR NRBSTH3 66/11 k		1.59	-17.02	0.09	0.88	41.88	Tap:	0.00	Min:	-3	Max:	4
trf_162/Tr2		TR NRBSTH3 66/11 k		1.77	5.02	0.33	0.27	17.39	Tap:	0.00	Min:	-4	Max:	3
BB 11 IBERAG2 (PSS/E 1034)														
11.00		0.00 0.00 0.00							Pv:		cLod:		L:	1.00 km
lne_103/Lne		Lne 11 IBERAG2 -							Tap:	0	Min:	-11	Max:	3
trf_162/Tr2		TR NRBSTH2 66/11 k												
BB 11 INDUST1 (PSS/E 1816)														
11.00		0.00 0.00 0.00							Pv:		cLod:		L:	1.00 km
lne_181/Lne		Lne 11 INDUST1 -							Tap:	0	Min:	-8	Max:	8
trf_161/Tr2		TR INDUST 66/11 kV												
BB 11 INDUST2 (PSS/E 1817)														
11.00		0.00 0.00 0.00							Pv:		cLod:		L:	1.00 km
lne_181/Lne		Lne 11 INDUST1 -							Tap:	0	Min:	-8	Max:	8
trf_167/Tr2		TR INDUS2 66/11 kV												
BB 11 JEEV1 (PSS/E 1820)														
11.00									Pv:		cLod:		L:	1.00 km
shntswt/Shnt		Shnt JEEV1 11kV							Tap:	0	Min:	-8	Max:	8
shntswt/Shnt		Shnt JEEV1 11kV(1)												
lne_182/Lne		Lne 11 JEEV1 - JE												
trf_162/Tr2		TR JEEVANJEE 66/11												

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 9	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 JEEVA2 (PSS/E 1821)													
11.00													
shntswt/Shnt		Shnt JEEVA2 11kV											
shntswt/Shnt		Shnt JEEVA2 11kV(1											
lne_182/Lne		Lne 11 JEEV1 - JE							Pv:	cLod:	L:	1.00 km	
trf_163/Tr2		TR JEEVA2 66/11 kV							Tap:	0	Min:	-8 Max: 8	
BB 11 JUJCOND (PSS/E 1021)													
11.00		0.98	10.81	-4.76									
trf_161/Tr2		TR JUJA 66/BB kV		-0.00	-0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-11 Max: 6	
BB 11 JUJCOND (PSS/E 1022)													
11.00		0.98	10.81	-4.75									
trf_166/Tr2		TR JUJA 66/11 kV		-0.00	-0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-11 Max: 6	
BB 11 KABETE (PSS/E 1861)													
11.00		0.00	0.00	0.00									
trf_173/Tr2		TR KABETE 66/11 kV							Tap:	0	Min:	-9 Max: 8	
BB 11 KAMBURU (PSS/E 1003)													
11.00		0.99	10.89	3.59									
sym_100/Sym		Sym KAMBURU -11 kV		53.13	60.00	0.66	4.25	72.20	Typ:	PV			
trf_110/Tr2		TR KAMBURU 132/11		17.71	20.00	0.66	1.42	72.92	Tap:	0.00	Min:	-6 Max: 0	
trf_110/Tr2		TR KAMBURU 132/11		17.71	20.00	0.66	1.42	72.92	Tap:	0.00	Min:	-6 Max: 0	
trf_110/Tr2		TR KAMBURU 132/11		17.71	20.00	0.66	1.42	72.92	Tap:	0.00	Min:	-6 Max: 0	
BB 11 KAREN1 (PSS/E 1808)													
11.00													
shntswt/Shnt		Shnt KAREN1 11kV											
lne_180/Lne		Lne 11 KAREN1 - K							Pv:	cLod:	L:	1.00 km	
trf_160/Tr2		TR KAREN 66/11 kV							Tap:	0	Min:	-13 Max: 3	
BB 11 KAREN2 (PSS/E 1809)													
11.00													
shntswt/Shnt		Shnt KAREN2 11kV											
lne_180/Lne		Lne 11 KAREN1 - K							Pv:	cLod:	L:	1.00 km	
trf_160/Tr2		TR KAREN 66/11 kV(							Tap:	0	Min:	-13 Max: 4	
BB 11 KIAMBERE (PSS/E 1005)													
11.00		1.01	11.11	5.00									
sym_100/Sym		Sym KIAMBERE -11 k		72.61	-17.49	0.97	3.88	43.93	Typ:	PV			
trf_120/Tr2		TR KIAMBERE 220/11		34.03	-8.25	0.97	1.82	39.62	Tap:	0.00	Min:	-7 Max: 13	
trf_120/Tr2		TR KIAMBERE 220/11		38.58	-9.25	0.97	2.06	44.89	Tap:	0.00	Min:	-7 Max: 13	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 10							
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data									
BB 11 KIAMBU RD (PSS/E 1860)																			
11.00		1.00		10.99		-6.89													
trf_173/Tr2		TR KIAMBU 66/11 kV		-0.00		0.00		-1.00		0.00		0.00		Tap:	0.00	Min:	-10	Max:	6
trf_173/Tr2		TR KIAMBU 66/11 kV		-0.00		0.00		-1.00		0.00		0.00		Tap:	0.00	Min:	-10	Max:	6
BB 11 KIKUYU1 (PSS/E 1806)																			
11.00																			
shntswt/Shnt		Shnt KIKUYU1 11kV																	
lne_180/Lne		Lne 11 KIKUYU1 -																	
trf_160/Tr2		TR KIKUYU 66/11 kV								Pv:		cLod:		L:	1.00 km				
										Tap:	0	Min:	-12	Max:	5				
BB 11 KIKUYU2 (PSS/E 1807)																			
11.00																			
shntswt/Shnt		Shnt KIKUYU2 11kV																	
lne_180/Lne		Lne 11 KIKUYU1 -																	
trf_160/Tr2		TR KIKUYU 66/11 kV								Pv:		cLod:		L:	1.00 km				
										Tap:	0	Min:	-13	Max:	4				
BB 11 KILELE1 (PSS/E 1810)																			
11.00		0.00		0.00		0.00													
lne_181/Lne		Lne 11 KILELE1 -																	
trf_164/Tr2		TR KILELES 66/11 k								Pv:		cLod:		L:	1.00 km				
										Tap:	0	Min:	-12	Max:	4				
BB 11 KILELE2 (PSS/E 1811)																			
11.00																			
shntswt/Shnt		Shnt KILELE2 11kV																	
lne_181/Lne		Lne 11 KILELE1 -																	
trf_164/Tr2		TR KILELES 66/11 k								Pv:		cLod:		L:	1.00 km				
										Tap:	0	Min:	-12	Max:	4				
BB 11 KIMATHI 1 (PSS/E 1854)																			
11.00		0.00		0.00		0.00													
trf_168/Tr2		TR KIMATHI 66/11 k																	
										Tap:	0	Min:	-8	Max:	8				
BB 11 KIMATHI 2 (PSS/E 1853)																			
11.00		0.00		0.00		0.00													
trf_168/Tr2		TR KIMATHI 66/11 k																	
										Tap:	0	Min:	-8	Max:	8				
BB 11 KIPETO (PSS/E 1095)																			
11.00		1.00		11.00		6.26													
sym_109/Sym		Sym KIPETO -11 kV-		42.50		-12.09		0.96		2.32		80.34		Typ:	PV				
trf_124/Tr2		TR KIPETO 220/11 k		42.50		-12.09		0.96		2.32		73.65		Tap:	0.00	Min:	-4	Max:	4

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 11	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 KIPETO (PSS/E 1096)													
11.00		1.00 11.00 6.26											
sym_109/Sym		Sym KIPETO -11 kV-		42.50	-12.09	0.96	2.32	80.34	Typ: PV				
trf_124/Tr2		TR KIPETO 220/11 k		42.50	-12.09	0.96	2.32	73.65	Tap: 0.00	Min: -4	Max: 4		
BB 11 KIPEVU III (PSS/E 1023)													
11.00		1.00 11.00 11.36											
sym_102/Sym		Sym KIPEVU III -11		57.50	2.81	1.00	3.02	92.11	Typ: PV				
trf_111/Tr2		TR KIPEVU 132/11 k		57.50	2.81	1.00	3.02	77.80	Tap: 0.00	Min: -1	Max: 2		
BB 11 KIPEVU III (PSS/E 1024)													
11.00		1.00 11.00 11.36											
sym_102/Sym		Sym KIPEVU III -11		57.50	2.81	1.00	3.02	92.11	Typ: PV				
trf_111/Tr2		TR KIPEVU 132/11 k		57.50	2.81	1.00	3.02	77.80	Tap: 0.00	Min: -2	Max: 1		
BB 11 KITENGELA (PSS/E 1871)													
11.00		0.00 0.00 0.00											
trf_170/Tr2		TR ATHI 66/11 kV(2							Tap: 0	Min: -16	Max: 16		
trf_170/Tr2		TR ATHI 66/11 kV(3							Tap: 0	Min: -16	Max: 16		
trf_171/Tr2		TR MSA 66/11 kV							Tap: 0	Min: -16	Max: 16		
trf_171/Tr2		TR MSA 66/11 kV(1)							Tap: 0	Min: -16	Max: 16		
BB 11 KITSU1 (PSS/E 1803)													
11.00													
shntswt/Shnt		Shnt KITSU1 11kV											
lne_180/Lne		Lne 11 KITSU1 - K							Pv: 0	cLod: -12	L: 1.00 km		
trf_160/Tr2		TR KITISUR 66/11 k							Tap: 0	Min: -12	Max: 4		
BB 11 KITSUR2 (PSS/E 1834)													
11.00													
shntswt/Shnt		Shnt KITSUR2 11kV											
lne_180/Lne		Lne 11 KITSU1 - K							Pv: 0	cLod: -12	L: 1.00 km		
trf_160/Tr2		TR KITISUR 66/11 k							Tap: 0	Min: -12	Max: 5		
BB 11 KOMOROCK (PSS/E 1865)													
11.00		0.00 0.00 0.00											
trf_170/Tr2		TR RUAI 66/11 kV							Tap: 0	Min: -9	Max: 7		
trf_171/Tr2		TR KOMOROCK 66/11							Tap: 0	Min: -6	Max: 10		
trf_171/Tr2		TR KOMOROCK 66/11							Tap: 0	Min: -6	Max: 10		

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 12			
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
BB 11 KWALE SUGAR (PSS/E 1062) 11.00 1.03 11.33 -0.07 sym_106/Sym Sym KWALE SUGAR -1 trf_115/Tr2 TR GALU 132/11 kV 5.31 -3.33 0.85 0.32 27.86 5.31 -3.33 0.85 0.32 26.46										Typ: PV					
										Tap: 2.00	Min: -5	Max: 2			
BB 11 LANGATA (PSS/E 1868) 11.00 0.00 0.00 0.00 trf_172/Tr2 TR LANGATA 66/11 k trf_172/Tr2 TR LANGATA 66/11 k										Tap: 0	Min: -9	Max: 7			
										Tap: 0	Min: -9	Max: 7			
BB 11 LAVINGTON (PSS/E 1877) 11.00 0.00 0.00 0.00 trf_174/Tr2 TR LAVINGTON 66/11 trf_174/Tr2 TR LAVINGTON 66/11										Tap: 0	Min: -10	Max: 7			
										Tap: 0	Min: -10	Max: 7			
BB 11 LESSOS (PSS/E 1940) 11.00 0.97 10.64 -8.74 shntswt/Shnt Shnt LESSOS 11kV 0.00 14.03 0.00 0.76 trf_174/Tr2 TR LESSTRF 132/11 -0.00 -14.03 -0.00 0.76 63.07										Tap: 0.00	Min: -24	Max: 8			
BB 11 LESSOS (PSS/E 1941) 11.00 0.97 10.64 -8.74 shntswt/Shnt Shnt LESSOS 11kV(1 0.00 14.03 0.00 0.76 trf_174/Tr2 TR LESSTRF 132/11 -0.00 -14.03 -0.00 0.76 63.07										Tap: 0.00	Min: -24	Max: 8			
BB 11 LIKONI RD (PSS/E 1881) 11.00 0.00 0.00 0.00 trf_174/Tr2 TR LIKONI 66/11 kV trf_174/Tr2 TR LIKONI 66/11 kV										Tap: 0	Min: -8	Max: 9			
										Tap: 0	Min: -8	Max: 9			
BB 11 LIMURU1 (PSS/E 1804) 11.00 shntswt/Shnt Shnt LIMURU1 11kV lne_180/Lne Lne 11 LIMURU1 - trf_160/Tr2 TR LIMURU 66/11 kV trf_160/Tr2 TR LIMURU 66/11 kV										Pv: 1.00 km	cLod:	L:			
										Tap: 0	Min: 0	Max: 16			
										Tap: 0	Min: 0	Max: 16			
BB 11 LIMURU2 (PSS/E 1805) 11.00 shntswt/Shnt Shnt LIMURU2 11kV lne_180/Lne Lne 11 LIMURU1 - trf_160/Tr2 TR LIMURU 66/11 kV trf_160/Tr2 TR LIMURU 66/11 kV										Pv: 1.00 km	cLod:	L:			
										Tap: 0	Min: -13	Max: 4			
										Tap: 0	Min: -13	Max: 4			

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 13		
rated Voltage [kV]				Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 11 LOWER KABETE (PSS/E 1878)																
11.00				0.00 0.00 0.00												
trf_174/Tr2				TR LOWER 66/11 kV							Tap:	0	Min:	-9	Max:	8
trf_174/Tr2				TR LOWER 66/11 kV(							Tap:	0	Min:	-9	Max:	8
BB 11 LUNGA LUNGA (PSS/E 1874)																
11.00				0.00 0.00 0.00												
trf_171/Tr2				TR LUNGA 66/11 kV							Tap:	0	Min:	-9	Max:	8
BB 11 LUNGA LUNGA (PSS/E 1875)																
11.00				0.00 0.00 0.00												
trf_171/Tr2				TR LUNGA 66/11 kV(							Tap:	0	Min:	-9	Max:	8
BB 11 MAI MAHIU (PSS/E 1867)																
11.00				0.00 0.00 0.00												
trf_171/Tr2				TR MAI 66/11 kV							Tap:	0	Min:	-7	Max:	9
trf_171/Tr2				TR MAI 66/11 kV(1)							Tap:	0	Min:	-7	Max:	9
BB 11 MARKN GN1 (PSS/E 1081)																
11.00				0.00 0.00 0.00												
sym_108/Sym				Sym MARKN GN1 -11							Typ:	PV				
BB 11 MARKN GN2 (PSS/E 1082)																
11.00				0.00 0.00 0.00												
sym_108/Sym				Sym MARKN GN2 -11							Typ:	PV				
BB 11 MASINGA (PSS/E 1004)																
11.00				1.02 11.21 2.47												
sym_100/Sym				Sym MASINGA -11 kV		31.88	24.00	0.80	2.06	84.90	Typ:	PV				
trf_110/Tr2				TR MASINGA 132/11		15.94	12.00	0.80	1.03	83.31	Tap:	4.00	Min:	-2	Max:	5
trf_110/Tr2				TR MASINGA 132/11		15.94	12.00	0.80	1.03	83.31	Tap:	4.00	Min:	-2	Max:	5
BB 11 MATASIA (PSS/E 1835)																
11.00																
shntswt/Shnt				Shnt MATASIA 11kV												
trf_167/Tr2				TR MATASIA 66/11 k							Tap:	0	Min:	-7	Max:	9
BB 11 MENENGAI																
11.00				1.02 11.22 -0.66												
Cub_2 /Sym				Sym MENENGAI -11 k							Typ:	PV				
Cub_3 /Sym				Sym MENENGAI -11 k		95.63	15.81	0.99	4.99	55.39	Typ:	PV				
Cub_1 /Tr2				TR MENENGAI 132/11		95.63	15.81	0.99	4.99	39.60	Tap:	0.00	Min:	-3	Max:	3

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 14		
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data				
BB 11 MENENGAI (PSS/E 1087) 11.00 0.00 0.00 0.00 trf_142/Tr2 TR MENENGAI 220/11 trf_142/Tr2 TR MENENGAI 220/11 trf_142/Tr2 TR MENENGAI 220/11										Tap: 0 Min: -5 Max: 2 Tap: 0 Min: -5 Max: 2 Tap: 0 Min: -5 Max: 2				
BB 11 MSA RD MSD (PSS/E 1049) 11.00 1.00 11.00 -2.20 sym_104/Sym Sym MSA RD -11 kV- sym_104/Sym Sym MSA RD -11 kV- 8.00 -9.55 0.64 0.65 24.92 trf_166/Tr2 TR ATHI 66/11 kV 4.00 -4.78 0.64 0.33 10.38 trf_166/Tr2 TR ATHI 66/11 kV(1 4.00 -4.78 0.64 0.33 10.38										Typ: PV Typ: PV Tap: 1.00 Min: -2 Max: 5 Tap: 1.00 Min: -2 Max: 5				
BB 11 MSA ROAD (PSS/E 1072) 11.00 0.00 0.00 0.00 sym_107/Sym Sym MSA ROAD -11 k trf_167/Tr2 TR EMBAKASI 66/11										Typ: PV Tap: 0 Min: -6 Max: 11				
BB 11 MUHORONI EG (PSS/E 1078) 11.00 0.00 0.00 0.00 sym_107/Sym Sym MUHORONI EG -1 sym_107/Sym Sym MUHORONI EG -1 trf_112/Tr2 TR MUHORONI 132/11 trf_112/Tr2 TR MUHORONI 132/11										Typ: PV Typ: PV Tap: 0 Min: -4 Max: 2 Tap: 0 Min: -4 Max: 2				
BB 11 MUMIAS (PSS/E 1058) 11.00 0.99 10.84 -10.91 sym_105/Sym Sym MUMIAS -11 kV- 10.00 10.00 0.71 0.75 33.08 trf_115/Tr2 TR MUMIAS 132/11 k 10.00 10.00 0.71 0.75 35.87										Typ: PV Tap: 0.00 Min: -15 Max: 9				
BB 11 MUTHURWA (PSS/E 1884) 11.00 0.00 0.00 0.00 lne_188/Lne Lne 11 MUTHURWA - trf_175/Tr2 TR MUTHURWA 66/11										Pv: cLod: L: 1.00 km Tap: 0 Min: -8 Max: 8				
BB 11 MUTHURWA (PSS/E 1885) 11.00 0.00 0.00 0.00 lne_188/Lne Lne 11 MUTHURWA - trf_175/Tr2 TR MUTHURWA 66/11										Pv: cLod: L: 1.00 km Tap: 0 Min: -8 Max: 8				

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 15	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 NBISTH11 (PSS/E 1026)													
11.00		1.01 11.13 -4.67											
lne_102/Lne		Lne 11 NFIATGT -							Pv:	cLod:	L:	1.00 km	
lne_102/Lne		Lne 11 NBISTH11 -							Pv:	cLod:	L:	1.00 km	
trf_162/Tr2		TR NRBSTH2 66/11 k		-0.00	0.00	-1.00	0.00	0.00	Tap:	0.00	Min: -10	Max: 7	
BB 11 NBIWES1 (PSS/E 1812)													
11.00													
shntswt/Shnt		Shnt NBIWES1 11kV											
shntswt/Shnt		Shnt NBIWES1 11kV(											
lne_181/Lne		Lne 11 NBIWES1 -							Pv:	cLod:	L:	1.00 km	
trf_161/Tr2		TR NBIWEST 66/11 k							Tap:	0	Min: -8	Max: 9	
BB 11 NBIWEST2 (PSS/E 1813)													
11.00													
shntswt/Shnt		Shnt NBIWEST2 11kV											
shntswt/Shnt		Shnt NBIWEST2 11kV											
lne_181/Lne		Lne 11 NBIWES1 -							Pv:	cLod:	L:	1.00 km	
trf_164/Tr2		TR NBIWEST2 66/11							Tap:	0	Min: -7	Max: 9	
BB 11 NFIATGT (PSS/E 1025)													
11.00													
sym_102/Sym		Sym NFIATGT -11 kV							Typ: PV				
lne_102/Lne		Lne 11 NFIATGT -							Pv:	cLod:	L:	1.00 km	
lne_102/Lne		Lne 11 NFIATGT -							Pv:	cLod:	L:	1.00 km	
trf_162/Tr2		TR NRBSTH3 66/11 k							Tap:	0	Min: -4	Max: 3	
BB 11 NGONG (PSS/E 1862)													
11.00		0.00 0.00 0.00											
trf_174/Tr2		TR NGONG 66/11 kV(							Tap:	0	Min: -8	Max: 9	
trf_174/Tr2		TR NGONG 66/11 kV(							Tap:	0	Min: -8	Max: 9	
BB 11 NGONG (PSS/E 1870)													
11.00		0.00 0.00 0.00											
BB 11 NGONG RD (PSS/E 1857)													
11.00		0.00 0.00 0.00											
trf_168/Tr2		TR NGONG 66/11 kV							Tap:	0	Min: -5	Max: 11	
BB 11 NGONG RD (PSS/E 1858)													
11.00		0.00 0.00 0.00											
trf_168/Tr2		TR NGONG 66/11 kV(							Tap:	0	Min: -5	Max: 11	

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 16	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 11 NGONG WIND (PSS/E 1090)															
11.00		1.04 11.44 3.29													
sym_109/Sym		Sym NGONG WIND -11		7.08	0.03	1.00	0.36	58.54	Typ:	PV					
trf_173/Tr2		TR NGONG 66/11 kV(		7.08	0.03	1.00	0.36	29.61	Tap:	0.00	Min:	-3	Max:	4	
BB 11 NSOUTH4 (PSS/E 1027)															
11.00		1.01 11.13 -4.67													
trf_162/Tr2		TR NRBSTH3 66/11 k		-0.00	-0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-10	Max:	7	
BB 11 NSSF (PSS/E 1859)															
11.00		0.00 0.00 0.00													
trf_168/Tr2		TR NSSF 66/11 kV							Tap:	0	Min:	-7	Max:	10	
BB 11 OLKAI III (PSS/E 1046)															
11.00		1.00 11.00 8.49													
Cub_1 /Sym		Sym OLKAI III -11 kV							Typ:	PV					
sym_104/Sym		Sym OLKAI III -11 kV							Typ:	PV					
sym_104/Sym		Sym OLKAI III -11 kV							Typ:	PV					
sym_104/Sym		Sym OLKAI III -11 kV		56.67	7.79	0.99	3.00	63.56	Typ:	PV					
Cub_2 /Tr2		TR OLKARIA 220/11		56.67	7.79	0.99	3.00	81.72	Tap:	1.00	Min:	-3	Max:	4	
trf_128/Tr2		TR OLKARIA 220/11							Tap:	-1	Min:	-2	Max:	1	
BB 11 OLKARIA 1 (PSS/E 1008)															
11.00		1.01 11.11 4.23													
sym_100/Sym		Sym OLKARIA -11 kV		39.85	12.31	0.96	2.17	74.47	Typ:	PV					
sym_100/Sym		Sym OLKARIA -11 kV							Typ:	PV					
trf_110/Tr2		TR OLKARIA 132/11		39.85	12.31	0.96	2.17	76.47	Tap:	0.00	Min:	-4	Max:	3	
BB 11 OLKARIA 1E (PSS/E 1053)															
11.00		1.00 11.00 5.25													
sym_105/Sym		Sym OLKARIA 1E -11							Typ:	PV					
sym_105/Sym		Sym OLKARIA 1E -11							Typ:	PV					
sym_105/Sym		Sym OLKARIA 1E -11		123.97	-5.58	1.00	6.51	70.91	Typ:	PV					
trf_121/Tr2		TR OLKARIA 220/11		41.32	-1.86	1.00	2.17	47.13	Tap:	-1.00	Min:	-4	Max:	3	
trf_121/Tr2		TR OLKARIA 220/11		41.32	-1.86	1.00	2.17	47.13	Tap:	-1.00	Min:	-4	Max:	3	
trf_121/Tr2		TR OLKARIA 220/11		41.32	-1.86	1.00	2.17	47.13	Tap:	-1.00	Min:	-4	Max:	3	

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001 / 17			
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 11 OLKARIA III (PSS/E 1051)															
11.00		1.00 11.00 8.11													
Cub_1 /Sym		Sym OLKARIA III -1		53.13	7.54	0.99	2.82	59.62	Typ:	PV					
sym_105/Sym		Sym OLKARIA III -1							Typ:	PV					
sym_105/Sym		Sym OLKARIA III -1							Typ:	PV					
sym_105/Sym		Sym OLKARIA III -1							Typ:	PV					
trf_128/Tr2		TR OLKARIA 220/11		53.13	7.54	0.99	2.82	76.66	Tap:	1.00	Min:	-3	Max:	4	
BB 11 OLKARIA IV (PSS/E 1052)															
11.00		1.04 11.44 8.35													
sym_105/Sym		Sym OLKARIA IV -11		61.98	-2.52	1.00	3.13	70.90	Typ:	PV					
sym_105/Sym		Sym OLKARIA IV -11		61.98	-2.52	1.00	3.13	70.90	Typ:	PV					
lne_105/Lne		Lne 11 OLKARIA -							Pv:		cLod:		L:	1.00 km	
trf_124/Tr2		TR OLKARIA 220/11		61.93	-3.84	1.00	3.13	66.29	Tap:	0.00	Min:	-1	Max:	6	
trf_124/Tr2		TR OLKARIA 220/11		62.04	-1.20	1.00	3.13	66.29	Tap:	0.00	Min:	-3	Max:	4	
Total Generation:				123.97	-5.04										
BB 11 OLKARIA IV (PSS/E 1054)															
11.00		0.00 0.00 0.00													
sym_105/Sym		Sym OLKARIA IV -11							Typ:	PV					
sym_105/Sym		Sym OLKARIA IV -11							Typ:	PV					
lne_105/Lne		Lne 11 OLKARIA -							Pv:		cLod:		L:	1.00 km	
trf_124/Tr2		TR OLKARIA 220/11							Tap:	0	Min:	-1	Max:	6	
trf_124/Tr2		TR OLKARIA 220/11							Tap:	0	Min:	-1	Max:	6	
BB 11 OLKARIA OW914/ 915/905(N)															
11.00		1.04 11.44 6.70													
sym_105/Sym		Sym OLKARIA OW914/		53.13	-6.15	0.99	2.70	61.12	Typ:	PV					
lne_105/Tr2		TR OLKARIA 220/11		53.13	-6.15	0.99	2.70	57.14	Tap:	0.00	Min:	-1	Max:	6	
BB 11 OLKARIA VI (N)															
11.00		0.00 0.00 0.00													
sym_105/Sym		Sym OLKARIA VI -11							Typ:	PV					
sym_105/Sym		Sym OLKARIA VI -11							Typ:	PV					
Cub_1 /Tr2		TR OLKARIA VI 220/							Tap:	0	Min:	-1	Max:	6	
lne_105/Tr2		TR OLKARIA VI 220/							Tap:	0	Min:	-1	Max:	6	
BB 11 OLKNEG1 (PSS/E 1040)															
11.00		1.01 11.11 7.78													
sym_104/Sym		Sym OLKNEG1 -11 kV		30.99	7.88	0.97	1.66	72.18	Typ:	PV					
trf_121/Tr2		TR OLKARIA 220/11		30.99	7.88	0.97	1.66	79.15	Tap:	0.00	Min:	-12	Max:	7	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 18	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 OLKNEG2 (PSS/E 1041)													
11.00		1.01 11.11 7.78											
sym_104/Sym		Sym OLKNEG2 -11 kV		30.99	7.88	0.97	1.66	72.18	Typ: PV				
trf_121/Tr2		TR OLKARIA 220/11		30.99	7.88	0.97	1.66	79.15	Tap: 0.00	Min: -12	Max: 7		
BB 11 OLKNEG3 (PSS/E 1043)													
11.00		1.01 11.11 7.78											
sym_104/Sym		Sym OLKNEG3 -11 kV		30.99	7.88	0.97	1.66	72.18	Typ: PV				
trf_121/Tr2		TR OLKARIA 220/11		30.99	7.88	0.97	1.66	79.15	Tap: 0.00	Min: -2	Max: 1		
BB 11 OLKNEG4 (PSS/E 1044)													
11.00		0.00 0.00 0.00											
sym_104/Sym		Sym OLKNEG4 -11 kV							Typ: PV				
trf_121/Tr2		TR OLKARIA 220/11							Tap: 0	Min: -2	Max: 1		
BB 11 PARKLS1 (PSS/E 1826)													
11.00													
shntswt/Shnt		Shnt PARKLS1 11kV							Pv: Tap:	cLod: Min:	L: Max:	1.00 km 7	
lne_182/Lne		Lne 11 PARKLS1 -											
trf_163/Tr2		TR PARK266 66/11 k							0	-9	7		
BB 11 PARKLS2 (PSS/E 1827)													
11.00													
shntswt/Shnt		Shnt PARKLS2 11kV							Pv: Tap:	cLod: Min:	L: Max:	1.00 km 7	
lne_182/Lne		Lne 11 PARKLS1 -											
trf_162/Tr2		TR PARKS 66/11 kV							0	-9	7		
BB 11 RABAI POWER (PSS/E 1056)													
11.00		0.96 10.52 3.50											
sym_105/Sym		Sym RABAI POWER -1		35.20	21.61	0.85	2.27	96.78	Typ: PV				
sym_105/Sym		Sym RABAI POWER -1							Typ: PV				
trf_112/Tr2		TR RABAI 132/11 kV		35.20	21.61	0.85	2.27	61.68	Tap: 0.00	Min: -2	Max: 0		
BB 11 RABAI POWER (PSS/E 1057)													
11.00		0.97 10.71 5.32											
sym_105/Sym		Sym RABAI POWER -1							Typ: PV	PV			
sym_105/Sym		Sym RABAI POWER -1											
sym_105/Sym		Sym RABAI POWER -1		52.80	32.41	0.85	3.34	96.78	Typ: PV				
trf_112/Tr2		TR RABAI 132/11 kV		52.80	32.41	0.85	3.34	90.89	Tap: 0.00	Min: -2	Max: 0		

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 19		
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]									Additional Data					
BB 11 RABAI11 (PSS/E 1927)														
11.00 shntswt/Shnt Shnt RABAI11 11kV														
trf_172/Tr2 TR RABAITRF 132/11									Tap:	0	Min:	-2	Max:	1
BB 11 RUAI (PSS/E 1866)														
11.00 0.00 0.00 0.00														
trf_170/Tr2 TR RUAI 66/11 kV(1									Tap:	0	Min:	-8	Max:	8
BB 11 RUARAK1 (PSS/E 1801)														
11.00 0.00 0.00 0.00														
lne_180/Lne Lne 11 RUARAK1 -									Pv:		cLod:		L:	3.50 km
trf_160/Tr2 TR RUARAKA 66/11 k									Tap:	0	Min:	-9	Max:	7
BB 11 RUARAK2 (PSS/E 1802)														
11.00 0.00 0.00 0.00														
lne_180/Lne Lne 11 RUARAK1 -									Pv:		cLod:		L:	3.50 km
trf_160/Tr2 TR RUARAKA 66/11 k									Tap:	0	Min:	-9	Max:	7
BB 11 RUIRU1 11 (PSS/E 1841)														
11.00 0.00 0.00 0.00														
trf_169/Tr2 TR RUIRU 66/11 kV									Tap:	0	Min:	-9	Max:	7
BB 11 RUIRU2 11 (PSS/E 1842)														
11.00 0.00 0.00 0.00														
trf_169/Tr2 TR RUIRU 66/11 kV(									Tap:	0	Min:	-8	Max:	8
BB 11 SANGORO (PSS/E 1061)														
11.00 1.05 11.54 -2.41														
sym_106/Sym Sym SANGORO -11 kV									Typ:	PV				
sym_106/Sym Sym SANGORO -11 kV									Typ:	PV				
trf_116/Tr2 TR SANGORO 132/11									Tap:	0.00	Min:	-8	Max:	9
17.71 7.05 0.93 0.95 66.19														
17.71 7.05 0.93 0.95 60.54														
BB 11 SONDU (PSS/E 1059)														
11.00 1.01 11.11 -2.48														
sym_105/Sym Sym SONDU -11 kV-									Typ:	PV				
lne_105/Lne Lne 11 SONDU - SO									Pv:	0.00 kw	cLod:	0.00 Mvar	L:	1.00 km
lne_105/Lne Lne 11 SONDU - SO									Pv:		cLod:		L:	1.00 km
trf_116/Tr2 TR SONDU 132/11 kV									Tap:	0.00	Min:	-2	Max:	5
22.14 1.06 1.00 1.15 58.32														
-2.21 0.00 -1.00 0.12 2.19														
24.35 1.06 1.00 1.27 64.35														

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 20	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 SONDU1 (PSS/E 1060)									Typ: PV Pv: 0.00 kW cLod: 0.00 Mvar L: 1.00 km Pv: 1.00 km Tap: 0.00 Min: -2 Max: 5				
11.00 1.01 11.11 -2.48													
sym_106/Sym Sym SONDU1 -11 kV-		26.56	1.06	1.00	1.38	69.96							
lne_105/Lne Lne 11 SONDU - SO		2.21	0.00	1.00	0.12	2.19							
lne_105/Lne Lne 11 SONDU - SO													
trf_116/Tr2 TR SONDU 132/11 kV		24.35	1.06	1.00	1.27	64.35							
BB 11 STEELB1 (PSS/E 1823)									Pv: 1.00 km Tap: 0 cLod: -8 Min: 8				
11.00 shntswt/Shnt Shnt STEELB1 11kV													
lne_182/Lne Lne 11 STEELB1 -													
trf_166/Tr2 TR STBILL1 66/11 k													
BB 11 STEELB2 (PSS/E 1824)									Pv: 1.00 km Tap: 0 cLod: -8 Min: 8				
11.00 shntswt/Shnt Shnt STEELB2 11kV													
lne_182/Lne Lne 11 STEELB1 -													
trf_166/Tr2 TR STBILL1 66/11 k													
BB 11 SYOKIMAU (PSS/E 1886)									Tap: 3.00 Min: -6 Max: 11				
11.00 1.02 11.26 -3.72													
trf_171/Tr2 TR SYOKIMAU 66/11		-0.00	-0.00	-1.00	0.00	0.00							
BB 11 TANGEN1 (PSS/E 1080)									Typ: PV Type: PV Tap: 0.00 Min: -4 Max: 12 Tap: 0.00 Min: -4 Max: 12 Tap: 0.00 Min: 0 Max: 6 Tap: 0.00 Min: 0 Max: 6 Tap: 0.00 Min: 0 Max: 6 Tap: 0.00 Min: -3 Max: 3 Tap: 0.00 Min: -3 Max: 3 Tap: 0.00 Min: -3 Max: 3				
11.00 1.03 11.33 -1.79													
sym_108/Sym Sym TANGEN1 -11 kV		4.43	-1.33	0.96	0.24	29.16							
sym_108/Sym Sym TANGEN1 -11 kV		5.31	-1.60	0.96	0.28	35.00							
trf_133/Tr2 TR TANATX1 33/11 k		2.25	0.98	0.92	0.12	31.75							
trf_133/Tr2 TR TANATX2 33/11 k		2.25	0.98	0.92	0.12	31.75							
trf_162/Tr2 TR TANA 66/11 kV		0.51	-2.28	0.22	0.12	45.44							
trf_162/Tr2 TR TANA 66/11 kV(1		0.52	-2.32	0.22	0.12	46.11							
trf_162/Tr2 TR TANA 66/11 kV(2		0.52	-2.32	0.22	0.12	46.11							
trf_166/Tr2 TR TANA2 66/11 kV		1.23	0.68	0.88	0.07	27.33							
trf_166/Tr2 TR TANA2 66/11 kV(		1.23	0.68	0.88	0.07	27.33							
trf_166/Tr2 TR TANA2 66/11 kV(		1.23	0.68	0.88	0.07	27.33							
Total													
Generation:		9.74	-2.92										
BB 11 THIKA PP (PSS/E 1085)													
11.00 1.00 11.00 1.31													
sym_108/Sym Sym THIKA PP -11 k		40.00	-2.42	1.00	2.10	85.26							
trf_168/Tr2 TR MANGU 66/11 kV		40.00	-2.42	1.00	2.10	66.79							

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 21	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 11 THIKA PP (PSS/E 1086)													
11.00		1.00 11.00 1.31											
sym_108/Sym		Sym THIKA PP -11 k		40.00	-2.43	1.00	2.10	85.26	Typ:	PV			
trf_167/Tr2		TR MANGU1 66/11 kV		40.00	-2.43	1.00	2.10	66.79	Tap:	0.00	Min:	-2	Max: 5
BB 11 THIKA RD (PSS/E 1869)													
11.00		1.04 11.45 -0.62											
trf_170/Tr2		TR THIKA 66/11 kV		-0.00	0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-16	Max: 16
trf_170/Tr2		TR THIKA 66/11 kV(		-0.00	-0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-16	Max: 16
BB 11 THIKA1 (PSS/E 1818)													
11.00													
shntswt/Shnt		Shnt THIKA1 11kV											
shntswt/Shnt		Shnt THIKA1 11kV(1											
lne_181/Lne		Lne 11 THIKA1 - T							Pv:		cLod:	L: 1.00 km	
trf_162/Tr2		TR 1THIKA1 66/11 k							Tap:	0	Min:	-8	Max: 8
BB 11 THIKA2 (PSS/E 1819)													
11.00													
shntswt/Shnt		Shnt THIKA2 11kV											
shntswt/Shnt		Shnt THIKA2 11kV(1											
lne_181/Lne		Lne 11 THIKA1 - T							Pv:		cLod:	L: 1.00 km	
trf_162/Tr2		TR THIKA2 66/11 kV							Tap:	0	Min:	-8	Max: 8
BB 11 TURKWEL (PSS/E 1007)													
11.00		1.01 11.11 -0.82											
sym_100/Sym		Sym TURKWEL -11 kV							Typ:	PV			
sym_100/Sym		Sym TURKWEL -11 kV							Typ:	PV			
trf_120/Tr2		TR TURKWEL 220/11		33.65	-3.45	0.99	1.76	56.76	Tap:	2.00	Min:	-5	Max: 12
trf_120/Tr2		TR TURKWEL 220/11		33.65	-3.45	0.99	1.76	56.76	Tap:	2.00	Min:	-5	Max: 12
BB 11 UHILL1 (PSS/E 1863)													
11.00		0.00 0.00 0.00											
trf_170/Tr2		TR UPPER 66/11 kV							Tap:	0	Min:	-8	Max: 9
BB 11 UHILL2 (PSS/E 1864)													
11.00		0.00 0.00 0.00											
trf_171/Tr2		TR UHILL 66/11 kV							Tap:	0	Min:	-7	Max: 10
BB 11 UPLANDS (PSS/E 1879)													
11.00		0.00 0.00 0.00											
trf_174/Tr2		TR UPLANDS 66/11 k							Tap:	0	Min:	-9	Max: 8

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 22			
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
BB 11 VILLA FRANCA (PSS/E 1882) 11.00 0.00 0.00 0.00 trf_175/Tr2 TR VILLA 66/11 kV trf_175/Tr2 TR VILLA 66/11 kV(										Tap:	0	Min:	-8	Max:	9
										Tap:	0	Min:	-8	Max:	9
BB 11 WESTLANDS1 (PSS/E 1856) 11.00 0.00 0.00 0.00 trf_168/Tr2 TR WESTLANDS 66/11										Tap:	0	Min:	-5	Max:	11
BB 11 WESTLANDS2 (PSS/E 1855) 11.00 0.00 0.00 0.00 trf_168/Tr2 TR WESTLANDS 66/11										Tap:	0	Min:	-5	Max:	11
BB 132 1RABTRF (PSS/E 1726) 132.00 1.01 133.20 -0.48 Cub_1 /Tr2 TR RABAI 220/132 2 lne_172/Lne Lne 132 1RABTRF - trf_122/Tr2 TR RABAI 220/132 k trf_172/Tr2 TR 1RABTRF 132/11 zpu_112/Zpu zpu_1126_1726_1										Tap:	-2.00	Min:	-11	Max:	6
										Pv:		cLod:		L:	1.00 km
										Tap:	-5	Min:	-11	Max:	6
										Tap:	0.00	Min:	-2	Max:	1
BB 132 AEOLOUS (PSS/E 1152) 132.00 1.01 133.04 -1.53 lne_114/Lne Lne 132 NAIVASHA trf_115/Tr2 TR AEOLOUS 132/11										Pv:	56.39 kW	cLod:	1.43 Mvar	L:	30.00 km
										Tap:	0.00	Min:	-3	Max:	3
BB 132 AWENDO (PSS/E 1174) 132.00 0.97 128.53 -10.03 lne_116/Lne Lne 132 KISII - A lne_117/Lne Lne 132 AWENDO - lne_117/Lne Lne 132 AWENDO - trf_117/Tr2 TR AWENDO 132/33 k										Pv:	197.29 kW	cLod:	1.91 Mvar	L:	44.00 km
										Pv:	79.19 kW	cLod:	0.66 Mvar	L:	15.00 km
										Pv:		cLod:		L:	50.00 km
										Tap:	0.00	Min:	-7	Max:	10
BB 132 BAMBURI (PSS/E 1136) 132.00 0.99 130.31 -1.64 lne_112/Lne Lne 132 MTWAPA - lne_112/Lne Lne 132 RABAI - B lne_112/Lne Lne 132 RABAI - B trf_113/Tr2 TR BAMBURI 132/33 trf_113/Tr2 TR BAMBURI 132/33										Pv:	421.27 kW	cLod:	1.09 Mvar	L:	24.30 km
										Pv:	661.02 kW	cLod:	1.14 Mvar	L:	24.60 km
										Pv:	661.02 kW	cLod:	1.14 Mvar	L:	24.60 km
										Tap:	0.00	Min:	-5	Max:	12
										Tap:	0.00	Min:	-5	Max:	12

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 23		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 BOMET (PSS/E 1164)														
132.00	0.98	128.79	-7.82											
lne_116/Lne		Lne 132 BOMET - S		52.10	-5.14	1.00	0.23	73.50	Pv:	1033.38 kW	cLod:	1.31 Mvar	L:	33.00 km
lne_116/Lne		Lne 132 BOMET - N		-28.97	3.65	-0.99	0.13	41.00	Pv:	945.32 kW	cLod:	0.01 Mvar	L:	88.00 km
lne_116/Lne		Lne 132 BOMET - N		-31.07	-1.99	-1.00	0.14	21.27	Pv:	743.44 kW	cLod:	4.06 Mvar	L:	88.00 km
trf_116/Tr2		TR BOMET 132/33 kV		7.94	3.49	0.92	0.04	36.42	Tap:	1.00	Min:	-4	Max:	13
BB 132 CHEMOSIT (PSS/E 1130)														
132.00	0.95	125.94	-11.81											
Cub_1(1/Shnt		Shn CHEMO 33 (MTP		0.00	-18.21	0.00	0.08							
lne_112/Lne		Lne 132 MUHORONI		-20.58	-8.66	-0.92	0.10	32.06	Pv:	197.17 kW	cLod:	1.32 Mvar	L:	30.70 km
lne_113/Lne		Lne 132 CHEMOSIT		-34.00	3.00	-1.00	0.16	23.93	Pv:	321.07 kW	cLod:	1.30 Mvar	L:	30.00 km
trf_113/Tr2		TR CHEMOSIT 132/33		27.30	11.94	0.92	0.14	34.00	Tap:	-1.00	Min:	-7	Max:	10
trf_113/Tr2		TR CHEMOSIT 132/33		27.28	11.93	0.92	0.14	33.98	Tap:	-1.00	Min:	-7	Max:	10
BB 132 CHOGORIA (PSS/E 1135)														
132.00	1.00	132.03	-2.24											
Cub_1 /Lod		Ld CHOGORIA (132kV		0.00	-0.00	1.00	0.00		Pl0:	1.00 MW	Ql0:	0.40 Mvar		
lne_113/Lne		Lne 132 CHOGORIA		-0.00	0.00	-1.00	0.00	2.59	Pv:	0.30 kW	cLod:	1.89 Mvar	L:	40.00 km
trf_113/Tr2		TR CHOGORIA 132/33		0.00	-0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-9	Max:	7
BB 132 DANDORA (PSS/E 1121)														
132.00	1.02	134.00	-2.64											
lne_111/Lne		Lne 132 JUJA - DA		77.71	24.88	0.95	0.35	53.60	Pv:	51.70 kW	cLod:	0.09 Mvar	L:	2.00 km
lne_111/Lne		Lne 132 JUJA - DA		77.71	24.88	0.95	0.35	53.60	Pv:	51.70 kW	cLod:	0.09 Mvar	L:	2.00 km
trf_112/Tr2		TR DANDORA 132/11		3.15	1.30	0.92	0.01	14.60	Tap:	0.00	Min:	-2	Max:	1
trf_112/Tr2		TR DANDORA 132/11		3.15	1.30	0.92	0.01	14.60	Tap:	0.00	Min:	-2	Max:	1
trf_122/Tr2		TR DANDORA 220/132		-80.86	-26.18	-0.95	0.37	41.86	Tap:	0.00	Min:	-6	Max:	11
trf_122/Tr2		TR DANDORA 220/132		-80.86	-26.18	-0.95	0.37	41.86	Tap:	0.00	Min:	-8	Max:	9
BB 132 DOMES (PSS/E 1110)														
132.00	1.03	135.35	-0.44											
lne_111/Lne		Lne 132 DOMES - 0		30.99	21.05	0.83	0.16	24.47	Pv:	33.79 kW	cLod:	0.29 Mvar	L:	6.00 km
trf_111/Tr2		TR DOMES 132/11 kV		-15.50	-10.53	-0.83	0.08	41.98	Tap:	0.00	Min:	-11	Max:	6
trf_111/Tr2		TR DOMES 132/11 kV		-15.50	-10.53	-0.83	0.08	41.98	Tap:	0.00	Min:	-11	Max:	6
BB 132 ELDORET (PSS/E 1127)														
132.00	0.98	129.65	-10.04											
lne_112/Lne		Lne 132 ELDORET -		-33.31	-10.41	-0.95	0.16	48.67	Pv:	480.15 kW	cLod:	1.48 Mvar	L:	32.10 km
lne_112/Lne		Lne 132 ELDORET -		-16.44	-10.45	-0.84	0.09	24.48	Pv:	226.96 kW	cLod:	2.73 Mvar	L:	60.00 km
trf_112/Tr2		TR ELDORET 132/33		24.89	10.43	0.92	0.12	19.74	Tap:	0.00	Min:	-7	Max:	10
trf_112/Tr2		TR ELDORET 132/33		24.86	10.43	0.92	0.12	19.72	Tap:	0.00	Min:	-7	Max:	10

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001 / 24					
rated Voltage [kV]				Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 132 GALU (PSS/E 1156)																	
132.00 0.99 130.33 -1.30																	
lne_112/Lne Lne 132 RABAI - G				-18.04	-9.70	-0.88	0.09	28.42	Pv:	245.38 kW	cLod:	2.32 Mvar	L:	50.00 km			
lne_115/Lne Lne 132 GALU - LU				1.40	-2.12	0.55	0.01	3.52	Pv:	1.63 kW	cLod:	2.69 Mvar	L:	60.00 km			
trf_115/Tr2 TR GALU 132/11 kV				-5.31	3.49	-0.84	0.03	26.46	Tap:	2.00	Min:	-5	Max:	2			
trf_115/Tr2 TR GALU 132/33 kV				10.98	4.16	0.93	0.05	50.15	Tap:	-1.00	Min:	-7	Max:	10			
trf_115/Tr2 TR GALU 132/33 kV(				10.98	4.16	0.93	0.05	50.15	Tap:	-1.00	Min:	-7	Max:	10			
BB 132 GARISSA (PSS/E 1187)																	
132.00 1.00 131.50 2.81																	
shntswt/Shnt Shnt GARISSA 132kV				0.00	0.00	1.00	0.00		Pv:	27.77 kW	cLod:	1.53 Mvar	L:	330.00 km			
lne_116/Lne Lne 132 WAJIR - G				3.13	-0.30	1.00	0.01	4.60	Pv:	159.04 kW	cLod:	8.90 Mvar	L:	192.00 km			
lne_118/Lne Lne 132 MWINGI -				6.68	-10.30	0.54	0.05	15.21	Tap:	1.00	Min:	-7	Max:	10			
trf_118/Tr2 TR GARISSA 132/33				5.82	2.50	0.92	0.03	27.66	Tap:	2.00	Min:	-8	Max:	8			
trf_129/Tr2 TR GARISSA 220/132				-15.63	8.09	-0.89	0.08	17.67									
BB 132 GATUNDU (PSS/E 1181)																	
132.00 0.98 129.34 -2.49																	
lne_111/Lne Lne 132 MANGU - G				-4.01	-1.67	-0.92	0.02	6.08	Pv:	3.78 kW	cLod:	0.90 Mvar	L:	20.00 km			
trf_118/Tr2 TR GATUNDU 132/33				4.01	1.67	0.92	0.02	18.32	Tap:	0.00	Min:	-6	Max:	11			
BB 132 GITARU (PSS/E 1102)																	
132.00 1.01 132.91 -0.07																	
lne_110/Lne Lne 132 GITARU -				-0.12	-20.40	-0.01	0.09	16.08	Pv:	32.27 kW	cLod:	0.37 Mvar	L:	7.70 km			
lne_110/Lne Lne 132 GITARU -				0.07	-20.48	0.00	0.09	16.15	Pv:	31.71 kW	cLod:	0.37 Mvar	L:	7.70 km			
trf_110/Tr2 TR GITARU 132/15 k				0.02	20.44	0.00	0.09	23.39	Tap:	1.00	Min:	-1	Max:	6			
trf_110/Tr2 TR GITARU 132/15 k				0.02	20.44	0.00	0.09	23.39	Tap:	1.00	Min:	-1	Max:	6			
BB 132 GITHAMBO (PSS/E 1182)																	
132.00 0.97 128.49 -2.90																	
lne_111/Lne Lne 132 MANGU - G				-9.46	-4.23	-0.91	0.05	14.58	Pv:	46.96 kW	cLod:	1.93 Mvar	L:	43.00 km			
trf_118/Tr2 TR GITHAMBO 132/33				9.46	4.23	0.91	0.05	43.20	Tap:	0.00	Min:	-4	Max:	12			
BB 132 HOMABAY (PSS/E 1194)																	
132.00 0.98 129.99 -9.20																	
lne_116/Lne Lne 132 SONDU - H				-21.36	-5.31	-0.97	0.10	30.61	Pv:	350.57 kW	cLod:	3.20 Mvar	L:	70.00 km			
lne_119/Lne Lne 132 HOMABAY -				21.36	5.31	0.97	0.10	30.85	Pv:	77.95 kW	cLod:	0.67 Mvar	L:	15.00 km			
trf_119/Tr2 TR HOMABAY 132/33									Tap:	0	Min:	-7	Max:	9			

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 25		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 ISHIARA (PSS/E 1159)														
132.00		1.00 131.91 -2.23												
lne_110/Lne		Lne 132 KAMBURU	-	-48.38	-6.48	-0.99	0.21	32.56	Pv:	304.20 kW	cLod:	1.43 Mvar	L:	31.00 km
lne_113/Lne		Lne 132 CHOGORIA		0.00	-1.89	0.00	0.01	2.59	Pv:	0.30 kW	cLod:	1.89 Mvar	L:	40.00 km
lne_115/Lne		Lne 132 KYENI	- I	13.19	4.84	0.94	0.06	18.08	Pv:	70.08 kW	cLod:	1.50 Mvar	L:	33.00 km
lne_115/Lne		Lne 132 ISHIARA	-	35.18	3.52	1.00	0.15	23.92	Pv:	488.36 kW	cLod:	4.14 Mvar	L:	93.00 km
BB 132 ISIBENIA (PSS/E 1196)														
132.00														
Cub_1 /Lod		Ld ISIBENIA (PSS/E							Pl0:	1.00 MW	Ql0:	0.40 Mvar		
lne_117/Lne		Lne 132 AWENDO	-						Pv:		cLod:		L:	50.00 km
trf_119/Tr2		TR ISIBENIA 132/33		0.00	0.00	1.00	0.00	0.00	Tap:	-1.00	Min:	-7	Max:	9
BB 132 ISINYA (PSS/E 1175)														
132.00		1.02 134.40 -2.67												
lne_116/Lne		Lne 132 KONZA	- I	40.78	16.57	0.93	0.19	29.24	Pv:	553.45 kW	cLod:	1.67 Mvar	L:	35.00 km
lne_117/Lne		Lne 132 KAJIADO	-	45.92	18.04	0.93	0.21	66.61	Pv:	243.39 kW	cLod:	0.47 Mvar	L:	10.00 km
trf_820/Tr2		TR ISINYA 220/132		-86.70	-34.60	-0.93	0.40	47.02	Tap:	-2.00	Min:	-13	Max:	3
BB 132 ISILOLO (PSS/E 1189)														
132.00		0.98 129.23 -6.87												
Cub_1 /Lne		Lne 132 MERU WF	-	-4.99	-2.32	-0.91	0.02	3.42	Pv:	2.59 kW	cLod:	0.96 Mvar	L:	20.00 km
Cub_2 /Lne		Lne 132 MERU WF	-	-4.99	-2.32	-0.91	0.02	3.42	Pv:	2.59 kW	cLod:	0.96 Mvar	L:	20.00 km
lne_113/Lne		Lne 132 NANYUKI	-	5.97	0.71	0.99	0.03	6.26	Pv:	22.44 kW	cLod:	2.88 Mvar	L:	64.00 km
lne_116/Lne		Lne 132 MERU	- IS	1.11	2.72	0.38	0.01	3.88	Pv:	3.65 kW	cLod:	1.44 Mvar	L:	32.00 km
trf_118/Tr2		TR ISILOLO 132/33 k		2.91	1.20	0.92	0.01	13.68	Tap:	3.00	Min:	-4	Max:	12
BB 132 JUJA RD (PSS/E 1117)														
132.00		1.01 133.76 -2.83												
lne_111/Lne		Lne 132 ULU	- JUJ	18.74	4.08	0.98	0.08	24.33	Pv:	240.21 kW	cLod:	2.89 Mvar	L:	62.50 km
lne_111/Lne		Lne 132 MANGU	- J	4.43	25.81	0.17	0.11	38.31	Pv:	344.26 kW	cLod:	2.15 Mvar	L:	46.00 km
lne_111/Lne		Lne 132 JUJA	- TH	1.94	0.42	0.98	0.01	3.27	Pv:	0.90 kW	cLod:	1.03 Mvar	L:	20.00 km
lne_111/Lne		Lne 132 JUJA	- DA	-77.66	-24.67	-0.95	0.35	53.60	Pv:	51.70 kW	cLod:	0.09 Mvar	L:	2.00 km
lne_111/Lne		Lne 132 JUJA	- DA	-77.66	-24.67	-0.95	0.35	53.60	Pv:	51.70 kW	cLod:	0.09 Mvar	L:	2.00 km
lne_111/Lne		Lne 132 JUJA	- RU	28.72	-0.31	1.00	0.12	38.82	Pv:	46.57 kW	cLod:	0.24 Mvar	L:	5.00 km
lne_111/Lne		Lne 132 JUJA	- RU	28.72	-0.31	1.00	0.12	38.82	Pv:	46.57 kW	cLod:	0.24 Mvar	L:	5.00 km
trf_111/Tr2		TR JUJA 132/66 kV		16.79	4.54	0.97	0.08	27.86	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2		TR JUJA 132/66 kV(		4.19	1.13	0.97	0.02	27.80	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2		TR JUJA 132/66 kV(		8.42	2.28	0.97	0.04	27.94	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2		TR JUJA 132/66 kV(		4.19	1.13	0.97	0.02	27.80	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2		TR JUJA 132/66 kV(		17.88	4.83	0.97	0.08	29.66	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2		TR JUJA 132/66 kV(		4.18	1.13	0.97	0.02	27.77	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2		TR JUJA 132/66 kV(		17.11	4.62	0.97	0.08	28.39	Tap:	2.00	Min:	-8	Max:	8

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 26		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 KABARNET (PSS/E 1166)														
132.00		0.99 130.06 -8.83												
Cub_1 /Lne		Lne 132 NYAHURURU		-1.79	10.25	-0.17	0.05	9.74	Pv:	60.09 kW	cLod:	3.98 Mvar	L:	90.00 km
lne_114/Lne		Lne 132 LESSOS -		-2.82	-12.20	-0.23	0.06	8.48	Pv:	34.60 kW	cLod:	3.00 Mvar	L:	65.00 km
trf_116/Tr2		TR KABARNET 132/33		4.62	1.95	0.92	0.02	22.12	Tap:	0.00	Min:	-9	Max:	8
BB 132 KAJIADO (PSS/E 1170)														
132.00		1.01 133.20 -3.19												
lne_116/Lne		Lne 132 KONZA - K		16.88	4.15	0.97	0.08	24.63	Pv:	175.54 kW	cLod:	2.53 Mvar	L:	55.00 km
lne_117/Lne		Lne 132 KAJIADO -		-45.67	-17.93	-0.93	0.21	66.61	Pv:	243.39 kW	cLod:	0.47 Mvar	L:	10.00 km
lne_117/Lne		Lne 132 KAJIADO -							Pv:		cLod:		L:	90.00 km
trf_117/Tr2		TR KAJIADO 132/33		28.79	13.78	0.90	0.14	68.76	Tap:	-1.00	Min:	-5	Max:	11
BB 132 KAMBTRF (PSS/E 1723)														
132.00		1.01 133.47 -0.21												
trf_120/Tr2		TR KAMBURU 220/132		-32.08	7.48	-0.97	0.14	12.07	Tap:	0.00	Min:	-10	Max:	7
trf_120/Tr2		TR KAMBURU 220/132		-32.08	7.48	-0.97	0.14	12.07	Tap:	0.00	Min:	-10	Max:	7
trf_172/Tr2		TR KAMBTRF 132/11							Tap:	0	Min:	-2	Max:	1
zpu_110/Zpu		zpu_1103_1723_1		32.08	-7.48	0.97	0.14							
zpu_110/Zpu		zpu_1103_1723_2		32.08	-7.48	0.97	0.14							
BB 132 KAMBURU (PSS/E 1103)														
132.00		1.01 133.41 -0.16												
Cub_1(1/Lne		Lne 132 KAMBURU -		46.12	6.43	0.99	0.20	28.37	Pv:	850.62 kW	cLod:	4.45 Mvar	L:	90.00 km
lne_110/Lne		Lne 132 KINDARUMA							Pv:		cLod:		L:	18.40 km
lne_110/Lne		Lne 132 GITARU -		0.15	20.11	0.01	0.09	16.08	Pv:	32.27 kW	cLod:	0.37 Mvar	L:	7.70 km
lne_110/Lne		Lne 132 GITARU -		-0.04	20.19	-0.00	0.09	16.15	Pv:	31.71 kW	cLod:	0.37 Mvar	L:	7.70 km
lne_110/Lne		Lne 132 KAMBURU -		22.07	-16.17	0.81	0.12	18.05	Pv:	54.68 kW	cLod:	0.86 Mvar	L:	18.40 km
lne_110/Lne		Lne 132 KAMBURU -		48.68	6.88	0.99	0.21	32.56	Pv:	304.20 kW	cLod:	1.43 Mvar	L:	31.00 km
trf_110/Tr2		TR KAMBURU 132/11		-17.61	-17.44	-0.71	0.11	72.92	Tap:	0.00	Min:	-6	Max:	0
trf_110/Tr2		TR KAMBURU 132/11		-17.61	-17.44	-0.71	0.11	72.92	Tap:	0.00	Min:	-6	Max:	0
trf_110/Tr2		TR KAMBURU 132/11		-17.61	-17.44	-0.71	0.11	72.92	Tap:	0.00	Min:	-6	Max:	0
trf_110/Tr2		TR KAMBURU 132/33		0.00	-0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-7	Max:	9
zpu_110/Zpu		zpu_1103_1723_1		-32.07	7.45	-0.97	0.14							
zpu_110/Zpu		zpu_1103_1723_2		-32.07	7.45	-0.97	0.14							
BB 132 KAPSABET (PSS/E 1153)														
132.00														
lne_114/Lne		Lne 132 LESSOS -							Pv:		cLod:		L:	30.00 km
trf_115/Tr2		TR KAPSABET 132/33							Tap:	0	Min:	-8	Max:	9

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 27		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 KIBOKO (PSS/E 1144)														
132.00		1.00 131.78 -4.19												
lod_114/Lod		Ld KIBOKO (132 kV)		2.20	0.72	0.95	0.01		Pl0:	2.64 MW	Ql0:	0.87 Mvar		
lne_114/Lne		Lne 132 SULTAN -		-6.53	0.50	-1.00	0.03	8.62	Pv:	19.83 kW	cLod:	1.98 Mvar	L:	43.00 km
lne_114/Lne		Lne 132 KIBOKO -		4.33	-1.22	0.96	0.02	6.29	Pv:	17.18 kW	cLod:	3.92 Mvar	L:	86.00 km
BB 132 KIGANJO (PSS/E 1132)														
132.00		0.98 129.22 -5.57												
Cub_1(1/Lne		Lne 132 KAMBURU -		-45.27	-6.36	-0.99	0.20	28.37	Pv:	850.62 kW	cLod:	4.45 Mvar	L:	90.00 km
lne_113/Lne		Lne 132 KIGANJO -		21.27	-6.22	0.96	0.10	31.01	Pv:	307.80 kW	cLod:	2.30 Mvar	L:	51.50 km
lne_113/Lne		Lne 132 KIGANJO -		-23.96	6.17	-0.97	0.11	35.38	Pv:	346.25 kW	cLod:	2.00 Mvar	L:	44.25 km
trf_113/Tr2		TR KIGANJO 132/33		23.98	3.20	0.99	0.11	53.82	Tap:	0.00	Min:	-7	Max:	10
trf_113/Tr2		TR KIGANJO 132/33		23.98	3.20	0.99	0.11	53.82	Tap:	0.00	Min:	-7	Max:	10
BB 132 KILIFI (PSS/E 1134)														
132.00		0.95 126.04 -3.89												
Cub_1(1/Shnt		Shn KILIFI 132kV (		-0.00	-3.65	-0.00	0.02							
lne_112/Lne		Lne 132 MTWAPA -		-35.54	-9.05	-0.97	0.17	52.61	Pv:	427.12 kW	cLod:	1.05 Mvar	L:	24.30 km
trf_113/Tr2		TR KILIFI 132/33 k		17.77	6.35	0.94	0.09	28.64	Tap:	-3.00	Min:	-5	Max:	12
trf_113/Tr2		TR KILIFI 132/33 k		17.77	6.35	0.94	0.09	28.64	Tap:	-3.00	Min:	-5	Max:	12
BB 132 KILIMAMBOGO														
132.00		1.01 133.65 -2.88												
Cub_2 /Lod		Ld KILIMAMBOGO (13		0.00	-0.00	1.00	0.00		Pl0:	1.00 MW	Ql0:	0.40 Mvar		
Cub_1 /Lne		Lne 132 THIKA - KI		-0.00	0.00	-1.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	17.00 km
BB 132 KINDARUMA (PSS/E 1101)														
132.00		1.02 134.57 1.35												
lne_110/Lne		Lne 132 KINDARUMA							Pv:		cLod:		L:	18.40 km
lne_110/Lne		Lne 132 KINDARUMA		26.64	1.80	1.00	0.11	36.77	Pv:	775.09 kW	cLod:	5.03 Mvar	L:	107.00 km
lne_110/Lne		Lne 132 KINDARUMA		23.06	-0.40	1.00	0.10	27.94	Pv:	169.09 kW	cLod:	1.52 Mvar	L:	32.00 km
trf_110/Tr2		TR KINDARUMA 132/1		-16.58	0.27	-1.00	0.07	64.12	Tap:	0.00	Min:	-2	Max:	3
trf_110/Tr2		TR KINDARUMA 132/1		-16.58	0.27	-1.00	0.07	64.12	Tap:	0.00	Min:	-2	Max:	3
trf_110/Tr2		TR KINDARUMA 132/1		-16.52	-1.95	-0.99	0.07	64.97	Tap:	0.00	Min:	-2	Max:	3

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 28		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 KIPEVU (PSS/E 1114)														
132.00	1.01	133.22	0.16											
lne_111/Lne	Lne 132 KIPEVU	-		-38.25	-34.57	-0.74	0.22	51.09	Pv:	26.95 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_111/Lne	Lne 132 KIPEVU	-		17.68	-8.19	0.91	0.08	26.45	Pv:	74.75 kW	cLod:	0.81 Mvar	L:	17.00 km
lne_111/Lne	Lne 132 KIPEVU	-		17.68	-8.19	0.91	0.08	26.45	Pv:	74.75 kW	cLod:	0.81 Mvar	L:	17.00 km
lne_111/Lne	Lne 132 KIPEVU	-		19.61	-4.26	0.98	0.09	13.26	Pv:	41.16 kW	cLod:	0.87 Mvar	L:	18.00 km
trf_111/Tr2	TR KIPEVU 132/11 k			0.00	-0.00	1.00	0.00	0.00	Tap:	-6.00	Min:	-16	Max:	9
trf_111/Tr2	TR KIPEVU 132/11 k			0.00	-0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-1	Max:	1
trf_111/Tr2	TR KIPEVU 132/11 k			0.00	-0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-1	Max:	1
trf_111/Tr2	TR KIPEVU 132/11 k			-56.91	8.41	-0.99	0.25	77.80	Tap:	0.00	Min:	-1	Max:	2
trf_111/Tr2	TR KIPEVU 132/11 k			-56.91	8.41	-0.99	0.25	77.80	Tap:	0.00	Min:	-2	Max:	1
trf_111/Tr2	TR KIPEVU 132/33 k			32.36	12.80	0.93	0.15	57.47	Tap:	-3.00	Min:	-6	Max:	11
trf_111/Tr2	TR KIPEVU 132/33 k			32.36	12.80	0.93	0.15	57.47	Tap:	-3.00	Min:	-6	Max:	11
trf_111/Tr2	TR KIPEVU 132/33 k			32.36	12.80	0.93	0.15	57.47	Tap:	-3.00	Min:	-6	Max:	11
BB 132 KIPEVU DII (PSS/E 1119)														
132.00	1.01	133.39	0.19											
lne_111/Lne	Lne 132 KIPEVU	-		38.28	34.64	0.74	0.22	51.09	Pv:	26.95 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_111/Lne	Lne 132 KIPEVU	-		21.58	-1.84	1.00	0.09	14.29	Pv:	48.08 kW	cLod:	0.87 Mvar	L:	18.00 km
trf_111/Tr2	TR KIPEVU 132/11 k			-19.97	-13.19	-0.83	0.10	33.60	Tap:	0.00	Min:	-2	Max:	1
trf_111/Tr2	TR KIPEVU 132/11 k			-39.89	-19.61	-0.90	0.19	62.41	Tap:	0.00	Min:	-2	Max:	1
BB 132 KISII (PSS/E 1167)														
132.00	0.96	126.42	-11.01											
Cub_1(1/Shnt	Shn KISUMU 132kV (			-0.00	-9.17	-0.00	0.04							
lne_116/Lne	Lne 132 KISII - S			-16.67	1.46	-1.00	0.08	11.75	Pv:	76.92 kW	cLod:	1.30 Mvar	L:	30.00 km
lne_116/Lne	Lne 132 KISII - A			-17.70	-6.40	-0.94	0.09	26.92	Pv:	197.29 kW	cLod:	1.91 Mvar	L:	44.00 km
trf_116/Tr2	TR KISII 132/33 kV			17.18	7.06	0.92	0.08	14.76	Tap:	-7.00	Min:	-11	Max:	5
trf_116/Tr2	TR KISII 132/33 kV			17.18	7.06	0.92	0.08	14.76	Tap:	-7.00	Min:	-11	Max:	5
BB 132 KISUMU (PSS/E 1129)														
132.00	0.99	130.45	-10.26											
lne_112/Lne	Lne 132 MUHORONI			15.60	7.97	0.89	0.08	25.78	Pv:	193.75 kW	cLod:	2.15 Mvar	L:	48.50 km
lne_112/Lne	Lne 132 KISUMU -								Pv:		cLod:		L:	103.00 km
lne_112/Lne	Lne 132 KISUMU -			-43.74	-0.74	-1.00	0.19	29.51	Pv:	816.36 kW	cLod:	2.35 Mvar	L:	50.00 km
trf_112/Tr2	TR KISUMU 132/33 k			37.53	15.67	0.92	0.18	17.38	Tap:	0.00	Min:	-5	Max:	12
trf_112/Tr2	TR KISUMU 132/33 k			37.46	15.65	0.92	0.18	17.35	Tap:	0.00	Min:	-5	Max:	12
trf_128/Tr2	TR KISUMU 220/132			-23.42	-19.28	-0.77	0.13	34.11	Tap:	1.00	Min:	-9	Max:	8
trf_128/Tr2	TR KISUMU 220/132			-23.42	-19.28	-0.77	0.13	34.11	Tap:	1.00	Min:	-9	Max:	8

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 29		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 KITALE (PSS/E 1179)														
132.00	1.01	132.85	-8.96						Pv:	226.96 kW	cLod:	2.73 Mvar	L:	60.00 km
lne_112/Lne		Lne 132 ELDORET	-	16.67	8.26	0.90	0.08	24.48	Tap:	-1.00	Min:	-8	Max:	9
trf_117/Tr2		TR KITALE 132/33 k		14.14	6.71	0.90	0.07	66.47	Tap:	2.00	Min:	-10	Max:	6
trf_129/Tr2		TR KITALE 220/132		-30.80	-14.97	-0.90	0.15	22.68						
BB 132 KITUI (PSS/E 1190)														
132.00	1.01	132.96	-0.69						Pv:	204.35 kW	cLod:	4.11 Mvar	L:	86.00 km
Cub_1 /Lne		Lne 132 SULTAN	-	16.50	-6.18	0.94	0.08	21.60	Pv:	172.26 kW	cLod:	1.41 Mvar	L:	30.00 km
lne_118/Lne		Lne 132 MWINGI	-	-23.43	3.17	-0.99	0.10	29.25	Tap:	-1.00	Min:	-8	Max:	8
trf_119/Tr2		TR KITUI 132/33 kV		6.93	3.01	0.92	0.03	32.62						
BB 132 KOKOTONI (PSS/E 1122)														
132.00	1.00	132.57	-0.84						Pl0:	7.65 MW	Ql0:	2.51 Mvar		
lod_112/Lod		Ld KOKOTONI (132 k		5.70	1.87	0.95	0.03		Pv:	153.53 kW	cLod:	0.05 Mvar	L:	10.50 km
lne_112/Lne		Lne 132 KOKOTONI		-35.26	-0.73	-1.00	0.15	48.11	Pv:	108.02 kW	cLod:	0.05 Mvar	L:	10.50 km
lne_112/Lne		Lne 132 KOKOTONI		29.56	-1.14	1.00	0.13	40.35						
BB 132 KONZA (PSS/E 1168)														
132.00	0.99	131.01	-4.32						Pl0:	1.00 MW	Ql0:	0.40 Mvar		
Cub_1 /Lod		Ld KONZA (132kV)N		63.70	25.18	0.93	0.30		Pv:	8.16 kW	cLod:	0.11 Mvar	L:	2.50 km
lne_111/Lne		Lne 132 ULU - KON		-16.69	-5.78	-0.94	0.08	21.98	Pv:	35.34 kW	cLod:	2.74 Mvar	L:	60.00 km
lne_114/Lne		Lne 132 SULTAN -		-7.30	-3.05	-0.92	0.03	9.84	Pv:	175.54 kW	cLod:	2.53 Mvar	L:	55.00 km
lne_116/Lne		Lne 132 KONZA - K		-16.71	-6.27	-0.94	0.08	24.63	Pv:	553.45 kW	cLod:	1.67 Mvar	L:	35.00 km
lne_116/Lne		Lne 132 KONZA - I		-40.23	-16.65	-0.92	0.19	29.24	Pv:	72.65 kW	cLod:	0.90 Mvar	L:	20.00 km
lne_116/Lne		Lne 132 KONZA - M		17.24	6.57	0.93	0.08	25.92						
BB 132 KUTUS (PSS/E 1162)														
132.00	0.98	129.95	-3.82						Pv:	1410.70 kW	cLod:	2.08 Mvar	L:	44.25 km
lne_110/Lne		Lne 132 MASINGA -		-50.70	-3.68	-1.00	0.23	70.73	Pv:	346.25 kW	cLod:	2.00 Mvar	L:	44.25 km
lne_113/Lne		Lne 132 KIGANJO -		24.30	-7.48	0.96	0.11	35.38	Tap:	0.00	Min:	-6	Max:	11
trf_116/Tr2		TR KUTUS 132/33 kV		13.19	11.96	0.74	0.08	24.91	Tap:	0.00	Min:	-7	Max:	10
trf_116/Tr2		TR KUTUS 132/33 kV		13.20	-0.80	1.00	0.06	18.88						
BB 132 KYENI (PSS/E 1158)														
132.00	0.99	130.73	-2.73						Pv:	70.08 kW	cLod:	1.50 Mvar	L:	33.00 km
lne_115/Lne		Lne 132 KYENI - I		-13.12	-6.18	-0.90	0.06	18.08	Tap:	0.00	Min:	-7	Max:	10
trf_115/Tr2		TR KYENI 132/33 kV		13.12	6.18	0.90	0.06	61.56						

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 30	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 132 LANET (PSS/E 1141)													
132.00	1.00	131.92	-4.22										
lne_114/Lne	Lne 132 LANET	- N	-18.83	0.59	-1.00	0.08	26.25	Pv:	288.92 kW	cLod:	3.18 Mvar	L:	67.00 km
lne_114/Lne	Lne 132 LANET	- N	-18.83	0.59	-1.00	0.08	26.25	Pv:	288.92 kW	cLod:	3.18 Mvar	L:	67.00 km
lne_114/Lne	Lne 132 LANET	- N	-3.68	-9.45	-0.36	0.04	13.90	Pv:	10.72 kW	cLod:	0.47 Mvar	L:	10.00 km
lne_114/Lne	Lne 132 LANET	- N	-3.68	-9.45	-0.36	0.04	13.90	Pv:	10.72 kW	cLod:	0.47 Mvar	L:	10.00 km
trf_114/Tr2	TR LANET 132/33 kV		15.11	5.93	0.93	0.07	67.87	Tap:	2.00	Min:	-4	Max:	13
trf_114/Tr2	TR LANET 132/33 kV		14.99	5.90	0.93	0.07	67.33	Tap:	2.00	Min:	-4	Max:	13
trf_114/Tr2	TR LANET 132/33 kV		14.93	5.89	0.93	0.07	67.11	Tap:	2.00	Min:	-4	Max:	13
BB 132 LESSOS (PSS/E 1140)													
132.00	1.00	132.43	-8.75										
lne_112/Lne	Lne 132 ELDORET	-	33.79	9.90	0.96	0.15	48.67	Pv:	480.15 kW	cLod:	1.48 Mvar	L:	32.10 km
lne_112/Lne	Lne 132 MUHORONI		33.07	8.30	0.97	0.15	47.49	Pv:	801.68 kW	cLod:	2.59 Mvar	L:	56.70 km
lne_112/Lne	Lne 132 KISUMU	-						Pv:		cLod:		L:	103.00 km
lne_113/Lne	Lne 132 MUSAGA	-	27.27	-9.82	0.94	0.13	39.58	Pv:	632.72 kW	cLod:	3.08 Mvar	L:	66.00 km
lne_113/Lne	Lne 132 MUSAGA	-	27.27	-9.82	0.94	0.13	39.58	Pv:	632.72 kW	cLod:	3.08 Mvar	L:	66.00 km
lne_114/Lne	Lne 132 LESSOS	-						Pv:		cLod:		L:	30.00 km
lne_114/Lne	Lne 132 LESSOS	-	2.86	9.40	0.29	0.04	8.48	Pv:	34.60 kW	cLod:	3.00 Mvar	L:	65.00 km
lne_114/Lne	Lne 132 LESSOS	-	-22.92	9.12	-0.93	0.11	36.85	Pv:	834.60 kW	cLod:	5.48 Mvar	L:	116.00 km
lne_114/Lne	Lne 132 LESSOS	-	-21.39	9.70	-0.91	0.10	33.88	Pv:	396.55 kW	cLod:	2.97 Mvar	L:	63.00 km
lne_114/Lne	Lne 132 LESSOS	-	-51.56	-18.22	-0.94	0.24	36.34	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_114/Lne	Lne 132 LESSOS	-	-51.56	-18.22	-0.94	0.24	54.51	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_114/Tr2	TR LESSOS 132/33 k		23.17	9.66	0.92	0.11	17.82	Tap:	1.00	Min:	-6	Max:	10
BB 132 LESSTRF (PSS/E 1740)													
132.00	1.00	132.43	-8.74										
lne_114/Lne	Lne 132 LESSOS	-	51.56	18.22	0.94	0.24	36.34	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_114/Lne	Lne 132 LESSOS	-	51.56	18.22	0.94	0.24	54.51	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_124/Tr2	TR LESSOS 220/132		-11.99	22.26	-0.47	0.11	33.59	Tap:	5.00	Min:	0	Max:	16
trf_124/Tr2	TR LESSOS 220/132		-30.38	-29.27	-0.72	0.18	56.06	Tap:	0.00	Min:	0	Max:	16
trf_124/Tr2	TR LESSOS 220/132		-30.38	-29.27	-0.72	0.18	56.06	Tap:	0.00	Min:	0	Max:	16
trf_124/Tr2	TR LESSOS 220/132		-30.38	-29.27	-0.72	0.18	56.06	Tap:	0.00	Min:	0	Max:	16
trf_174/Tr2	TR LESSTRF 132/11		0.00	14.55	0.00	0.06	63.07	Tap:	0.00	Min:	-24	Max:	8
trf_174/Tr2	TR LESSTRF 132/11		0.00	14.55	0.00	0.06	63.07	Tap:	0.00	Min:	-24	Max:	8
BB 132 LOITOKITOK (PSS/E 1199)													
132.00													
Cub_1 /Lod	Ld LOITOKITOK (PSS							Pl0:	1.00 MW	Ql0:	0.20 Mvar		
lne_117/Lne	Lne 132 TAVETA	-						Pv:		cLod:		L:	120.00 km

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001 / 31			
rated Voltage [kV] [p.u.] Bus-voltage [kV] [deg]				Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 132 LUNGA LUNGA (PSS/E 1197)															
132.00 0.99 130.36 -1.45															
lne_115/Lne Lne 132 GALU - LU				-1.40	-0.57	-0.93	0.01	3.52	Pv:	1.63 kW	cLod:	2.69 Mvar	L:	60.00 km	
trf_119/Tr2 TR LUNGA 132/33 kV				1.40	0.57	0.93	0.01	10.46	Tap:	2.00	Min:	-10	Max:	7	
BB 132 MACHAKOS (PSS/E 1192)															
132.00 0.99 130.09 -4.73															
lne_116/Lne Lne 132 KONZA - M				-17.16	-7.30	-0.92	0.08	25.92	Pv:	72.65 kW	cLod:	0.90 Mvar	L:	20.00 km	
trf_119/Tr2 TR MACHAKOS 132/33				17.16	7.30	0.92	0.08	25.60	Tap:	0.00	Min:	-4	Max:	12	
BB 132 MAKUTANO (PSS/E 1183)															
132.00 1.00 132.22 -6.45															
lne_114/Lne Lne 132 LESSOS -				21.78	-11.80	0.88	0.11	33.88	Pv:	396.55 kW	cLod:	2.97 Mvar	L:	63.00 km	
lne_117/Lne Lne 132 NAKURU -				-25.19	10.38	-0.92	0.12	38.63	Pv:	442.22 kW	cLod:	2.50 Mvar	L:	53.00 km	
trf_118/Tr2 TR MAKUTANO 132/33				3.41	1.41	0.92	0.02	16.00	Tap:	2.00	Min:	-7	Max:	10	
BB 132 MANGU (PSS/E 1116)															
132.00 0.98 129.53 -2.38															
lne_110/Lne Lne 132 KINDARUMA				-25.86	-4.99	-0.98	0.12	36.77	Pv:	775.09 kW	cLod:	5.03 Mvar	L:	107.00 km	
lne_111/Lne Lne 132 MANGU - J				-4.08	-27.14	-0.15	0.12	38.31	Pv:	344.26 kW	cLod:	2.15 Mvar	L:	46.00 km	
lne_111/Lne Lne 132 MANGU - G				4.01	0.78	0.98	0.02	6.08	Pv:	3.78 kW	cLod:	0.90 Mvar	L:	20.00 km	
lne_111/Lne Lne 132 MANGU - G				9.51	2.41	0.97	0.04	14.58	Pv:	46.96 kW	cLod:	1.93 Mvar	L:	43.00 km	
trf_111/Tr2 TR MANGU 132/66 kV				8.20	14.47	0.49	0.07	26.83	Tap:	0.00	Min:	-8	Max:	8	
trf_111/Tr2 TR MANGU 132/66 kV				8.22	14.47	0.49	0.07	26.86	Tap:	0.00	Min:	-8	Max:	8	
BB 132 MANYANI (PSS/E 1115)															
132.00 0.99 130.59 -4.69															
lod_111/Lod Ld MANYANI (132 kV				11.00	3.62	0.95	0.05		Pl0:	2.55 MW	Ql0:	0.84 Mvar			
lne_111/Lne Lne 132 MANYANI -				-1.31	-3.69	-0.33	0.02	4.88	Pv:	4.21 kW	cLod:	2.03 Mvar	L:	45.00 km	
lne_111/Lne Lne 132 MANYANI -				-9.69	0.07	-1.00	0.04	12.36	Pv:	45.16 kW	cLod:	2.03 Mvar	L:	45.00 km	
BB 132 MARALAL (PSS/E 1180)															
132.00															
Cub_1 /Lod Ld MARALAL (PSS/E									Pl0:	1.00 MW	Ql0:	0.40 Mvar			
lne_117/Lne Lne 132 RUMURUTI									Pv:		cLod:		L:	148.00 km	
trf_118/Tr2 TR MARALAL 132/33				0.00	0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-12	Max:	4	
BB 132 MARIAKANI (PSS/E 1148)															
132.00 1.00 132.13 -1.28															
lod_114/Lod Ld MARIAKANI (132				12.10	3.98	0.95	0.06		Pl0:	16.30 MW	Ql0:	5.36 Mvar			
lne_111/Lne Lne 132 SAMBURU -				17.35	-5.29	0.96	0.08	22.38	Pv:	141.17 kW	cLod:	1.97 Mvar	L:	43.00 km	
lne_112/Lne Lne 132 KOKOTONI				-29.45	1.31	-1.00	0.13	40.35	Pv:	108.02 kW	cLod:	0.05 Mvar	L:	10.50 km	

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001 / 32				
rated Voltage [kV] [p.u.]				Bus-voltage [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 MASINGA (PSS/E 1104)																
132.00 1.02 134.13 -0.79																
lne_110/Lne Lne 132 KAMBURU -				-22.02	15.64	-0.82	0.12	18.05	Pv:	54.68 kW	cLod:	0.86 Mvar	L:	18.40 km		
lne_110/Lne Lne 132 MASINGA -				52.11	4.45	1.00	0.23	70.73	Pv:	1410.70 kW	cLod:	2.08 Mvar	L:	44.25 km		
trf_110/Tr2 TR MASINGA 132/11				-15.05	-10.04	-0.83	0.08	83.31	Tap:	4.00	Min:	-2	Max:	5		
trf_110/Tr2 TR MASINGA 132/11				-15.05	-10.04	-0.83	0.08	83.31	Tap:	4.00	Min:	-2	Max:	5		
BB 132 MAUA (PSS/E 1198)																
132.00 0.98 128.75 -7.02																
lne_116/Lne Lne 132 MERU - MA				-1.90	-0.78	-0.92	0.01	3.32	Pv:	2.01 kW	cLod:	2.19 Mvar	L:	50.00 km		
trf_119/Tr2 TR MAUA 132/33 kV				1.90	0.78	0.92	0.01	13.79	Tap:	1.00	Min:	-10	Max:	7		
BB 132 MAUNGU (PSS/E 1147)																
132.00 1.00 131.36 -3.44																
lod_114/Lod Ld MAUNGU (132 kV)				0.90	0.30	0.95	0.00		Pl0:	3.97 MW	Ql0:	1.31 Mvar				
lne_111/Lne Lne 132 SAMBURU -				-14.91	2.67	-0.98	0.07	19.34	Pv:	105.24 kW	cLod:	1.96 Mvar	L:	43.00 km		
lne_114/Lne Lne 132 VOI - MAU				14.01	-2.96	0.98	0.06	17.76	Pv:	58.84 kW	cLod:	1.27 Mvar	L:	28.00 km		
BB 132 MERU (PSS/E 1163)																
132.00 0.98 128.83 -6.87																
Cub_1(1/Shnt Shn MERU 132kV (MT				0.00	-4.76	0.00	0.02									
lne_115/Lne Lne 132 ISHIARA -				-34.70	-4.74	-0.99	0.16	23.92	Pv:	488.36 kW	cLod:	4.14 Mvar	L:	93.00 km		
lne_116/Lne Lne 132 MERU - IS				-1.11	-4.15	-0.26	0.02	3.88	Pv:	3.65 kW	cLod:	1.44 Mvar	L:	32.00 km		
lne_116/Lne Lne 132 MERU - MA				1.90	-1.40	0.80	0.01	3.32	Pv:	2.01 kW	cLod:	2.19 Mvar	L:	50.00 km		
trf_116/Tr2 TR MERU 132/33 kV				33.90	15.06	0.91	0.17	37.24	Tap:	0.00	Min:	-13	Max:	20		
BB 132 MTITO ANDEI (PSS/E 1145)																
132.00 0.99 131.06 -4.68																
lod_114/Lod Ld MTITO (132 kV)				3.00	0.99	0.95	0.01		Pl0:	3.97 MW	Ql0:	1.31 Mvar				
lne_111/Lne Lne 132 MANYANI -				1.31	1.67	0.62	0.01	4.88	Pv:	4.21 kW	cLod:	2.03 Mvar	L:	45.00 km		
lne_114/Lne Lne 132 KIBOKO -				-4.31	-2.65	-0.85	0.02	6.29	Pv:	17.18 kW	cLod:	3.92 Mvar	L:	86.00 km		
BB 132 MTWAPA (PSS/E 1123)																
132.00 0.97 128.19 -2.76																
lne_112/Lne Lne 132 MTWAPA -				35.97	8.86	0.97	0.17	52.61	Pv:	427.12 kW	cLod:	1.05 Mvar	L:	24.30 km		
lne_112/Lne Lne 132 MTWAPA -				-35.97	-8.86	-0.97	0.17	52.25	Pv:	421.27 kW	cLod:	1.09 Mvar	L:	24.30 km		
trf_112/Tr2 TR MTWAPA 132/33 k				0.00	0.00	1.00	0.00	0.00	Tap:	-2.00	Min:	-9	Max:	7		
trf_112/Tr2 TR MTWAPA 132/33 k				0.00	0.00	1.00	0.00	0.00	Tap:	-2.00	Min:	-9	Max:	7		

Grid: 1 KENYA		System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 33		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 MUHORONI (PSS/E 1128)														
132.00	0.97	127.82	-11.04						Pv:	193.75 kW	cLod:	2.15 Mvar	L:	48.50 km
lne_112/Lne	Lne 132 MUHORONI	-15.41	-9.73	-0.85	0.08	25.78			Pv:	197.17 kW	cLod:	1.32 Mvar	L:	30.70 km
lne_112/Lne	Lne 132 MUHORONI	20.78	7.74	0.94	0.10	32.06			Pv:	801.68 kW	cLod:	2.59 Mvar	L:	56.70 km
lne_112/Lne	Lne 132 MUHORONI	-32.27	-9.26	-0.96	0.15	47.49			Tap:	0	Min:	-4	Max:	2
trf_112/Tr2	TR MUHORONI 132/11								Tap:	0	Min:	-4	Max:	2
trf_112/Tr2	TR MUHORONI 132/11								Tap:	-2.00	Min:	-8	Max:	8
trf_112/Tr2	TR MUHORONI 132/33	13.45	5.63	0.92	0.07	21.82			Tap:	-2.00	Min:	-8	Max:	8
trf_112/Tr2	TR MUHORONI 132/33	13.45	5.63	0.92	0.07	21.82								
BB 132 MUMIAS (PSS/E 1155)														
132.00	0.99	130.75	-12.19						Pv:	84.76 kW	cLod:	1.33 Mvar	L:	27.00 km
lne_113/Lne	Lne 132 MUSAGA -	-16.01	-1.22	-1.00	0.07	20.01			Pv:	117.63 kW	cLod:	1.54 Mvar	L:	34.00 km
lne_115/Lne	Lne 132 MUMIAS -	25.99	10.75	0.92	0.12	19.34			Tap:	0.00	Min:	-15	Max:	9
trf_115/Tr2	TR MUMIAS 132/11 k	-9.97	-9.54	-0.72	0.06	35.87								
BB 132 MUSAGA (PSS/E 1139)														
132.00	1.00	131.50	-11.60											
Cub_1(1/Shnt	Shn MUSAGA 132kV (	0.00	-31.76	0.00	0.14				Pv:	0.35 kW	cLod:	0.83 Mvar	L:	18.00 km
lne_113/Lne	Lne 132 WEBUYE -	1.10	0.21	0.98	0.00	2.09			Pv:		cLod:		L:	70.50 km
lne_113/Lne	Lne 132 TORORO -								Pv:		cLod:		L:	70.50 km
lne_113/Lne	Lne 132 TORORO -								Pv:	632.72 kW	cLod:	3.08 Mvar	L:	66.00 km
lne_113/Lne	Lne 132 MUSAGA -	-26.64	8.03	-0.96	0.12	39.58			Pv:	632.72 kW	cLod:	3.08 Mvar	L:	66.00 km
lne_113/Lne	Lne 132 MUSAGA -	-26.64	8.03	-0.96	0.12	39.58			Pv:	84.76 kW	cLod:	1.33 Mvar	L:	27.00 km
lne_113/Lne	Lne 132 MUSAGA -	16.10	0.05	1.00	0.07	20.01			Tap:	0.00	Min:	-7	Max:	10
trf_113/Tr2	TR MUSAGA 132/33 k	14.09	5.94	0.92	0.07	33.08			Tap:	0.00	Min:	-7	Max:	10
trf_113/Tr2	TR MUSAGA 132/33 k	21.99	9.50	0.92	0.11	33.81								
BB 132 MWINGI (PSS/E 1184)														
132.00	1.01	133.56	0.35						Pv:	169.09 kW	cLod:	1.52 Mvar	L:	32.00 km
lne_110/Lne	Lne 132 KINDARUMA	-22.89	-0.72	-1.00	0.10	27.94			Pv:	159.04 kW	cLod:	8.90 Mvar	L:	192.00 km
lne_118/Lne	Lne 132 MWINGI -	-6.52	1.77	-0.96	0.03	15.21			Pv:	172.26 kW	cLod:	1.41 Mvar	L:	30.00 km
lne_118/Lne	Lne 132 MWINGI -	23.61	-4.17	0.98	0.10	29.25			Tap:	0.00	Min:	-5	Max:	12
trf_118/Tr2	TR MWINGI 132/33 k	5.80	3.12	0.88	0.03	26.88								

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001		/ 34			
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 NAIVASHA (PSS/E 1142)														
132.00	1.01	133.52	-2.39						Tap:	0	Min:	-4	Max:	3
Cub_1 /Tr2	TR EBUURU GEN 132/								Pv:	266.89 kW	cLod:	1.06 Mvar	L:	22.00 km
lne_111/Lne	Lne 132 OLKARIA -			-54.29	-3.34	-1.00	0.24	35.85	Pv:	288.92 kW	cLod:	3.18 Mvar	L:	67.00 km
lne_114/Lne	Lne 132 LANET - N			19.12	-3.19	0.99	0.08	26.25	Pv:	288.92 kW	cLod:	3.18 Mvar	L:	67.00 km
lne_114/Lne	Lne 132 LANET - N			19.12	-3.19	0.99	0.08	26.25	Pv:	288.92 kW	cLod:	3.18 Mvar	L:	67.00 km
lne_114/Lne	Lne 132 NAIVASHA			5.33	-4.29	0.78	0.03	9.26	Pv:	28.61 kW	cLod:	3.31 Mvar	L:	71.20 km
lne_114/Lne	Lne 132 NAIVASHA			5.33	-4.29	0.78	0.03	9.26	Pv:	28.61 kW	cLod:	3.31 Mvar	L:	71.20 km
lne_114/Lne	Lne 132 NAIVASHA			-19.58	7.91	-0.93	0.09	14.29	Pv:	56.39 kW	cLod:	1.43 Mvar	L:	30.00 km
trf_114/Tr2	TR NAIVASHA 132/11								Tap:	0	Min:	-12	Max:	5
trf_114/Tr2	TR NAIVASHA 132/11								Tap:	0	Min:	-12	Max:	5
trf_114/Tr2	TR NAIVASHA 132/11								Tap:	0	Min:	-12	Max:	5
trf_114/Tr2	TR NAIVASHA 132/33			12.49	5.19	0.92	0.06	17.21	Tap:	1.00	Min:	-5	Max:	12
trf_114/Tr2	TR NAIVASHA 132/33			12.48	5.19	0.92	0.06	17.20	Tap:	1.00	Min:	-5	Max:	12
BB 132 NAKURU WEST (PSS/E 1172)														
132.00	1.00	132.27	-4.23											
Cub_1 /Lne	Lne 132 MENENGAI -			-47.37	-4.83	-0.99	0.21	37.71	Pv:	351.85 kW	cLod:	0.00 Mvar	L:	15.00 km
Cub_2 /Lne	Lne 132 MENENGAI -			-47.37	-4.83	-0.99	0.21	37.71	Pv:	351.85 kW	cLod:	0.00 Mvar	L:	15.00 km
lne_114/Lne	Lne 132 LESSOS -			23.75	-12.74	0.88	0.12	36.85	Pv:	834.60 kW	cLod:	5.48 Mvar	L:	116.00 km
lne_114/Lne	Lne 132 LANET - N			3.69	9.00	0.38	0.04	13.90	Pv:	10.72 kW	cLod:	0.47 Mvar	L:	10.00 km
lne_114/Lne	Lne 132 LANET - N			3.69	9.00	0.38	0.04	13.90	Pv:	10.72 kW	cLod:	0.47 Mvar	L:	10.00 km
lne_117/Lne	Lne 132 NAKURU -			25.63	-11.90	0.91	0.12	38.63	Pv:	442.22 kW	cLod:	2.50 Mvar	L:	53.00 km
trf_117/Tr2	TR NAKURU 132/33 k			18.98	8.15	0.92	0.09	28.79	Tap:	5.00	Min:	-8	Max:	25
trf_117/Tr2	TR NAKURU 132/33 k			18.98	8.15	0.92	0.09	28.79	Tap:	5.00	Min:	-8	Max:	25
BB 132 NAMANGA (PSS/E 1191)														
132.00														
Cub_1 /Lod	Ld NAMANGA (132kV)								Pl0:	1.00 MW	Ql0:	0.40 Mvar		
lne_117/Lne	Lne 132 KAJIADO -								Pv:		cLod:		L:	90.00 km
trf_119/Tr2	TR NAMANGA 132/33			0.00	0.00	1.00	0.00	0.00	Tap:	-1.00	Min:	-8	Max:	8
BB 132 NANYUKI (PSS/E 1133)														
132.00	0.97	128.36	-7.35											
Cub_1 /Lne	Lne 132 NANYUKI -			9.14	3.63	0.93	0.04	7.92	Pv:	39.41 kW	cLod:	3.44 Mvar	L:	79.00 km
lne_113/Lne	Lne 132 KIGANJO -			-20.96	4.54	-0.98	0.10	31.01	Pv:	307.80 kW	cLod:	2.30 Mvar	L:	51.50 km
lne_113/Lne	Lne 132 NANYUKI -			-5.95	-3.53	-0.86	0.03	6.26	Pv:	22.44 kW	cLod:	2.88 Mvar	L:	64.00 km
trf_113/Tr2	TR NANYUKI 132/33			17.77	-4.64	0.97	0.08	27.83	Tap:	1.00	Min:	-8	Max:	8

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 35		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 NAROK (PSS/E 1185)														
132.00		1.00 132.17 -3.98												
Cub_1(1/Lne		Lne 132 OLKARIA 1		-36.36	-5.15	-0.99	0.16	22.28	Pv:	396.48 kW	cLod:	3.47 Mvar	L:	68.00 km
lne_110/Lne		Lne 132 OLKARIA -		-31.59	4.17	-0.99	0.14	44.26	Pv:	838.50 kW	cLod:	3.23 Mvar	L:	68.00 km
lne_116/Lne		Lne 132 BOMET - N		29.92	-1.75	1.00	0.13	41.00	Pv:	945.32 kW	cLod:	0.01 Mvar	L:	88.00 km
lne_116/Lne		Lne 132 BOMET - N		31.81	0.07	1.00	0.14	21.27	Pv:	743.44 kW	cLod:	4.06 Mvar	L:	88.00 km
trf_118/Tr2		TR NAROK 132/33 kV		6.23	2.67	0.92	0.03	28.93	Tap:	-1.00	Min:	-7	Max:	10
BB 132 NDHIWA (PSS/E 1195)														
132.00		0.98 129.27 -9.61												
lne_117/Lne		Lne 132 AWENDO -		21.28	5.79	0.96	0.10	31.10	Pv:	79.19 kW	cLod:	0.66 Mvar	L:	15.00 km
lne_119/Lne		Lne 132 HOMABAY -		-21.28	-5.79	-0.96	0.10	30.85	Pv:	77.95 kW	cLod:	0.67 Mvar	L:	15.00 km
BB 132 NYAHURURU (PSS/E 1165)														
132.00		0.96 126.30 -8.52												
lne_116/Lne		Lne 132 NYAHURURU		-7.24	-3.17	-0.92	0.04	5.50	Pv:	5.49 kW	cLod:	0.86 Mvar	L:	20.00 km
trf_116/Tr2		TR NYAHURURU 132/3		7.24	3.17	0.92	0.04	34.70	Tap:	-1.00	Min:	-6	Max:	10
BB 132 OLKARIA 1 (PSS/E 1108)														
132.00		1.02 134.53 -0.80												
Cub_1(1/Lne		Lne 132 OLKARIA 1		36.76	3.79	0.99	0.16	22.28	Pv:	396.48 kW	cLod:	3.47 Mvar	L:	68.00 km
lne_110/Lne		Lne 132 OLKARIA -		-30.94	-21.22	-0.82	0.16	24.54	Pv:	22.69 kW	cLod:	0.19 Mvar	L:	3.00 km
lne_110/Lne		Lne 132 OLKARIA -		1.39	31.66	0.04	0.14	20.76	Pv:	4.07 kW	cLod:	0.05 Mvar	L:	1.10 km
lne_110/Lne		Lne 132 OLKARIA -		32.43	-5.71	0.98	0.14	44.26	Pv:	838.50 kW	cLod:	3.23 Mvar	L:	68.00 km
trf_110/Tr2		TR OLKARIA 132/11		-39.64	-8.52	-0.98	0.17	76.47	Tap:	0.00	Min:	-4	Max:	3
BB 132 OLKARIA 1A (PSS/E 1111)														
132.00		1.02 134.86 -0.66												
lne_110/Lne		Lne 132 OLKARIA -		30.96	21.15	0.83	0.16	24.54	Pv:	22.69 kW	cLod:	0.19 Mvar	L:	3.00 km
lne_111/Lne		Lne 132 DOMES - 0		-30.96	-21.15	-0.83	0.16	24.47	Pv:	33.79 kW	cLod:	0.29 Mvar	L:	6.00 km
BB 132 OLKARIA IE (PSS/E 1112)														
132.00		1.02 134.43 -0.80												
lne_110/Lne		Lne 132 OLKARIA -		-1.38	-31.69	-0.04	0.14	20.76	Pv:	4.07 kW	cLod:	0.05 Mvar	L:	1.10 km
lne_111/Lne		Lne 132 OLKARIA -		54.56	3.81	1.00	0.23	35.85	Pv:	266.89 kW	cLod:	1.06 Mvar	L:	22.00 km
trf_121/Tr2		TR OLKARIA 220/132		-53.17	27.87	-0.89	0.26	39.30	Tap:	0.00	Min:	-11	Max:	6
BB 132 OLKARIA II (PSS/E 1109)														
132.00														
zpu_110/Zpu		zpu_1109_1210_1												

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 36		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 RABAI (PSS/E 1126)														
132.00	1.01	133.18	-0.34						Pv:	276.53 kW	cLod:	6.26 Mvar	L:	125.00 km
Cub_1(1/Lne	Lne 132 RABAI	- V0		22.57	-1.10	1.00	0.10	13.83	Pv:	74.75 kW	cLod:	0.81 Mvar	L:	17.00 km
lne_111/Lne	Lne 132 KIPEVU	-		-17.61	7.53	-0.92	0.08	26.45	Pv:	74.75 kW	cLod:	0.81 Mvar	L:	17.00 km
lne_111/Lne	Lne 132 KIPEVU	-		-17.61	7.53	-0.92	0.08	26.45	Pv:	41.16 kW	cLod:	0.87 Mvar	L:	18.00 km
lne_111/Lne	Lne 132 KIPEVU	-		-19.57	3.57	-0.98	0.09	13.26	Pv:	48.08 kW	cLod:	0.87 Mvar	L:	18.00 km
lne_111/Lne	Lne 132 KIPEVU	-		-21.53	1.17	-1.00	0.09	14.29	Pv:	153.53 kW	cLod:	0.05 Mvar	L:	10.50 km
lne_112/Lne	Lne 132 KOKOTONI			35.41	1.00	1.00	0.15	48.11	Pv:	661.02 kW	cLod:	1.14 Mvar	L:	24.60 km
lne_112/Lne	Lne 132 RABAI	- B		45.42	14.18	0.95	0.21	65.07	Pv:	661.02 kW	cLod:	1.14 Mvar	L:	24.60 km
lne_112/Lne	Lne 132 RABAI	- B		45.42	14.18	0.95	0.21	65.07	Pv:	245.38 kW	cLod:	2.32 Mvar	L:	50.00 km
lne_112/Lne	Lne 132 RABAI	- G		18.29	7.88	0.92	0.09	28.42	Tap:	0.00	Min:	-2	Max:	0
trf_112/Tr2	TR RABAI 132/11 kV			-35.06	-18.41	-0.89	0.17	61.68	Tap:	0.00	Min:	-2	Max:	0
trf_112/Tr2	TR RABAI 132/11 kV			-52.50	-25.48	-0.90	0.25	90.89	Tap:	0.00	Min:	-7	Max:	10
trf_112/Tr2	TR RABAI 132/33 kV			37.86	13.75	0.94	0.17	34.72	Tap:	0.00	Min:	-7	Max:	10
trf_112/Tr2	TR RABAI 132/33 kV			37.82	13.74	0.94	0.17	34.68						
zpu_112/Zpu	zpu_1126_1726_1			-39.46	-19.76	-0.89	0.19							
zpu_112/Zpu	zpu_1126_1727_2			-39.46	-19.76	-0.89	0.19							
BB 132 RABAITRF (PSS/E 1727)														
132.00	1.01	133.20	-0.48											
Cub_1 /Tr2	TR RABAI 220/132 2			-39.52	-19.67	-0.90	0.19	22.43	Tap:	-2.00	Min:	-11	Max:	6
lne_172/Lne	Lne 132 1RABTRF	-							Pv:		cLod:		L:	1.00 km
trf_122/Tr2	TR RABAI 220/132 k								Tap:	-5	Min:	-11	Max:	6
trf_172/Tr2	TR RABAITRF 132/11								Tap:	0	Min:	-2	Max:	1
zpu_112/Zpu	zpu_1126_1727_2			39.52	19.67	0.90	0.19							
BB 132 RANGALA (PSS/E 1178)														
132.00	0.98	129.02	-13.36											
lne_115/Lne	Lne 132 MUMIAS	-		-25.87	-11.62	-0.91	0.13	19.34	Pv:	117.63 kW	cLod:	1.54 Mvar	L:	34.00 km
trf_117/Tr2	TR RANGALA 132/33			25.87	11.62	0.91	0.13	42.03	Tap:	1.00	Min:	-8	Max:	9
BB 132 RUARAKA (PSS/E 1151)														
132.00	1.01	133.48	-3.10											
lne_115/Lne	Lne 132 RUARAKA	-		-33.95	1.18	-1.00	0.15	41.48	Pv:	20.32 kW	cLod:	0.07 Mvar	L:	1.50 km
lne_115/Lne	Lne 132 RUARAKA	-		-33.95	1.18	-1.00	0.15	41.48	Pv:	20.32 kW	cLod:	0.07 Mvar	L:	1.50 km
trf_115/Tr2	TR RUARAKA 132/66			33.95	-1.18	1.00	0.15	55.53	Tap:	2.00	Min:	-10	Max:	7
trf_115/Tr2	TR RUARAKA 132/66			33.95	-1.18	1.00	0.15	55.53	Tap:	2.00	Min:	-10	Max:	7

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 37		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 RUARAKA TEE (PSS/E 1150)														
132.00		1.01 133.55 -3.03												
lne_111/Lne		Lne 132 JUJA - RU		-28.67	0.17	-1.00	0.12	38.82	Pv:	46.57 kW	cLod:	0.24 Mvar	L:	5.00 km
lne_111/Lne		Lne 132 JUJA - RU		-28.67	0.17	-1.00	0.12	38.82	Pv:	46.57 kW	cLod:	0.24 Mvar	L:	5.00 km
lne_114/Lne		Lne 132 NAIVASHA		-5.30	1.04	-0.98	0.02	9.26	Pv:	28.61 kW	cLod:	3.31 Mvar	L:	71.20 km
lne_114/Lne		Lne 132 NAIVASHA		-5.30	1.04	-0.98	0.02	9.26	Pv:	28.61 kW	cLod:	3.31 Mvar	L:	71.20 km
lne_115/Lne		Lne 132 RUARAKA -		33.97	-1.22	1.00	0.15	41.48	Pv:	20.32 kW	cLod:	0.07 Mvar	L:	1.50 km
lne_115/Lne		Lne 132 RUARAKA -		33.97	-1.22	1.00	0.15	41.48	Pv:	20.32 kW	cLod:	0.07 Mvar	L:	1.50 km
BB 132 RUMURUTI (PSS/E 1177)														
132.00		0.96 126.57 -8.32												
Cub_3(1/Shnt		Shnt RUMURUTI 132k		-0.00	18.39	-0.00	0.08							
Cub_1 /Lne		Lne 132 NANYUKI -		-9.10	-6.85	-0.80	0.05	7.92	Pv:	39.41 kW	cLod:	3.44 Mvar	L:	79.00 km
Cub_2 /Lne		Lne 132 NYAHURURU		1.85	-13.88	0.13	0.06	9.74	Pv:	60.09 kW	cLod:	3.98 Mvar	L:	90.00 km
lne_116/Lne		Lne 132 NYAHURURU		7.24	2.34	0.95	0.03	5.50	Pv:	5.49 kW	cLod:	0.86 Mvar	L:	20.00 km
lne_117/Lne		Lne 132 RUMURUTI							Pv:		cLod:		L:	148.00 km
trf_141/Tr2		TR RUMURUTI 220/13							Tap:	5	Min:	-12	Max:	5
BB 132 SAMBURU (PSS/E 1118)														
132.00		1.00 131.74 -2.44												
lod_111/Lod		Ld SAMBURU (132 kV		2.20	0.72	0.95	0.01		Pl0:	2.55 MW	Ql0:	0.84 Mvar		
lne_111/Lne		Lne 132 SAMBURU -		15.01	-4.38	0.96	0.07	19.34	Pv:	105.24 kW	cLod:	1.96 Mvar	L:	43.00 km
lne_111/Lne		Lne 132 SAMBURU -		-17.21	3.65	-0.98	0.08	22.38	Pv:	141.17 kW	cLod:	1.97 Mvar	L:	43.00 km
BB 132 SANGORO (PSS/E 1161)														
132.00		1.01 133.23 -7.13												
lne_116/Lne		Lne 132 SONDU - S		17.71	5.41	0.96	0.08	25.23	Pv:	20.24 kW	cLod:	0.24 Mvar	L:	5.00 km
trf_116/Tr2		TR SANGORO 132/11		-17.71	-5.41	-0.96	0.08	60.54	Tap:	0.00	Min:	-8	Max:	9
BB 132 SONDU (PSS/E 1160)														
132.00		1.01 133.00 -7.24												
lne_112/Lne		Lne 132 KISUMU -		44.56	0.74	1.00	0.19	29.51	Pv:	816.36 kW	cLod:	2.35 Mvar	L:	50.00 km
lne_116/Lne		Lne 132 SONDU - S		-17.69	-5.60	-0.95	0.08	25.23	Pv:	20.24 kW	cLod:	0.24 Mvar	L:	5.00 km
lne_116/Lne		Lne 132 SONDU - H		21.71	2.94	0.99	0.10	30.61	Pv:	350.57 kW	cLod:	3.20 Mvar	L:	70.00 km
trf_116/Tr2		TR SONDU 132/11 kV		-24.29	0.96	-1.00	0.11	64.35	Tap:	0.00	Min:	-2	Max:	5
trf_116/Tr2		TR SONDU 132/11 kV		-24.29	0.96	-1.00	0.11	64.35	Tap:	0.00	Min:	-2	Max:	5
trf_116/Tr2		TR SONDU 132/33 kV							Tap:	0	Min:	-10	Max:	7
BB 132 SOTIK (PSS/E 1173)														
132.00		0.96 126.80 -10.23												
lne_113/Lne		Lne 132 CHEMOSIT		34.32	-3.37	1.00	0.16	23.93	Pv:	321.07 kW	cLod:	1.30 Mvar	L:	30.00 km
lne_116/Lne		Lne 132 BOMET - S		-51.06	5.91	-0.99	0.23	73.50	Pv:	1033.38 kW	cLod:	1.31 Mvar	L:	33.00 km
lne_116/Lne		Lne 132 KISII - S		16.74	-2.54	0.99	0.08	11.75	Pv:	76.92 kW	cLod:	1.30 Mvar	L:	30.00 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 38		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 SULTAN HAMUD (PSS/E 1143)														
132.00		1.00 131.95 -3.76												
Cub_1(1/Lne		Lne 132 SULTAN	-	-16.19	1.03	-1.00	0.07	20.29	Pv:	112.65 kW	cLod:	1.89 Mvar	L:	41.00 km
lne_114/Lne		Lne 132 SULTAN	-	6.55	-2.43	0.94	0.03	8.62	Pv:	19.83 kW	cLod:	1.98 Mvar	L:	43.00 km
lne_114/Lne		Lne 132 SULTAN	-	7.34	0.39	1.00	0.03	9.84	Pv:	35.34 kW	cLod:	2.74 Mvar	L:	60.00 km
trf_114/Tr2		TR SULTAN 132/33 k		2.30	1.00	0.92	0.01	32.60	Tap:	0.00	Min:	-4	Max:	12
BB 132 TAVETA (PSS/E 1171)														
132.00		1.00 131.44 -4.42												
lod_117/Lod		Ld TAVETA (132 kV)		1.70	0.56	0.95	0.01		Pl0:	2.09 MW	Ql0:	0.69 Mvar		
lne_114/Lne		Lne 132 VOI - TAV		-1.70	-0.56	-0.95	0.01	6.37	Pv:	7.17 kW	cLod:	4.87 Mvar	L:	107.00 km
lne_117/Lne		Lne 132 TAVETA -							Pv:		cLod:		L:	120.00 km
BB 132 THIKA (PSS/E 11160)														
132.00		1.01 133.65 -2.88												
Cub_1 /Lne		Lne 132 THIKA - KI		0.00	-0.00	0.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	17.00 km
lne_111/Lne		Lne 132 JUJA - TH		-1.94	-1.44	-0.80	0.01	3.27	Pv:	0.90 kW	cLod:	1.03 Mvar	L:	20.00 km
trf_111/Tr2		TR THIKA 132/66 kV							Tap:	0	Min:	-12	Max:	4
trf_111/Tr2		TR THIKA 132/66 kV		1.94	1.45	0.80	0.01	5.31	Tap:	0.00	Min:	-12	Max:	4
BB 132 TORORO (PSS/E 1138)														
132.00														
lne_113/Lne		Lne 132 OWEN - TO							Pv:		cLod:		L:	112.00 km
lne_113/Lne		Lne 132 OWEN - TO							Pv:		cLod:		L:	112.00 km
lne_113/Lne		Lne 132 TORORO -							Pv:		cLod:		L:	70.50 km
lne_113/Lne		Lne 132 TORORO -							Pv:		cLod:		L:	70.50 km
BB 132 ULU (PSS/E 1113)														
132.00		0.99 131.12 -4.27												
lod_111/Lod		Ld ULU (132 kV)		1.80	0.71	0.93	0.01		Pl0:	2.36 MW	Ql0:	0.93 Mvar		
lne_111/Lne		Lne 132 ULU - JUJ		-18.50	-6.40	-0.95	0.09	24.33	Pv:	240.21 kW	cLod:	2.89 Mvar	L:	62.50 km
lne_111/Lne		Lne 132 ULU - KON		16.70	5.69	0.95	0.08	21.98	Pv:	8.16 kW	cLod:	0.11 Mvar	L:	2.50 km
BB 132 VOI (PSS/E 1146)														
132.00		0.99 131.04 -4.04												
Cub_1(1/Shnt		Shn VOI 132kV (MTP		0.00	-0.00	1.00	0.00							
lod_114/Lod		Ld VOI (132 kV)		24.80	8.15	0.95	0.12		Pl0:	7.55 MW	Ql0:	2.48 Mvar		
Cub_2(1/Lne		Lne 132 RABAI - VO		-22.30	-3.69	-0.99	0.10	13.83	Pv:	276.53 kW	cLod:	6.26 Mvar	L:	125.00 km
lne_111/Lne		Lne 132 MANYANI -		9.74	-2.00	0.98	0.04	12.36	Pv:	45.16 kW	cLod:	2.03 Mvar	L:	45.00 km
lne_114/Lne		Lne 132 VOI - MAU		-13.95	1.83	-0.99	0.06	17.76	Pv:	58.84 kW	cLod:	1.27 Mvar	L:	28.00 km
lne_114/Lne		Lne 132 VOI - TAV		1.71	-4.29	0.37	0.02	6.37	Pv:	7.17 kW	cLod:	4.87 Mvar	L:	107.00 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 39		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 132 WAJIR (PSS/E 1169)														
132.00	0.98	129.90	1.44											
Cub_1 /Lod		Ld WAJIR (PSS/E 11		1.40	0.46	0.95	0.01		Pl0:	1.00 MW	Ql0:	0.33 Mvar		
lne_116/Lne		Lne 132 WAJIR - G		-3.10	-1.15	-0.94	0.01	4.60	Pv:	27.77 kW	cLod:	1.53 Mvar	L: 330.00	km
trf_116/Tr2		TR WAJIR 132/33 kV		1.70	0.69	0.93	0.01	8.11	Tap:	-1.00	Min:	-9	Max:	8
BB 132 WEBUYE (PSS/E 1131)														
132.00	1.00	131.43	-11.62											
Cub_1 /Lod		Ld WEBUYE (PSS/E 1		1.10	1.04	0.72	0.01		Pl0:	1.00 MW	Ql0:	0.95 Mvar		
lne_113/Lne		Lne 132 WEBUYE -		-1.10	-1.04	-0.72	0.01	2.09	Pv:	0.35 kW	cLod:	0.83 Mvar	L: 18.00	km
BB 132 WOTE (PSS/E 1186)														
132.00	1.00	132.62	-2.78											
Cub_1(1/Lne		Lne 132 SULTAN -		-16.30	2.66	-0.99	0.07	21.60	Pv:	204.35 kW	cLod:	4.11 Mvar	L: 86.00	km
Cub_2 /Lne		Lne 132 SULTAN -		16.30	-2.66	0.99	0.07	20.29	Pv:	112.65 kW	cLod:	1.89 Mvar	L: 41.00	km
trf_118/Tr2		TR WOTE 132/33 kV		0.00	0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-7	Max:	10
BB 132MENENGAI														
132.00	1.01	133.49	-3.30											
Cub_1 /Lne		Lne 132 MENENGAI -		47.72	5.65	0.99	0.21	37.71	Pv:	351.85 kW	cLod:	0.00 Mvar	L: 15.00	km
Cub_2 /Lne		Lne 132 MENENGAI -		47.72	5.65	0.99	0.21	37.71	Pv:	351.85 kW	cLod:	0.00 Mvar	L: 15.00	km
Cub_3 /Tr2		TR MENENGAI 132/11		-95.44	-11.30	-0.99	0.42	39.60	Tap:	0.00	Min:	-3	Max:	3
BB 15 GITARU 1&2 (PSS/E 1002)														
15.00	1.00	15.00	0.00											
sym_100/Sym		Sym GITARU 1&2 -15		-0.00	-39.76	0.00	1.53	23.25	Typ:	SL				
trf_110/Tr2		TR GITARU 132/15 k		-0.00	-19.88	-0.00	0.77	23.39	Tap:	1.00	Min:	-1	Max:	6
trf_110/Tr2		TR GITARU 132/15 k		-0.00	-19.88	-0.00	0.77	23.39	Tap:	1.00	Min:	-1	Max:	6
BB 15 GITARU3 (PSS/E 1009)														
15.00	1.00	15.00	4.44											
sym_100/Sym		Sym GITARU3 -15 kV		55.00	0.11	1.00	2.12	64.71	Typ:	PV				
trf_120/Tr2		TR GITARU 220/15 k		55.00	0.11	1.00	2.12	57.89	Tap:	0.00	Min:	-9	Max:	8
BB 220 0RTUM (PSS/E 1290)														
220.00	1.03	225.54	-6.53											
lod_129/Lod		Ld 0RTUM (220 kV)		9.40	3.72	0.93	0.03		Pl0:	5.66 MW	Ql0:	2.24 Mvar		
lne_120/Lne		Lne 220 KAINUK -		-40.33	-3.28	-1.00	0.10	15.94	Pv:	185.89 kW	cLod:	10.71 Mvar	L: 80.00	km
lne_129/Lne		Lne 220 0RTUM - K		30.93	-0.44	1.00	0.08	12.46	Pv:	89.98 kW	cLod:	8.63 Mvar	L: 65.00	km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001 / 40		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data		
BB 220 ATHI RIVER (PSS/E 1286)											
220.00		1.02 224.96 -0.62									
lne_120/Lne		Lne 220 MATASIA -							Pv:	cLod:	L: 25.00 km
lne_120/Lne		Lne 220 MATASIA -							Pv:	cLod:	L: 25.00 km
lne_120/Lne		Lne 220 GITARU -							Pv:	cLod:	L: 150.00 km
lne_122/Lne		Lne 220 EMBAKASI		21.78	36.11	0.52	0.11	8.38	Pv:	15.55 kW	cLod: 0.79 Mvar L: 12.00 km
lne_122/Lne		Lne 220 EMBAKASI		21.78	36.11	0.52	0.11	8.38	Pv:	15.55 kW	cLod: 0.79 Mvar L: 12.00 km
lne_820/Lne		Lne 220 ISINYA -		-75.33	-22.17	-0.96	0.20	38.40	Pv:	179.35 kW	cLod: 2.74 Mvar L: 7.50 km
lne_820/Lne		Lne 220 ISINYA -		-75.33	-22.17	-0.96	0.20	38.40	Pv:	179.35 kW	cLod: 2.74 Mvar L: 7.50 km
trf_128/Tr2		TR ATHI 220/BB kV		53.56	-13.94	0.97	0.14	27.06	Tap:	0.00	Min: -12 Max: 4
trf_128/Tr2		TR ATHI 220/BB kV(		53.56	-13.94	0.97	0.14	27.06	Tap:	0.00	Min: -12 Max: 4
BB 220 DANDORA (PSS/E 1221)											
220.00		1.02 224.25 -0.31									
Cub_1(1/Lne		Lne 220 DANDORA -		-102.95	14.18	-0.99	0.27	37.26	Pv:	247.08 kW	cLod: 1.98 Mvar L: 15.00 km
Cub_2(1/Lne		Lne 220 DANDORA -		-102.95	14.18	-0.99	0.27	37.26	Pv:	247.08 kW	cLod: 1.98 Mvar L: 15.00 km
lne_120/Lne		Lne 220 KAMBURU -		-17.42	-13.90	-0.78	0.06	8.75	Pv:	54.22 kW	cLod: 14.30 Mvar L: 107.50 km
lne_120/Lne		Lne 220 KAMBURU -		-17.10	-13.91	-0.78	0.06	8.65	Pv:	53.22 kW	cLod: 14.56 Mvar L: 109.50 km
lne_120/Lne		Lne 220 KIAMBERE -		-22.55	-12.10	-0.88	0.07	10.04	Pv:	113.09 kW	cLod: 20.11 Mvar L: 151.00 km
lne_122/Lne		Lne 220 DANDORA -		68.44	18.55	0.97	0.18	24.25	Pv:	3.78 kW	cLod: 11.85 Mvar L: 3.00 km
lne_122/Lne		Lne 220 DANDORA -		68.44	18.55	0.97	0.18	24.25	Pv:	3.78 kW	cLod: 11.85 Mvar L: 3.00 km
lne_122/Lne		Lne 220 DANDORA -		54.25	-24.51	0.91	0.15	23.36	Pv:	87.66 kW	cLod: 1.71 Mvar L: 12.50 km
lne_122/Lne		Lne 220 DANDORA -		54.25	-23.74	0.92	0.15	23.24	Pv:	87.66 kW	cLod: 0.17 Mvar L: 12.50 km
lne_122/Lne		Lne 220 DANDORA -							Pv:	cLod:	L: 51.00 km
lne_122/Lne		Lne 220 DANDORA -							Pv:	cLod:	L: 51.00 km
lne_122/Lne		Lne 220 DANDORA -		-43.18	10.12	-0.97	0.11	17.57	Pv:	48.72 kW	cLod: 1.71 Mvar L: 25.50 km
lne_122/Lne		Lne 220 DANDORA -		-43.18	10.12	-0.97	0.11	17.57	Pv:	48.72 kW	cLod: 1.71 Mvar L: 13.00 km
lne_820/Lne		Lne 220 ISINYA -							Pv:	cLod:	L: 17.00 km
lne_820/Lne		Lne 220 ISINYA -		-28.88	-28.64	-0.71	0.10	15.96	Pv:	74.72 kW	cLod: 4.52 Mvar L: 34.00 km
lne_820/Lne		Lne 220 ISINYA -		-28.88	-28.64	-0.71	0.10	15.96	Pv:	74.72 kW	cLod: 4.52 Mvar L: 34.00 km
lne_820/Lne		Lne 220 ISINYA -							Pv:	cLod:	L: 34.00 km
trf_122/Tr2		TR DANDORA 220/132		80.87	29.86	0.94	0.22	41.86	Tap:	0.00	Min: -6 Max: 11
trf_122/Tr2		TR DANDORA 220/132		80.87	29.86	0.94	0.22	41.86	Tap:	0.00	Min: -8 Max: 9

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 41	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 220 EMBAKASI (PSS/E 1223)													
220.00	1.02	224.50	-0.67										
Cub_1 /Shnt		Shnt EMBAKASI 220k		0.00	52.07	0.00	0.13						
lne_122/Lne		Lne 220 DANDORA -		-54.16	23.17	-0.92	0.15	23.36	Pv:	87.66 kW	cLod:	1.71 Mvar	L: 12.50 km
lne_122/Lne		Lne 220 DANDORA -		-54.16	23.94	-0.91	0.15	23.24	Pv:	87.66 kW	cLod:	0.17 Mvar	L: 12.50 km
lne_122/Lne		Lne 220 EMBAKASI		-21.76	-36.81	-0.51	0.11	8.38	Pv:	15.55 kW	cLod:	0.79 Mvar	L: 12.00 km
lne_122/Lne		Lne 220 EMBAKASI		-21.76	-36.81	-0.51	0.11	8.38	Pv:	15.55 kW	cLod:	0.79 Mvar	L: 12.00 km
trf_122/Tr2		TR EMBAKASI 220/66		50.60	-8.53	0.99	0.13	55.31	Tap:	0.00	Min:	-11	Max: 6
trf_122/Tr2		TR EMBAKASI 220/66		50.63	-8.51	0.99	0.13	55.34	Tap:	0.00	Min:	-11	Max: 6
trf_122/Tr2		TR EMBAKASI 220/66		50.63	-8.51	0.99	0.13	55.34	Tap:	0.00	Min:	-11	Max: 6
BB 220 GARISSA (PSS/E 1295)													
220.00	1.02	224.65	2.81										
Cub_1 /Shnt		Shnt GARISA 220kV		0.00	7.82	0.00	0.02						
lne_129/Lne		Lne 220 GARISSA -		-15.63	0.27	-1.00	0.04	9.15	Pv:	60.37 kW	cLod:	17.19 Mvar	L: 144.00 km
trf_129/Tr2		TR GARISSA 220/132		15.63	-8.09	0.89	0.05	17.67	Tap:	2.00	Min:	-8	Max: 8
BB 220 GARSEN (PSS/E 1255)													
220.00	0.99	218.39	5.16										
shntswt/Shnt		Shnt GARSEN 220kV		0.00	0.00	1.00	0.00						
lne_125/Lne		Lne 220 MALINDI -		43.77	-6.90	0.99	0.12	21.26	Pv:	478.37 kW	cLod:	14.95 Mvar	L: 117.00 km
lne_125/Lne		Lne 220 GARSEN -		-60.66	33.93	-0.87	0.18	36.85	Pv:	1232.97 kW	cLod:	13.65 Mvar	L: 108.00 km
lne_125/Lne		Lne 220 GARSEN -		15.79	-27.46	0.50	0.08	12.76	Pv:	96.26 kW	cLod:	11.15 Mvar	L: 96.00 km
trf_125/Tr2		TR GARSEN 220/33 k		1.10	0.44	0.93	0.00	5.17	Tap:	0.00	Min:	-8	Max: 9
BB 220 GITARU (PSS/E 1209)													
220.00	1.03	226.40	0.78										
lne_120/Lne		Lne 220 KAMBURU -		54.85	-3.40	1.00	0.14	21.36	Pv:	39.87 kW	cLod:	1.21 Mvar	L: 9.00 km
lne_120/Lne		Lne 220 GITARU -							Pv:		cLod:		L: 150.00 km
trf_120/Tr2		TR GITARU 220/15 k		-54.85	3.40	-1.00	0.14	57.89	Tap:	0.00	Min:	-9	Max: 8
BB 220 HOLA (PSS/E 1296)													
220.00	1.01	222.61	4.14										
lne_125/Lne		Lne 220 GARSEN -		-15.69	17.02	-0.68	0.06	12.76	Pv:	96.26 kW	cLod:	11.15 Mvar	L: 96.00 km
lne_129/Lne		Lne 220 GARISSA -		15.69	-17.02	0.68	0.06	9.15	Pv:	60.37 kW	cLod:	17.19 Mvar	L: 144.00 km
trf_129/Tr2		TR HOLA 220/33 kV		0.00	-0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-11	Max: 6

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 42		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 220 ISINYA (PSS/E 820)														
220.00		1.03 226.30 0.10												
Cub_3 /Tr2	TR ISINYA 400/220								Tap:	-7	Min:	-10	Max:	10
Cub_4 /Tr2	TR ISINYA 400/220								Tap:	-7	Min:	-10	Max:	10
lne_820/Lne	Lne 220 ISINYA -								Pv:		cLod:		L:	17.00 km
lne_820/Lne	Lne 220 ISINYA -		28.96	24.56	0.76	0.10	15.96		Pv:	74.72 kW	cLod:	4.52 Mvar	L:	34.00 km
lne_820/Lne	Lne 220 ISINYA -		28.96	24.56	0.76	0.10	15.96		Pv:	74.72 kW	cLod:	4.52 Mvar	L:	34.00 km
lne_820/Lne	Lne 220 ISINYA -								Pv:		cLod:		L:	34.00 km
lne_820/Lne	Lne 220 ISINYA -		-84.31	30.09	-0.94	0.23	35.35		Pv:	349.99 kW	cLod:	4.02 Mvar	L:	30.00 km
lne_820/Lne	Lne 220 ISINYA -		75.51	20.50	0.97	0.20	38.40		Pv:	179.35 kW	cLod:	2.74 Mvar	L:	7.50 km
lne_820/Lne	Lne 220 ISINYA -		75.51	20.50	0.97	0.20	38.40		Pv:	179.35 kW	cLod:	2.74 Mvar	L:	7.50 km
trf_140/Tr2	TR ISINYA 400/220		-105.78	-79.93	-0.80	0.34	38.77		Tap:	-4.00	Min:	-10	Max:	7
trf_140/Tr2	TR ISINYA 400/220		-105.78	-79.93	-0.80	0.34	38.77		Tap:	-4.00	Min:	-10	Max:	7
trf_820/Tr2	TR ISINYA 220/132		86.92	39.65	0.91	0.24	47.02		Tap:	-2.00	Min:	-13	Max:	3
BB 220 KAINUK (PSS/E 1208)														
220.00		1.03 226.35 -4.95												
lne_120/Lne	Lne 220 TURKWEL -		-42.82	5.40	-0.99	0.11	41.95		Pv:	0.00 kW	cLod:	0.00 Mvar	L:	10.00 km
lne_120/Lne	Lne 220 KAINUK -		40.52	-6.32	0.99	0.10	15.94		Pv:	185.89 kW	cLod:	10.71 Mvar	L:	80.00 km
trf_120/Tr2	TR KAINUK 220/66 k		2.30	0.92	0.93	0.01	5.41		Tap:	1.00	Min:	-8	Max:	9
BB 220 KAMBURU (PSS/E 1203)														
220.00		1.03 226.29 0.54												
lne_120/Lne	Lne 220 KAMBURU -		-44.01	12.07	-0.96	0.12	21.81		Pv:	150.16 kW	cLod:	4.85 Mvar	L:	35.00 km
lne_120/Lne	Lne 220 KAMBURU -		-54.81	2.42	-1.00	0.14	21.36		Pv:	39.87 kW	cLod:	1.21 Mvar	L:	9.00 km
lne_120/Lne	Lne 220 KAMBURU -		17.47	-0.08	1.00	0.04	8.75		Pv:	54.22 kW	cLod:	14.30 Mvar	L:	107.50 km
lne_120/Lne	Lne 220 KAMBURU -		17.15	-0.34	1.00	0.04	8.65		Pv:	53.22 kW	cLod:	14.56 Mvar	L:	109.50 km
trf_120/Tr2	TR KAMBURU 220/132		32.09	-7.04	0.98	0.08	12.07		Tap:	0.00	Min:	-10	Max:	7
trf_120/Tr2	TR KAMBURU 220/132		32.09	-7.04	0.98	0.08	12.07		Tap:	0.00	Min:	-10	Max:	7
BB 220 KIAMBERE (PSS/E 1205)														
220.00		1.03 226.07 1.32												
Cub_1(1/Shnt	Shnt KIAMBERE 220k		0.00	21.12	0.00	0.05								
lne_120/Lne	Lne 220 KAMBURU -		44.16	-16.31	0.94	0.12	21.81		Pv:	150.16 kW	cLod:	4.85 Mvar	L:	35.00 km
lne_120/Lne	Lne 220 KIAMBERE		22.67	-7.35	0.95	0.06	10.04		Pv:	113.09 kW	cLod:	20.11 Mvar	L:	151.00 km
lne_120/Lne	Lne 220 KIAMBERE		5.65	-19.93	0.27	0.05	18.55		Pv:	124.92 kW	cLod:	58.38 Mvar	L:	440.00 km
lne_120/Lne	Lne 220 KIAMBERE								Pv:		cLod:		L:	431.00 km
trf_120/Tr2	TR KIAMBERE 220/11		-33.96	10.58	-0.95	0.09	39.62		Tap:	0.00	Min:	-7	Max:	13
trf_120/Tr2	TR KIAMBERE 220/11		-38.51	11.89	-0.96	0.10	44.89		Tap:	0.00	Min:	-7	Max:	13

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 43		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 220 KIPETO (PSS/E 1245)														
220.00	1.02	225.34	1.40						Pv:	349.99 kW	cLod:	4.02 Mvar	L:	30.00 km
lne_820/Lne		Lne 220 ISINYA	-	84.66	-32.05	0.94	0.23	35.35	Tap:	0.00	Min:	-4	Max:	4
trf_124/Tr2		TR KIPETO 220/11 k	-42.33	16.03	-0.94	0.12	0.12	73.65	Tap:	0.00	Min:	-4	Max:	4
trf_124/Tr2		TR KIPETO 220/11 k	-42.33	16.03	-0.94	0.12	0.12	73.65						
BB 220 KISUMU (PSS/E 1288)														
220.00	0.98	216.49	-8.52						Pv:	110.14 kW	cLod:	11.75 Mvar	L:	103.00 km
lne_124/Lne		Lne 220 LESSOS	-	-23.46	-20.53	-0.75	0.08	12.67	Pv:	110.14 kW	cLod:	11.75 Mvar	L:	103.00 km
lne_124/Lne		Lne 220 LESSOS	-	-23.46	-20.53	-0.75	0.08	12.67	Tap:	1.00	Min:	-9	Max:	8
trf_128/Tr2		TR KISUMU 220/132	23.46	20.53	0.75	0.08	0.08	34.11	Tap:	1.00	Min:	-9	Max:	8
trf_128/Tr2		TR KISUMU 220/132	23.46	20.53	0.75	0.08	0.08	34.11						
BB 220 KITALE (PSS/E 1292)														
220.00	1.02	224.44	-7.49						Pv:	89.98 kW	cLod:	8.63 Mvar	L:	65.00 km
Cub_1 /Shnt		Shn KITALE 220kV (	-0.00	-8.33	-0.00	0.02			Tap:	2.00	Min:	-10	Max:	6
lne_129/Lne		Lne 220 0RTUM - K	-30.84	-7.65	-0.97	0.08	0.08	12.46						
trf_129/Tr2		TR KITALE 220/132	30.84	15.98	0.89	0.09	0.09	22.68						
BB 220 KOMOROCK (PSS/E 1222)														
220.00	1.02	224.19	-0.34						Pv:	3.78 kW	cLod:	11.85 Mvar	L:	3.00 km
lne_122/Lne		Lne 220 DANDORA	-	-68.43	-30.35	-0.91	0.19	24.25	Pv:	3.78 kW	cLod:	11.85 Mvar	L:	3.00 km
lne_122/Lne		Lne 220 DANDORA	-	-68.43	-30.35	-0.91	0.19	24.25	Tap:	0.00	Min:	-10	Max:	6
trf_122/Tr2		TR KOMOROCK 220/66	68.43	30.35	0.91	0.19	0.19	35.81	Tap:	0.00	Min:	-10	Max:	6
trf_122/Tr2		TR KOMOROCK 220/66	68.43	30.35	0.91	0.19	0.19	35.81						
BB 220 LAMU (PSS/E 1256)														
220.00	0.97	213.59	9.04						Pl0:	1.00 MW	Ql0:	0.33 Mvar		
Cub_3 /Lod		Ld LAMU (220kV)N	1.50	0.49	0.95	0.00	0.00							
shnt_12/Shnt		Shnt LAMU 220kV	0.00	0.00	1.00	0.00								
Cub_1 /Tr2		TR LAMU 400/220kV	-36.70	18.82	-0.89	0.11	12.14		Tap:	5.00	Min:	-10	Max:	10
Cub_2 /Tr2		TR LAMU 400/220kV	-36.70	18.82	-0.89	0.11	12.14		Tap:	5.00	Min:	-10	Max:	10
lne_125/Lne		Lne 220 GARSEN	-	61.89	-42.57	0.82	0.20	36.85	Pv:	1232.97 kW	cLod:	13.65 Mvar	L:	108.00 km
trf_125/Tr2		TR LAMU 220/33 kV	10.00	4.43	0.91	0.03	48.98		Tap:	-2.00	Min:	-7	Max:	10
BB 220 LAMU CPP														
220.00	1.02	224.40	13.65						Typ:	PV				
Cub_3 /Sym		Sym LAMU CPP G1	283.35	-15.26	1.00	0.73	52.55		Typ:	PV				
Cub_4 /Sym		Sym LAMU CPP G2							Tap:	0.00	Min:	-10	Max:	10
Cub_1 /Tr2		TR LAMU CPP 400/22	141.68	-7.63	1.00	0.37	39.74		Tap:	0.00	Min:	-10	Max:	10
Cub_2 /Tr2		TR LAMU CPP 400/22	141.68	-7.63	1.00	0.37	39.74		Tap:	0.00	Min:	-10	Max:	10

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 44	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 220 LESSOS (PSS/E 1240)													
220.00		1.00 220.65 -7.24											
Cub_1 /Tr2	TR LESSOS 400/220	17.06	-30.25	0.49	0.09	47.35	Tap: -2.00 Min: -10 Max: 10						
Cub_2 /Tr2	TR LESSOS 400/220	17.06	-30.25	0.49	0.09	47.35	Tap: -2.00 Min: -10 Max: 10						
lne_120/Lne	Lne 220 TURKWEL -	-24.01	-21.88	-0.74	0.08	15.42	Pv: 288.12 kW	cLod: 29.48 Mvar	L: 218.00 km				
lne_121/Lne	Lne 220 OLKARIA -	-81.48	-5.14	-1.00	0.21	22.37	Pv: 1817.32 kW	cLod: 24.13 Mvar	L: 203.00 km				
lne_121/Lne	Lne 220 OLKARIA -	-81.48	-5.14	-1.00	0.21	22.37	Pv: 1817.32 kW	cLod: 24.13 Mvar	L: 203.00 km				
lne_124/Lne	Lne 220 LESSOS -	23.57	9.59	0.93	0.07	12.67	Pv: 110.14 kW	cLod: 11.75 Mvar	L: 103.00 km				
lne_124/Lne	Lne 220 LESSOS -	23.57	9.59	0.93	0.07	12.67	Pv: 110.14 kW	cLod: 11.75 Mvar	L: 103.00 km				
lne_124/Lne	Lne 220 LESSOS -						Pv: cLod:		L: 121.80 km				
lne_124/Lne	Lne 220 LESSOS -						Pv: cLod:		L: 121.80 km				
trf_124/Tr2	TR LESSOS 220/132	12.26	-21.41	0.50	0.06	33.59	Tap: 5.00	Min: 0	Max: 16				
trf_124/Tr2	TR LESSOS 220/132	31.15	31.62	0.70	0.12	56.06	Tap: 0.00	Min: 0	Max: 16				
trf_124/Tr2	TR LESSOS 220/132	31.15	31.62	0.70	0.12	56.06	Tap: 0.00	Min: 0	Max: 16				
trf_124/Tr2	TR LESSOS 220/132	31.15	31.62	0.70	0.12	56.06	Tap: 0.00	Min: 0	Max: 16				
BB 220 LOYANGALANI (PSS/E 1410)													
220.00		1.01 222.54 4.16											
Cub_3 /Shnt	Shnt LOIYANGALANI	0.00	245.58	0.00	0.64								
Cub_1 /Tr2	TR LOIYANGALANI 40	-0.00	-122.79	-0.00	0.32	63.89	Tap: -4.00 Min: -10 Max: 10						
Cub_2 /Tr2	TR LOIYANGALANI 40	-0.00	-122.79	-0.00	0.32	63.89	Tap: -4.00 Min: -10 Max: 10						
lne_121/Lne	Lne 220 SUSWA - L						Pv: cLod:		L: 430.00 km				
lne_141/Lne	Lne 220 LOYANGALAN						Pv: cLod:		L: 328.95 km				
trf_141/Tr2	TR LOYANGALANI 220	0.00	-0.00	1.00	0.00	0.00	Tap: 1.00	Min: -5	Max: 2				
trf_141/Tr2	TR LOYANGALANI 220	0.00	-0.00	1.00	0.00	0.00	Tap: 1.00	Min: -5	Max: 2				
trf_141/Tr2	TR LOYANGALANI 220	0.00	-0.00	1.00	0.00	0.00	Tap: 1.00	Min: -5	Max: 2				
BB 220 MALINDI (PSS/E 1254)													
220.00		0.98 216.08 2.60											
shnt_12/Shnt	Shnt MALINDI 220kV	0.00	20.26	0.00	0.05								
lne_122/Lne	Lne 220 RABAI - M	36.69	-16.86	0.91	0.11	19.58	Pv: 308.92 kW	cLod: 12.29 Mvar	L: 97.00 km				
lne_125/Lne	Lne 220 MALINDI -	-43.29	-6.11	-0.99	0.12	21.26	Pv: 478.37 kW	cLod: 14.95 Mvar	L: 117.00 km				
trf_125/Tr2	TR MALINDI 220/33	3.30	1.36	0.92	0.01	15.80	Tap: 0.00	Min: -7	Max: 10				
trf_125/Tr2	TR MALINDI 220/33	3.30	1.36	0.92	0.01	15.80	Tap: 0.00	Min: -7	Max: 10				
BB 220 MARIAKANI (PSS/E 1250)													
220.00		0.99 217.97 0.81											
Cub_3 /Tr2	TR MARIAKANI 400/2	-18.62	-25.99	-0.58	0.08	16.14	Tap: 0.00	Min: -10	Max: 7				
lne_120/Lne	Lne 220 KIAMBERE						Pv: cLod:		L: 431.00 km				
lne_122/Lne	Lne 220 RABAI - M	18.62	25.99	0.58	0.08	16.59	Pv: 56.73 kW	cLod: 3.07 Mvar	L: 24.00 km				
lne_122/Lne	Lne 220 RABAI - M	18.62	25.99	0.58	0.08	16.59	Pv: 56.73 kW	cLod: 3.07 Mvar	L: 24.00 km				
trf_140/Tr2	TR MARIAKANI 400/2	-18.62	-25.99	-0.58	0.08	16.14	Tap: 0.00	Min: -10	Max: 7				

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 45		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 220 MATASIA (PSS/E 1204)														
220.00		1.01 221.47 -0.03												
lne_120/Lne		Lne 220 MATASIA	-	-75.10	-24.69	-0.95	0.21	15.71	Pv:	132.86 kW	cLod:	1.87 Mvar	L:	25.00 km
lne_120/Lne		Lne 220 MATASIA	-	-75.10	-24.69	-0.95	0.21	15.71	Pv:	132.86 kW	cLod:	1.87 Mvar	L:	25.00 km
lne_120/Lne		Lne 220 MATASIA	-						Pv:		cLod:		L:	25.00 km
lne_120/Lne		Lne 220 MATASIA	-						Pv:		cLod:		L:	25.00 km
trf_120/Tr2		TR MATASIA 220/66		75.10	24.69	0.95	0.21	39.27	Tap:	0.00	Min:	-16	Max:	16
trf_120/Tr2		TR MATASIA 220/66		75.10	24.69	0.95	0.21	39.27	Tap:	0.00	Min:	-16	Max:	16
BB 220 MENENGAI (PSS/E 1424)														
220.00														
lne_129/Lne		Lne 220 RONGAI	-						Pv:		cLod:		L:	30.00 km
lne_129/Lne		Lne 220 RONGAI	-						Pv:		cLod:		L:	30.00 km
trf_142/Tr2		TR MENENGAI 220/11							Tap:	0	Min:	-5	Max:	2
trf_142/Tr2		TR MENENGAI 220/11							Tap:	0	Min:	-5	Max:	2
trf_142/Tr2		TR MENENGAI 220/11							Tap:	0	Min:	-5	Max:	2
BB 220 NBEAST (MTP)														
220.00		1.02 224.35 0.48												
Cub_1 /Lne		Lne 220 DANDORA	-	103.20	-14.74	0.99	0.27	37.26	Pv:	247.08 kW	cLod:	1.98 Mvar	L:	15.00 km
Cub_2 /Lne		Lne 220 DANDORA	-	103.20	-14.74	0.99	0.27	37.26	Pv:	247.08 kW	cLod:	1.98 Mvar	L:	15.00 km
Cub_3 /Tr2		TR NBEAST 400/220		-103.20	14.74	-0.99	0.27	29.21	Tap:	0.00	Min:	-10	Max:	10
Cub_4 /Tr2		TR NBEAST 400/220		-103.20	14.74	-0.99	0.27	29.21	Tap:	0.00	Min:	-10	Max:	10
BB 220 NBNORTH (PSS/E 1224)														
220.00		1.02 224.40 0.56												
lne_121/Lne		Lne 220 OLKARIA	-						Pv:		cLod:		L:	69.00 km
lne_121/Lne		Lne 220 OLKARIA	-						Pv:		cLod:		L:	69.00 km
lne_121/Lne		Lne 220 SUSWA - N	-114.21		13.76	-0.99	0.30	22.62	Pv:	372.46 kW	cLod:	2.58 Mvar	L:	39.00 km
lne_121/Lne		Lne 220 SUSWA - N	-114.21		13.76	-0.99	0.30	22.62	Pv:	372.46 kW	cLod:	2.58 Mvar	L:	39.00 km
lne_121/Lne		Lne 220 OLKARIA	-						Pv:		cLod:		L:	69.00 km
lne_122/Lne		Lne 220 DANDORA	-						Pv:		cLod:		L:	51.00 km
lne_122/Lne		Lne 220 DANDORA	-						Pv:		cLod:		L:	51.00 km
lne_122/Lne		Lne 220 NBNORTH	-	61.14	-6.25	0.99	0.16	12.05	Pv:	103.10 kW	cLod:	2.51 Mvar	L:	38.00 km
lne_122/Lne		Lne 220 NBNORTH	-	61.14	-6.25	0.99	0.16	12.05	Pv:	103.10 kW	cLod:	2.51 Mvar	L:	38.00 km
trf_122/Tr2		TR NBNORTH 220/66		34.90	-11.03	0.95	0.09	40.25	Tap:	1.00	Min:	-11	Max:	6
trf_122/Tr2		TR NBNORTH 220/66		34.90	-11.03	0.95	0.09	40.25	Tap:	1.00	Min:	-11	Max:	6
trf_122/Tr2		TR NBNORTH 220/66		36.34	7.04	0.98	0.10	39.48	Tap:	1.00	Min:	-9	Max:	8

Grid: 1 KENYA		System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex:		LF.001		/ 46		
rated Voltage [kV]		Bus-voltage [p.u.] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data							
BB 220 NGONG (PSS/E 1284)																
220.00		1.01 222.50 0.48														
lne_120/Lne		Lne 220 MATASIA -		75.23	23.61	0.95	0.20	15.71	Pv:	132.86 kW	cLod:	1.87 Mvar	L:	25.00 km		
lne_120/Lne		Lne 220 MATASIA -		75.23	23.61	0.95	0.20	15.71	Pv:	132.86 kW	cLod:	1.87 Mvar	L:	25.00 km		
lne_121/Lne		Lne 220 SUSWA - N		-100.67	-26.82	-0.97	0.27	20.60	Pv:	393.75 kW	cLod:	3.28 Mvar	L:	50.00 km		
lne_121/Lne		Lne 220 SUSWA - N		-100.67	-26.82	-0.97	0.27	20.60	Pv:	393.75 kW	cLod:	3.28 Mvar	L:	50.00 km		
trf_128/Tr2		TR NGONG 220/66 kV		25.44	3.21	0.99	0.07	12.45	Tap:	0.00	Min:	-11	Max:	6		
trf_128/Tr2		TR NGONG 220/66 kV		25.44	3.21	0.99	0.07	12.45	Tap:	0.00	Min:	-11	Max:	6		
BB 220 OLKARIA IE (PSS/E 1212)																
220.00		1.03 225.52 2.05														
Cub_1 /Tr2		TR OLKARIA VI 220/							Tap:	0	Min:	-1	Max:	6		
Cub_2 /Tr2		TR OLKARIA VI 220/							Tap:	0	Min:	-1	Max:	6		
lne_121/Lne		Lne 220 OLKARIA -		8.34	-4.87	0.86	0.02	3.77	Pv:	0.52 kW	cLod:	0.53 Mvar	L:	4.00 km		
lne_121/Lne		Lne 220 OLKARIA -		8.34	-4.87	0.86	0.02	3.77	Pv:	0.52 kW	cLod:	0.53 Mvar	L:	4.00 km		
lne_121/Lne		Lne 220 SUSWA - 0		26.84	10.93	0.93	0.07	11.84	Pv:	30.42 kW	cLod:	3.27 Mvar	L:	27.00 km		
lne_121/Lne		Lne 220 SUSWA - 0		26.84	10.93	0.93	0.07	11.84	Pv:	30.42 kW	cLod:	3.27 Mvar	L:	27.00 km		
lne_121/Lne		Lne 220 OLKARIA -							Pv:		cLod:		L:	69.00 km		
trf_121/Tr2		TR OLKARIA 220/11		-41.20	4.17	-0.99	0.11	47.13	Tap:	-1.00	Min:	-4	Max:	3		
trf_121/Tr2		TR OLKARIA 220/11		-41.20	4.17	-0.99	0.11	47.13	Tap:	-1.00	Min:	-4	Max:	3		
trf_121/Tr2		TR OLKARIA 220/11		-41.20	4.17	-0.99	0.11	47.13	Tap:	-1.00	Min:	-4	Max:	3		
trf_121/Tr2		TR OLKARIA 220/132		53.25	-24.63	0.91	0.15	39.30	Tap:	0.00	Min:	-11	Max:	6		
BB 220 OLKARIA II (PSS/E 1210)																
220.00		1.03 225.54 2.03														
lne_121/Lne		Lne 220 OLKARIA -		25.99	10.29	0.93	0.07	11.57	Pv:	35.23 kW	cLod:	3.98 Mvar	L:	30.00 km		
lne_121/Lne		Lne 220 OLKARIA -		25.99	10.29	0.93	0.07	11.57	Pv:	35.23 kW	cLod:	3.98 Mvar	L:	30.00 km		
lne_121/Lne		Lne 220 OLKARIA -		-8.34	4.34	-0.89	0.02	3.77	Pv:	0.52 kW	cLod:	0.53 Mvar	L:	4.00 km		
lne_121/Lne		Lne 220 OLKARIA -		-8.34	4.34	-0.89	0.02	3.77	Pv:	0.52 kW	cLod:	0.53 Mvar	L:	4.00 km		
lne_121/Lne		Lne 220 OLKARIA -							Pv:		cLod:		L:	69.00 km		
lne_121/Lne		Lne 220 OLKARIA -							Pv:		cLod:		L:	69.00 km		
lne_121/Lne		Lne 220 OLKARIA -		83.30	-5.63	1.00	0.21	22.37	Pv:	1817.32 kW	cLod:	24.13 Mvar	L:	203.00 km		
lne_121/Lne		Lne 220 OLKARIA -		83.30	-5.63	1.00	0.21	22.37	Pv:	1817.32 kW	cLod:	24.13 Mvar	L:	203.00 km		
lne_121/Lne		Lne 220 OLKARIA -		-109.30	-4.13	-1.00	0.28	42.68	Pv:	118.35 kW	cLod:	0.93 Mvar	L:	7.00 km		
lne_121/Lne		Lne 220 OLKARIA -							Pv:		cLod:		L:	81.20 km		
lne_121/Lne		Lne 220 OLKARIA -							Pv:		cLod:		L:	81.20 km		
trf_121/Tr2		TR OLKARIA 220/11		-30.87	-4.62	-0.99	0.08	79.15	Tap:	0.00	Min:	-12	Max:	7		
trf_121/Tr2		TR OLKARIA 220/11		-30.87	-4.62	-0.99	0.08	79.15	Tap:	0.00	Min:	-12	Max:	7		
trf_121/Tr2		TR OLKARIA 220/11		-30.87	-4.62	-0.99	0.08	79.15	Tap:	0.00	Min:	-2	Max:	1		
trf_121/Tr2		TR OLKARIA 220/11							Tap:	0	Min:	-2	Max:	1		
zpu_110/Zpu		zpu_1109_1210_1														

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 47	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 220 OLKARIA III (PSS/E 1280)													
220.00		1.03 225.84 2.40											
Cub_1 /Tr2	TR OLKARIA 220/11	-56.47	-1.71	-1.00	0.14	81.72	Tap:	1.00	Min:	-3	Max:	4	
lne_121/Lne	Lne 220 OLKARIA -	109.42	3.91	1.00	0.28	42.68	Pv:	118.35 kW	cLod:	0.93 Mvar	L:	7.00 km	
trf_128/Tr2	TR OLKARIA 220/11						Tap:	-1	Min:	-2	Max:	1	
trf_128/Tr2	TR OLKARIA 220/11	-52.95	-2.19	-1.00	0.14	76.66	Tap:	1.00	Min:	-3	Max:	4	
BB 220 OLKARIA IV (PSS/E 1243)													
220.00		1.02 224.55 2.90											
Cub_1 /Tr2	TR OLKARIA 220/11	-52.94	9.72	-0.98	0.14	57.14	Tap:	0.00	Min:	-1	Max:	6	
lne_121/Lne	Lne 220 SUSWA - 0	88.33	-13.31	0.99	0.23	35.01	Pv:	256.87 kW	cLod:	3.01 Mvar	L:	25.00 km	
lne_121/Lne	Lne 220 SUSWA - 0	88.33	-13.31	0.99	0.23	35.00	Pv:	256.86 kW	cLod:	3.01 Mvar	L:	25.00 km	
trf_124/Tr2	TR OLKARIA 220/11	-61.68	9.77	-0.99	0.16	66.29	Tap:	0.00	Min:	-1	Max:	6	
trf_124/Tr2	TR OLKARIA 220/11	-62.04	7.13	-0.99	0.16	66.29	Tap:	0.00	Min:	-3	Max:	4	
trf_124/Tr2	TR OLKARIA 220/11						Tap:	0	Min:	-1	Max:	6	
trf_124/Tr2	TR OLKARIA 220/11						Tap:	0	Min:	-1	Max:	6	
BB 220 RABAI (PSS/E 1226)													
220.00		0.98 216.51 0.67											
Cub_1 /Shnt	Shnt RABAI 220kV (	-0.00	48.43	-0.00	0.13		Tap:	-2.00	Min:	-11	Max:	6	
Cub_2 /Tr2	TR RABAI 220/132 2	39.52	20.67	0.89	0.12	22.43	Tap:	-2.00	Min:	-11	Max:	6	
Cub_3 /Tr2	TR RABAI 220/132 2	39.52	20.67	0.89	0.12	22.43	Pv:	124.92 kW	cLod:	58.38 Mvar	L:	440.00 km	
lne_120/Lne	Lne 220 KIAMBERE	-5.52	-37.94	-0.14	0.10	18.55	Pv:	56.73 kW	cLod:	3.07 Mvar	L:	24.00 km	
lne_122/Lne	Lne 220 RABAI - M	-18.57	-28.83	-0.54	0.09	16.59	Pv:	56.73 kW	cLod:	3.07 Mvar	L:	24.00 km	
lne_122/Lne	Lne 220 RABAI - M	-18.57	-28.83	-0.54	0.09	16.59	Pv:	56.73 kW	cLod:	3.07 Mvar	L:	24.00 km	
lne_122/Lne	Lne 220 RABAI - M	-36.38	5.83	-0.99	0.10	19.58	Pv:	308.92 kW	cLod:	12.29 Mvar	L:	97.00 km	
trf_122/Tr2	TR RABAI 220/132 k						Tap:	-5	Min:	-11	Max:	6	
trf_122/Tr2	TR RABAI 220/132 k						Tap:	-5	Min:	-11	Max:	6	
BB 220 RONGAI (PSS/E 1294)													
220.00													
lne_121/Lne	Lne 220 OLKARIA -						Pv:		cLod:		L:	81.20 km	
lne_121/Lne	Lne 220 OLKARIA -						Pv:		cLod:		L:	81.20 km	
lne_124/Lne	Lne 220 LESSOS -						Pv:		cLod:		L:	121.80 km	
lne_124/Lne	Lne 220 LESSOS -						Pv:		cLod:		L:	121.80 km	
lne_129/Lne	Lne 220 RONGAI -						Pv:		cLod:		L:	30.00 km	
lne_129/Lne	Lne 220 RONGAI -						Pv:		cLod:		L:	30.00 km	
BB 220 RUMURUTI (PSS/E 1411)													
220.00													
lne_121/Lne	Lne 220 SUSWA - R						Pv:		cLod:		L:	101.05 km	
lne_141/Lne	Lne 220 LOYANGALAN						Pv:		cLod:		L:	328.95 km	
trf_141/Tr2	TR RUMURUTI 220/13						Tap:	5	Min:	-12	Max:	5	

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 48	
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]									Additional Data						
BB 220 SUSWA (PSS/E 1211)															
220.00	1.02	224.59	1.68												
Cub_3 /Shnt	Shnt SUSWA (PSS/E			0.00	0.00	1.00	0.00								
Cub_5 /Shnt	Shnt SUSWA 220kV			-0.00	62.53	-0.00	0.16								
Cub_1 /Tr2	TR SUSWA 400/220 k			-74.81	-27.20	-0.94	0.20	38.99	Tap:	0.00	Min:	-10	Max:	10	
Cub_2 /Tr2	TR SUSWA 400/220 k			-74.81	-27.20	-0.94	0.20	38.99	Tap:	0.00	Min:	-10	Max:	10	
lne_121/Lne	Lne 220 OLKARIA -			-25.95	-14.06	-0.88	0.08	11.57	Pv:	35.23 kW	cLod:	3.98 Mvar	L:	30.00 km	
lne_121/Lne	Lne 220 OLKARIA -			-25.95	-14.06	-0.88	0.08	11.57	Pv:	35.23 kW	cLod:	3.98 Mvar	L:	30.00 km	
lne_121/Lne	Lne 220 SUSWA - 0			-26.81	-13.97	-0.89	0.08	11.84	Pv:	30.42 kW	cLod:	3.27 Mvar	L:	27.00 km	
lne_121/Lne	Lne 220 SUSWA - 0			-26.81	-13.97	-0.89	0.08	11.84	Pv:	30.42 kW	cLod:	3.27 Mvar	L:	27.00 km	
lne_121/Lne	Lne 220 SUSWA - N			114.58	-14.12	0.99	0.30	22.62	Pv:	372.46 kW	cLod:	2.58 Mvar	L:	39.00 km	
lne_121/Lne	Lne 220 SUSWA - N			114.58	-14.12	0.99	0.30	22.62	Pv:	372.46 kW	cLod:	2.58 Mvar	L:	39.00 km	
lne_121/Lne	Lne 220 SUSWA - 0			-88.07	12.19	-0.99	0.23	35.01	Pv:	256.87 kW	cLod:	3.01 Mvar	L:	25.00 km	
lne_121/Lne	Lne 220 SUSWA - 0			-88.07	12.19	-0.99	0.23	35.00	Pv:	256.86 kW	cLod:	3.01 Mvar	L:	25.00 km	
lne_121/Lne	Lne 220 SUSWA - N			101.06	25.89	0.97	0.27	20.60	Pv:	393.75 kW	cLod:	3.28 Mvar	L:	50.00 km	
lne_121/Lne	Lne 220 SUSWA - N			101.06	25.89	0.97	0.27	20.60	Pv:	393.75 kW	cLod:	3.28 Mvar	L:	50.00 km	
lne_121/Lne	Lne 220 SUSWA - L								Pv:		cLod:		L:	430.00 km	
lne_121/Lne	Lne 220 SUSWA - R								Pv:		cLod:		L:	101.05 km	
trf_142/Tr2	TR SUSWA 400/220 k								Tap:	0	Min:	-10	Max:	7	
trf_142/Tr2	TR SUSWA 400/220 k								Tap:	0	Min:	-10	Max:	7	
Total Compensation:					62.53										
BB 220 THIKA RD (PSS/E 1282)															
220.00	1.02	224.21	-0.02												
lne_122/Lne	Lne 220 DANDORA -			43.23	-11.62	0.97	0.12	17.57	Pv:	48.72 kW	cLod:	1.71 Mvar	L:	25.50 km	
lne_122/Lne	Lne 220 DANDORA -			43.23	-11.62	0.97	0.12	17.57	Pv:	48.72 kW	cLod:	1.71 Mvar	L:	13.00 km	
lne_122/Lne	Lne 220 NBNORTH -			-61.04	4.36	-1.00	0.16	12.05	Pv:	103.10 kW	cLod:	2.51 Mvar	L:	38.00 km	
lne_122/Lne	Lne 220 NBNORTH -			-61.04	4.36	-1.00	0.16	12.05	Pv:	103.10 kW	cLod:	2.51 Mvar	L:	38.00 km	
trf_128/Tr2	TR THIKA 220/66 kV			17.81	7.26	0.93	0.05	9.19	Tap:	1.00	Min:	-9	Max:	7	
trf_128/Tr2	TR THIKA 220/66 kV			17.81	7.26	0.93	0.05	9.19	Tap:	1.00	Min:	-9	Max:	7	
BB 220 TORORO (PSS/E 1260)															
220.00	1.00	220.00	-10.45												
Cub_3 /Xnet	External Grid (UGA			-34.00	-77.90	-0.40	0.22		Sk": 10000.00 MVA						
Cub_1 /Tr2	TR TORORO 400/220			-17.00	-38.95	-0.40	0.11	58.87	Tap:	-3.00	Min:	-10	Max:	10	
Cub_2 /Tr2	TR TORORO 400/220			-17.00	-38.95	-0.40	0.11	58.87	Tap:	-3.00	Min:	-10	Max:	10	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 49		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 220 TURKWEL (PSS/E 1207)														
220.00		1.03 226.34 -4.93												
lne_120/Lne		Lne 220 TURKWEL -		42.82	-5.38	0.99	0.11	41.95	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	10.00 km
lne_120/Lne		Lne 220 TURKWEL -		24.30	-6.42	0.97	0.06	15.42	Pv:	288.12 kW	cLod:	29.48 Mvar	L:	218.00 km
trf_120/Tr2		TR TURKWEL 220/11		-33.56	5.90	-0.98	0.09	56.76	Tap:	2.00	Min:	-5	Max:	12
trf_120/Tr2		TR TURKWEL 220/11		-33.56	5.90	-0.98	0.09	56.76	Tap:	2.00	Min:	-5	Max:	12
BB 33 1KIP33 (PSS/E 1314)														
33.00		1.03 33.93 -3.23												
lod_131/Lod		Ld 1KIP33 (33 kV)		96.80	31.82	0.95	1.73		Pl0:	133.34 MW	Ql0:	43.83 Mvar		
lne_131/Lne		Lne 33 1KIP33 - M		0.00	-0.02	0.00	0.00	0.04	Pv:	0.00 kW	cLod:	0.02 Mvar	L:	1.30 km
trf_111/Tr2		TR KIPEVU 132/33 k		-32.27	-10.60	-0.95	0.58	57.47	Tap:	-3.00	Min:	-6	Max:	11
trf_111/Tr2		TR KIPEVU 132/33 k		-32.27	-10.60	-0.95	0.58	57.47	Tap:	-3.00	Min:	-6	Max:	11
trf_111/Tr2		TR KIPEVU 132/33 k		-32.27	-10.60	-0.95	0.58	57.47	Tap:	-3.00	Min:	-6	Max:	11
trf_131/Tr2		TR 1KIP33 33/11 kV							Tap:	0	Min:	-8	Max:	5
trf_131/Tr2		TR 1KIP33 33/11 kV							Tap:	0	Min:	-8	Max:	5
BB 33 ATHIR33 (PSS/E 1333)														
33.00		0.00 0.00 0.00												
trf_165/Tr2		TR ATHI 66/BB kV							Tap:	0	Min:	-7	Max:	9
BB 33 AWENDO (PSS/E 1377)														
33.00		1.00 32.94 -10.96												
lod_137/Lod		Ld AWENDO (33 kV)		3.30	1.30	0.93	0.06		Pl0:	1.99 MW	Ql0:	0.79 Mvar		
trf_117/Tr2		TR AWENDO 132/33 k		-3.30	-1.30	-0.93	0.06	15.45	Tap:	0.00	Min:	-7	Max:	10
BB 33 BAMBURI (PSS/E 1364)														
33.00		1.02 33.77 -3.46												
lod_136/Lod		Ld BAMBURI (33 kV)		52.90	17.39	0.95	0.95		Pl0:	38.05 MW	Ql0:	12.51 Mvar		
trf_113/Tr2		TR BAMBURI 132/33		-26.45	-8.69	-0.95	0.48	30.23	Tap:	0.00	Min:	-5	Max:	12
trf_113/Tr2		TR BAMBURI 132/33		-26.45	-8.69	-0.95	0.48	30.23	Tap:	0.00	Min:	-5	Max:	12
BB 33 BOMET (PSS/E 1386)														
33.00		1.01 33.47 -9.96												
lod_138/Lod		Ld BOMET (33 kV)		7.90	3.12	0.93	0.15		Pl0:	11.82 MW	Ql0:	4.67 Mvar		
trf_116/Tr2		TR BOMET 132/33 kV		-7.90	-3.12	-0.93	0.15	36.42	Tap:	1.00	Min:	-4	Max:	13
BB 33 CHEM033 (PSS/E 1350)														
33.00		0.97 32.02 -13.87												
lod_135/Lod		Ld CHEM033 (33 kV)		54.30	21.46	0.93	1.05		Pl0:	19.57 MW	Ql0:	7.74 Mvar		
lne_135/Lne		Lne 33 CHEM033 -		-27.14	-10.73	-0.93	0.53	30.07	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_113/Tr2		TR CHEMOSIT 132/33		-27.16	-10.73	-0.93	0.53	34.00	Tap:	-1.00	Min:	-7	Max:	10

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 50		
rated Voltage [kV]				Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 33 CHEM033 (PSS/E 1351)																
33.00 0.97 32.02 -13.87																
shntswt/Shnt Shnt CHEM033 33kV				0.00		-0.00	1.00	0.00								
lne_135/Lne Lne 33 CHEM033 -				27.14		10.73	0.93	0.53	30.07		Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_113/Tr2 TR CHEMOSIT 132/33				-27.14		-10.73	-0.93	0.53	33.98		Tap:	-1.00	Min:	-7	Max:	10
BB 33 CHOGORIA (PSS/E 1318)																
33.00 1.03 33.87 -2.24																
trf_113/Tr2 TR CHOGORIA 132/33				-0.00		0.00	-1.00	0.00	0.00		Tap:	1.00	Min:	-9	Max:	7
BB 33 ELD33 (PSS/E 1327)																
33.00 1.00 33.04 -11.22																
lod_132/Lod Ld ELD33 (33 kV)				49.60		19.60	0.93	0.93			Pl0:	37.56 MW	Ql0:	14.84 Mvar		
lne_132/Lne Lne 33 ELD33 - EL				-24.79		-9.80	-0.93	0.47	26.62		Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_112/Tr2 TR ELDORET 132/33				-24.81		-9.81	-0.93	0.47	19.74		Tap:	0.00	Min:	-7	Max:	10
BB 33 ELD33 (PSS/E 1328)																
33.00 1.00 33.04 -11.22																
lne_132/Lne Lne 33 ELD33 - EL				24.79		9.80	0.93	0.47	26.62		Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_112/Tr2 TR ELDORET 132/33				-24.79		-9.80	-0.93	0.47	19.72		Tap:	0.00	Min:	-7	Max:	10
BB 33 GALU (PSS/E 1346)																
33.00 1.01 33.38 -3.88																
lod_134/Lod Ld GALU (33 kV)				21.80		7.17	0.95	0.40			Pl0:	28.91 MW	Ql0:	9.50 Mvar		
trf_115/Tr2 TR GALU 132/33 kV				-10.90		-3.58	-0.95	0.20	50.15		Tap:	-1.00	Min:	-7	Max:	10
trf_115/Tr2 TR GALU 132/33 kV(				-10.90		-3.58	-0.95	0.20	50.15		Tap:	-1.00	Min:	-7	Max:	10
BB 33 GARISSA (PSS/E 1383)																
33.00 0.98 32.35 1.12																
lod_138/Lod Ld GARISSA (33 kV)				5.80		2.29	0.93	0.11			Pl0:	5.07 MW	Ql0:	2.00 Mvar		
trf_118/Tr2 TR GARISSA 132/33				-5.80		-2.29	-0.93	0.11	27.66		Tap:	1.00	Min:	-7	Max:	10
BB 33 GARSEN (PSS/E 1379)																
33.00 0.99 32.81 4.90																
lod_137/Lod Ld GARSEN (33 kV)				1.10		0.43	0.93	0.02			Pl0:	1.29 MW	Ql0:	0.51 Mvar		
trf_125/Tr2 TR GARSEN 220/33 k				-1.10		-0.43	-0.93	0.02	5.17		Tap:	0.00	Min:	-8	Max:	9
BB 33 GATUNDU (PSS/E 1358)																
33.00 1.02 33.68 -3.57																
lod_135/Lod Ld GATUNDU (33 kV)				4.00		1.58	0.93	0.07			Pl0:	7.35 MW	Ql0:	2.91 Mvar		
trf_118/Tr2 TR GATUNDU 132/33				-4.00		-1.58	-0.93	0.07	18.32		Tap:	0.00	Min:	-6	Max:	11

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 51		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 33 GITHAMBO (PSS/E 1357)														
33.00		1.02 33.57 -5.42												
lod_135/Lod		Ld GITHAMBO (33 kV)		9.40	3.72	0.93	0.17		Pl0:	8.44 MW	Ql0:	3.34 Mvar		
trf_118/Tr2		TR GITHAMBO 132/33		-9.40	-3.72	-0.93	0.17	43.20	Tap:	0.00	Min:	-4	Max:	12
BB 33 HOLA (PSS/E 1366)														
33.00		0.98 32.48 4.14												
trf_129/Tr2		TR HOLA 220/33 kV		-0.00	-0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-11	Max:	6
BB 33 HOMABAY (PSS/E 1397)														
33.00		0.00 0.00 0.00												
trf_119/Tr2		TR HOMABAY 132/33							Tap:	0	Min:	-7	Max:	9
BB 33 ISIBENIA (PSS/E 1398)														
33.00		0.00 0.00 0.00												
trf_119/Tr2		TR ISIBENIA 132/33		0.00	0.00	1.00	0.00	0.00	Tap:	-1.00	Min:	-7	Max:	9
BB 33 ISILOLO (PSS/E 1367)														
33.00		0.99 32.70 -7.70												
lod_136/Lod		Ld ISILOLO (33 kV)		2.90	1.15	0.93	0.06		Pl0:	8.05 MW	Ql0:	3.18 Mvar		
trf_118/Tr2		TR ISILOLO 132/33 k		-2.90	-1.15	-0.93	0.06	13.68	Tap:	3.00	Min:	-4	Max:	12
BB 33 KABARNET (PSS/E 1384)														
33.00		0.97 32.09 -10.20												
lod_138/Lod		Ld KABARNET (33 kV)		4.60	1.82	0.93	0.09		Pl0:	3.58 MW	Ql0:	1.41 Mvar		
trf_116/Tr2		TR KABARNET 132/33		-4.60	-1.82	-0.93	0.09	22.12	Tap:	0.00	Min:	-9	Max:	8
BB 33 KAJIADO (PSS/E 1362)														
33.00		0.00 0.00 0.00												
lod_136/Lod		Ld KAJIADO (33 kV)							Pl0:	17.00 MW	Ql0:	6.72 Mvar		
trf_165/Tr2		TR EPZ 66/BB kV		0.00	0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-8	Max:	8
BB 33 KAJIADO (PSS/E 1395)														
33.00		0.99 32.51 -7.20												
lod_139/Lod		Ld KAJIADO (1)		28.50	11.26	0.93	0.54		Pl0:	16.89 MW	Ql0:	6.68 Mvar		
trf_117/Tr2		TR KAJIADO 132/33		-28.50	-11.26	-0.93	0.54	68.76	Tap:	-1.00	Min:	-5	Max:	11
BB 33 KAMBURU (PSS/E 1303)														
33.00		1.02 33.67 -0.16												
trf_110/Tr2		TR KAMBURU 132/33		-0.00	0.00	-1.00	0.00	0.00	Tap:	0.00	Min:	-7	Max:	9

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 52		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 33 KAPSABET (PSS/E 1315)														
33.00		0.00 0.00 0.00												
trf_115/Tr2		TR KAPSABET 132/33							Tap:	0	Min:	-8	Max:	9
BB 33 KIGA33 (PSS/E 1352)														
33.00		0.98 32.50 -9.23												
lod_135/Lod		Ld KIGA33 (33 kV)		47.60	18.81	0.93	0.91		Pl0:	37.86 MW	Ql0:	14.96 Mvar		
shntswt/Shnt		Shnt KIGA33 33kV		-0.00	-15.52	-0.00	0.28							
trf_113/Tr2		TR KIGANJO 132/33		-23.80	-1.64	-1.00	0.42	53.82	Tap:	0.00	Min:	-7	Max:	10
trf_113/Tr2		TR KIGANJO 132/33		-23.80	-1.64	-1.00	0.42	53.82	Tap:	0.00	Min:	-7	Max:	10
BB 33 KILIFI (PSS/E 1345)														
33.00		0.99 32.74 -5.36												
lod_134/Lod		Ld KILIFI (33 kV)		35.40	11.64	0.95	0.66		Pl0:	19.18 MW	Ql0:	6.30 Mvar		
trf_113/Tr2		TR KILIFI 132/33 k		-17.70	-5.82	-0.95	0.33	28.64	Tap:	-3.00	Min:	-5	Max:	12
trf_113/Tr2		TR KILIFI 132/33 k		-17.70	-5.82	-0.95	0.33	28.64	Tap:	-3.00	Min:	-5	Max:	12
BB 33 KINDARUMA (PSS/E 1354)														
33.00		1.04 34.48 5.11												
lod_135/Lod		Ld KINDARUMA (33 k		0.60	0.24	0.93	0.01		Pl0:	0.50 MW	Ql0:	0.20 Mvar		
trf_135/Tr2		TR KINDARUMA 33/11		-0.60	-0.24	-0.93	0.01	8.30	Tap:	0.00	Min:	-7	Max:	10
BB 33 KISII33 (PSS/E 1356)														
33.00		1.02 33.82 -11.78												
lod_135/Lod		Ld KISII33 (33 kV)		34.30	13.56	0.93	0.63		Pl0:	23.05 MW	Ql0:	9.11 Mvar		
shntswt/Shnt		Shnt KISII33 33kV		0.00	-0.00	1.00	0.00							
trf_116/Tr2		TR KISII 132/33 kV		-17.15	-6.78	-0.93	0.31	14.76	Tap:	-7.00	Min:	-11	Max:	5
trf_116/Tr2		TR KISII 132/33 kV		-17.15	-6.78	-0.93	0.31	14.76	Tap:	-7.00	Min:	-11	Max:	5
BB 33 KISU33 (PSS/E 1329)														
33.00		1.03 33.97 -11.37												
lod_132/Lod		Ld KISU33 (33 kV)		74.80	29.56	0.93	1.37		Pl0:	55.74 MW	Ql0:	22.03 Mvar		
lne_132/Lne		Lne 33 KISU33 - K		-37.37	-14.77	-0.93	0.68	39.03	Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_112/Tr2		TR KISUMU 132/33 k		-37.43	-14.79	-0.93	0.68	17.38	Tap:	0.00	Min:	-5	Max:	12
BB 33 KISU33 (PSS/E 1330)														
33.00		1.03 33.98 -11.37												
lne_132/Lne		Lne 33 KISU33 - K		37.37	14.77	0.93	0.68	39.03	Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_112/Tr2		TR KISUMU 132/33 k		-37.37	-14.77	-0.93	0.68	17.35	Tap:	0.00	Min:	-5	Max:	12

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 53	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 33 KITALE (PSS/E 1382)															
33.00		1.00 33.04 -12.79													
lod_138/Lod		Ld KITALE (33 kV)		14.00	5.53	0.93	0.26		Pl0:	10.14 MW	Ql0:	4.01 Mvar			
trf_117/Tr2		TR KITALE 132/33 k		-14.00	-5.53	-0.93	0.26	66.47	Tap:	-1.00	Min:	-8	Max:	9	
BB 33 KITUI (PSS/E 1387)															
33.00		1.01 33.18 -2.59													
lod_138/Lod		Ld KITUI (33 kV)		6.90	2.73	0.93	0.13		Pl0:	6.26 MW	Ql0:	2.47 Mvar			
trf_119/Tr2		TR KITUI 132/33 kV		-6.90	-2.73	-0.93	0.13	32.62	Tap:	-1.00	Min:	-8	Max:	8	
BB 33 KUTUS (PSS/E 1392)															
33.00		1.01 33.45 -4.93													
lod_139/Lod		Ld KUTUS (33 kV)		26.30	10.39	0.93	0.49		Pl0:	22.06 MW	Ql0:	8.72 Mvar			
trf_116/Tr2		TR KUTUS 132/33 kV		-13.13	-11.45	-0.75	0.30	24.91	Tap:	0.00	Min:	-6	Max:	11	
trf_116/Tr2		TR KUTUS 132/33 kV		-13.17	1.06	-1.00	0.23	18.88	Tap:	0.00	Min:	-7	Max:	10	
BB 33 KYENI (PSS/E 1389)															
33.00		0.99 32.58 -6.39													
lod_138/Lod		Ld KYENI (33 kV)		13.00	5.14	0.93	0.25		Pl0:	10.43 MW	Ql0:	4.12 Mvar			
trf_115/Tr2		TR KYENI 132/33 kV		-13.00	-5.14	-0.93	0.25	61.56	Tap:	0.00	Min:	-7	Max:	10	
BB 33 LAMU (PSS/E 1380)															
33.00		0.99 32.58 6.71													
lod_138/Lod		Ld LAMU (33 kV)		10.00	3.95	0.93	0.19		Pl0:	11.33 MW	Ql0:	4.48 Mvar			
trf_125/Tr2		TR LAMU 220/33 kV		-10.00	-3.95	-0.93	0.19	48.98	Tap:	-2.00	Min:	-7	Max:	10	
BB 33 LANET33 (PSS/E 1341)															
33.00		1.01 33.29 -7.51													
lod_134/Lod		Ld LANET33 (33 kV)		44.60	14.66	0.95	0.81		Pl0:	48.59 MW	Ql0:	15.97 Mvar			
sym_134/Sym		Sym LANET33 -33 kV							Typ:	PV					
lne_134/Lne		Lne 33 LANET33 -		-14.79	-4.87	-0.95	0.27	15.44	Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
trf_114/Tr2		TR LANET 132/33 kV		-14.97	-4.90	-0.95	0.27	67.87	Tap:	2.00	Min:	-4	Max:	13	
trf_114/Tr2		TR LANET 132/33 kV		-14.84	-4.88	-0.95	0.27	67.33	Tap:	2.00	Min:	-4	Max:	13	
BB 33 LANET33 (PSS/E 1342)															
33.00		1.01 33.30 -7.51													
lne_134/Lne		Lne 33 LANET33 -		14.79	4.87	0.95	0.27	15.44	Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
trf_114/Tr2		TR LANET 132/33 kV		-14.79	-4.87	-0.95	0.27	67.11	Tap:	2.00	Min:	-4	Max:	13	
BB 33 LESS033 (PSS/E 1340)															
33.00		1.01 33.34 -9.81													
lod_134/Lod		Ld LESS033 (33 kV)		23.10	9.13	0.93	0.43		Pl0:	11.92 MW	Ql0:	4.71 Mvar			
trf_114/Tr2		TR LESS03 132/33 k		-23.10	-9.13	-0.93	0.43	17.82	Tap:	1.00	Min:	-6	Max:	10	

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 54	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 33 LOYANGALANI (PSS/E 1390)									Typ: Tap:	PV 1.00	Min:	-5	Max:	2	
33.00		1.05 34.49 4.16													
sym_139/Sym		Sym LOYANGALANI -3							Typ: Tap:	PV 1.00	Min:	-5	Max:	2	
trf_141/Tr2		TR LOYANGALANI 220		-0.00	-0.00	-1.00	0.00	0.00							
BB 33 LOYANGALANI (PSS/E 1391)									Typ: Tap:	PV 1.00	Min:	-5	Max:	2	
33.00		1.05 34.49 4.16													
sym_139/Sym		Sym LOYANGALANI -3							Typ: Tap:	PV 1.00	Min:	-5	Max:	2	
trf_141/Tr2		TR LOYANGALANI 220		-0.00	-0.00	-1.00	0.00	0.00							
BB 33 LOYANGALANI (PSS/E 1393)									Typ: Tap:	PV 1.00	Min:	-5	Max:	2	
33.00		1.05 34.49 4.16													
sym_139/Sym		Sym LOYANGALANI -3							Typ: Tap:	PV 1.00	Min:	-5	Max:	2	
trf_141/Tr2		TR LOYANGALANI 220		-0.00	-0.00	-1.00	0.00	0.00							
BB 33 LUNGA (PSS/E 1399)									Pl0: Tap:	1.89 MW 2.00	Ql0: Min:	0.75 Mvar -10	Max:	7	
33.00		0.96 31.66 -2.05													
lod_139/Lod		Ld LUNGA (33 kV)		1.40	0.55	0.93	0.03		Pl0: Tap:	1.89 MW 2.00	Ql0: Min:	0.75 Mvar -10	Max:	7	
trf_119/Tr2		TR LUNGA 132/33 kV		-1.40	-0.55	-0.93	0.03	10.46							
BB 33 MACHAKOS (PSS/E 1394)									Pl0: Tap:	19.28 MW 0.00	Ql0: Min:	7.62 Mvar -4	Max:	12	
33.00		1.04 34.35 -6.20													
lod_139/Lod		Ld MACHAKOS (33 kV)		17.10	6.76	0.93	0.31		Pl0: Tap:	19.28 MW 0.00	Ql0: Min:	7.62 Mvar -4	Max:	12	
trf_119/Tr2		TR MACHAKOS 132/33		-17.10	-6.76	-0.93	0.31	25.60							
BB 33 MAKANDE (PSS/E 1355)									Pv:	0.00 kW	cLod:	0.02 Mvar	L:	1.30 km	
33.00		1.03 33.93 -3.23													
lne_131/Lne		Lne 33 1KIP33 - M		-0.00	-0.00	-1.00	0.00	0.04	Pv:	0.00 kW	cLod:	0.02 Mvar	L:	1.30 km	
BB 33 MAKUTANO (PSS/E 1316)									Pl0: Tap:	2.88 MW 2.00	Ql0: Min:	1.14 Mvar -7	Max:	10	
33.00		0.99 32.79 -7.42													
lod_131/Lod		Ld MAKUTANO (33 kV)		3.40	1.34	0.93	0.06		Pl0: Tap:	2.88 MW 2.00	Ql0: Min:	1.14 Mvar -7	Max:	10	
trf_118/Tr2		TR MAKUTANO 132/33		-3.40	-1.34	-0.93	0.06	16.00							
BB 33 MALINDI (PSS/E 1378)									Pl0: Tap:	17.49 MW 0.00	Ql0: Min:	6.91 Mvar -7	Max:	10	
33.00		0.98 32.23 1.81													
lod_137/Lod		Ld MALINDI (33 kV)		6.60	2.61	0.93	0.13		Pl0: Tap:	17.49 MW 0.00	Ql0: Min:	6.91 Mvar -7	Max:	10	
trf_125/Tr2		TR MALINDI 220/33		-3.30	-1.30	-0.93	0.06	15.80							
trf_125/Tr2		TR MALINDI 220/33		-3.30	-1.30	-0.93	0.06	15.80	Pl0: Tap:	17.49 MW 0.00	Ql0: Min:	6.91 Mvar -7	Max:	10	
BB 33 MARALAL (PSS/E 1372)									Tap:	1.00	Min:	-12	Max:	4	
33.00		0.00 0.00 0.00													
trf_118/Tr2		TR MARALAL 132/33		0.00	0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-12	Max:	4	

Grid: 1 KENYA		System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 55		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 33 MAUA (PSS/E 1373)		33.00	0.99	32.60	-7.79									
lod_137/Lod		Ld MAUA (33 kV)		1.90	0.75	0.93	0.04							
trf_119/Tr2		TR MAUA 132/33 kV		-1.90	-0.75	-0.93	0.04	13.79	Pl0: Tap:	1.59 MW 1.00	Ql0: Min:	0.63 Mvar -10	Max:	7
BB 33 MERU (PSS/E 1360)		33.00	0.98	32.30	-9.25									
lod_136/Lod		Ld MERU (33 kV)		33.90	13.40	0.93	0.65							
trf_116/Tr2		TR MERU 132/33 kV		-33.90	-13.40	-0.93	0.65	37.24	Pl0: Tap:	13.81 MW 0.00	Ql0: Min:	5.46 Mvar -13	Max:	20
BB 33 MERU WPP F1		33.00	0.98	32.45	-6.23									
Cub_1 /Lne		Lne 33UGC F1		1.40	-0.01	1.00	0.02	5.40	Pv: Tap:	0.99 kW 0.00	cLod: Min:	0.41 Mvar -2	L: Max:	5.00 km 2
Cub_2 /Tr2		TR 33kV/0.69kV MER		-1.40	0.01	-1.00	0.02	9.15						
BB 33 MERU WPP F3		33.00	0.98	32.45	-6.23									
Cub_1 /Lne		Lne 33UGC F3		1.40	-0.01	1.00	0.02	5.40	Pv: Tap:	0.99 kW 0.00	cLod: Min:	0.41 Mvar -2	L: Max:	5.00 km 2
Cub_2 /Tr2		TR 33kV/0.69kV MER		-1.40	0.01	-1.00	0.02	9.15						
BB 33 MERU WPP F4		33.00	0.98	32.45	-6.23									
Cub_1 /Lne		Lne 33UGC F4		1.40	-0.01	1.00	0.02	5.40	Pv: Tap:	0.99 kW 0.00	cLod: Min:	0.41 Mvar -2	L: Max:	5.00 km 2
Cub_2 /Tr2		TR 33kV/0.69kV MER		-1.40	0.01	-1.00	0.02	9.15						
BB 33 MERU WPP F5		33.00	0.98	32.45	-6.23									
Cub_1 /Lne		Lne 33UGC F5		1.40	-0.01	1.00	0.02	5.40	Pv: Tap:	0.99 kW 0.00	cLod: Min:	0.41 Mvar -2	L: Max:	5.00 km 2
Cub_2 /Tr2		TR 33kV/0.69kV MER		-1.40	0.01	-1.00	0.02	9.15						
BB 33 MERU WPP F6		33.00	0.98	32.45	-6.23									
Cub_1 /Lne		Lne 33UGC F6		1.40	-0.01	1.00	0.02	5.40	Pv: Tap:	0.99 kW 0.00	cLod: Min:	0.41 Mvar -2	L: Max:	5.00 km 2
Cub_2 /Tr2		TR 33kV/0.69kV MER		-1.40	0.01	-1.00	0.02	9.15						
BB 33 MERU WPP F7		33.00	0.98	32.46	-6.22									
Cub_1 /Lne		Lne 33UGC F7		1.60	-0.01	1.00	0.03	6.11	Pv: Tap:	1.28 kW 0.00	cLod: Min:	0.41 Mvar -2	L: Max:	5.00 km 2
Cub_2 /Tr2		TR 33kV/0.69kV MER		-1.60	0.01	-1.00	0.03	9.15						

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 56		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 33 MERU WPP-S/S (1)														
33.00		0.98 32.43 -6.27												
Cub_1	/Coup	CB MERU WPP S/S		-0.80	-0.20	-0.97	0.01	0.00	Tap:	0.00	Min:	-10	Max:	14
Cub_2	/Tr2	TR MERU-WPP 132kV/		5.00	1.41	0.96	0.09	7.05	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_3	/Lne	Lne 33UGC F1		-1.40	-0.40	-0.96	0.03	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_4	/Lne	Lne 33UGC F2		-1.40	-0.40	-0.96	0.03	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_5	/Lne	Lne 33UGC F3		-1.40	-0.40	-0.96	0.03	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
BB 33 MERU WPP-S/S (2)														
33.00		0.98 32.43 -6.27												
Cub_1	/Coup	CB MERU WPP S/S		0.80	0.20	0.97	0.01	0.00	Tap:	0.00	Min:	-10	Max:	14
Cub_2	/Tr2	TR MERU-WPP 132kV/		5.00	1.41	0.96	0.09	7.05	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_3	/Lne	Lne 33UGC F4		-1.40	-0.40	-0.96	0.03	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_4	/Lne	Lne 33UGC F5		-1.40	-0.40	-0.96	0.03	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_5	/Lne	Lne 33UGC F6		-1.40	-0.40	-0.96	0.03	5.40	Pv:	0.99 kW	cLod:	0.41 Mvar	L:	5.00 km
Cub_6	/Lne	Lne 33UGC F7		-1.60	-0.40	-0.97	0.03	6.11	Pv:	1.28 kW	cLod:	0.41 Mvar	L:	5.00 km
BB 33 MTWAPA (PSS/E 1365)														
33.00		1.00 32.87 -2.76							Tap:	-2.00	Min:	-9	Max:	7
trf_112/Tr2		TR MTWAPA 132/33 k		-0.00	-0.00	-1.00	0.00	0.00	Tap:	-2.00	Min:	-9	Max:	7
trf_112/Tr2		TR MTWAPA 132/33 k		-0.00	-0.00	-1.00	0.00	0.00						
BB 33 MUHORONI (PSS/E 1375)														
33.00		0.99 32.51 -12.19							Pl0:	22.26 MW	Ql0:	8.80 Mvar		
lod_137/Lod		Ld MUHORONI (33 kV		26.90	10.63	0.93	0.51		Tap:	-2.00	Min:	-8	Max:	8
trf_112/Tr2		TR MUHORONI 132/33		-13.45	-5.32	-0.93	0.26	21.82	Tap:	-2.00	Min:	-8	Max:	8
trf_112/Tr2		TR MUHORONI 132/33		-13.45	-5.32	-0.93	0.26	21.82						
BB 33 MUSAGA (PSS/E 1339)														
33.00		1.01 33.33 -13.20							Pl0:	17.69 MW	Ql0:	6.99 Mvar		
lod_133/Lod		Ld MUSAGA (33 kV)		35.90	14.19	0.93	0.67		Tap:	0.00	Min:	-7	Max:	10
trf_113/Tr2		TR MUSAGA 132/33 k		-14.02	-5.45	-0.93	0.26	33.08	Tap:	0.00	Min:	-7	Max:	10
trf_113/Tr2		TR MUSAGA 132/33 k		-21.88	-8.74	-0.93	0.41	33.81						
BB 33 MWINGI (PSS/E 1381)														
33.00		0.99 32.72 -6.34							Pl0:	5.17 MW	Ql0:	2.04 Mvar		
lod_138/Lod		Ld MWINGI (33 kV)		5.70	2.25	0.93	0.11		Tap:	0.00	Min:	-5	Max:	12
trf_118/Tr2		TR MWINGI 132/33 k		-5.70	-2.25	-0.93	0.11	26.88						

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 57	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 33 NAIVA33 (PSS/E 1343)															
33.00		1.04 34.23 -3.39													
lod_134/Lod		Ld NAIVA33 (33 kV)		24.90	9.84	0.93	0.45		Pl0:	19.47 MW	Ql0:	7.70 Mvar			
sym_134/Sym		Sym NAIVA33 -33 kV							Typ:	PV					
lne_134/Lne		Lne 33 NAIVA33 -		-12.45	-4.92	-0.93	0.23	12.90	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
trf_114/Tr2		TR NAIVASHA 132/33		-12.45	-4.92	-0.93	0.23	17.21	Tap:	1.00	Min:	-5	Max:	12	
BB 33 NAIVA33 (PSS/E 1344)															
33.00		1.04 34.23 -3.39													
lne_134/Lne		Lne 33 NAIVA33 -		12.45	4.92	0.93	0.23	12.90	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
trf_114/Tr2		TR NAIVASHA 132/33		-12.45	-4.92	-0.93	0.23	17.20	Tap:	1.00	Min:	-5	Max:	12	
BB 33 NAKURU WEST (PSS/E 1359)															
33.00		1.02 33.76 -5.91													
lod_135/Lod		Ld NAKURU (33 kV)		37.80	14.94	0.93	0.70		Pl0:	29.51 MW	Ql0:	11.66 Mvar			
trf_117/Tr2		TR NAKURU 132/33 k		-18.90	-7.47	-0.93	0.35	28.79	Tap:	5.00	Min:	-8	Max:	25	
trf_117/Tr2		TR NAKURU 132/33 k		-18.90	-7.47	-0.93	0.35	28.79	Tap:	5.00	Min:	-8	Max:	25	
BB 33 NAMANGA (PSS/E 1396)															
33.00		0.00 0.00 0.00													
trf_119/Tr2		TR NAMANGA 132/33		0.00	0.00	1.00	0.00	0.00	Tap:	-1.00	Min:	-8	Max:	8	
BB 33 NANYU33 (PSS/E 1353)															
33.00		0.96 31.74 -9.33													
lod_135/Lod		Ld NANYU33 (33 kV)		17.70	5.82	0.95	0.34		Pl0:	11.72 MW	Ql0:	3.85 Mvar			
shntswt/Shnt		Shnt NANYU33 33kV		-0.00	-11.10	-0.00	0.20								
trf_113/Tr2		TR NANYUKI 132/33		-17.70	5.28	-0.96	0.34	27.83	Tap:	1.00	Min:	-8	Max:	8	
BB 33 NAROK (PSS/E 1385)															
33.00		1.02 33.62 -5.65													
lod_138/Lod		Ld NAROK (33 kV)		6.20	2.45	0.93	0.11		Pl0:	4.87 MW	Ql0:	1.92 Mvar			
trf_118/Tr2		TR NAROK 132/33 kV		-6.20	-2.45	-0.93	0.11	28.93	Tap:	-1.00	Min:	-7	Max:	10	
BB 33 NYAHURURU33 (PSS/E 1370)															
33.00		0.99 32.55 -10.58													
lod_137/Lod		Ld NYAHURURU33 (33		7.20	2.85	0.93	0.14		Pl0:	5.66 MW	Ql0:	2.24 Mvar			
trf_116/Tr2		TR NYAHURURU 132/3		-7.20	-2.85	-0.93	0.14	34.70	Tap:	-1.00	Min:	-6	Max:	10	
BB 33 RABAI33 (PSS/E 1325)															
33.00		0.99 32.77 -2.11													
lod_132/Lod		Ld RABAI33 (33 kV)		75.30	24.75	0.95	1.40		Pl0:	7.45 MW	Ql0:	2.45 Mvar			
lne_132/Lne		Lne 33 RABAI33 -		-37.63	-12.37	-0.95	0.70	39.88	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
trf_112/Tr2		TR RABAI 132/33 kV		-37.67	-12.38	-0.95	0.70	34.72	Tap:	0.00	Min:	-7	Max:	10	

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 58		
rated Voltage [kV]				Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 33 RABAI33 (PSS/E 1326)										Pv: 0.00 kW Tap: 0.00 cLod: 0.00 Mvar L: 1.00 km Min: -7 Max: 10						
33.00 0.99 32.77 -2.11				lne_132/Lne Lne 33 RABAI33 -		37.63	12.37	0.95	0.70							39.88
trf_112/Tr2 TR RABAI 132/33 kV				-37.63	-12.37	-0.95	0.70	34.68								
BB 33 RANGALA (PSS/E 1376)										Pl0: 5.76 MW Tap: 1.00 Ql0: 2.28 Mvar Min: -8 Max: 9						
33.00 0.95 31.44 -15.97				lod_137/Lod Ld RANGALA (33 kV)		25.70	10.16	0.93	0.51							
trf_117/Tr2 TR RANGALA 132/33				-25.70	-10.16	-0.93	0.51	42.03								
BB 33 RUIRU 33 (PSS/E 1371)										Tap: 0 Min: -8 Max: 8						
33.00 0.00 0.00 0.00				trf_169/Tr2 TR RUIRU 66/33 kV												
BB 33 SONDU MIRIU (PSS/E 1363)										Tap: 0 Min: -10 Max: 7						
33.00 0.00 0.00 0.00				trf_116/Tr2 TR SONDU 132/33 kV												
BB 33 SULTAN HAMUD (PSS/E 1317)										Pl0: 2.55 MW Tap: 0.00 Ql0: 1.01 Mvar Min: -4 Max: 12						
33.00 1.01 33.38 -5.70				lod_131/Lod Ld SULTAN (33 kV)		2.30	0.91	0.93	0.04							
trf_114/Tr2 TR SULTAN 132/33 k				-2.30	-0.91	-0.93	0.04	32.60								
BB 33 TANATX1 (PSS/E 1334)										Pl0: 2.19 MW Pv: 0.00 kW Tap: 0.00 Ql0: 0.86 Mvar cLod: 0.00 Mvar L: 1.00 km Min: -4 Max: 12						
33.00 0.99 32.68 -3.67				lod_133/Lod Ld TANATX1 (33 kV)		4.50	1.78	0.93	0.09							
lne_133/Lne Lne 33 TANATX1 -				-2.25	-0.89	-0.93	0.04	2.44								
trf_133/Tr2 TR TANATX1 33/11 k				-2.25	-0.89	-0.93	0.04	31.75								
BB 33 TANATX2 (PSS/E 1336)										Pv: 0.00 kW Tap: 0.00 cLod: 0.00 Mvar L: 1.00 km Min: -4 Max: 12						
33.00 0.99 32.68 -3.67				lne_133/Lne Lne 33 TANATX1 -		2.25	0.89	0.93	0.04							2.44
trf_133/Tr2 TR TANATX2 33/11 k				-2.25	-0.89	-0.93	0.04	31.75								
BB 33 THIKA (PSS/E 1335)										Tap: 0 Min: -8 Max: 8						
33.00 0.00 0.00 0.00				trf_162/Tr2 TR THIKA2 66/33 kV												
BB 33 THIKA IND (PSS/E 1361)										Tap: 0.00 Tap: 0.00 Min: -12 Max: 4 Min: -12 Max: 4						
33.00 1.01 33.17 -3.17				trf_173/Tr2 TR THIKA 66/33 kV		-0.14	-1.14	-0.12	0.02							2.53
trf_173/Tr2 TR THIKA 66/33 kV(				0.14	1.14	0.12	0.02	2.53								

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 59	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 33 WAJIR (PSS/E 1347)									Pl0: 1.31 MW Tap: -1.00 Ql0: 0.52 Mvar Min: -9 Max: 8				
33.00		1.00 32.87 0.95											
lod_134/Lod		Ld WAJIR (33 kV)		1.70	0.67	0.93	0.03						
trf_116/Tr2		TR WAJIR 132/33 kV		-1.70	-0.67	-0.93	0.03	8.11					
BB 33 WOTE (PSS/E 1388)									Tap: 1.00 Min: -7 Max: 10				
33.00		1.00 33.16 -2.78											
trf_118/Tr2		TR WOTE 132/33 kV		-0.00	-0.00	-1.00	0.00	0.00					
BB 40 RUAR1 (PSS/E 1331)									Pv: Tap: 0 cLod: Min: -11 L: 1.00 km Max: 5				
40.00													
lne_133/Lne		Lne 40 RUAR1 - RU											
trf_160/Tr2		TR RUARAKA 66/40 k											
BB 40 RUAR2 (PSS/E 1332)									Pv: Tap: 0 cLod: Min: -11 L: 1.00 km Max: 5				
40.00													
lne_133/Lne		Lne 40 RUAR1 - RU											
trf_160/Tr2		TR RUARAKA 66/40 k											
BB 400 Ethiopia									Sk": 10000.00 MVA				
400.00		0.00 0.00 0.00											
Cub_4 /Xnet		External Grid (Eth											
Cub_1 /Rec		InvD											
Cub_5 /Rec		InvY											

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001 / 60	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data	
BB 400 ISINYA (PSS/E 1403)										
400.00	1.01	405.43	2.55							
shnt_14/Shnt	Shnt	ISINYA 400kV		0.00	0.00	1.00	0.00			
shnt_14/Shnt	Shnt	ISINYA 400kV(		0.00	0.00	1.00	0.00			
shnt_14/Shnt	Shnt	ISINYA 400kV(		-0.00	61.64	-0.00	0.09			
shnt_14/Shnt	Shnt	ISINYA 400kV(		-0.00	61.64	-0.00	0.09			
shnt_14/Shnt	Shnt	ISINYA 400kV(		-0.00	61.64	-0.00	0.09			
shnt_14/Shnt	Shnt	ISINYA 400kV(		-0.00	61.64	-0.00	0.09			
Cub_1 /Tr2	TR	ISINYA 400/220							Tap: -7	Min: -10 Max: 10
Cub_2 /Tr2	TR	ISINYA 400/220							Tap: -7	Min: -10 Max: 10
Cub_3 /Lne	Lne	220 ISINYA -							Pv: cLod:	L: 429.00 km
Cub_4 /Lne	Lne	220 ISINYA -							Pv: cLod:	L: 429.00 km
Cub_5 /Lne	Lne	400 ISINYA -	-124.76	-64.64	-0.89	0.20	18.15		Pv: 370.96 kW	cLod: 57.80 Mvar L: 100.00 km
Cub_6 /Lne	Lne	400 ISINYA -	-124.76	-64.64	-0.89	0.20	18.15		Pv: 370.96 kW	cLod: 57.80 Mvar L: 100.00 km
lne_140/Lne	Lne	400 MARIAKANI	18.69	-146.17	0.13	0.21	18.60		Pv: 33.43 kW	cLod: 295.59 Mvar L: 429.00 km
lne_140/Lne	Lne	400 MARIAKANI	18.69	-146.17	0.13	0.21	18.60		Pv: 33.43 kW	cLod: 295.59 Mvar L: 429.00 km
lne_140/Lne	Lne	400 ISINYA -							Pv: cLod:	L: 100.00 km
lne_140/Lne	Lne	400 ISINYA -							Pv: cLod:	L: 100.00 km
lne_140/Lne	Lne	400 ISINYA -							Pv: cLod:	L: 200.00 km
lne_140/Lne	Lne	400 ISINYA -							Pv: cLod:	L: 200.00 km
trf_140/Tr2	TR	ISINYA 400/220	106.07	87.53	0.77	0.20	38.77		Tap: -4.00	Min: -10 Max: 7
trf_140/Tr2	TR	ISINYA 400/220	106.07	87.53	0.77	0.20	38.77		Tap: -4.00	Min: -10 Max: 7
Total Compensation:					246.56					
BB 400 LAMU CPP										
400.00	1.02	409.19	10.08							
Cub_2 /Tr2	TR	LAMU 400/220kV	36.73	-18.00	0.90	0.06	12.14		Tap: 5.00	Min: -10 Max: 10
Cub_3 /Tr2	TR	LAMU 400/220kV	36.73	-18.00	0.90	0.06	12.14		Tap: 5.00	Min: -10 Max: 10
Cub_4 /Tr2	TR	LAMU CPP 400/22	-141.34	16.47	-0.99	0.20	39.74		Tap: 0.00	Min: -10 Max: 10
Cub_5 /Tr2	TR	LAMU CPP 400/22	-141.34	16.47	-0.99	0.20	39.74		Tap: 0.00	Min: -10 Max: 10
Cub_7(1/Lne	Lne	400 LAMU CPP-N	104.61	1.52	1.00	0.15	6.82		Pv: 1229.44 kW	cLod: 1.16 Mvar L: 520.00 km
Cub_8(1/Lne	Lne	400 LAMU CPP-N	104.61	1.52	1.00	0.15	6.82		Pv: 1229.44 kW	cLod: 1.16 Mvar L: 520.00 km
BB 400 LESSOS										
400.00	1.02	409.99	-8.76							
lne_120/Tr2	TR	LESSOS 400/220	-17.04	32.17	-0.47	0.05	47.35		Tap: -2.00	Min: -10 Max: 10
lne_121/Lne	Lne	400 LESSOS -	17.04	-32.17	0.47	0.05	6.23		Pv: 8.60 kW	cLod: 74.09 Mvar L: 127.00 km
lne_124/Lne	Lne	400 LESSOS -	17.04	-32.17	0.47	0.05	6.23		Pv: 8.60 kW	cLod: 74.09 Mvar L: 127.00 km
lne_124/Tr2	TR	LESSOS 400/220	-17.04	32.17	-0.47	0.05	47.35		Tap: -2.00	Min: -10 Max: 10

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 61	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 400 LOIYANGALANI													
400.00	1.02	406.92	4.14										
Cub_2 /Tr2	TR LOIYANGALANI	40		0.04	131.63	0.00	0.19	63.89	Tap:	-4.00	Min: -10	Max: 10	
Cub_3 /Tr2	TR LOIYANGALANI	40		0.04	131.63	0.00	0.19	63.89	Tap:	-4.00	Min: -10	Max: 10	
Cub_4 /Lne	Lne 400 SUSWA - LO			-0.04	-131.63	-0.00	0.19	16.94	Pv:	5.77 kW	cLod:249.46 Mvar	L: 430.00 km	
lne_121/Lne	Lne 400 SUSWA - LO			-0.04	-131.63	-0.00	0.19	16.94	Pv:	5.77 kW	cLod:249.46 Mvar	L: 430.00 km	
BB 400 MARIAKANI													
400.00													
Cub_4 /Shnt	Shnt MARIAKANI	220											
Cub_2 /Lne	Lne 220 ISINYA -								Pv:		cLod:	L: 429.00 km	
Cub_3 /Lne	Lne 220 ISINYA -								Pv:		cLod:	L: 429.00 km	
BB 400 MARIAKANI (PSS/E 1401)													
400.00	1.01	403.92	1.52										
shnt_14/Shnt	Shnt MARIAKANI	400		0.00	244.73	0.00	0.35						
Cub_1 /Tr2	TR MARIAKANI 400/2			18.65	26.72	0.57	0.05	16.14	Tap:	0.00	Min: -10	Max: 7	
lne_140/Lne	Lne 400 MARIAKANI			-18.65	-149.08	-0.12	0.21	18.60	Pv:	33.43 kW	cLod:295.59 Mvar	L: 429.00 km	
lne_140/Lne	Lne 400 MARIAKANI			-18.65	-149.08	-0.12	0.21	18.60	Pv:	33.43 kW	cLod:295.59 Mvar	L: 429.00 km	
trf_140/Tr2	TR MARIAKANI 400/2			18.65	26.72	0.57	0.05	16.14	Tap:	0.00	Min: -10	Max: 7	
BB 400 NBEAST (MTP)													
400.00	1.02	406.40	3.11										
Cub_1 /Tr2	TR NBEAST 400/220			103.38	-9.97	1.00	0.15	29.21	Tap:	0.00	Min: -10	Max: 10	
Cub_2 /Tr2	TR NBEAST 400/220			103.38	-9.97	1.00	0.15	29.21	Tap:	0.00	Min: -10	Max: 10	
Cub_3 /Lne	Lne 400 LAMU CPP-N			-103.38	9.97	-1.00	0.15	6.82	Pv:	1229.44 kW	cLod: 1.16 Mvar	L: 520.00 km	
Cub_4 /Lne	Lne 400 LAMU CPP-N			-103.38	9.97	-1.00	0.15	6.82	Pv:	1229.44 kW	cLod: 1.16 Mvar	L: 520.00 km	
BB 400 SUSWA													
400.00	1.02	410.00	4.10										
Cub_7 /Xnet	Ethiopia			400.00	-152.54	0.93	0.60		Sk": 10000.00 MVA				
Cub_8 /Xnet	Ethiopia(1)								Sk": 10000.00 MVA				
Cub_9 /Shnt	Shunt/Filter KENYA												
Cub_2 /Lne	Lne 400 ISINYA -			125.13	10.65	1.00	0.18	18.15	Pv:	370.96 kW	cLod: 57.80 Mvar	L: 100.00 km	
Cub_3 /Lne	Lne 400 ISINYA -			125.13	10.65	1.00	0.18	18.15	Pv:	370.96 kW	cLod: 57.80 Mvar	L: 100.00 km	
Cub_4 /Rec	RectY												
Cub_5 /Rec	RectD												
Cub_6 /Lne	Lne 400 SUSWA - LO			0.04	-117.77	0.00	0.17	16.94	Pv:	5.77 kW	cLod:249.46 Mvar	L: 430.00 km	
lne_121/Tr2	TR SUSWA 400/220 k			74.83	30.85	0.92	0.11	38.99	Tap:	0.00	Min: -10	Max: 10	
lne_121/Tr2	TR SUSWA 400/220 k			74.83	30.85	0.92	0.11	38.99	Tap:	0.00	Min: -10	Max: 10	
lne_121/Lne	Lne 400 SUSWA - LO			0.04	-117.77	0.00	0.17	16.94	Pv:	5.77 kW	cLod:249.46 Mvar	L: 430.00 km	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 62					
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data							
BB 400 SUSWA (PSS/E 1420) 400.00 svsg_14/Svs svsg_1420_1 lne_140/Lne Lne 400 ISINYA - lne_140/Lne Lne 400 ISINYA - trf_142/Tr2 TR SUSWA 400/220 k trf_142/Tr2 TR SUSWA 400/220 k										Qtcr: Pv: Pv: Tap: Tap:				Qtsc: cLod: cLod: Min: Min:		nCap: 0 L: 100.00 km L: 100.00 km Max: 7 Max: 7	
BB 400 TORORO 400.00 1.02 409.23 -9.02 Cub_1 /Lne Lne 400 LESSOS - -17.03 -41.84 -0.38 0.06 6.23 Cub_2 /Lne Lne 400 LESSOS - -17.03 -41.84 -0.38 0.06 6.23 lne_124/Tr2 TR TORORO 400/220 17.03 41.84 0.38 0.06 58.87 lne_124/Tr2 TR TORORO 400/220 17.03 41.84 0.38 0.06 58.87										Pv: 8.60 kW Pv: 8.60 kW Tap: -3.00 Tap: -3.00		cLod: 74.09 Mvar cLod: 74.09 Mvar Min: -10 Min: -10		L: 127.00 km L: 127.00 km Max: 10 Max: 10			
BB 66 1THIKA1 (PSS/E 1620) 66.00 0.00 0.00 0.00 lne_162/Lne Lne 66 1THIKA1 - lne_162/Lne Lne 66 1THIKA1 - trf_111/Tr2 TR THIKA 132/66 kV trf_162/Tr2 TR 1THIKA1 66/11 k										Pv: Pv: Tap: Tap:		cLod: cLod: Min: Min:		L: 7.00 km L: 3.50 km Max: 4 Max: 8			
BB 66 ACCURATE ST (PSS/E 1731) 66.00 0.00 0.00 0.00 lne_161/Lne Lne 66 INDUST - A										Pv:		cLod:		L: 1.00 km			
BB 66 AIRPORT1 (PSS/E 1631) 66.00 0.00 0.00 0.00 lne_163/Lne Lne 66 AIRPORT1 - lne_163/Lne Lne 66 AIRPORT1 - trf_163/Tr2 TR AIRPORT1 66/11										Pv: Pv: Tap:		cLod: cLod: Min:		L: 1.00 km L: 7.00 km Max: 8			
BB 66 AIRTEE1 (PSS/E 1647) 66.00 0.00 0.00 0.00																	
BB 66 AIRTEE2 (PSS/E 1648) 66.00 0.00 0.00 0.00 lne_163/Lne Lne 66 AIRPORT1 - lne_164/Lne Lne 66 AIRTEE2 - trf_164/Tr2 TR AIRTEE2 66/11 k										Pv: Pv: Tap:		cLod: cLod: Min:		L: 1.00 km L: 1.32 km Max: 9			

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 63		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 ATHI MP (PSS/E 1755)														
66.00		0.00 0.00 0.00												
lne_161/Lne		Lne 66 JUJA - ATH							Pv:	cLod:	L:	15.00	km	
lne_172/Lne		Lne 66 ATHI - ATH							Pv:	cLod:	L:	15.00	km	
BB 66 ATHI MSD (PSS/E 1667)														
66.00		1.03 67.90 -2.69												
lne_161/Lne		Lne 66 JUJA - ATH							Pv:	cLod:	L:	30.00	km	
lne_166/Lne		Lne 66 ATHI - ATH							Pv:	cLod:	L:	6.70	km	
lne_166/Lne		Lne 66 ATHI - SIL							Pv:	cLod:	L:	1.80	km	
lne_166/Lne		Lne 66 ATHI - DEV							Pv:	cLod:	L:	8.20	km	
lne_166/Lne		Lne 66 ATHI - EPZ		-3.99	-3.16	-0.78	0.04	6.50	Pv:	4.95 kW	cLod:	0.16 Mvar	L:	10.00 km
lne_166/Lne		Lne 66 ATHI - ATH		-3.04	-1.32	-0.92	0.03	4.24	Pv:	2.51 kW	cLod:	0.19 Mvar	L:	12.00 km
lne_166/Lne		Lne 66 ATHI - MSA							Pv:	cLod:	L:	4.00	km	
lne_166/Lne		Lne 66 ATHI - SY0		15.02	-5.23	0.94	0.14	20.34	Pv:	73.59 kW	cLod:	0.23 Mvar	L:	15.00 km
lne_166/Lne		Lne 66 ATHI - ATH							Pv:	cLod:	L:	1.00	km	
trf_166/Tr2		TR ATHI 66/11 kV		-4.00	4.86	-0.64	0.05	10.38	Tap:	1.00	Min:	-2	Max:	5
trf_166/Tr2		TR ATHI 66/11 kV(1		-4.00	4.86	-0.64	0.05	10.38	Tap:	1.00	Min:	-2	Max:	5
BB 66 ATHI MSD2 (PSS/E 1728)														
66.00		0.00 0.00 0.00												
lne_166/Lne		Lne 66 ATHI - ATH							Pv:	cLod:	L:	1.00	km	
lne_169/Lne		Lne 66 SILVERWOOD							Pv:	cLod:	L:	1.80	km	
lne_172/Lne		Lne 66 ATHI - ATH							Pv:	cLod:	L:	15.00	km	
BB 66 ATHI RIVER (PSS/E 1659)														
66.00		1.03 68.09 -2.55												
Cub_1 /Shnt		Shnt 66 ATHI RIVER		0.00	-0.00	1.00	0.00							
lne_165/Lne		Lne 66 BABTEE2 -							Pv:	cLod:	L:	1.50	km	
lne_165/Lne		Lne 66 PORTLAND -		-0.61	-1.30	-0.42	0.01	2.88	Pv:	0.03 kW	cLod:	0.00 Mvar	L:	0.30 km
lne_165/Lne		Lne 66 ATHI - ATH		0.61	1.30	0.42	0.01	5.96	Pv:	0.71 kW	cLod:	3.33 Mvar	L:	4.00 km
lne_165/Lne		Lne 66 ATHI - DEL		0.00	0.00	1.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
trf_165/Tr2		TR ATHI 66/BB kV							Tap:	0	Min:	-7	Max:	9
trf_165/Tr2		TR ATHI 66/BB kV(1							Tap:	0	Min:	-5	Max:	11
trf_165/Tr2		TR ATHI 66/BB kV(2							Tap:	0	Min:	-5	Max:	11
trf_165/Tr2		TR ATHI 66/BB kV(3							Tap:	0	Min:	0	Max:	16

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 64			
rated Voltage [kV] [p.u.] Bus-voltage [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
BB 66 ATHI RIVER (PSS/E 1704)															
66.00 1.03 68.03 -2.55															
Cub_1 /Shnt Shnt 66 ATHI RIVER															
lod_170/Lod Ld ATHI (66 kV) 107.90										Pl0: 118.43 MW Ql0: 46.81 Mvar					
lne_165/Lne Lne 66 ATHI - ATH -0.61 -4.63 -0.13 0.04 5.96										Pv: 0.71 kW cLod: 3.33 Mvar L: 4.00 km					
lne_166/Lne Lne 66 ATHI - ATH 3.04 1.14 0.94 0.03 4.24										Pv: 2.51 kW cLod: 0.19 Mvar L: 12.00 km					
lne_168/Lne Lne 66 ATHITEE -										Pv: cLod: L: 6.00 km					
lne_169/Lne Lne 66 EPZ - ATHI -1.69 -8.87 -0.19 0.08 11.53										Pv: 2.63 kW cLod: 1.66 Mvar L: 2.00 km					
lne_169/Lne Lne 66 EPZ - ATHI -1.69 -8.88 -0.19 0.08 11.54										Pv: 2.62 kW cLod: 1.66 Mvar L: 2.00 km					
lne_170/Lne Lne 66 ATHI - MSA										Pv: cLod: L: 8.00 km					
trf_128/Tr2 TR ATHI 220/BB kV -53.48 15.85 -0.96 0.47 27.06										Tap: 0.00 Min: -12 Max: 4					
trf_128/Tr2 TR ATHI 220/BB kV(-53.48 15.85 -0.96 0.47 27.06										Tap: 0.00 Min: -12 Max: 4					
trf_170/Tr2 TR ATHI 66/11 kV(2										Tap: 0 Min: -16 Max: 16					
trf_170/Tr2 TR ATHI 66/11 kV(3										Tap: 0 Min: -16 Max: 16					
BB 66 ATHI TEE (PSS/E 1693)															
66.00 0.00 0.00 0.00															
lne_165/Lne Lne 66 ATHTEE3 -										Pv: cLod: L: 7.80 km					
lne_166/Lne Lne 66 ATHI - ATH										Pv: cLod: L: 6.70 km					
lne_169/Lne Lne 66 MSA - ATHI										Pv: cLod: L: 0.82 km					
lne_169/Lne Lne 66 ATHI - SIL										Pv: cLod: L: 4.90 km					
BB 66 ATHITEE (PSS/E 1682)															
66.00 0.00 0.00 0.00															
lne_168/Lne Lne 66 ATHITEE -										Pv: cLod: L: 18.20 km					
lne_168/Lne Lne 66 ATHITEE -										Pv: cLod: L: 0.40 km					
lne_168/Lne Lne 66 ATHITEE -										Pv: cLod: L: 6.00 km					
BB 66 ATHTEE1 (PSS/E 1649)															
66.00 0.00 0.00 0.00															
lne_164/Lne Lne 66 AIRTEE2 -										Pv: cLod: L: 1.32 km					
lne_164/Lne Lne 66 ATHTEE1 -										Pv: cLod: L: 7.30 km					
lne_164/Lne Lne 66 ATHTEE1 -										Pv: cLod: L: 7.00 km					
lne_164/Lne Lne 66 ATHTEE1 -										Pv: cLod: L: 1.00 km					
BB 66 ATHTEE3 (PSS/E 1651)															
66.00 0.00 0.00 0.00															
lne_164/Lne Lne 66 ATHTEE1 -										Pv: cLod: L: 7.30 km					
lne_165/Lne Lne 66 ATHTEE3 -										Pv: cLod: L: 8.80 km					
lne_165/Lne Lne 66 ATHTEE3 -										Pv: cLod: L: 7.80 km					
BB 66 ATHTEE5 (PSS/E 1652)															
66.00 0.00 0.00 0.00															

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 65	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 66 ATR MINING (PSS/E 1721)													
66.00		0.00 0.00 0.00											
lne_169/Lne		Lne 66 EPZ - ATR							Pv:	cLod:	L:	2.50	km
lne_172/Lne		Lne 66 SAVANNAH -							Pv:	cLod:	L:	0.45	km
BB 66 BABADOGO (PSS/E 1680)													
66.00		0.00 0.00 0.00											
lne_160/Lne		Lne 66 RUA2JUJ -							Pv:	cLod:	L:	1.40	km
lne_166/Lne		Lne 66 JUJA - BAB							Pv:	cLod:	L:	3.00	km
lne_167/Lne		Lne 66 BREWERIES							Pv:	cLod:	L:	1.30	km
lne_168/Lne		Lne 66 BABADOGO -							Pv:	cLod:	L:	8.00	km
trf_168/Tr2		TR BABADOGO 66/11							Tap:	0	Min:	-8	Max: 8
BB 66 BABADOGO2 (PSS/E 1681)													
66.00		0.00 0.00 0.00											
lne_160/Lne		Lne 66 RUARAKA -							Pv:	cLod:	L:	1.40	km
lne_161/Lne		Lne 66 JUJA - BAB							Pv:	cLod:	L:	3.00	km
lne_168/Lne		Lne 66 BABADOGO2							Pv:	cLod:	L:	8.00	km
trf_168/Tr2		TR BABADOGO2 66/11							Tap:	0	Min:	-7	Max: 9
BB 66 BABTEE1 (PSS/E 1655)													
66.00		0.00 0.00 0.00											
lne_165/Lne		Lne 66 BABTEE1 -							Pv:	cLod:	L:	0.30	km
lne_165/Lne		Lne 66 BABTEE1 -							Pv:	cLod:	L:	0.22	km
lne_165/Lne		Lne 66 BABTEE1 -							Pv:	cLod:	L:	0.40	km
lne_165/Lne		Lne 66 BABTEE1 -							Pv:	cLod:	L:	0.41	km
BB 66 BABTEE2 (PSS/E 1654)													
66.00		0.00 0.00 0.00											
lne_165/Lne		Lne 66 ATHTEE3 -							Pv:	cLod:	L:	8.80	km
lne_165/Lne		Lne 66 BABTEE2 -							Pv:	cLod:	L:	1.00	km
lne_165/Lne		Lne 66 BABTEE2 -							Pv:	cLod:	L:	1.50	km
BB 66 BAMBURI (PSS/E 1656)													
66.00		0.00 0.00 0.00											
lne_165/Lne		Lne 66 BABTEE2 -							Pv:	cLod:	L:	1.00	km
lne_165/Lne		Lne 66 BABTEE1 -							Pv:	cLod:	L:	0.30	km
lne_165/Lne		Lne 66 BAMBURI -							Pv:	cLod:	L:	2.50	km
BB 66 BREWERIES (PSS/E 1679)													
66.00		0.00 0.00 0.00											
lne_167/Lne		Lne 66 BREWERIES							Pv:	cLod:	L:	1.30	km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 66	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 66 CATHD (PSS/E 1612)													
66.00		0.00 0.00 0.00											
lne_161/Lne		Lne 66 CATHTEE -							Pv:		cLod:	L:	3.80 km
lne_161/Lne		Lne 66 CATHD - PA							Pv:		cLod:	L:	2.90 km
trf_161/Tr2		TR CATHD 66/11 kV							Tap:	0	Min:	-8	Max: 9
trf_161/Tr2		TR CATHD 66/11 kV(							Tap:	0	Min:	-7	Max: 10
BB 66 CATHTEE (PSS/E 1611)													
66.00		0.00 0.00 0.00											
lne_161/Lne		Lne 66 NBIWEST -							Pv:		cLod:	L:	1.00 km
lne_161/Lne		Lne 66 CATHTEE -							Pv:		cLod:	L:	3.80 km
lne_161/Lne		Lne 66 CATHTEE -							Pv:		cLod:	L:	1.00 km
BB 66 CIANDA66 (PSS/E 1660)													
66.00		0.00 0.00 0.00											
lne_164/Lne		Lne 66 NBNOR66 -							Pv:		cLod:	L:	10.70 km
trf_166/Tr2		TR CIANDA66 66/11							Tap:	0	Min:	-8	Max: 9
trf_166/Tr2		TR CIANDA66 66/11							Tap:	0	Min:	-9	Max: 8
BB 66 CITY SQUARE (PSS/E 1745)													
66.00		0.00 0.00 0.00											
lne_161/Lne		Lne 66 NBIWEST -							Pv:		cLod:	L:	4.00 km
lne_168/Lne		Lne 66 NGONG - CI							Pv:		cLod:	L:	1.00 km
trf_174/Tr2		TR CITY 66/11 kV							Tap:	0	Min:	-7	Max: 10
trf_174/Tr2		TR CITY 66/11 kV(1							Tap:	0	Min:	-7	Max: 10
BB 66 DELTA STEEL (PSS/E 1733)													
66.00		1.03 68.09 -2.55											
lne_165/Lne		Lne 66 ATHI - DEL		-0.00	-0.00	-1.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar	L: 1.00 km
BB 66 DEVKI CEMENT (PSS/E 1695)													
66.00		0.00 0.00 0.00											
lne_166/Lne		Lne 66 ATHI - DEV							Pv:		cLod:	L:	8.20 km
lne_169/Lne		Lne 66 SILVERWOOD							Pv:		cLod:	L:	6.40 km
BB 66 DRIVE IN (PSS/E 1752)													
66.00		1.03 68.11 -4.76											
lne_161/Lne		Lne 66 JUJA - DRI		-0.00	0.02	-0.00	0.00	0.19	Pv:	0.00 kW	cLod:	0.08 Mvar	L: 6.08 km
lne_173/Lne		Lne 66 EASTLEIGH		0.00	-0.02	0.00	0.00	0.04	Pv:	0.00 kW	cLod:	0.02 Mvar	L: 1.52 km
trf_175/Tr2		TR DRIVE 66/11 kV		0.00	-0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max: 9
trf_175/Tr2		TR DRIVE 66/11 kV(		0.00	-0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max: 9

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 67		
rated Voltage [kV]	Bus-voltage [p.u.]	Bus-voltage [kV]	[deg]	Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 EASTLEIGH (PSS/E 1732)														
66.00	1.03	68.11	-4.76											
lne_173/Lne		Lne 66 EASTLEIGH		-0.00	-0.00	-1.00	0.00	0.04	Pv:	0.00 kW	cLod:	0.02 Mvar	L:	1.52 km
trf_173/Tr2		TR EASTLEIGH 66/11		0.00	-0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max:	8
trf_173/Tr2		TR EASTLEIGH 66/11		0.00	-0.00	1.00	0.00	0.00	Tap:	1.00	Min:	-8	Max:	8
BB 66 EMBAKASI (PSS/E 1625)														
66.00	1.05	69.15	-5.49											
shntswt/Shnt		Shnt EMBAKASI 66kV		-0.00	-49.39	-0.00	0.41							
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	1.00 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	6.22 km
lne_162/Lne		Lne 66 EMBAKASI -		50.52	36.43	0.81	0.52	59.45	Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	6.00 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	7.95 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	11.00 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	6.88 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	2.50 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	2.20 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	3.40 km
trf_122/Tr2		TR EMBAKASI 220/66		-50.52	12.96	-0.97	0.44	55.31	Tap:	0.00	Min:	-11	Max:	6
trf_162/Tr2		TR EMBAKASI 66/11		0.00	-0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-3	Max:	4
trf_162/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-10	Max:	7
trf_162/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-16	Max:	1
trf_162/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-8	Max:	9
trf_162/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-10	Max:	7
BB 66 EMBAKASI (PSS/E 1635)														
66.00	0.00	0.00	0.00											
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:		L:	7.00 km
lne_162/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	1.00 km
lne_163/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L:	3.50 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 68		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 EMBAKASI (PSS/E 1672)														
66.00		1.05 69.14 -5.49												
lod_167/Lod		Ld EMBAKASI (66 kV		151.60	59.92	0.93	1.36		Pl0:	166.33 MW	Ql0:	65.74 Mvar		
shntswt/Shnt		Shnt EMBAKASI 66kV		-0.00	-49.39	-0.00	0.41							
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	7.00 km	
lne_162/Lne		Lne 66 EMBAKASI -		-50.52	-36.42	-0.81	0.52	59.45	Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_163/Lne		Lne 66 AIRPORT1 -							Pv:		cLod:	L:	7.00 km	
lne_163/Lne		Lne 66 INDTEE2 -							Pv:		cLod:	L:	6.22 km	
lne_164/Lne		Lne 66 ATHTEE1 -							Pv:		cLod:	L:	7.00 km	
lne_167/Lne		Lne 66 EMBAKASI -							Pv:		cLod:	L:	24.40 km	
lne_167/Lne		Lne 66 EMBAKASI -							Pv:		cLod:	L:	2.50 km	
lne_167/Lne		Lne 66 EMBAKASI -							Pv:		cLod:	L:	3.50 km	
trf_122/Tr2		TR EMBAKASI 220/66		-50.54	12.95	-0.97	0.44	55.34	Tap:	0.00	Min:	-11	Max:	6
trf_122/Tr2		TR EMBAKASI 220/66		-50.54	12.95	-0.97	0.44	55.34	Tap:	0.00	Min:	-11	Max:	6
trf_167/Tr2		TR EMBAKASI 66/11		0.00	0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-3	Max:	4
trf_167/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-12	Max:	5
trf_167/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-6	Max:	11
trf_167/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-16	Max:	0
trf_167/Tr2		TR EMBAKASI 66/11							Tap:	0	Min:	-13	Max:	3
BB 66 EMBTEE1 (PSS/E 1613)														
66.00		0.00 0.00 0.00												
lne_161/Lne		Lne 66 CATHTEE -							Pv:		cLod:	L:	1.00 km	
lne_161/Lne		Lne 66 EMBTEE1 -							Pv:		cLod:	L:	1.00 km	
BB 66 EMBTEE2 (PSS/E 1619)														
66.00		0.00 0.00 0.00												
BB 66 EMC0 (PSS/E 1662)														
66.00		0.00 0.00 0.00												
lne_162/Lne		Lne 66 EMCOTEE -							Pv:		cLod:	L:	0.31 km	
BB 66 EMCOTEE (PSS/E 1623)														
66.00		0.00 0.00 0.00												
lne_160/Lne		Lne 66 RUARAKA -							Pv:		cLod:	L:	4.59 km	
lne_160/Lne		Lne 66 RUA2JUJ -							Pv:		cLod:	L:	5.79 km	
lne_162/Lne		Lne 66 EMCOTEE -							Pv:		cLod:	L:	0.31 km	
lne_162/Lne		Lne 66 EMCOTEE -							Pv:		cLod:	L:	0.50 km	
lne_162/Lne		Lne 66 EMCOTEE -							Pv:		cLod:	L:	1.20 km	
lne_162/Lne		Lne 66 EMCOTEE -							Pv:		cLod:	L:	7.00 km	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 69	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 66 EPZ MSD (PSS/E 1699)													
66.00		1.03 68.11 -2.55							Pv:		cLod:	L:	2.50 km
lne_165/Lne		Lne 66 BAMBURI -							Pv:		cLod:	L:	1.00 km
lne_165/Lne		Lne 66 EPZ - EPZ							Pv:	0.19 kW	cLod:	0.02 Mvar	L: 2.00 km
lne_165/Lne		Lne 66 PORTLAND -		0.61	1.28	0.43	0.01	2.88	Pv:	4.95 kW	cLod:	0.16 Mvar	L: 10.00 km
lne_166/Lne		Lne 66 ATHI - EPZ		3.99	3.02	0.80	0.04	6.50	Pv:		cLod:		L: 24.40 km
lne_167/Lne		Lne 66 EMBAKASI -							Pv:		cLod:		L: 0.40 km
lne_168/Lne		Lne 66 ATHITEE -							Pv:	2.63 kW	cLod:	1.66 Mvar	L: 2.00 km
lne_169/Lne		Lne 66 EPZ - ATHI		1.69	7.22	0.23	0.06	11.53	Pv:	2.62 kW	cLod:	1.66 Mvar	L: 2.00 km
lne_169/Lne		Lne 66 EPZ - ATR							Pv:		cLod:		L: 2.50 km
trf_169/Tr2		TR EPZ 66/11 kV		-3.99	-9.37	-0.39	0.09	17.27	Tap:	-1.00	Min:	-4	Max: 3
trf_169/Tr2		TR EPZ 66/11 kV(1)		-3.99	-9.37	-0.39	0.09	17.27	Tap:	-1.00	Min:	-4	Max: 3
BB 66 EPZ S/S (PSS/E 1657)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L:	2.00 km
lne_165/Lne		Lne 66 EPZ - PORT							Pv:		cLod:	L:	1.79 km
lne_165/Lne		Lne 66 EPZ - RHIN							Pv:		cLod:	L:	1.00 km
lne_165/Lne		Lne 66 EPZ - EPZ							Pv:		cLod:	L:	1.00 km
trf_165/Tr2		TR EPZ 66/BB kV		0.00	0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-8	Max: 8
trf_165/Tr2		TR EPZ 66/BB kV(1)							Tap:	0	Min:	-7	Max: 9
trf_165/Tr2		TR EPZ 66/BB kV(2)							Tap:	0	Min:	-6	Max: 11
BB 66 FIRESTO (PSS/E 1615)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L:	3.60 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	3.60 km
BB 66 FIRESTO (PSS/E 1671)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L:	3.60 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	3.60 km
BB 66 FIRETEE (PSS/E 1614)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L:	3.60 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	1.70 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	7.00 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	3.60 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	7.00 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	3.50 km
lne_161/Lne		Lne 66 FIRETEE -							Pv:		cLod:	L:	7.00 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 70		
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data				
BB 66 GEN MOTORS (PSS/E 1711)														
66.00 0.00 0.00 0.00														
lne_162/Lne Lne 66 EMBAKASI -										Pv: cLod: L: 2.50 km				
lne_167/Lne Lne 66 EMBAKASI -										Pv: cLod: L: 2.50 km				
trf_171/Tr2 TR GEN 66/11 kV										Tap: 0 Min: -7 Max: 10				
trf_171/Tr2 TR GEN 66/11 kV(1)										Tap: 0 Min: -7 Max: 10				
BB 66 GIGIRI (PSS/E 1670)														
66.00 0.00 0.00 0.00														
lne_160/Lne Lne 66 KITISUR -										Pv: cLod: L: 5.25 km				
BB 66 INDTEE1 (PSS/E 1637)														
66.00 0.00 0.00 0.00														
lne_161/Lne Lne 66 NBIWEST -										Pv: cLod: L: 2.87 km				
lne_161/Lne Lne 66 EMBTEE1 -										Pv: cLod: L: 1.00 km				
lne_161/Lne Lne 66 INDUST - I										Pv: cLod: L: 0.80 km				
lne_162/Lne Lne 66 EMBAKASI -										Pv: cLod: L: 6.22 km				
BB 66 INDTEE2 (PSS/E 1618)														
66.00 0.00 0.00 0.00														
BB 66 INDTEE2 (PSS/E 1638)														
66.00 0.00 0.00 0.00														
lne_163/Lne Lne 66 INDTEE2 -										Pv: cLod: L: 2.87 km				
lne_163/Lne Lne 66 INDTEE2 -										Pv: cLod: L: 6.22 km				
lne_163/Lne Lne 66 INDTEE2 -										Pv: cLod: L: 0.80 km				
BB 66 INDUS2 (PSS/E 1674)														
66.00 0.00 0.00 0.00														
lne_161/Lne Lne 66 INDUST - I										Pv: cLod: L: 1.00 km				
lne_162/Lne Lne 66 NRBSTH2 -										Pv: cLod: L: 4.03 km				
lne_163/Lne Lne 66 INDTEE2 -										Pv: cLod: L: 0.80 km				
lne_167/Lne Lne 66 INDUS2 - L										Pv: cLod: L: 1.21 km				
trf_167/Tr2 TR INDUS2 66/11 kV										Tap: 0 Min: -8 Max: 8				

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 71			
					Active Power	Reactive Power	Power Factor	Current	Loading	Additional Data					
rated Voltage [kV]	Bus-voltage [p.u.]	Bus-voltage [kV]	[deg]		[MW]	[Mvar]	[-]	[kA]	[%]						
BB 66 INDUST (PSS/E 1616)															
66.00	0.00	0.00	0.00												
lne_161/Lne	Lne 66 INDUST	- N								Pv:	cLod:	L:	4.03 km		
lne_161/Lne	Lne 66 INDUST	- I								Pv:	cLod:	L:	0.80 km		
lne_161/Lne	Lne 66 INDUST	- I								Pv:	cLod:	L:	1.00 km		
lne_161/Lne	Lne 66 INDUST	- L								Pv:	cLod:	L:	1.00 km		
lne_161/Lne	Lne 66 INDUST	- A								Pv:	cLod:	L:	1.00 km		
lne_161/Lne	Lne 66 INDUST	- L								Pv:	cLod:	L:	1.21 km		
trf_161/Tr2	TR INDUST 66/11 kV									Tap:	0	Min: -8	Max: 8		
BB 66 JEEVA2 (PSS/E 1639)															
66.00	0.00	0.00	0.00												
lne_163/Lne	Lne 66 JEEVA2	- K								Pv:	cLod:	L:	2.90 km		
lne_163/Lne	Lne 66 JEEVA2	- M								Pv:	cLod:	L:	0.87 km		
trf_163/Tr2	TR JEEVA2 66/11 kV									Tap:	0	Min: -8	Max: 8		
BB 66 JEEVANJEE 1 (PSS/E 1622)															
66.00	0.00	0.00	0.00												
lne_162/Lne	Lne 66 JEEVANJEE									Pv:	cLod:	L:	2.90 km		
lne_162/Lne	Lne 66 JEEVANJEE									Pv:	cLod:	L:	0.58 km		
trf_162/Tr2	TR JEEVANJEE 66/11									Tap:	0	Min: -8	Max: 8		
BB 66 JUJA RD (PSS/E 1617)															
66.00	1.03	68.11	-4.76												
lod_161/Lod	Ld JUJA (66 kV)			97.70	38.61	0.93	0.89			Pl0:	107.21 MW	Ql0:	42.37 Mvar		
shntswt/Shnt	Shnt JUJA 66kV			0.00	-31.94	0.00	0.27								
lne_161/Lne	Lne 66 JUJA	- NRB		-1.17	4.26	-0.26	0.04	8.95		Pv:	4.71 kW	cLod: 0.06 Mvar	L: 5.17 km		
lne_161/Lne	Lne 66 JUJA	- PAR								Pv:	cLod:	L:	12.20 km		
lne_161/Lne	Lne 66 JUJA	- ATH								Pv:	cLod:	L:	30.00 km		
lne_161/Lne	Lne 66 JUJA	- JUJ	-44.70	-20.49	-0.91	0.42	47.65			Pv:	0.00 kW	cLod: 0.00 Mvar	L: 1.00 km		
lne_161/Lne	Lne 66 JUJA	- BAB								Pv:	cLod:	L:	3.00 km		
lne_161/Lne	Lne 66 JUJA	- KIM								Pv:	cLod:	L:	7.60 km		
lne_161/Lne	Lne 66 JUJA	- MAN	-3.37	12.20	-0.27	0.11	25.98			Pv:	214.39 kW	cLod: 0.35 Mvar	L: 30.00 km		
lne_161/Lne	Lne 66 JUJA	- SYO	-14.87	5.32	-0.94	0.13	20.24			Pv:	72.87 kW	cLod: 0.23 Mvar	L: 15.00 km		
lne_161/Lne	Lne 66 JUJA	- DRI	0.00	-0.09	0.00	0.00	0.19			Pv:	0.00 kW	cLod: 0.08 Mvar	L: 6.08 km		
lne_161/Lne	Lne 66 JUJA	- ATH								Pv:	cLod:	L:	15.00 km		
trf_111/Tr2	TR JUJA 132/66 kV			-16.79	-3.94	-0.97	0.15	27.86		Tap:	2.00	Min: -8	Max: 8		
trf_111/Tr2	TR JUJA 132/66 kV(			-4.19	-0.98	-0.97	0.04	27.80		Tap:	2.00	Min: -8	Max: 8		
trf_111/Tr2	TR JUJA 132/66 kV(			-8.42	-1.97	-0.97	0.07	27.94		Tap:	2.00	Min: -8	Max: 8		
trf_111/Tr2	TR JUJA 132/66 kV(			-4.19	-0.98	-0.97	0.04	27.80		Tap:	2.00	Min: -8	Max: 8		
trf_161/Tr2	TR JUJA 66/BB kV			0.00	0.00	1.00	0.00	0.00		Tap:	0.00	Min: -11	Max: 6		

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 72		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 JUJA RD (PSS/E 1668)														
66.00	1.03	68.11	-4.75											
shntswt/Shnt	Shnt JUJA 66kV(1)			0.00	-31.95	0.00	0.27							
lne_161/Lne	Lne 66 JUJA - JUJ			44.70	20.49	0.91	0.42	47.65	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_162/Lne	Lne 66 EMCOTEE -								Pv:		cLod:		L:	1.20 km
lne_162/Lne	Lne 66 PARKS - JU								Pv:		cLod:		L:	12.20 km
lne_162/Lne	Lne 66 NRBSTH2 -			-1.08	4.27	-0.24	0.04	8.92	Pv:	4.67 kW	cLod:	0.06 Mvar	L:	5.17 km
lne_162/Lne	Lne 66 NRBSTH3 -			-1.07	4.28	-0.24	0.04	8.95	Pv:	4.70 kW	cLod:	0.06 Mvar	L:	5.17 km
lne_166/Lne	Lne 66 JUJA - MAN			-3.37	12.20	-0.27	0.11	25.99	Pv:	214.47 kW	cLod:	0.35 Mvar	L:	30.00 km
lne_166/Lne	Lne 66 JUJA - BAB								Pv:		cLod:		L:	3.00 km
lne_166/Lne	Lne 66 JUJA - KIM								Pv:		cLod:		L:	7.60 km
lne_166/Lne	Lne 66 JUJA - KOM			0.00	-0.12	0.00	0.00	0.24	Pv:	0.00 kW	cLod:	0.03 Mvar	L:	2.59 km
trf_111/Tr2	TR JUJA 132/66 kV(			-17.88	-4.19	-0.97	0.16	29.66	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2	TR JUJA 132/66 kV(			-4.18	-0.98	-0.97	0.04	27.77	Tap:	2.00	Min:	-8	Max:	8
trf_111/Tr2	TR JUJA 132/66 kV(			-17.11	-4.01	-0.97	0.15	28.39	Tap:	2.00	Min:	-8	Max:	8
trf_166/Tr2	TR JUJA 66/11 kV			0.00	0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-11	Max:	6
BB 66 KABETE (PSS/E 1737)														
66.00	0.00	0.00	0.00											
lne_164/Lne	Lne 66 NBNOR66 -								Pv:		cLod:		L:	17.02 km
lne_164/Lne	Lne 66 KILELES -								Pv:		cLod:		L:	5.98 km
lne_173/Lne	Lne 66 KABETE - L								Pv:		cLod:		L:	3.40 km
trf_173/Tr2	TR KABETE 66/11 kV								Tap:	0	Min:	-9	Max:	8
BB 66 KAINUK (PSS/E 1757)														
66.00	1.02	67.04	-5.28											
lod_175/Lod	Ld KAINUK (66 kV)			2.30	0.91	0.93	0.02		Pl0:	1.39 MW	Ql0:	0.55 Mvar		
trf_120/Tr2	TR KAINUK 220/66 k			-2.30	-0.91	-0.93	0.02	5.41	Tap:	1.00	Min:	-8	Max:	9
BB 66 KAPA OIL (PSS/E 1698)														
66.00	0.00	0.00	0.00											
lne_162/Lne	Lne 66 EMBAKASI -								Pv:		cLod:		L:	6.00 km
lne_164/Lne	Lne 66 ATHTEE1 -								Pv:		cLod:		L:	1.00 km
lne_168/Lne	Lne 66 ATHITEE -								Pv:		cLod:		L:	18.20 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001		/ 73	
rated Voltage [kV] [p.u.] Bus-voltage [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]					Additional Data							
BB 66 KAREN (PSS/E 1609)												
66.00 0.00 0.00 0.00												
lne_160/Lne Lne 66 KAREN - KI					Pv:		cLod:		L: 14.30 km			
lne_160/Lne Lne 66 KAREN - NB					Pv:		cLod:		L: 19.00 km			
lne_160/Lne Lne 66 KAREN - KI					Pv:		cLod:		L: 13.20 km			
lne_160/Lne Lne 66 KAREN - NG					Pv:		cLod:		L: 15.00 km			
lne_160/Lne Lne 66 KAREN - NG					Pv:		cLod:		L: 5.00 km			
trf_160/Tr2 TR KAREN 66/11 kV					Tap:		0 Min: -13		Max: 3			
trf_160/Tr2 TR KAREN 66/11 kV(					Tap:		0 Min: -13		Max: 4			
BB 66 KIAMBU RD (PSS/E 1738)												
66.00 1.02 67.61 -6.89												
lne_160/Lne Lne 66 RUARAKA -					-0.00		0.00		-1.00		0.00 0.30	
trf_173/Tr2 TR KIAMBU 66/11 kV					0.00		-0.00		1.00		0.00 0.00	
trf_173/Tr2 TR KIAMBU 66/11 kV					0.00		-0.00		1.00		0.00 0.00	
BB 66 KIKUYU (PSS/E 1608)												
66.00 0.00 0.00 0.00												
lne_160/Lne Lne 66 LIMURU - K					Pv:		cLod:		L: 15.00 km			
lne_160/Lne Lne 66 KIKUYU - K					Pv:		cLod:		L: 1.00 km			
lne_160/Lne Lne 66 KIKUYU - P					Pv:		cLod:		L: 1.00 km			
lne_160/Lne Lne 66 KIKUYU - N					Pv:		cLod:		L: 23.00 km			
trf_160/Tr2 TR KIKUYU 66/11 kV					Tap:		0 Min: -12		Max: 5			
trf_160/Tr2 TR KIKUYU 66/11 kV					Tap:		0 Min: -13		Max: 4			
BB 66 KIKUYU (PSS/E 1636)												
66.00 0.00 0.00 0.00												
lne_160/Lne Lne 66 KIKUYU - K					Pv:		cLod:		L: 1.00 km			
lne_160/Lne Lne 66 KAREN - KI					Pv:		cLod:		L: 14.30 km			
lne_163/Lne Lne 66 KIKUYU - N					Pv:		cLod:		L: 19.00 km			
BB 66 KILE TEE (PSS/E 1707)												
66.00 0.00 0.00 0.00												
lne_162/Lne Lne 66 EMBAKASI -					Pv:		cLod:		L: 7.95 km			
lne_167/Lne Lne 66 MATASIA -					Pv:		cLod:		L: 18.55 km			
lne_170/Lne Lne 66 KILE - UPP					Pv:		cLod:		L: 1.00 km			
lne_170/Lne Lne 66 KILE - LAN					Pv:		cLod:		L: 9.27 km			

Grid: 1 KENYA		System Stage: 1 KENYA		Study Case: Study Case MTP/LTP				Annex: LF.001 / 74	
rated Voltage [kV]	Bus-voltage [p.u.]	Bus-voltage [kV]	[deg]	Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data
BB 66 KILELES (PSS/E 1643)									
66.00	0.00	0.00	0.00						
lne_164/Lne		Lne 66 NBNOR66	-						Pv: cLod: L: 23.00 km
lne_164/Lne		Lne 66 KILELES	-						Pv: cLod: L: 2.00 km
lne_164/Lne		Lne 66 KILELES	-						Pv: cLod: L: 5.98 km
lne_164/Lne		Lne 66 KILELES	-						Pv: cLod: L: 11.50 km
trf_164/Tr2		TR KILELES 66/11 k							Tap: 0 Min: -12 Max: 4
trf_164/Tr2		TR KILELES 66/11 k							Tap: 0 Min: -12 Max: 4
BB 66 KILETEE (PSS/E 1642)									
66.00	0.00	0.00	0.00						
lne_160/Lne		Lne 66 KAREN	- KI						Pv: cLod: L: 13.20 km
lne_164/Lne		Lne 66 KILETEE	-						Pv: cLod: L: 1.60 km
lne_164/Lne		Lne 66 KILETEE	-						Pv: cLod: L: 1.85 km
BB 66 KIMATHI 1 (PSS/E 1684)									
66.00	0.00	0.00	0.00						
lne_161/Lne		Lne 66 JUJA	- KIM						Pv: cLod: L: 7.60 km
lne_162/Lne		Lne 66 JEEVANJEE							Pv: cLod: L: 2.90 km
lne_168/Lne		Lne 66 KIMATHI	-						Pv: cLod: L: 2.32 km
trf_168/Tr2		TR KIMATHI 66/11 k							Tap: 0 Min: -8 Max: 8
BB 66 KIMATHI 2 (PSS/E 1683)									
66.00	0.00	0.00	0.00						
lne_163/Lne		Lne 66 JEEVA2	- K						Pv: cLod: L: 2.90 km
lne_166/Lne		Lne 66 JUJA	- KIM						Pv: cLod: L: 7.60 km
lne_168/Lne		Lne 66 KIMATHI	-						Pv: cLod: L: 2.03 km
trf_168/Tr2		TR KIMATHI 66/11 k							Tap: 0 Min: -8 Max: 8
BB 66 KITISUR (PSS/E 1606)									
66.00	0.00	0.00	0.00						
lne_160/Lne		Lne 66 KITTEE	- K						Pv: cLod: L: 1.70 km
lne_160/Lne		Lne 66 KITISUR	-						Pv: cLod: L: 14.70 km
lne_160/Lne		Lne 66 KITISUR	-						Pv: cLod: L: 5.25 km
trf_160/Tr2		TR KITISUR 66/11 k							Tap: 0 Min: -12 Max: 4
trf_160/Tr2		TR KITISUR 66/11 k							Tap: 0 Min: -12 Max: 5
BB 66 KITTEE (PSS/E 1605)									
66.00	0.00	0.00	0.00						
lne_160/Lne		Lne 66 RUAKITI	-						Pv: cLod: L: 17.84 km
lne_160/Lne		Lne 66 KITTEE	- K						Pv: cLod: L: 1.70 km
lne_160/Lne		Lne 66 KITTEE	- L						Pv: cLod: L: 20.80 km

Grid: 1 KENYA				System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001 / 75			
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
BB 66 KOM TEE (PSS/E 1725)															
66.00 1.03 68.11 -4.75															
lne_166/Lne Lne 66 JUJA - KOM				-0.00	0.09	-0.00	0.00	0.24	Pv:	0.00 kW	cLod:	0.03 Mvar	L:	2.59 km	
lne_171/Lne Lne 66 KOMOROCK -				0.00	-0.09	0.00	0.00	0.17	Pv:	0.00 kW	cLod:	0.09 Mvar	L:	7.00 km	
BB 66 KOMOROCK (PSS/E 1703)															
66.00 1.03 67.67 -2.69															
lod_170/Lod Ld KOMOROCK (66 kV				136.60	53.99	0.93	1.25		Pl0:	149.83 MW	Ql0:	59.22 Mvar			
lne_162/Lne Lne 66 EMCOTEE -										Pv:		cLod:		L:	7.00 km
lne_162/Lne Lne 66 NRBSTH1 -										Pv:		cLod:		L:	10.00 km
lne_162/Lne Lne 66 NRBSTH3 -										Pv:		cLod:		L:	10.00 km
lne_168/Lne Lne 66 NSSF - KOM										Pv:		cLod:		L:	9.00 km
lne_170/Lne Lne 66 KOMOROCK -										Pv:		cLod:		L:	6.00 km
lne_170/Lne Lne 66 KOMOROCK -										Pv:		cLod:		L:	6.00 km
trf_122/Tr2 TR KOMOROCK 220/66				-68.30	-26.99	-0.93	0.63	35.81	Tap:	0.00	Min:	-10	Max:	6	
trf_122/Tr2 TR KOMOROCK 220/66				-68.30	-26.99	-0.93	0.63	35.81	Tap:	0.00	Min:	-10	Max:	6	
BB 66 KOMOROCK (PSS/E 1714)															
66.00 1.03 68.11 -4.75															
lne_170/Lne Lne 66 RUAI - KOM										Pv:		cLod:		L:	6.00 km
lne_171/Lne Lne 66 KOMOROCK -				0.00	-0.00	1.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
lne_171/Lne Lne 66 KOMOROCK -				-0.00	-0.00	-1.00	0.00	0.17	Pv:	0.00 kW	cLod:	0.09 Mvar	L:	7.00 km	
trf_171/Tr2 TR KOMOROCK 66/11										Tap:	0	Min:	-6	Max:	10
trf_171/Tr2 TR KOMOROCK 66/11										Tap:	0	Min:	-6	Max:	10
BB 66 KOMOROCK (PSS/E 1734)															
66.00 0.00 0.00 0.00															
BB 66 KPC LUNGA (PSS/E 1630)															
66.00 0.00 0.00 0.00															
lne_162/Lne Lne 66 NRBSTH1 -										Pv:		cLod:		L:	2.50 km
lne_162/Lne Lne 66 NRBSTH2 -										Pv:		cLod:		L:	2.50 km
lne_163/Lne Lne 66 KPC - MORR										Pv:		cLod:		L:	1.60 km
BB 66 KPCNGEM (PSS/E 1646)															
66.00 0.00 0.00 0.00															
lne_160/Lne Lne 66 LIMURU - K										Pv:		cLod:		L:	19.50 km
lne_164/Lne Lne 66 KPCNGEM -										Pv:		cLod:		L:	9.75 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 76	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 66 LANGATA (PSS/E 1724)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	9.27 km	
lne_170/Lne		Lne 66 KILE - LAN							Tap:	0 Min: -9	Max: 7		
trf_172/Tr2		TR LANGATA 66/11 k							Tap:	0 Min: -9	Max: 7		
trf_172/Tr2		TR LANGATA 66/11 k											
BB 66 LAVINGTON (PSS/E 1742)													
66.00		1.03 68.02 -2.90							Pv:	0.00 kw	cLod: 0.15 Mvar	L: 11.50 km	
lne_164/Lne		Lne 66 NBNOR66 -		-0.00	-0.00	-1.00	0.00	0.30	Pv:		cLod:	L: 11.50 km	
lne_164/Lne		Lne 66 KILELES -							Tap:	0 Min: -10	Max: 7		
trf_174/Tr2		TR LAVINGTON 66/11							Tap:	0 Min: -10	Max: 7		
trf_174/Tr2		TR LAVINGTON 66/11											
BB 66 LIKONI (PSS/E 1746)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L: 1.21 km	
lne_161/Lne		Lne 66 INDUST - L							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L											
BB 66 LIKONI (PSS/E 1747)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L: 1.21 km	
lne_167/Lne		Lne 66 INDUS2 - L							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L											
BB 66 LIKONI RD (PSS/E 1748)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L							Tap:	0 Min: -8	Max: 9		
trf_174/Tr2		TR LIKONI 66/11 kV											
BB 66 LIKONI RD (PSS/E 1749)													
66.00		0.00 0.00 0.00							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L							Pv:		cLod:	L: 1.00 km	
lne_174/Lne		Lne 66 LIKONI - L							Tap:	0 Min: -8	Max: 9		
trf_174/Tr2		TR LIKONI 66/11 kV											

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001		/ 77			
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 LIMURU (PSS/E 1607)														
66.00		0.00 0.00 0.00												
lne_160/Lne		Lne 66 KITTEE - L							Pv:	cLod:	L:	20.80 km		
lne_160/Lne		Lne 66 LIMURU - K							Pv:	cLod:	L:	15.00 km		
lne_160/Lne		Lne 66 LIMURU - N							Pv:	cLod:	L:	7.60 km		
lne_160/Lne		Lne 66 LIMURU - K							Pv:	cLod:	L:	19.50 km		
lne_160/Lne		Lne 66 LIMURU - U							Pv:	cLod:	L:	7.60 km		
trf_160/Tr2		TR LIMURU 66/11 kV							Tap:	0	Min:	0	Max:	16
trf_160/Tr2		TR LIMURU 66/11 kV							Tap:	0	Min:	0	Max:	16
trf_160/Tr2		TR LIMURU 66/11 kV							Tap:	0	Min:	-13	Max:	4
trf_160/Tr2		TR LIMURU 66/11 kV							Tap:	0	Min:	-13	Max:	4
BB 66 LOWER KABETE (PSS/E 1743)														
66.00		0.00 0.00 0.00												
lne_164/Lne		Lne 66 NBNOR66 -							Pv:	cLod:	L:	13.62 km		
lne_173/Lne		Lne 66 KABETE - L							Pv:	cLod:	L:	3.40 km		
trf_174/Tr2		TR LOWER 66/11 kV							Tap:	0	Min:	-9	Max:	8
trf_174/Tr2		TR LOWER 66/11 kV(							Tap:	0	Min:	-9	Max:	8
BB 66 LUNGA LUNGA (PSS/E 1712)														
66.00		0.00 0.00 0.00												
lne_161/Lne		Lne 66 INDUST - L							Pv:	cLod:	L:	1.00 km		
lne_162/Lne		Lne 66 NRBSTH2 -							Pv:	cLod:	L:	3.00 km		
trf_171/Tr2		TR LUNGA 66/11 kV							Tap:	0	Min:	-9	Max:	8
trf_171/Tr2		TR LUNGA 66/11 kV(							Tap:	0	Min:	-9	Max:	8
BB 66 MAGADI (PSS/E 1669)														
66.00														
shntswt/Shnt		Shnt MAGADI 66kV												
lne_166/Lne		Lne 66 MAGADI - M							Pv:	cLod:	L:	82.20 km		
BB 66 MAI MAHIU (PSS/E 1718)														
66.00		0.00 0.00 0.00												
lne_164/Lne		Lne 66 KPCNGEM -							Pv:	cLod:	L:	9.75 km		
trf_171/Tr2		TR MAI 66/11 kV							Tap:	0	Min:	-7	Max:	9
trf_171/Tr2		TR MAI 66/11 kV(1)							Tap:	0	Min:	-7	Max:	9

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 78	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 66 MANGU 2 (PSS/E 1686)													
66.00	1.00	66.30	-3.31										
lod_168/Lod		Ld MANGU (66 kV)		96.00	37.94	0.93	0.90		Pl0:	48.59 MW	Ql0:	19.20 Mvar	
lne_161/Lne		Lne 66 JUJA - MAN		3.59	-12.14	0.28	0.11	25.98	Pv:	214.39 kW	cLod:	0.35 Mvar	L: 30.00 km
lne_163/Lne		Lne 66 THKTEE2 -		-5.46	-2.77	-0.89	0.05	12.56	Pv:	10.23 kW	cLod:	0.07 Mvar	L: 6.00 km
lne_167/Lne		Lne 66 MANGU1 - M		-46.05	-14.75	-0.95	0.42	48.13	Pv:	-0.00 kW	cLod:	0.00 Mvar	L: 1.00 km
trf_111/Tr2		TR MANGU 132/66 kV		-8.22	-13.94	-0.51	0.14	26.86	Tap:	0.00	Min:	-8	Max: 8
trf_168/Tr2		TR MANGU 66/11 kV		-39.86	5.66	-0.99	0.35	66.79	Tap:	0.00	Min:	-2	Max: 5
BB 66 MANGU1 (PSS/E 1673)													
66.00	1.00	66.30	-3.30										
lne_163/Lne		Lne 66 THKTEE1 -		-1.58	5.66	-0.27	0.05	12.20	Pv:	9.60 kW	cLod:	0.07 Mvar	L: 6.00 km
lne_166/Lne		Lne 66 JUJA - MAN		3.59	-12.14	0.28	0.11	25.99	Pv:	214.47 kW	cLod:	0.35 Mvar	L: 30.00 km
lne_167/Lne		Lne 66 MANGU1 - M		46.05	14.75	0.95	0.42	48.13	Pv:	-0.00 kW	cLod:	0.00 Mvar	L: 1.00 km
trf_111/Tr2		TR MANGU 132/66 kV		-8.20	-13.94	-0.51	0.14	26.83	Tap:	0.00	Min:	-8	Max: 8
trf_167/Tr2		TR MANGU1 66/11 kV		-39.86	5.67	-0.99	0.35	66.79	Tap:	0.00	Min:	-2	Max: 5
BB 66 MATASIA (PSS/E 1675)													
66.00	0.00	0.00	0.00										
lne_166/Lne		Lne 66 MAGADI - M							Pv:		cLod:		L: 82.20 km
lne_167/Lne		Lne 66 MATASIA -							Pv:		cLod:		L: 22.00 km
lne_167/Lne		Lne 66 MATASIA -							Pv:		cLod:		L: 22.00 km
lne_167/Lne		Lne 66 MATASIA -							Pv:		cLod:		L: 18.55 km
trf_167/Tr2		TR MATASIA 66/11 k							Tap:	0	Min:	-7	Max: 9
BB 66 MATASIA BSP (PSS/E 1756)													
66.00	1.01	66.44	-0.04										
lod_175/Lod		Ld MATASIA (66 kV)		150.20	49.37	0.95	1.37		Pl0:	178.45 MW	Ql0:	58.65 Mvar	
trf_120/Tr2		TR MATASIA 220/66		-75.10	-24.68	-0.95	0.69	39.27	Tap:	0.00	Min:	-16	Max: 16
trf_120/Tr2		TR MATASIA 220/66		-75.10	-24.68	-0.95	0.69	39.27	Tap:	0.00	Min:	-16	Max: 16
BB 66 MORRIS (PSS/E 1677)													
66.00	0.00	0.00	0.00										
lne_163/Lne		Lne 66 KPC - MORR							Pv:		cLod:		L: 1.60 km
BB 66 MSA CEMENT (PSS/E 1692)													
66.00	0.00	0.00	0.00										
lne_169/Lne		Lne 66 MSA - MSA							Pv:		cLod:		L: 0.10 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 79	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data				
BB 66 MSA ROAD (PSS/E 1713)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	4.00 km	
lne_166/Lne		Lne 66 ATHI - MSA							Pv:	cLod:	L:	8.00 km	
lne_170/Lne		Lne 66 ATHI - MSA							Tap:	0	Min: -16	Max: 16	
trf_171/Tr2		TR MSA 66/11 kV							Tap:	0	Min: -16	Max: 16	
trf_171/Tr2		TR MSA 66/11 kV(1)											
BB 66 MSA TEE (PSS/E 1691)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	0.22 km	
lne_165/Lne		Lne 66 BABTEE1 -							Pv:	cLod:	L:	0.10 km	
lne_169/Lne		Lne 66 MSA - MSA							Pv:	cLod:	L:	0.82 km	
lne_169/Lne		Lne 66 MSA - ATHI											
BB 66 MUTHURWA (PSS/E 1753)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	0.58 km	
lne_162/Lne		Lne 66 JEEVANJEE							Pv:	cLod:	L:	2.32 km	
lne_168/Lne		Lne 66 KIMATHI -							Tap:	0	Min: -8	Max: 8	
trf_175/Tr2		TR MUTHURWA 66/11											
BB 66 MUTHURWA (PSS/E 1754)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	0.87 km	
lne_163/Lne		Lne 66 JEEVA2 - M							Pv:	cLod:	L:	2.03 km	
lne_168/Lne		Lne 66 KIMATHI -							Tap:	0	Min: -8	Max: 8	
trf_175/Tr2		TR MUTHURWA 66/11											
BB 66 NAT CEMENT (PSS/E 1715)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	1.00 km	
lne_169/Lne		Lne 66 SILVERWOOD											
BB 66 NBIWEST (PSS/E 1610)													
66.00		0.00 0.00 0.00							Pv:	cLod:	L:	1.00 km	
lne_161/Lne		Lne 66 NBIWEST -							Pv:	cLod:	L:	2.87 km	
lne_161/Lne		Lne 66 NBIWEST -							Pv:	cLod:	L:	1.00 km	
lne_161/Lne		Lne 66 NBIWEST -							Pv:	cLod:	L:	1.00 km	
lne_161/Lne		Lne 66 NBIWEST -							Pv:	cLod:	L:	4.00 km	
trf_161/Tr2		TR NBIWEST 66/11 k							Tap:	0	Min: -8	Max: 9	

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 80		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 NBIWEST2 (PSS/E 1645)														
66.00		0.00 0.00 0.00												
lne_161/Lne		Lne 66 NBIWEST -							Pv:	cLod:	L:	1.00 km		
lne_163/Lne		Lne 66 INDTEE2 -							Pv:	cLod:	L:	2.87 km		
lne_164/Lne		Lne 66 KILETEE -							Pv:	cLod:	L:	1.60 km		
trf_164/Tr2		TR NBIWEST2 66/11							Tap:	0	Min:	-7	Max:	9
BB 66 NBNOR66 (PSS/E 1640)														
66.00		1.03 68.01 -2.90												
lod_164/Lod		Ld NBNOR66 (66 kV)		106.00	41.89	0.93	0.97		Pl0:	116.25 MW	Ql0:	45.94 Mvar		
shntswt/Shnt		Shnt NBNOR66 66kV		0.00	-31.86	0.00	0.27							
shntswt/Shnt		Shnt NBNOR66 66kV(		0.00	-31.86	0.00	0.27							
lne_160/Lne		Lne 66 KITISUR -							Pv:	cLod:	L:	14.70 km		
lne_160/Lne		Lne 66 LIMURU - N							Pv:	cLod:	L:	7.60 km		
lne_160/Lne		Lne 66 KAREN - NB							Pv:	cLod:	L:	19.00 km		
lne_163/Lne		Lne 66 KIKUYU - N							Pv:	cLod:	L:	19.00 km		
lne_164/Lne		Lne 66 NBNOR66 -							Pv:	cLod:	L:	23.00 km		
lne_164/Lne		Lne 66 NBNOR66 -							Pv:	cLod:	L:	10.70 km		
lne_164/Lne		Lne 66 NBNOR66 -							Pv:	cLod:	L:	23.00 km		
lne_164/Lne		Lne 66 NBNOR66 -							Pv:	cLod:	L:	17.02 km		
lne_164/Lne		Lne 66 NBNOR66 -		0.00	-0.15	0.00	0.00	0.30	Pv:	0.00 kW	cLod:	0.15 Mvar	L:	11.50 km
lne_164/Lne		Lne 66 NBNOR66 -							Pv:	cLod:	L:	13.62 km		
trf_122/Tr2		TR NBNORTH 220/66		-34.85	13.37	-0.93	0.32	40.25	Tap:	1.00	Min:	-11	Max:	6
trf_122/Tr2		TR NBNORTH 220/66		-34.85	13.37	-0.93	0.32	40.25	Tap:	1.00	Min:	-11	Max:	6
trf_122/Tr2		TR NBNORTH 220/66		-36.30	-4.78	-0.99	0.31	39.48	Tap:	1.00	Min:	-9	Max:	8
		Total Compensation:												
									</					

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 81										
rated Voltage [kV]		Bus-voltage [p.u.]		Active Power [MW]		Reactive Power [Mvar]		Power Factor [-]		Current [kA]		Loading [%]		Additional Data								
BB 66 NGONG (PSS/E 1730)																						
66.00		1.03		68.14		-0.13																
lne_173/Lne		Lne 66 NGONG		- NG		7.08		-0.40		1.00		0.06		14.17		Pv:	10.90 kW	cLod:	0.06 Mvar	L:	5.00 km	
trf_173/Tr2		TR NGONG 66/11		kV(		-7.08		0.40		-1.00		0.06		29.61		Tap:	0.00	Min:	-3	Max:	4	
BB 66 NGONG (PSS/E 1741)																						
66.00		1.03		68.05		-0.30																
lne_160/Lne		Lne 66 KAREN		- NG										Pv:					cLod:		L:	5.00 km
lne_170/Lne		Lne 66 NGONG		- NG		3.54		-0.18		1.00		0.03		11.95		Pv:	6.34 kW	cLod:	8.84 Mvar	L:	10.00 km	
lne_170/Lne		Lne 66 NGONG		- NG		3.54		-0.18		1.00		0.03		11.95		Pv:	6.34 kW	cLod:	8.84 Mvar	L:	10.00 km	
lne_173/Lne		Lne 66 NGONG		- NG		-7.07		0.36		-1.00		0.06		14.17		Pv:	10.90 kW	cLod:	0.06 Mvar	L:	5.00 km	
trf_174/Tr2		TR NGONG 66/11		kV(										Tap:				0	Min:	-8	Max:	9
trf_174/Tr2		TR NGONG 66/11		kV(										Tap:				0	Min:	-8	Max:	9
BB 66 NGONG ROAD (PSS/E 1687)																						
66.00		0.00		0.00		0.00																
lne_164/Lne		Lne 66 KILETEE		-										Pv:					cLod:		L:	1.85 km
lne_164/Lne		Lne 66 KILELES		-										Pv:					cLod:		L:	2.00 km
lne_168/Lne		Lne 66 NGONG		- CI										Pv:					cLod:		L:	1.00 km
trf_168/Tr2		TR NGONG 66/11		kV										Tap:				0	Min:	-5	Max:	11
trf_168/Tr2		TR NGONG 66/11		kV(										Tap:				0	Min:	-5	Max:	11
BB 66 NRBSTH1 (PSS/E 1626)																						
66.00		1.03		67.99		-4.67																
lne_161/Lne		Lne 66 INDUST		- N										Pv:					cLod:		L:	4.03 km
lne_161/Lne		Lne 66 JUJA		- NRB		1.17		-4.32		0.26		0.04		8.95		Pv:	4.71 kW	cLod:	0.06 Mvar	L:	5.17 km	
lne_162/Lne		Lne 66 NRBSTH1		-		-1.17		4.32		-0.26		0.04		4.34		Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
lne_162/Lne		Lne 66 NRBSTH1		-										Pv:					cLod:		L:	2.50 km
lne_162/Lne		Lne 66 NRBSTH1		-										Pv:					cLod:		L:	10.00 km
BB 66 NRBSTH2 (PSS/E 1627)																						
66.00		1.03		67.99		-4.67																
lne_161/Lne		Lne 66 FIRETEE		-										Pv:					cLod:		L:	1.70 km
lne_162/Lne		Lne 66 NRBSTH1		-		1.17		-4.32		0.26		0.04		4.34		Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
lne_162/Lne		Lne 66 NRBSTH2		-		-2.25		8.64		-0.25		0.08		8.66		Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km	
lne_162/Lne		Lne 66 NRBSTH2		-										Pv:					cLod:		L:	2.50 km
lne_162/Lne		Lne 66 NRBSTH2		-		1.08		-4.32		0.24		0.04		8.92		Pv:	4.67 kW	cLod:	0.06 Mvar	L:	5.17 km	
lne_162/Lne		Lne 66 NRBSTH2		-										Pv:					cLod:		L:	4.03 km
lne_162/Lne		Lne 66 NRBSTH2		-										Pv:					cLod:		L:	3.00 km
trf_162/Tr2		TR NRBSTH2 66/11		k		0.00		0.00		1.00		0.00		0.00		Tap:	0.00	Min:	-10	Max:	7	
trf_162/Tr2		TR NRBSTH2 66/11		k		-0.02		-0.62		-0.04		0.01		1.53		Tap:	0.00	Min:	-11	Max:	6	
trf_162/Tr2		TR NRBSTH2 66/11		k		0.02		0.62		0.04		0.01		2.03		Tap:	0.00	Min:	-9	Max:	5	
trf_162/Tr2		TR NRBSTH2 66/11		k										Tap:				0	Min:	-11	Max:	3

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 82		
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data					
BB 66 NRBSTH3 (PSS/E 1628)														
66.00	1.03	67.99	-4.67						Pv:	-0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
lne_162/Lne	Lne 66 NRBSTH2	-		2.25	-8.64	0.25	0.08	8.66	Pv:	4.70 kW	cLod:	0.06 Mvar	L:	5.17 km
lne_162/Lne	Lne 66 NRBSTH3	-		1.08	-4.34	0.24	0.04	8.95	Pv:		cLod:		L:	3.50 km
lne_162/Lne	Lne 66 NRBSTH3	-							Pv:		cLod:		L:	10.00 km
lne_162/Lne	Lne 66 NRBSTH3	-							Pv:		cLod:		L:	10.00 km
trf_162/Tr2	TR NRBSTH3 66/11 k								Tap:	0	Min:	-4	Max:	3
trf_162/Tr2	TR NRBSTH3 66/11 k			0.00	0.00	1.00	0.00	0.00	Tap:	0.00	Min:	-10	Max:	7
trf_162/Tr2	TR NRBSTH3 66/11 k			-1.56	17.88	-0.09	0.15	41.88	Tap:	0.00	Min:	-3	Max:	4
trf_162/Tr2	TR NRBSTH3 66/11 k			-1.77	-4.91	-0.34	0.04	17.39	Tap:	0.00	Min:	-4	Max:	3
BB 66 NSSF (PSS/E 1689)														
66.00	0.00	0.00	0.00						Pv:		cLod:		L:	2.30 km
lne_168/Lne	Lne 66 NSSF - NSS								Pv:		cLod:		L:	9.00 km
lne_168/Lne	Lne 66 NSSF - KOM								Tap:	0	Min:	-7	Max:	10
trf_168/Tr2	TR NSSF 66/11 kV													
BB 66 NSSF TEE (PSS/E 1688)														
66.00	0.00	0.00	0.00						Pv:		cLod:		L:	3.50 km
lne_162/Lne	Lne 66 NRBSTH3	-							Pv:		cLod:		L:	3.50 km
lne_163/Lne	Lne 66 EMBAKASI	-							Pv:		cLod:		L:	2.30 km
lne_168/Lne	Lne 66 NSSF - NSS								Pv:		cLod:		L:	1.00 km
lne_168/Lne	Lne 66 NSSF - VIL								Pv:		cLod:		L:	1.00 km
BB 66 ORBIT (PSS/E 1722)														
66.00	0.00	0.00	0.00						Pv:		cLod:		L:	2.20 km
lne_162/Lne	Lne 66 EMBAKASI	-							Pv:		cLod:		L:	19.84 km
lne_172/Lne	Lne 66 SAVANNAH	-												
BB 66 PARK266 (PSS/E 1632)														
66.00	0.00	0.00	0.00						Pv:		cLod:		L:	11.00 km
lne_160/Lne	Lne 66 RUARAKA	-							Pv:		cLod:		L:	2.90 km
lne_161/Lne	Lne 66 CATHD	- PA							Pv:		cLod:		L:	12.20 km
lne_161/Lne	Lne 66 JUJA	- PAR							Pv:		cLod:		L:	1.00 km
lne_162/Lne	Lne 66 PARKS	- PA							Pv:		cLod:		L:	2.10 km
lne_163/Lne	Lne 66 PARK266	-							Pv:		cLod:		L:	2.10 km
trf_163/Tr2	TR PARK266 66/11 k								Tap:	0	Min:	-9	Max:	7

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001 / 83	
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]					Additional Data						
BB 66 PARKS (PSS/E 1624)											
66.00 0.00 0.00 0.00											
lne_160/Lne Lne 66 RUARAKA -					Pv: cLod: L: 11.00 km						
lne_162/Lne Lne 66 PARKS - PA					Pv: cLod: L: 1.00 km						
lne_162/Lne Lne 66 PARKS - JU					Pv: cLod: L: 12.20 km						
trf_162/Tr2 TR PARKS 66/11 kV					Tap: 0 Min: -9 Max: 7						
BB 66 POLYPIPE (PSS/E 1678)											
66.00 0.00 0.00 0.00											
lne_160/Lne Lne 66 KIKUYU - P					Pv: cLod: L: 1.00 km						
BB 66 PORTLAND (PSS/E 1658)											
66.00 1.03 68.09 -2.55											
lne_165/Lne Lne 66 EPZ - PORT					Pv: cLod: L: 2.00 km						
lne_165/Lne Lne 66 PORTLAND - 0.61 1.30 0.42 0.01 2.88					Pv: 0.03 kW cLod: 0.00 Mvar L: 0.30 km						
lne_165/Lne Lne 66 PORTLAND - -0.61 -1.30 -0.42 0.01 2.88					Pv: 0.19 kW cLod: 0.02 Mvar L: 2.00 km						
BB 66 RHINO CEMENT (PSS/E 1697)											
66.00 0.00 0.00 0.00											
lne_165/Lne Lne 66 BABTEE1 -					Pv: cLod: L: 0.41 km						
lne_165/Lne Lne 66 EPZ - RHIN					Pv: cLod: L: 1.79 km						
BB 66 RUA2JUJ (PSS/E 1603)											
66.00 0.00 0.00 0.00											
lne_160/Lne Lne 66 RUARAKA -					Pv: cLod: L: 1.00 km						
lne_160/Lne Lne 66 RUAKITI -					Pv: cLod: L: 1.00 km						
lne_160/Lne Lne 66 RUA2JUJ -					Pv: cLod: L: 5.79 km						
lne_160/Lne Lne 66 RUA2JUJ -					Pv: cLod: L: 1.40 km						
BB 66 RUAI (PSS/E 1706)											
66.00 0.00 0.00 0.00											
lne_170/Lne Lne 66 KOMOROCK -					Pv: cLod: L: 6.00 km						
lne_170/Lne Lne 66 KOMOROCK -					Pv: cLod: L: 6.00 km						
lne_170/Lne Lne 66 RUAI - KOM					Pv: cLod: L: 6.00 km						
trf_170/Tr2 TR RUAI 66/11 kV					Tap: 0 Min: -9 Max: 7						
trf_170/Tr2 TR RUAI 66/11 kV(1					Tap: 0 Min: -8 Max: 8						
BB 66 RUAKITI (PSS/E 1602)											
66.00 0.00 0.00 0.00											
lne_160/Lne Lne 66 RUARAKA -					Pv: cLod: L: 1.00 km						
lne_160/Lne Lne 66 RUAKITI -					Pv: cLod: L: 1.00 km						
lne_160/Lne Lne 66 RUAKITI -					Pv: cLod: L: 17.84 km						

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001		/ 84	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data			
BB 66 RUARAKA (PSS/E 1601)												
66.00	1.02	67.60	-6.89									
lod_160/Lod	Ld RUARAKA (66 kV)			67.90	26.84	0.93	0.62		Pl0:	74.52 MW	Ql0:	29.45 Mvar
shntswt/Shnt	Shnt RUARAKA 66kV			0.00	-31.47	0.00	0.27					
shntswt/Shnt	Shnt RUARAKA 66kV(			0.00	-2.10	0.00	0.02					
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 1.00 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 1.00 km
lne_160/Lne	Lne 66 RUARAKA -			0.00	0.00	1.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar L: 1.00 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 1.00 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 4.59 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 11.00 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 11.00 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 11.30 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 1.40 km
lne_160/Lne	Lne 66 RUARAKA -			0.00	-0.15	0.00	0.00	0.30	Pv:	0.00 kW	cLod:	0.15 Mvar L: 11.30 km
trf_115/Tr2	TR RUARAKA 132/66			-33.95	3.44	-0.99	0.29	55.53	Tap:	2.00	Min:	-10 Max: 7
trf_115/Tr2	TR RUARAKA 132/66			-33.95	3.44	-0.99	0.29	55.53	Tap:	2.00	Min:	-10 Max: 7
trf_160/Tr2	TR RUARAKA 66/40 k								Tap:	0	Min:	-11 Max: 5
trf_160/Tr2	TR RUARAKA 66/40 k								Tap:	0	Min:	-11 Max: 5
Total Compensation:					-33.57							
BB 66 RUARAKA (PSS/E 1604)												
66.00	1.02	67.60	-6.89									
lne_160/Lne	Lne 66 RUARAKA -			-0.00	-0.00	-1.00	0.00	0.00	Pv:	0.00 kW	cLod:	0.00 Mvar L: 1.00 km
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 1.00 km
trf_160/Tr2	TR RUARAKA 66/11 k								Tap:	0	Min:	-9 Max: 7
trf_160/Tr2	TR RUARAKA 66/11 k								Tap:	0	Min:	-9 Max: 7
BB 66 RUIRU (PSS/E 1690)												
66.00	0.00	0.00	0.00									
lne_164/Lne	Lne 66 RUIRUST -								Pv:		cLod:	L: 0.40 km
trf_169/Tr2	TR RUIRU 66/33 kV								Tap:	0	Min:	-8 Max: 8
trf_169/Tr2	TR RUIRU 66/11 kV								Tap:	0	Min:	-9 Max: 7
trf_169/Tr2	TR RUIRU 66/11 kV(								Tap:	0	Min:	-8 Max: 8
BB 66 RUIRUST (PSS/E 1641)												
66.00	0.00	0.00	0.00									
lne_160/Lne	Lne 66 RUARAKA -								Pv:		cLod:	L: 11.30 km
lne_164/Lne	Lne 66 RUIRUST -								Pv:		cLod:	L: 0.40 km
lne_164/Lne	Lne 66 RUIRUST -								Pv:		cLod:	L: 4.00 km

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP				Annex: LF.001 / 85	
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data	
BB 66 SAVANNAH CMT (PSS/E 1720)		66.00	0.00 0.00 0.00							
lne_172/Lne	Lne 66 SAVANNAH	-							Pv:	cLod: L: 0.45 km
lne_172/Lne	Lne 66 SAVANNAH	-							Pv:	cLod: L: 19.84 km
BB 66 SILVERWOOD (PSS/E 1694)		66.00	0.00 0.00 0.00							
lne_166/Lne	Lne 66 ATHI - SIL								Pv:	cLod: L: 1.80 km
lne_169/Lne	Lne 66 ATHI - SIL								Pv:	cLod: L: 4.90 km
lne_169/Lne	Lne 66 SILVERWOOD								Pv:	cLod: L: 6.40 km
lne_169/Lne	Lne 66 SILVERWOOD								Pv:	cLod: L: 1.00 km
lne_169/Lne	Lne 66 SILVERWOOD								Pv:	cLod: L: 1.80 km
BB 66 STBILL1 (PSS/E 1663)		66.00	0.00 0.00 0.00							
lne_162/Lne	Lne 66 EMCOTEE	-							Pv:	cLod: L: 0.50 km
lne_166/Lne	Lne 66 STBILL1	-							Pv:	cLod: L: 1.00 km
BB 66 STBILL1 (PSS/E 1664)		66.00	0.00 0.00 0.00							
lne_166/Lne	Lne 66 STBILL1	-							Pv:	cLod: L: 1.00 km
trf_166/Tr2	TR STBILL1 66/11 k								Tap: 0	Min: -8 Max: 8
trf_166/Tr2	TR STBILL1 66/11 k								Tap: 0	Min: -8 Max: 8
BB 66 STEEL MAKERS (PSS/E 1696)		66.00	0.00 0.00 0.00							
lne_165/Lne	Lne 66 BABTEE1	-							Pv:	cLod: L: 0.40 km
BB 66 SYOKIMAU (PSS/E 1716)		66.00	1.03 68.00 -3.72							
lne_161/Lne	Lne 66 JUJA - SYO	14.95	-5.28	0.94	0.13	20.24			Pv: 72.87 kW	cLod: 0.23 Mvar L: 15.00 km
lne_166/Lne	Lne 66 ATHI - SYO	-14.95	5.28	-0.94	0.13	20.34			Pv: 73.59 kW	cLod: 0.23 Mvar L: 15.00 km
trf_171/Tr2	TR SYOKIMAU 66/11	0.00	0.00	1.00	0.00	0.00			Tap: 3.00	Min: -6 Max: 11
BB 66 TANA (PSS/E 1629)		66.00	0.98 64.72 -2.15							
lne_162/Lne	Lne 66 TANA - THK	1.55	-7.13	0.21	0.07	15.34			Pv: 91.82 kW	cLod: 0.42 Mvar L: 35.60 km
lne_162/Lne	Lne 66 TANA - TAN								Pv:	cLod: L: 1.00 km
trf_162/Tr2	TR TANA 66/11 kV	-0.51	2.35	-0.21	0.02	45.44			Tap: 0.00	Min: 0 Max: 6
trf_162/Tr2	TR TANA 66/11 kV(1	-0.52	2.39	-0.21	0.02	46.11			Tap: 0.00	Min: 0 Max: 6
trf_162/Tr2	TR TANA 66/11 kV(2	-0.52	2.39	-0.21	0.02	46.11			Tap: 0.00	Min: 0 Max: 6

Grid: 1 KENYA		System Stage: 1 KENYA			Study Case: Study Case MTP/LTP					Annex: LF.001		/ 87			
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
BB 66 THKTEE1 (PSS/E 1634)															
66.00 1.00 66.13 -3.17															
lne_162/Lne Lne 66 1THIKA1 -										Pv:		cLod:		L:	7.00 km
lne_162/Lne Lne 66 TANA - THK -1.45 6.89 -0.21 0.06 15.34										Pv:	91.82 kW	cLod:	0.42 Mvar	L:	35.60 km
lne_163/Lne Lne 66 THKTEE1 - 1.59 -5.71 0.27 0.05 12.20										Pv:	9.60 kW	cLod:	0.07 Mvar	L:	6.00 km
lne_163/Lne Lne 66 THKTEE1 - -0.14 -1.17 -0.11 0.01 2.43										Pv:	0.23 kW	cLod:	0.04 Mvar	L:	3.50 km
BB 66 THKTEE2 (PSS/E 1633)															
66.00 1.01 66.50 -3.18															
lne_162/Lne Lne 66 THIKA2 - T										Pv:		cLod:		L:	7.00 km
lne_163/Lne Lne 66 THKTEE2 - -3.66 -2.35 -0.84 0.04 8.91										Pv:	31.03 kW	cLod:	0.44 Mvar	L:	35.60 km
lne_163/Lne Lne 66 THKTEE2 - 5.47 2.72 0.90 0.05 12.56										Pv:	10.23 kW	cLod:	0.07 Mvar	L:	6.00 km
lne_163/Lne Lne 66 THKTEE2 - -1.80 -0.37 -0.98 0.02 3.77										Pv:	0.57 kW	cLod:	0.04 Mvar	L:	3.50 km
BB 66 TONONOKA (PSS/E 1717)															
66.00 1.03 68.11 -4.75															
lne_171/Lne Lne 66 KOMOROCK - -0.00 0.00 -1.00 0.00 0.00										Pv:	0.00 kW	cLod:	0.00 Mvar	L:	1.00 km
BB 66 UHILL 2 (PSS/E 1710)															
66.00 0.00 0.00 0.00															
lne_170/Lne Lne 66 UPPER - UH										Pv:		cLod:		L:	1.00 km
lne_170/Lne Lne 66 UHILL - UH										Pv:		cLod:		L:	4.12 km
trf_171/Tr2 TR UHILL 66/11 kV										Tap:	0	Min:	-7	Max:	10
BB 66 UHILL TEE (PSS/E 1709)															
66.00 0.00 0.00 0.00															
lne_161/Lne Lne 66 NBIWEST -										Pv:		cLod:		L:	1.00 km
lne_162/Lne Lne 66 EMBAKASI -										Pv:		cLod:		L:	6.88 km
lne_170/Lne Lne 66 UHILL - UH										Pv:		cLod:		L:	4.12 km
BB 66 UPLANDS (PSS/E 1744)															
66.00 0.00 0.00 0.00															
lne_160/Lne Lne 66 LIMURU - U										Pv:		cLod:		L:	7.60 km
trf_174/Tr2 TR UPLANDS 66/11 k										Tap:	0	Min:	-9	Max:	8
BB 66 UPPER HILL (PSS/E 1708)															
66.00 0.00 0.00 0.00															
lne_162/Lne Lne 66 EMBAKASI -										Pv:		cLod:		L:	11.00 km
lne_170/Lne Lne 66 KILE - UPP										Pv:		cLod:		L:	1.00 km
lne_170/Lne Lne 66 UPPER - UH										Pv:		cLod:		L:	1.00 km
trf_170/Tr2 TR UPPER 66/11 kV										Tap:	0	Min:	-8	Max:	9

Grid: 1 KENYA		System Stage: 1 KENYA		Study Case: Study Case MTP/LTP				Annex: LF.001		/ 88
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data	
BB 66 VILLA FRANCA (PSS/E 1750)		66.00 0.00 0.00 0.00							Pv: cLod: L: 3.50 km	
lne_161/Lne		Lne 66 FIRETEE -							Pv: cLod: L: 3.50 km	
lne_167/Lne		Lne 66 EMBAKASI -							Tap: 0 Min: -8 Max: 9	
trf_175/Tr2		TR VILLA 66/11 kV								
BB 66 VILLA FRANCA (PSS/E 1751)		66.00 0.00 0.00 0.00							Pv: cLod: L: 7.00 km	
lne_161/Lne		Lne 66 FIRETEE -							Pv: cLod: L: 3.40 km	
lne_162/Lne		Lne 66 EMBAKASI -							Pv: cLod: L: 1.00 km	
lne_168/Lne		Lne 66 NSSF - VIL							Tap: 0 Min: -8 Max: 9	
trf_175/Tr2		TR VILLA 66/11 kV(								
BB 66 WESTLANDS (PSS/E 1685)		66.00 0.00 0.00 0.00							Pv: cLod: L: 2.10 km	
lne_163/Lne		Lne 66 PARK266 -							Pv: cLod: L: 23.00 km	
lne_164/Lne		Lne 66 NBNOR66 -							Tap: 0 Min: -5 Max: 11	
trf_168/Tr2		TR WESTLANDS 66/11							Tap: 0 Min: -5 Max: 11	
trf_168/Tr2		TR WESTLANDS 66/11								
GND1		1.00								
Cub_2 /Dcu		Ground1								
Cub_1 /Rec		RectD								
GND2		1.00								
Cub_2 /Dcu		Ground2								
Cub_1 /Rec		InvD								
T_DC_Line		500.00								
Cub_4 /Shnt		ShuntCapDC							Pv: cLod: L: 300.00 km	
Cub_1 /Lne		LineDC_R							PV: cLod: L: 300.00 km	
Cub_2 /Lne		LineDC_I								
T_DC_Line_I		500.00								
Cub_1 /Sind		Reactor_I							X: 0.00 Ohm R: 0.00 Ohm L: 300.00 km	
Cub_2 /Lne		LineDC_I							PV: cLod: L: 300.00 km	

Grid: 1 KENYA		System Stage: 1 KENYA				Study Case: Study Case MTP/LTP				Annex: LF.001		/ 89			
rated Voltage [kV] Bus-voltage [p.u.] [kV] [deg] Active Power [MW] Reactive Power [Mvar] Power Factor [-] Current [kA] Loading [%]										Additional Data					
T_DC_Line_R 500.00 Cub_1 /Sind Cub_2 /Lne Reactor_R LineDC_R										X: 0.00 Ohm Pv: cLod: 0.00 Ohm L: 300.00 km					
Term250kV_I 250.00 Cub_5 /Rec Cub_6 /Rec InvY InvD															
Term250kV_R 250.00 Cub_1 /Rec Cub_2 /Rec RectY RectD															
Term_I 500.00 Cub_2 /Sind Cub_3 /Rec Reactor_I InvY										X: 0.00 Ohm R: 0.00 Ohm					
Term_R 500.00 Cub_1 /Rec Cub_2 /Sind RectY Reactor_R										X: 0.00 Ohm R: 0.00 Ohm					

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DIgSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

Load Flow Calculation			Busbars/Terminals
AC Load Flow, balanced, positive sequence		Automatic Model Adaptation for Convergence	No
Automatic Tap Adjust of Transformers	Yes	Max. Acceptable Load Flow Error for	
Consider Reactive Power Limits	Yes	Nodes	1.00 kVA
		Model Equations	0.10 %

Grid: 2 UGANDA				System Stage: 2 UGANDA				Study Case: Study Case MTP/LTP				Annex: LF.001 / 90			
rated Voltage [kV]		Bus-voltage [p.u.] [kV] [deg]		Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data						
BB 132 OWEN FALLS (PSS/E 1137)															
132.00															
lod_113/Lod		Ld OWEN (132 kV)								Pl0: 150.00 MW		Ql0: 59.28 Mvar			
sym_113/Sym		Sym OWEN FALLS -13								Typ: PV					
lne_113/Lne		Lne 132 OWEN - TO								Pv:		cLod:		L: 112.00 km	
lne_113/Lne		Lne 132 OWEN - TO								Pv:		cLod:		L: 112.00 km	

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DIgSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

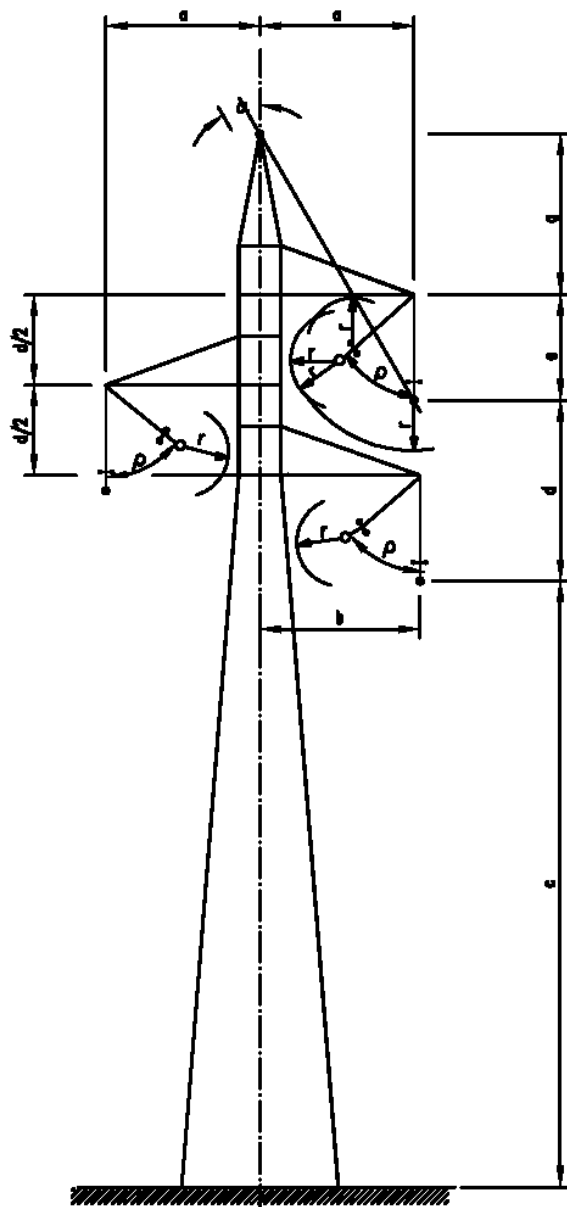
Load Flow Calculation			Busbars/Terminals
AC Load Flow, balanced, positive sequence		Automatic Model Adaptation for Convergence	No
Automatic Tap Adjust of Transformers	Yes	Max. Acceptable Load Flow Error for	
Consider Reactive Power Limits	Yes	Nodes	1.00 kVA
		Model Equations	0.10 %

Grid: 3 TANZANIA		System Stage: 3 TANZANIA		Study Case: Study Case MTP/LTP			Annex: LF.001 / 91	
rated Voltage [kV]	Bus-voltage [p.u.] [kV] [deg]	Active Power [MW]	Reactive Power [Mvar]	Power Factor [-]	Current [kA]	Loading [%]	Additional Data	
BB 400 ARUSHA (PSS/E 1430) 400.00 Cub_1 /Xnet shnt_14/Shnt shnt_14/Shnt svsg_14/Svs lne_140/Lne lne_140/Lne							Sk": 10000.00 MVA Qtcr: Pv: Pv:	
External Grid(TANZ Shnt ARUSHA 400kV Shnt ARUSHA 400kV(svsg_1430_1 Lne 400 ISINYA - Lne 400 ISINYA -							Qtsc: cLod: cLod:	
							nCap: 1 L: 200.00 km L: 200.00 km	

Annex 8.E Sample tower profiles

Tower Silhouettes

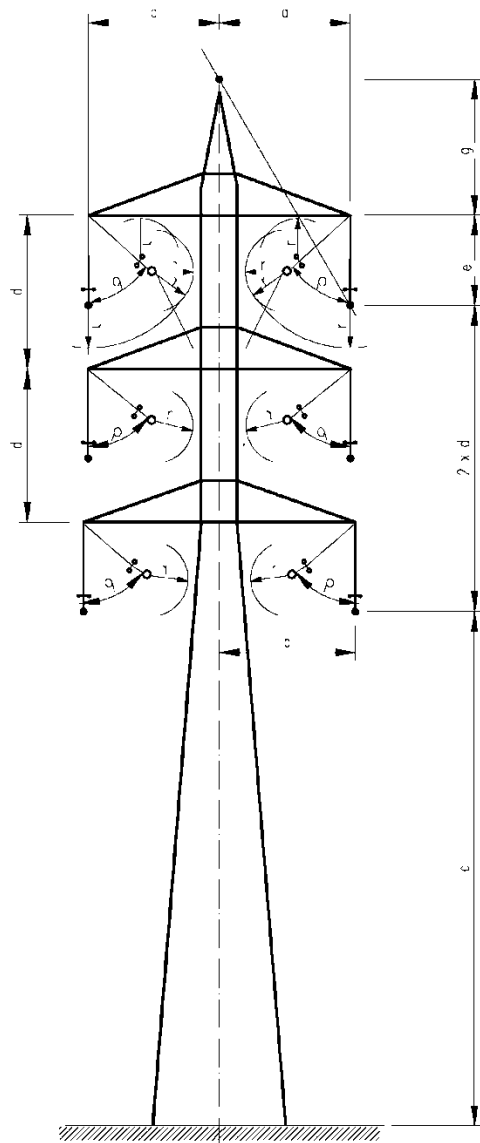
Tower Silhouettes 132kV



Approximate tower main dimensions:

	[m]
a	2.60
b	4.00
c (min)	15.00
Insulator	1.60
Shield angle	min. 30°

Single Circuit Suspension Tower



Approximate tower main dimensions:

	[m]
a	2.60
b	4.00
c (min)	17.00
Insulator	1.60
Shield angle	min. 30°

132kV Double Circuit Suspension Tower



30.75 / 3

1.00

11.00

9.00

8.00

14.50

65.0°

8.00

6.50

65.0°

65.0°

MIN 1.1m

65.0°

65.0°

65.0°

Insulator string length; 5m

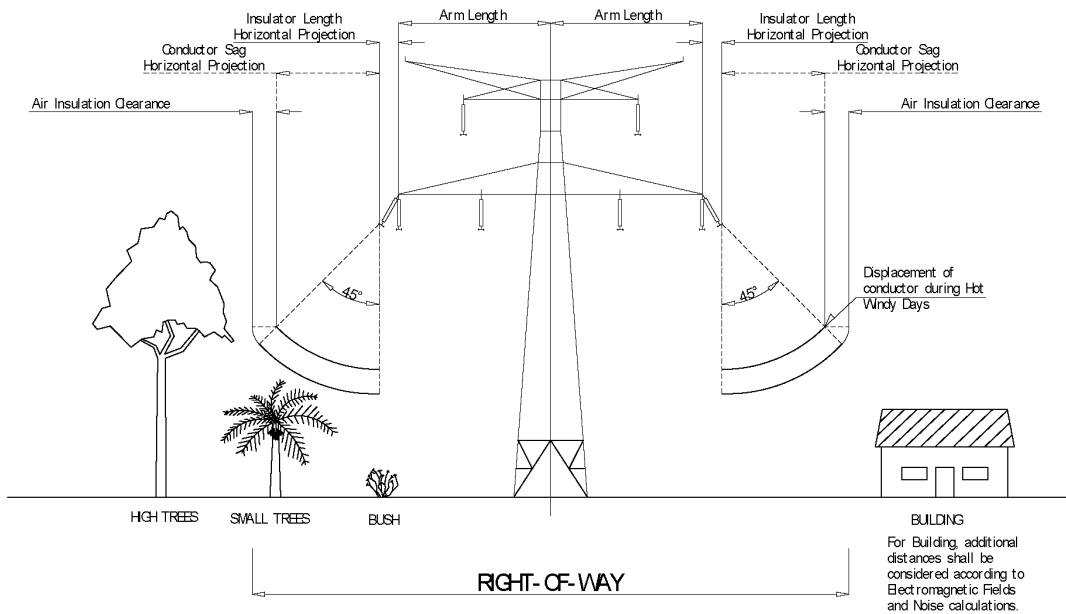
400 kV SUSPENSION
DANUBE

BASIC TOWER BODY 26.75m ; +3.00; +6.00; +9.00; +12.00

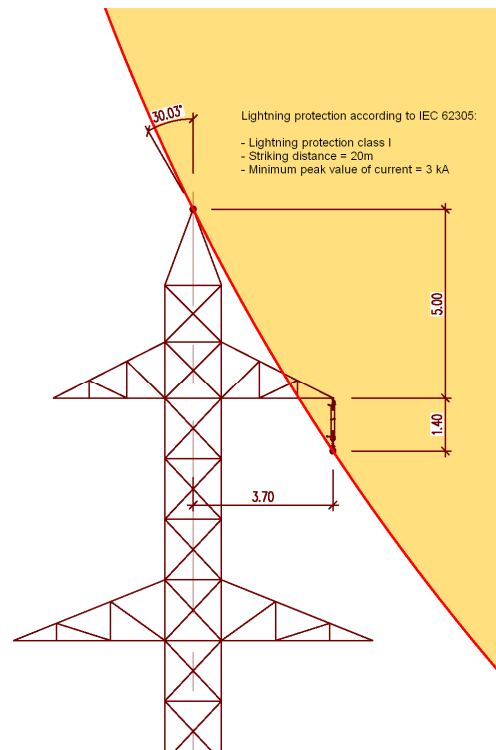
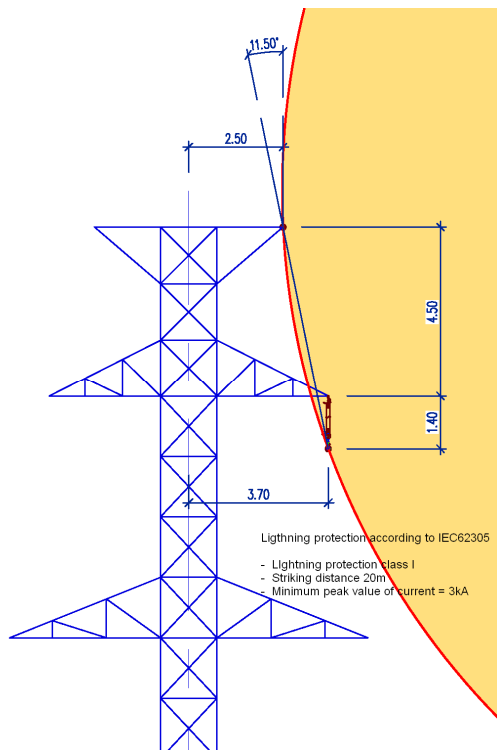
+1.00 BASIC LEG ; +2.00; +3.00; +4.00

400kV Double Circuit Suspension Tower – Danube Type

Way-Leave Definition



Lightning Protection





Annex 8.F Contingency report MTP

Contingency Analysis Report: Maximum Loadings

Study Case: Study Case MTP/LTP
 Result File: Contingency Analysis MTP Upd 2020.
 Loading Limit: 80.0
 Overloading Limit: 110

	Component	Branch, Substation or Site	Loading Continuous [%]	Loading Short-Term [%]	Loading Base Case [%]	Contingency Number	Contingency Name	Base Case and Continuous Loading [0 % - 129 %]
1	Lne 132 RABAI - BAMBURI(1)		129.3	129.3	65.1	86	Lne 132 RABAI - BAMBURI	
2	Lne 132 RABAI - BAMBURI		129.3	129.3	65.1	87	Lne 132 RABAI - BAMBURI(1)	
3	Lne 132 ULU - JUJA		124.7	124.7	24.3	193	TR ISINYA 220/132 kv	
4	Lne 132 ULU - KONZA		122.0	122.0	22.0	193	TR ISINYA 220/132 kv	
5	TR LOIYANGALANI 400/220kv (1)		120.7	120.7	63.9	181	TR LOIYANGALANI 400/220kv (2)	
6	TR LOIYANGALANI 400/220kv (2)		120.7	120.7	63.9	180	TR LOIYANGALANI 400/220kv (1)	
7	Lne 132 MASINGA - KUTUS		111.2	111.2	70.7	24	Lne 132 KAMBURU - KIGANJO (MTP Upd. LTP)	
8	TR RUARAKA 132/66 kv(1)		111.2	111.2	55.5	230	TR RUARAKA 132/66 kv	
9	TR RUARAKA 132/66 kv		111.2	111.2	55.5	231	TR RUARAKA 132/66 kv(1)	
10	TR KIGANJO 132/33 kv(1)		110.9	110.9	53.8	257	TR KIGANJO 132/33 kv	
11	TR KIGANJO 132/33 kv		110.9	110.9	53.8	258	TR KIGANJO 132/33 kv(1)	
12	Lne 132 LESSOS - LESSTRF(1)		109.0	109.0	54.5	49	Lne 132 LESSOS - LESSTRF	
13	Lne 132 ELDORET - LESSOS		108.1	108.1	48.7	157	Lne 220 TURKWEL - KAINUK	
14	TR GALU 132/11 kv		106.0	106.0	26.5	88	Lne 132 RABAI - GALU	
15	Lne 132 JUJA - DANDORA(1)		105.0	105.0	53.6	16	Lne 132 JUJA - DANDORA	
16	Lne 132 JUJA - DANDORA		105.0	105.0	53.6	17	Lne 132 JUJA - DANDORA(1)	
17	TR LANET 132/33 kv		103.6	103.6	67.9	275	TR LANET 132/33 kv(1)	
18	TR GALU 132/33 kv(1)		103.3	103.3	50.2	245	TR GALU 132/33 kv	
19	TR GALU 132/33 kv		103.3	103.3	50.2	246	TR GALU 132/33 kv(1)	
20	TR LANET 132/33 kv(1)		103.2	103.2	67.3	274	TR LANET 132/33 kv	
21	TR LANET 132/33 kv(2)		102.9	102.9	67.1	274	TR LANET 132/33 kv	
22	Lne 132 KAJIADO - ISINYA		100.5	100.5	66.6	40	Lne 132 KONZA - ISINYA	
23	Lne 132 BOMET - SOTIK		97.2	97.2	73.5	65	Lne 132 MUHORONI - CHEMOSIT	
24	TR TORORO 400/220 kv (1)		94.3	94.3	58.9	189	TR TORORO 400/220 kv (2)	
25	TR TORORO 400/220 kv (2)		94.3	94.3	58.9	188	TR TORORO 400/220 kv (1)	
26	TR RABAI 132/11 kv(1)		92.0	92.0	90.9	131	Lne 220 KIAMBARE - RABAI	
27	Lne 132 SONDU - HOMABAY		89.9	89.9	30.6	37	Lne 132 KISUMU - SONDU	
28	Lne 132 HOMABAY - NDHIWA		89.1	89.1	30.8	37	Lne 132 KISUMU - SONDU	
29	Lne 132 AWENDO - NDHIWA		88.9	88.9	31.1	37	Lne 132 KISUMU - SONDU	
30	Lne 132 MUHORONI - CHEMOSIT		88.4	88.4	32.1	5	Lne 132 BOMET - SOTIK	
31	TR MUSAGA 132/33 kv		87.8	87.8	33.1	296	TR MUSAGA 132/33 kv(1)	
32	TR KIPEVU 132/33 kv(1)		87.7	87.7	57.5	261	TR KIPEVU 132/33 kv	
33	TR KIPEVU 132/33 kv(2)		87.7	87.7	57.5	261	TR KIPEVU 132/33 kv	
34	TR KIPEVU 132/33 kv		87.7	87.7	57.5	262	TR KIPEVU 132/33 kv(1)	
35	TR MASINGA 132/11 kv(1)		87.3	87.3	83.3	143	Lne 220 OLKARIA - OLKARIA(2)	
36	TR MASINGA 132/11 kv		87.3	87.3	83.3	143	Lne 220 OLKARIA - OLKARIA(2)	
37	TR OLKARIA 220/11 kv(13)		86.9	86.9	81.7	124	Lne 220 ISINYA - KIPETO	
38	TR OLKARIA 220/11 kv(1)		85.8	85.8	79.2	143	Lne 220 OLKARIA - OLKARIA(2)	
39	TR OLKARIA 220/11 kv(2)		85.8	85.8	79.2	143	Lne 220 OLKARIA - OLKARIA(2)	
40	TR OLKARIA 220/11 kv		85.8	85.8	79.2	143	Lne 220 OLKARIA - OLKARIA(2)	
41	Lne 132 KIGANJO - NANYUKI		85.2	85.2	31.0	22	Lne 132 KAMBURU - SHIARA	
42	Lne 132 KISIL - AWENDO		84.7	84.7	26.9	37	Lne 132 KISUMU - SONDU	
43	TR EMBAKASI 220/66 kv(1)		84.1	84.1	55.3	210	TR EMBAKASI 220/66 kv(2)	
44	TR EMBAKASI 220/66 kv(2)		84.1	84.1	55.3	209	TR EMBAKASI 220/66 kv(1)	
45	TR EMBAKASI 220/66 kv		84.0	84.0	55.3	209	TR EMBAKASI 220/66 kv(1)	
46	Lne 132 MUHORONI - LESSOS		83.1	83.1	47.5	5	Lne 132 BOMET - SOTIK	
47	Lne 132 RUARAKA - RUARAKA(1)		83.0	83.0	41.5	89	Lne 132 RUARAKA - RUARAKA(1)	
48	Lne 132 RUARAKA - RUARAKA		83.0	83.0	41.5	90	Lne 220 OLKARIA - OLKARIA(2)	
49	TR OLKARIA 132/11 kv		82.6	82.6	76.5	143	Lne 132 OLKARIA 1 - NAROK (MTP Upd.)	
50	Lne 132 OLKARIA - NAROK		81.8	81.8	44.3	171	Lne 220 ISINYA - KIPETO	
51	TR OLKARIA 220/11 kv(12)		81.5	81.5	76.7	124	TR ISINYA 220/132 kv	
52	TR KAJIADO 132/33 kv		81.5	81.5	68.8	193	TR RABAI 132/33 kv	
53	Lne 33 RABAI33 - RABAI33		81.4	81.4	39.9	306		



Annex 8.G Short circuit results MTP (3PH)

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DiGSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

Fault Locations with Feeders Short-Circuit Calculation / Method : IEC 60909				3-Phase Short-Circuit / Max. Short-Circuit Currents	
Asynchronous Motors Always Considered	Decaying Aperiodic Component (idc) Using Method B	Grid Identification Automatic	Conductor Temperature User Defined No	Short-Circuit Duration	
				Break Time	0.08 s
				Fault Clearing Time (Ith)	1.00 s
				c-Voltage Factor	
				User Defined	No

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 1					
	rtd.V. [kV]	Voltage [kV]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	Ik" [deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]		
WPP-S/S MERU (HV)													
BB 132 MERU WF	132.00	0.00	0.00	1.10	897.21 MVA	3.92 kA	-76.58	8.37 kA	3.66	836.55	2.09	3.20	
Lne 132 MERU WF BB 132 ISI					238.96 MVA	1.05 kA	103.76	2.23 kA					
Lne 132 MERU WF BB 132 ISI					238.96 MVA	1.05 kA	103.76	2.23 kA					
TR MERU-WPP 132 BB 33 MERU					209.65 MVA	0.92 kA	103.03	1.96 kA					
TR MERU-WPP 132 BB 33 MERU					209.65 MVA	0.92 kA	103.03	1.96 kA					
BB 132 1RABTRF (P													
TR RABAI 220/13 BB 220 RAB	132.00	0.00	0.00	1.10	2864.07 MVA	12.53 kA	-80.26	28.83 kA	11.63	2659.17	12.48	12.66	
TR 1RABTRF 132/ BB 11 1RAB					464.43 MVA	2.03 kA	86.07	4.67 kA					
zpu_1126_1726_1 BB 132 RAB					0.00 MVA	0.00 kA	0.00	0.00 kA					
					2415.29 MVA	10.56 kA	102.34	24.31 kA					
BB 132 AEOLOUS (P													
Lne 132 NAI VASH BB 132 NAI	132.00	0.00	0.00	1.10	1175.61 MVA	5.14 kA	-80.35	11.87 kA	4.98	1139.31	5.11	5.20	
TR AEOLOUS 132/ BB 11 AEOL					892.73 MVA	3.90 kA	101.58	9.01 kA					
					284.97 MVA	1.25 kA	93.59	2.88 kA					
BB 132 AWENDO (PS													
Lne 132 KISII BB 132 KIS	132.00	0.00	0.00	1.10	553.05 MVA	2.42 kA	-70.82	4.72 kA	2.42	553.05	2.42	2.43	
Lne 132 AWENDO BB 132 NDH					295.03 MVA	1.29 kA	111.11	2.52 kA					
TR AWENDO 132/3 BB 33 AWEN					258.38 MVA	1.13 kA	106.97	2.20 kA					
					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 BAMBURI (P													
Lne 132 MTWAPA BB 132 MTW	132.00	0.00	0.00	1.10	1503.64 MVA	6.58 kA	-74.80	13.59 kA	6.49	1483.72	6.55	6.62	
Lne 132 RABAI BB 132 RAB					0.00 MVA	0.00 kA	0.00	0.00 kA					
Lne 132 RABAI BB 132 RAB					751.82 MVA	3.29 kA	105.20	6.79 kA					
Lne 132 RABAI BB 132 RAB					751.82 MVA	3.29 kA	105.20	6.79 kA					
TR BAMBURI 132/ BB 33 BAMB					0.00 MVA	0.00 kA	0.00	0.00 kA					
TR BAMBURI 132/ BB 33 BAMB					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 BOMET (PSS													
	132.00	0.00	0.00	1.10	805.22 MVA	3.52 kA	-70.97	6.90 kA	3.52	805.22	3.52	3.54	

Grid: 1 KENYA				System Stage: 1 KENYA						Annex: LF.001 / 2					
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 BOMET		BB 132 SOT				367.87 MVA	1.61 kA	110.70		3.15 kA					
Lne 132 BOMET		BB 132 NAR				212.47 MVA	0.93 kA	111.33		1.82 kA					
Lne 132 BOMET		BB 132 NAR				226.04 MVA	0.99 kA	104.12		1.94 kA					
TR BOMET 132/33		BB 33 BOME				0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 CHEMOSIT (		132.00	0.00	0.00	1.10	842.07 MVA	3.68 kA	-70.34		7.13 kA	3.68	842.07	3.68	3.70	
Lne 132 MUHORON		BB 132 MUH				495.00 MVA	2.17 kA	110.94		4.19 kA					
Lne 132 CHEMOSI		BB 132 SOT				347.36 MVA	1.52 kA	107.85		2.94 kA					
TR CHEMOSIT 132		BB 33 CHEM				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR CHEMOSIT 132		BB 33 CHEM				0.00 MVA	0.00 kA	0.00		0.00 kA					
Shn CHEMO 33 (M						0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 CHOGORIA (		132.00	0.00	0.00	1.10	572.34 MVA	2.50 kA	-75.67		5.23 kA	2.50	572.34	2.19	2.52	
Lne 132 CHOGORI		BB 132 ISH				572.34 MVA	2.50 kA	104.33		5.23 kA					
TR CHOGORIA 132		BB 33 CHOG				0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 DANDORA (P		132.00	0.00	0.00	1.10	4062.23 MVA	17.77 kA	-83.38		44.08 kA	17.67	4040.02	17.59	18.08	
Lne 132 JUJA -		BB 132 JUJ				789.19 MVA	3.45 kA	104.71		8.56 kA					
Lne 132 JUJA -		BB 132 JUJ				789.19 MVA	3.45 kA	104.71		8.56 kA					
TR DANDORA 132/		BB 11 1DAN				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR DANDORA 132/		BB 11 1DAN				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR DANDORA 220/		BB 220 DAN				1254.70 MVA	5.49 kA	91.55		13.61 kA					
TR DANDORA 220/		BB 220 DAN				1254.70 MVA	5.49 kA	91.55		13.61 kA					
BB 132 DOMES (PSS		132.00	0.00	0.00	1.10	1811.31 MVA	7.92 kA	-82.55		19.15 kA	7.74	1769.33	7.87	8.04	
Lne 132 DOMES		BB 132 OLK				1475.65 MVA	6.45 kA	98.58		15.60 kA					
TR DOMES 132/11		BB 11 DOME				168.60 MVA	0.74 kA	92.51		1.78 kA					
TR DOMES 132/11		BB 11 DOME				168.60 MVA	0.74 kA	92.51		1.78 kA					
BB 132 ELDORET (P		132.00	0.00	0.00	1.10	946.55 MVA	4.14 kA	-71.32		8.19 kA	4.14	946.55	4.14	4.16	
Lne 132 ELDORET		BB 132 LES				761.62 MVA	3.33 kA	110.95		6.59 kA					
Lne 132 ELDORET		BB 132 KIT				187.97 MVA	0.82 kA	99.42		1.63 kA					
TR ELDORET 132/		BB 33 ELD3				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR ELDORET 132/		BB 33 ELD3				0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 GALU (PSS/		132.00	0.00	0.00	1.10	738.86 MVA	3.23 kA	-71.42		6.46 kA	3.17	725.00	3.22	3.25	
Lne 132 RABAI		BB 132 RAB				626.30 MVA	2.74 kA	111.58		5.48 kA					
Lne 132 GALU -		BB 132 LUN				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR GALU 132/11		BB 11 KWAL				118.04 MVA	0.52 kA	92.49		1.03 kA					
TR GALU 132/33		BB 33 GALU				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR GALU 132/33		BB 33 GALU				0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 GARISSA (P		132.00	0.00	0.00	1.10	486.98 MVA	2.13 kA	-77.46		4.68 kA	2.13	486.98	2.13	2.15	
Lne 132 WAJIR		BB 132 WAJ				0.00 MVA	0.00 kA	0.00		0.00 kA					
Lne 132 MWINGI		BB 132 MWI				158.22 MVA	0.69 kA	111.04		1.52 kA					

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 3					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	Ik" [deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
TR GARISSA 132/ TR GARISSA 220/ Shnt GARISSA 13	BB 33 GARI BB 220 GAR				0.00 MVA 331.33 MVA 0.00 MVA	0.00 kA 1.45 kA 0.00 kA	0.00 98.49 0.00	0.00 kA 3.19 kA 0.00 kA					
BB 132 GATUNDU (P Lne 132 MANGU TR GATUNDU 132/	132.00 0.00 BB 132 MAN BB 33 GATU	0.00	0.00	1.10	843.36 MVA 843.36 MVA 0.00 MVA	3.69 kA 3.69 kA 0.00 kA	-72.64 107.36 0.00	7.46 kA 7.46 kA 0.00 kA	3.69	843.36	3.69	3.71	
BB 132 GITARU (PS Lne 132 GITARU Lne 132 GITARU TR GITARU 132/1 TR GITARU 132/1	132.00 0.00 BB 132 KAM BB 132 KAM BB 15 GITA BB 15 GITA	0.00	0.00	1.10	3101.05 MVA 1133.24 MVA 1137.63 MVA 417.61 MVA 417.61 MVA	13.56 kA 4.96 kA 4.98 kA 1.83 kA 1.83 kA	-81.94 100.29 99.77 92.68 92.68	32.14 kA 11.74 kA 11.79 kA 4.33 kA 4.33 kA	13.10	2995.01	12.89	13.74	
BB 132 GITHAMBO (Lne 132 MANGU TR GITHAMBO 132	132.00 0.00 BB 132 MAN BB 33 GITH	0.00	0.00	1.10	574.34 MVA 574.34 MVA 0.00 MVA	2.51 kA 2.51 kA 0.00 kA	-70.90 109.10 0.00	4.92 kA 4.92 kA 0.00 kA	2.51	574.34	2.51	2.53	
BB 132 HOMABAY (P Lne 132 SONDU Lne 132 HOMABAY	132.00 0.00 BB 132 SON BB 132 NDH	0.00	0.00	1.10	563.49 MVA 328.24 MVA 235.74 MVA	2.46 kA 1.44 kA 1.03 kA	-71.80 106.16 111.03	4.89 kA 2.85 kA 2.05 kA	2.46	563.49	2.46	2.48	
BB 132 ISHIARA (P Lne 132 KAMBURU Lne 132 CHOGORI Lne 132 KYENI Lne 132 ISHIARA	132.00 0.00 BB 132 KAM BB 132 CHO BB 132 KYE BB 132 MER	0.00	0.00	1.10	1201.58 MVA 990.24 MVA 0.00 MVA 0.00 MVA 211.75 MVA	5.26 kA 4.33 kA 0.00 kA 0.00 kA 0.93 kA	-81.05 98.26 0.00 0.00 102.19	12.15 kA 10.01 kA 0.00 kA 0.00 kA 2.14 kA	5.26	1201.58	4.59	5.31	
BB 132 ISINYA (PS Lne 132 KONZA Lne 132 KAJIADO TR ISINYA 220/1	132.00 0.00 BB 132 KON BB 132 KAJ BB 220 ISI	0.00	0.00	1.10	1908.57 MVA 320.92 MVA 164.54 MVA 1440.93 MVA	8.35 kA 1.40 kA 0.72 kA 6.30 kA	-82.76 109.41 113.04 92.76	20.53 kA 3.45 kA 1.77 kA 15.50 kA	8.35	1908.57	8.35	8.48	
BB 132 ISIOLO (PS Lne 132 MERU WF Lne 132 MERU WF Lne 132 NANYUKI Lne 132 MERU - TR ISIOLO 132/3	132.00 0.00 WPP-S/S ME WPP-S/S ME BB 132 NAN BB 132 MER BB 33 ISIO	0.00	0.00	1.10	917.22 MVA 192.29 MVA 192.29 MVA 288.82 MVA 244.98 MVA 0.00 MVA	4.01 kA 0.84 kA 0.84 kA 1.26 kA 1.07 kA 0.00 kA	-76.42 102.83 102.83 107.51 100.12 0.00	8.54 kA 1.79 kA 1.79 kA 2.69 kA 2.28 kA 0.00 kA	3.80	868.51	2.33	3.37	
BB 132 JUJA RD (P Lne 132 ULU - Lne 132 MANGU Lne 132 JUJA - Lne 132 JUJA -	132.00 0.00 BB 132 ULU BB 132 MAN BB 132 THI BB 132 DAN	0.00	0.00	1.10	3990.77 MVA 283.87 MVA 224.65 MVA 79.69 MVA 1180.45 MVA	17.46 kA 1.24 kA 0.98 kA 0.35 kA 5.16 kA	-82.77 109.05 104.79 95.39 91.89	42.79 kA 3.04 kA 2.41 kA 0.85 kA 12.66 kA	17.35	3966.00	17.29	17.73	

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 4			
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
Lne 132 JUJA -	BB 132 DAN							1180.45 MVA	5.16 kA	91.89	12.66 kA				
Lne 132 JUJA -	BB 132 RUA							308.78 MVA	1.35 kA	109.52	3.31 kA				
Lne 132 JUJA -	BB 132 RUA							308.78 MVA	1.35 kA	109.52	3.31 kA				
TR JUJA 132/66	BB 66 JUJA							105.45 MVA	0.46 kA	97.63	1.13 kA				
TR JUJA 132/66	BB 66 JUJA							26.32 MVA	0.12 kA	97.63	0.28 kA				
TR JUJA 132/66	BB 66 JUJA							52.88 MVA	0.23 kA	97.63	0.57 kA				
TR JUJA 132/66	BB 66 JUJA							26.32 MVA	0.12 kA	97.63	0.28 kA				
TR JUJA 132/66	BB 66 JUJA							111.88 MVA	0.49 kA	97.63	1.20 kA				
TR JUJA 132/66	BB 66 JUJA							26.30 MVA	0.12 kA	97.63	0.28 kA				
TR JUJA 132/66	BB 66 JUJA							107.39 MVA	0.47 kA	97.63	1.15 kA				
BB 132 KABARNET (	132.00	0.00	0.00	1.10	701.03 MVA	3.07 kA	-79.10	6.83 kA	3.07	701.03	2.81	3.09			
Lne 132 NYAHURU	BB 132 RUM				190.46 MVA	0.83 kA	101.93	1.86 kA							
Lne 132 LESSOS	BB 132 LES				510.61 MVA	2.23 kA	100.52	4.98 kA							
TR KABARNET 132	BB 33 KABA				0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 132 KAJIADO (P	132.00	0.00	0.00	1.10	1446.21 MVA	6.33 kA	-78.01	14.06 kA	6.33	1446.21	6.33	6.38			
Lne 132 KONZA	BB 132 KON				285.59 MVA	1.25 kA	108.07	2.78 kA							
Lne 132 KAJIADO	BB 132 ISI				1162.62 MVA	5.09 kA	100.50	11.30 kA							
TR KAJIADO 132/	BB 33 KAJI				0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 132 KAMBTRF (P	132.00	0.00	0.00	1.10	3607.59 MVA	15.78 kA	-83.96	38.92 kA	15.21	3477.39	14.89	16.04			
TR KAMBURU 220/	BB 220 KAM				972.57 MVA	4.25 kA	95.42	10.49 kA							
TR KAMBURU 220/	BB 220 KAM				972.57 MVA	4.25 kA	95.42	10.49 kA							
zpu_1103_1723_1	BB 132 KAM				831.35 MVA	3.64 kA	96.76	8.97 kA							
zpu_1103_1723_2	BB 132 KAM				831.35 MVA	3.64 kA	96.76	8.97 kA							
BB 132 KAMBURU (P	132.00	0.00	0.00	1.10	3623.58 MVA	15.85 kA	-83.89	39.01 kA	15.31	3500.64	15.00	16.11			
Lne 132 KAMBURU	BB 132 KIG				105.32 MVA	0.46 kA	102.82	1.13 kA							
Lne 132 GITARU	BB 132 GIT				388.72 MVA	1.70 kA	94.37	4.19 kA							
Lne 132 GITARU	BB 132 GIT				390.22 MVA	1.71 kA	93.85	4.20 kA							
Lne 132 KAMBURU	BB 132 MAS				215.58 MVA	0.94 kA	105.50	2.32 kA							
Lne 132 KAMBURU	BB 132 ISH				137.37 MVA	0.60 kA	99.73	1.48 kA							
TR KAMBURU 132/	BB 11 KAMB				131.63 MVA	0.58 kA	92.57	1.42 kA							
TR KAMBURU 132/	BB 11 KAMB				131.63 MVA	0.58 kA	92.57	1.42 kA							
TR KAMBURU 132/	BB 11 KAMB				131.63 MVA	0.58 kA	92.57	1.42 kA							
TR KAMBURU 132/	BB 33 KAMB				0.00 MVA	0.00 kA	0.00	0.00 kA							
zpu_1103_1723_1	BB 132 KAM				998.31 MVA	4.37 kA	95.99	10.75 kA							
zpu_1103_1723_2	BB 132 KAM				998.31 MVA	4.37 kA	95.99	10.75 kA							
BB 132 KIBOKO (PS	132.00	0.00	0.00	1.10	539.88 MVA	2.36 kA	-69.62	4.50 kA	2.36	539.88	2.36	2.37			
Lne 132 SULTAN	BB 132 SUL				378.17 MVA	1.65 kA	110.55	3.15 kA							
Lne 132 KIBOKO	BB 132 MTI				161.72 MVA	0.71 kA	109.98	1.35 kA							
BB 132 KIGANJO (P	132.00	0.00	0.00	1.10	1003.35 MVA	4.39 kA	-74.75	9.17 kA	4.39	1003.35	3.77	4.42			

Grid: 1 KENYA				System Stage: 1 KENYA						Annex: LF.001 / 5				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA] [deg]		ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 KAMBURU		BB 132 KAM				403.54 MVA	1.77 kA	98.24	3.69 kA					
Lne 132 KIGANJO		BB 132 NAN				292.20 MVA	1.28 kA	108.02	2.67 kA					
Lne 132 KIGANJO		BB 132 KUT				312.95 MVA	1.37 kA	111.70	2.86 kA					
TR KIGANJO 132/		BB 33 KIGA				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR KIGANJO 132/		BB 33 KIGA				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 KILIFI (PS	132.00	0.00	0.00	1.10	540.87 MVA	2.37 kA	-67.60	4.37 kA	2.37	540.87	2.37	2.38		
Lne 132 MTWAPA	BB 132 MTW				540.87 MVA	2.37 kA	112.40	4.37 kA						
TR KILIFI 132/3	BB 33 KILI				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KILIFI 132/3	BB 33 KILI				0.00 MVA	0.00 kA	0.00	0.00 kA						
Shn KILIFI 132k					0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 KILIMAMBOG	132.00	0.00	0.00	1.10	932.89 MVA	4.08 kA	-71.71	8.06 kA	4.08	932.89	4.08	4.10		
Lne 132 THIKA -	BB 132 THI				932.89 MVA	4.08 kA	108.29	8.06 kA						
BB 132 KINDARUMA	132.00	0.00	0.00	1.10	895.88 MVA	3.92 kA	-76.93	8.67 kA	3.79	866.03	3.90	3.95		
Lne 132 KINDARU	BB 132 MAN				287.29 MVA	1.26 kA	110.09	2.78 kA						
Lne 132 KINDARU	BB 132 MWI				247.56 MVA	1.08 kA	109.38	2.40 kA						
TR KINDARUMA 13	BB 11 1KIN				124.56 MVA	0.54 kA	93.36	1.21 kA						
TR KINDARUMA 13	BB 11 1KIN				124.56 MVA	0.54 kA	93.36	1.21 kA						
TR KINDARUMA 13	BB 11 1KIN				120.87 MVA	0.53 kA	93.37	1.17 kA						
BB 132 KIPEVU (PS	132.00	0.00	0.00	1.10	2456.50 MVA	10.74 kA	-83.02	26.09 kA	10.08	2303.77	10.70	10.90		
Lne 132 KIPEVU	BB 132 KIP				893.37 MVA	3.91 kA	93.70	9.49 kA						
Lne 132 KIPEVU	BB 132 RAB				390.05 MVA	1.71 kA	104.97	4.14 kA						
Lne 132 KIPEVU	BB 132 RAB				390.05 MVA	1.71 kA	104.97	4.14 kA						
Lne 132 KIPEVU	BB 132 RAB				403.45 MVA	1.76 kA	92.27	4.29 kA						
TR KIPEVU 132/1	BB 11 1KIP				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KIPEVU 132/1	BB 11 2KIP				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KIPEVU 132/1	BB 11 3KIP				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KIPEVU 132/1	BB 11 KIPE				195.36 MVA	0.85 kA	93.44	2.07 kA						
TR KIPEVU 132/1	BB 11 KIPE				195.36 MVA	0.85 kA	93.44	2.07 kA						
TR KIPEVU 132/3	BB 33 1KIP				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KIPEVU 132/3	BB 33 1KIP				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KIPEVU 132/3	BB 33 1KIP				0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 KIPEVU DII	132.00	0.00	0.00	1.10	2423.39 MVA	10.60 kA	-82.97	25.72 kA	9.93	2270.35	10.56	10.76		
Lne 132 KIPEVU	BB 132 KIP				1426.80 MVA	6.24 kA	99.72	15.14 kA						
Lne 132 KIPEVU	BB 132 RAB				446.11 MVA	1.95 kA	92.88	4.73 kA						
TR KIPEVU 132/1	BB 11 1KIP				211.37 MVA	0.92 kA	93.60	2.24 kA						
TR KIPEVU 132/1	BB 11 2KIP				342.94 MVA	1.50 kA	93.35	3.64 kA						
BB 132 KISII (PSS	132.00	0.00	0.00	1.10	644.48 MVA	2.82 kA	-71.17	5.51 kA	2.82	644.48	2.82	2.83		
Lne 132 KISII	BB 132 SOT				453.62 MVA	1.98 kA	109.10	3.88 kA						
Lne 132 KISII	BB 132 AWE				190.88 MVA	0.83 kA	108.20	1.63 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 6			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]		
TR KISII 132/33		BB 33	KISI			0.00 MVA	0.00 kA	0.00	0.00 kA						
TR KISII 132/33		BB 33	KISI			0.00 MVA	0.00 kA	0.00	0.00 kA						
Shn KISUMU 132k						0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132	KISUMU (PS	132.00	0.00	0.00	1.10	1188.08 MVA	5.20 kA	-79.32	12.01 kA	5.18	1183.31	5.12	5.25		
	Lne 132 MUHORON	BB 132	MUH			313.09 MVA	1.37 kA	113.76	3.16 kA						
	Lne 132 KISUMU	BB 132	SON			299.96 MVA	1.31 kA	100.65	3.03 kA						
	TR KISUMU 132/3	BB 33	KISU			0.00 MVA	0.00 kA	0.00	0.00 kA						
	TR KISUMU 132/3	BB 33	KISU			0.00 MVA	0.00 kA	0.00	0.00 kA						
	TR KISUMU 220/1	BB 220	KIS			293.71 MVA	1.28 kA	93.77	2.97 kA						
	TR KISUMU 220/1	BB 220	KIS			293.71 MVA	1.28 kA	93.77	2.97 kA						
BB 132	KITALE (PS	132.00	0.00	0.00	1.10	634.87 MVA	2.78 kA	-75.32	5.96 kA	2.78	634.87	2.78	2.80		
	Lne 132 ELDORET	BB 132	ELD			348.19 MVA	1.52 kA	111.91	3.27 kA						
	TR KITALE 132/3	BB 33	KITA			0.00 MVA	0.00 kA	0.00	0.00 kA						
	TR KITALE 220/1	BB 220	KIT			292.75 MVA	1.28 kA	96.08	2.75 kA						
BB 132	KITUI (PSS	132.00	0.00	0.00	1.10	608.46 MVA	2.66 kA	-71.84	5.28 kA	2.66	608.46	2.66	2.68		
	Lne 132 SULTAN	BB 132	WOT			210.16 MVA	0.92 kA	109.79	1.82 kA						
	Lne 132 MWINGI	BB 132	MWI			398.44 MVA	1.74 kA	107.30	3.46 kA						
	TR KITUI 132/33	BB 33	KITU			0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132	KOKOTONI (	132.00	0.00	0.00	1.10	1663.75 MVA	7.28 kA	-75.95	15.35 kA	7.15	1635.02	7.25	7.33		
	Lne 132 KOKOTON	BB 132	RAB			1553.14 MVA	6.79 kA	103.97	14.33 kA						
	Lne 132 KOKOTON	BB 132	MAR			110.64 MVA	0.48 kA	105.25	1.02 kA						
BB 132	KONZA (PSS	132.00	0.00	0.00	1.10	1506.92 MVA	6.59 kA	-75.23	13.85 kA	6.59	1506.92	6.59	6.64		
	Lne 132 ULU -	BB 132	ULU			505.17 MVA	2.21 kA	110.05	4.64 kA						
	Lne 132 SULTAN	BB 132	SUL			207.65 MVA	0.91 kA	109.69	1.91 kA						
	Lne 132 KONZA	BB 132	KAJ			271.13 MVA	1.19 kA	102.57	2.49 kA						
	Lne 132 KONZA	BB 132	ISI			528.82 MVA	2.31 kA	98.94	4.86 kA						
	Lne 132 KONZA	BB 132	MAC			0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132	KUTUS (PSS	132.00	0.00	0.00	1.10	918.64 MVA	4.02 kA	-71.45	7.87 kA	4.02	918.64	3.61	4.04		
	Lne 132 MASINGA	BB 132	MAS			548.83 MVA	2.40 kA	109.09	4.70 kA						
	Lne 132 KIGANJO	BB 132	KIG			369.71 MVA	1.62 kA	107.76	3.17 kA						
	TR KUTUS 132/33	BB 33	KUTU			7.78 MVA	0.03 kA	97.04	0.07 kA						
	TR KUTUS 132/33	BB 33	KUTU			7.62 MVA	0.03 kA	-82.96	0.07 kA						
BB 132	KYENI (PSS	132.00	0.00	0.00	1.10	617.58 MVA	2.70 kA	-74.26	5.51 kA	2.70	617.58	2.36	2.72		
	Lne 132 KYENI	BB 132	ISH			617.58 MVA	2.70 kA	105.74	5.51 kA						
	TR KYENI 132/33	BB 33	KYEN			0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132	LANET (PSS	132.00	0.00	0.00	1.10	1704.57 MVA	7.46 kA	-73.69	15.44 kA	7.32	1674.57	7.38	7.50		
	Lne 132 LANET	BB 132	NAI			369.12 MVA	1.61 kA	110.40	3.34 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 7		
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
Lne 132 LANET	BB 132 NAI					369.12 MVA	1.61 kA	110.40		3.34 kA				
Lne 132 LANET	BB 132 NAK					484.82 MVA	2.12 kA	103.20		4.39 kA				
Lne 132 LANET	BB 132 NAK					484.82 MVA	2.12 kA	103.20		4.39 kA				
TR LANET 132/33	BB 33 LANE					0.00 MVA	0.00 kA	0.00		0.00 kA				
TR LANET 132/33	BB 33 LANE					0.00 MVA	0.00 kA	0.00		0.00 kA				
TR LANET 132/33	BB 33 LANE					0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 LESSOS (PS	132.00	0.00		0.00	1.10	2127.72 MVA	9.31 kA	-77.54		20.40 kA	9.26	2117.81	9.09	9.38
Lne 132 ELDORET	BB 132 ELD					119.61 MVA	0.52 kA	99.17		1.15 kA				
Lne 132 MUHORON	BB 132 MUH					222.87 MVA	0.97 kA	109.68		2.14 kA				
Lne 132 MUSAGA	BB 132 MUS					74.06 MVA	0.32 kA	98.50		0.71 kA				
Lne 132 MUSAGA	BB 132 MUS					74.06 MVA	0.32 kA	98.50		0.71 kA				
Lne 132 LESSOS	BB 132 KAB					147.17 MVA	0.64 kA	101.23		1.41 kA				
Lne 132 LESSOS	BB 132 NAK					221.47 MVA	0.97 kA	109.71		2.12 kA				
Lne 132 LESSOS	BB 132 MAK					221.47 MVA	0.97 kA	109.71		2.12 kA				
Lne 132 LESSOS	BB 132 LES					527.41 MVA	2.31 kA	99.01		5.06 kA				
Lne 132 LESSOS	BB 132 LES					527.41 MVA	2.31 kA	99.01		5.06 kA				
TR LESSOS 132/3	BB 33 LESS					0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 LESSTRF (P	132.00	0.00		0.00	1.10	2127.72 MVA	9.31 kA	-77.54		20.40 kA	9.26	2117.83	9.09	9.38
Lne 132 LESSOS	BB 132 LES					538.01 MVA	2.35 kA	105.84		5.16 kA				
Lne 132 LESSOS	BB 132 LES					538.01 MVA	2.35 kA	105.84		5.16 kA				
TR LESSOS 220/1	BB 220 LES					263.87 MVA	1.15 kA	99.02		2.53 kA				
TR LESSOS 220/1	BB 220 LES					263.87 MVA	1.15 kA	99.02		2.53 kA				
TR LESSOS 220/1	BB 220 LES					263.87 MVA	1.15 kA	99.02		2.53 kA				
TR LESSOS 220/1	BB 220 LES					263.87 MVA	1.15 kA	99.02		2.53 kA				
TR LESSTRF 132/	BB 11 LESS					0.00 MVA	0.00 kA	0.00		0.00 kA				
TR LESSTRF 132/	BB 11 LESS					0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 LUNGA LUNG	132.00	0.00		0.00	1.10	356.63 MVA	1.56 kA	-69.22		2.98 kA	1.56	356.16	1.55	1.57
Lne 132 GALU -	BB 132 GAL					356.63 MVA	1.56 kA	110.78		2.98 kA				
TR LUNGA 132/33	BB 33 LUNG					0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 MACHAKOS (	132.00	0.00		0.00	1.10	873.34 MVA	3.82 kA	-71.83		7.55 kA	3.82	873.34	3.82	3.84
Lne 132 KONZA	BB 132 KON					873.34 MVA	3.82 kA	108.17		7.55 kA				
TR MACHAKOS 132	BB 33 MACH					0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 MAKUTANO (	132.00	0.00		0.00	1.10	959.89 MVA	4.20 kA	-69.93		8.06 kA	4.20	959.89	4.20	4.22
Lne 132 LESSOS	BB 132 LES					465.46 MVA	2.04 kA	110.05		3.91 kA				
Lne 132 NAKURU	BB 132 NAK					494.42 MVA	2.16 kA	110.10		4.15 kA				
TR MAKUTANO 132	BB 33 MAKU					0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 MANGU (PSS	132.00	0.00		0.00	1.10	1418.58 MVA	6.20 kA	-76.38		13.51 kA	6.19	1415.91	6.16	6.25
Lne 132 KINDARU	BB 132 KIN					230.67 MVA	1.01 kA	107.08		2.20 kA				
Lne 132 MANGU	BB 132 JUJ					661.33 MVA	2.89 kA	109.53		6.30 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 8			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
Lne 132 MANGU		BB 132 GAT				0.00	MVA	0.00	kA	0.00	0.00	kA			
Lne 132 MANGU		BB 132 GIT				0.00	MVA	0.00	kA	0.00	0.00	kA			
TR MANGU 132/66		BB 66 MANG				268.39	MVA	1.17	kA	94.84	2.56	kA			
TR MANGU 132/66		BB 66 MANG				268.42	MVA	1.17	kA	94.83	2.56	kA			
BB 132 MANYANI (P		132.00	0.00	0.00	1.10	507.43	MVA	2.22	kA	-71.27	4.36	kA	2.22	507.43	2.22
Lne 132 MANYANI		BB 132 MTI				170.64	MVA	0.75	kA	111.69	1.47	kA			2.23
Lne 132 MANYANI		BB 132 VOI				337.14	MVA	1.47	kA	107.23	2.90	kA			
BB 132 MARIAKANI		132.00	0.00	0.00	1.10	1236.45	MVA	5.41	kA	-72.89	10.84	kA	5.38	1230.02	5.38
Lne 132 SAMBURU		BB 132 SAM				142.98	MVA	0.63	kA	105.07	1.25	kA			5.44
Lne 132 KOKOTON		BB 132 KOK				1093.58	MVA	4.78	kA	107.37	9.58	kA			
BB 132 MASINGA (P		132.00	0.00	0.00	1.10	1727.07	MVA	7.55	kA	-80.48	17.41	kA	7.49	1712.06	7.08
Lne 132 KAMBURU		BB 132 KAM				1349.67	MVA	5.90	kA	97.32	13.60	kA			7.64
Lne 132 MASINGA		BB 132 KUT				202.67	MVA	0.89	kA	111.26	2.04	kA			
TR MASINGA 132/		BB 11 MASI				90.15	MVA	0.39	kA	102.93	0.91	kA			
TR MASINGA 132/		BB 11 MASI				90.15	MVA	0.39	kA	102.93	0.91	kA			
BB 132 MAUA (PSS/		132.00	0.00	0.00	1.10	394.86	MVA	1.73	kA	-72.30	3.43	kA	1.73	394.86	1.13
Lne 132 MERU -		BB 132 MER				394.86	MVA	1.73	kA	107.70	3.43	kA			1.51
TR MAUA 132/33		BB 33 MAUA				0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 MAUNGU (PS		132.00	0.00	0.00	1.10	631.52	MVA	2.76	kA	-72.39	5.53	kA	2.76	631.52	2.76
Lne 132 SAMBURU		BB 132 SAM				307.78	MVA	1.35	kA	110.65	2.70	kA			2.78
Lne 132 VOI -		BB 132 VOI				324.58	MVA	1.42	kA	104.72	2.84	kA			
BB 132 MERU (PSS/		132.00	0.00	0.00	1.10	751.09	MVA	3.29	kA	-76.96	7.08	kA	3.21	734.32	2.15
Lne 132 ISHIARA		BB 132 ISH				308.72	MVA	1.35	kA	98.48	2.91	kA			2.87
Lne 132 MERU -		BB 132 ISI				444.03	MVA	1.94	kA	106.21	4.19	kA			
Lne 132 MERU -		BB 132 MAU				0.00	MVA	0.00	kA	0.00	0.00	kA			
TR MERU 132/33		BB 33 MERU				0.00	MVA	0.00	kA	0.00	0.00	kA			
Shn MERU 132kV						0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 MTITO ANDE		132.00	0.00	0.00	1.10	456.68	MVA	2.00	kA	-70.02	3.84	kA	2.00	456.68	2.00
Lne 132 MANYANI		BB 132 MAN				246.15	MVA	1.08	kA	108.69	2.07	kA			2.01
Lne 132 KIBOKO		BB 132 KIB				210.67	MVA	0.92	kA	111.49	1.77	kA			
BB 132 MTWAPA (PS		132.00	0.00	0.00	1.10	796.79	MVA	3.49	kA	-69.50	6.62	kA	3.48	796.51	3.47
Lne 132 MTWAPA		BB 132 KIL				0.00	MVA	0.00	kA	0.00	0.00	kA			3.50
Lne 132 MTWAPA		BB 132 BAM				796.79	MVA	3.49	kA	110.50	6.62	kA			
TR MTWAPA 132/3		BB 33 MTWA				0.00	MVA	0.00	kA	0.00	0.00	kA			
TR MTWAPA 132/3		BB 33 MTWA				0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 MUHORONI (		132.00	0.00	0.00	1.10	1088.22	MVA	4.76	kA	-71.66	9.41	kA	4.76	1088.22	4.76

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 9			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 MUHORON		BB 132 KIS				370.89 MVA	1.62 kA	104.36		3.21 kA					
Lne 132 MUHORON		BB 132 CHE				251.28 MVA	1.10 kA	108.31		2.17 kA					
Lne 132 MUHORON		BB 132 LES				467.66 MVA	2.05 kA	111.52		4.04 kA					
TR MUHORONI 132		BB 33 MUHO				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR MUHORONI 132		BB 33 MUHO				0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 MUMIAS (PS	132.00	0.00	0.00	1.10		689.31 MVA	3.01 kA	-72.17		6.19 kA	2.92	668.04	2.96	3.03	
Lne 132 MUSAGA	BB 132 MUS					511.04 MVA	2.24 kA	112.93		4.59 kA					
Lne 132 MUMIAS	BB 132 RAN					0.00 MVA	0.00 kA	0.00		0.00 kA					
TR MUMIAS 132/1	BB 11 MUMI					185.92 MVA	0.81 kA	93.69		1.67 kA					
BB 132 MUSAGA (PS	132.00	0.00	0.00	1.10		931.40 MVA	4.07 kA	-71.56		8.14 kA	4.01	916.30	3.99	4.10	
Lne 132 WEBUYE	BB 132 WEB					0.00 MVA	0.00 kA	0.00		0.00 kA					
Lne 132 MUSAGA	BB 132 LES					384.57 MVA	1.68 kA	111.09		3.36 kA					
Lne 132 MUSAGA	BB 132 LES					384.57 MVA	1.68 kA	111.09		3.36 kA					
Lne 132 MUSAGA	BB 132 MUM					166.92 MVA	0.73 kA	96.14		1.46 kA					
TR MUSAGA 132/3	BB 33 MUSA					0.00 MVA	0.00 kA	0.00		0.00 kA					
TR MUSAGA 132/3	BB 33 MUSA					0.00 MVA	0.00 kA	0.00		0.00 kA					
Shn MUSAGA 132k						0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 MWINGI (PS	132.00	0.00	0.00	1.10		742.20 MVA	3.25 kA	-73.66		6.67 kA	3.22	736.32	3.23	3.27	
Lne 132 KINDARU	BB 132 KIN					432.71 MVA	1.89 kA	104.63		3.89 kA					
Lne 132 MWINGI	BB 132 GAR					129.63 MVA	0.57 kA	106.96		1.17 kA					
Lne 132 MWINGI	BB 132 KIT					180.43 MVA	0.79 kA	110.01		1.62 kA					
TR MWINGI 132/3	BB 33 MWIN					0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 NAIVASHA (	132.00	0.00	0.00	1.10		2453.51 MVA	10.73 kA	-76.77		23.55 kA	10.63	2430.89	10.64	10.82	
Lne 132 OLKARIA	BB 132 OLK					908.40 MVA	3.97 kA	95.97		8.72 kA					
Lne 132 LANET	BB 132 LAN					262.02 MVA	1.15 kA	108.42		2.51 kA					
Lne 132 LANET	BB 132 LAN					262.02 MVA	1.15 kA	108.42		2.51 kA					
Lne 132 NAIVASH	BB 132 RUA					400.20 MVA	1.75 kA	110.64		3.84 kA					
Lne 132 NAIVASH	BB 132 RUA					400.20 MVA	1.75 kA	110.64		3.84 kA					
Lne 132 NAIVASH	BB 132 AEO					239.48 MVA	1.05 kA	94.60		2.30 kA					
TR NAIVASHA 132	BB 33 NAIV					0.00 MVA	0.00 kA	0.00		0.00 kA					
TR NAIVASHA 132	BB 33 NAIV					0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 NAKURU WES	132.00	0.00	0.00	1.10		1768.50 MVA	7.74 kA	-74.82		16.40 kA	7.52	1719.85	7.65	7.79	
Lne 132 MENENGA	BB 132MENE					307.74 MVA	1.35 kA	95.65		2.85 kA					
Lne 132 MENENGA	BB 132MENE					307.74 MVA	1.35 kA	95.65		2.85 kA					
Lne 132 LESSOS	BB 132 LES					245.58 MVA	1.07 kA	109.59		2.28 kA					
Lne 132 LANET	BB 132 LAN					337.44 MVA	1.48 kA	110.65		3.13 kA					
Lne 132 LANET	BB 132 LAN					337.44 MVA	1.48 kA	110.65		3.13 kA					
Lne 132 NAKURU	BB 132 MAK					245.58 MVA	1.07 kA	109.59		2.28 kA					
TR NAKURU 132/3	BB 33 NAKU					0.00 MVA	0.00 kA	0.00		0.00 kA					
TR NAKURU 132/3	BB 33 NAKU					0.00 MVA	0.00 kA	0.00		0.00 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 10	
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	Ik" [deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 132 NANYUKI (P	132.00	0.00	0.00	1.10	854.80 MVA	3.74 kA	-73.98	7.68 kA	3.74	854.80	2.84	3.41	
Lne 132 NANYUKI	BB 132 RUM				173.56 MVA	0.76 kA	99.95	1.56 kA					
Lne 132 KIGANJO	BB 132 KIG				366.35 MVA	1.60 kA	109.80	3.29 kA					
Lne 132 NANYUKI	BB 132 ISI				316.71 MVA	1.39 kA	104.97	2.84 kA					
TR NANYUKI 132/	BB 33 NANY				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 NAROK (PSS	132.00	0.00	0.00	1.10	1076.13 MVA	4.71 kA	-74.58	9.91 kA	4.71	1076.13	4.71	4.74	
Lne 132 OLKARIA	BB 132 OLK				439.47 MVA	1.92 kA	96.32	4.05 kA					
Lne 132 OLKARIA	BB 132 OLK				386.31 MVA	1.69 kA	112.07	3.56 kA					
Lne 132 BOMET	BB 132 BOM				126.07 MVA	0.55 kA	114.64	1.16 kA					
Lne 132 BOMET	BB 132 BOM				134.12 MVA	0.59 kA	107.43	1.24 kA					
TR NAROK 132/33	BB 33 NARO				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 NDHIWA (PS	132.00	0.00	0.00	1.10	551.82 MVA	2.41 kA	-71.25	4.74 kA	2.41	551.82	2.41	2.43	
Lne 132 AWENDO	BB 132 AWE				262.61 MVA	1.15 kA	111.08	2.26 kA					
Lne 132 HOMABAY	BB 132 HOM				289.63 MVA	1.27 kA	106.64	2.49 kA					
BB 132 NYAHURURU	132.00	0.00	0.00	1.10	448.81 MVA	1.96 kA	-78.52	4.33 kA	1.96	448.81	1.63	1.98	
Lne 132 NYAHURU	BB 132 RUM				448.81 MVA	1.96 kA	101.48	4.33 kA					
TR NYAHURURU 13	BB 33 NYAH				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 OLKARIA 1	132.00	0.00	0.00	1.10	2513.14 MVA	10.99 kA	-82.66	26.81 kA	10.77	2461.46	10.91	11.16	
Lne 132 OLKARIA	BB 132 NAR				107.09 MVA	0.47 kA	102.48	1.14 kA					
Lne 132 OLKARIA	BB 132 OLK				313.75 MVA	1.37 kA	93.03	3.35 kA					
Lne 132 OLKARIA	BB 132 OLK				1761.60 MVA	7.70 kA	97.23	18.79 kA					
Lne 132 OLKARIA	BB 132 NAR				94.13 MVA	0.41 kA	118.23	1.00 kA					
TR OLKARIA 132/	BB 11 OLKA				244.61 MVA	1.07 kA	93.55	2.61 kA					
BB 132 OLKARIA 1A	132.00	0.00	0.00	1.10	2160.62 MVA	9.45 kA	-82.55	22.92 kA	9.26	2116.42	9.39	9.59	
Lne 132 OLKARIA	BB 132 OLK				1839.13 MVA	8.04 kA	98.26	19.51 kA					
Lne 132 DOMES	BB 132 DOM				322.73 MVA	1.41 kA	92.83	3.42 kA					
BB 132 OLKARIA IE	132.00	0.00	0.00	1.10	2572.86 MVA	11.25 kA	-82.73	27.50 kA	11.04	2523.52	11.17	11.43	
Lne 132 OLKARIA	BB 132 OLK				737.92 MVA	3.23 kA	97.60	7.89 kA					
Lne 132 OLKARIA	BB 132 NAI				853.16 MVA	3.73 kA	103.81	9.12 kA					
TR OLKARIA 220/	BB 220 OLK				992.54 MVA	4.34 kA	91.40	10.61 kA					
BB 132 RABAI (PSS	132.00	0.00	0.00	1.10	2675.11 MVA	11.70 kA	-83.81	28.82 kA	11.01	2517.20	11.65	11.89	
Lne 132 RABAI -	BB 132 VOI				60.88 MVA	0.27 kA	105.19	0.66 kA					
Lne 132 KIPEVU	BB 132 KIP				209.13 MVA	0.91 kA	101.45	2.25 kA					
Lne 132 KIPEVU	BB 132 KIP				209.13 MVA	0.91 kA	101.45	2.25 kA					
Lne 132 KIPEVU	BB 132 KIP				216.32 MVA	0.95 kA	88.74	2.33 kA					
Lne 132 KIPEVU	BB 132 KIP				232.74 MVA	1.02 kA	88.90	2.51 kA					
Lne 132 KOKOTON	BB 132 KOK				50.10 MVA	0.22 kA	117.82	0.54 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 11				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 RABAI		BB 132 BAM				0.00	MVA	0.00	kA	0.00	0.00	kA				
Lne 132 RABAI		BB 132 BAM				0.00	MVA	0.00	kA	0.00	0.00	kA				
Lne 132 RABAI		BB 132 GAL				104.11	MVA	0.46	kA	95.45	1.12	kA				
TR RABAI 132/11		BB 11 RABA				195.17	MVA	0.85	kA	93.53	2.10	kA				
TR RABAI 132/11		BB 11 RABA				253.09	MVA	1.11	kA	93.39	2.73	kA				
TR RABAI 132/33		BB 33 RABA				0.00	MVA	0.00	kA	0.00	0.00	kA				
TR RABAI 132/33		BB 33 RABA				0.00	MVA	0.00	kA	0.00	0.00	kA				
zpu_1126_1726_1		BB 132 1RA				577.39	MVA	2.53	kA	96.89	6.22	kA				
zpu_1126_1727_2		BB 132 RAB				577.39	MVA	2.53	kA	96.89	6.22	kA				
BB 132 RABAITRF (		132.00	0.00	0.00	1.10	2864.07	MVA	12.53	kA	-80.26	28.83	kA	11.63	2659.17	12.48	12.66
TR RABAI 220/13		BB 220 RAB				464.43	MVA	2.03	kA	86.07	4.67	kA				
zpu_1126_1727_2		BB 132 RAB				2415.29	MVA	10.56	kA	102.34	24.31	kA				
BB 132 RANGALA (P		132.00	0.00	0.00	1.10	453.50	MVA	1.98	kA	-74.91	4.20	kA	1.96	449.09	1.95	2.00
Lne 132 MUMIAS		BB 132 MUM				453.50	MVA	1.98	kA	105.09	4.20	kA				
TR RANGALA 132/		BB 33 RANG				0.00	MVA	0.00	kA	0.00	0.00	kA				
BB 132 RUARAKA (P		132.00	0.00	0.00	1.10	3272.42	MVA	14.31	kA	-78.58	32.07	kA	14.28	3263.79	14.18	14.45
Lne 132 RUARAKA		BB 132 RUA				1636.21	MVA	7.16	kA	101.42	16.03	kA				
Lne 132 RUARAKA		BB 132 RUA				1636.21	MVA	7.16	kA	101.42	16.03	kA				
TR RUARAKA 132/		BB 66 RUAR				0.00	MVA	0.00	kA	0.00	0.00	kA				
TR RUARAKA 132/		BB 66 RUAR				0.00	MVA	0.00	kA	0.00	0.00	kA				
BB 132 RUARAKA TE		132.00	0.00	0.00	1.10	3472.66	MVA	15.19	kA	-79.53	34.68	kA	15.14	3461.50	15.04	15.34
Lne 132 JUJA -		BB 132 JUJ				1415.25	MVA	6.19	kA	98.51	14.13	kA				
Lne 132 JUJA -		BB 132 JUJ				1415.25	MVA	6.19	kA	98.51	14.13	kA				
Lne 132 NAIVASH		BB 132 NAI				325.55	MVA	1.42	kA	109.05	3.25	kA				
Lne 132 NAIVASH		BB 132 NAI				325.55	MVA	1.42	kA	109.05	3.25	kA				
Lne 132 RUARAKA		BB 132 RUA				0.00	MVA	0.00	kA	0.00	0.00	kA				
Lne 132 RUARAKA		BB 132 RUA				0.00	MVA	0.00	kA	0.00	0.00	kA				
BB 132 RUMURUTI (		132.00	0.00	0.00	1.10	561.24	MVA	2.45	kA	-78.11	5.37	kA	2.45	561.24	2.04	2.48
Lne 132 NANYUKI		BB 132 NAN				309.91	MVA	1.36	kA	103.32	2.97	kA				
Lne 132 NYAHURU		BB 132 KAB				251.55	MVA	1.10	kA	100.14	2.41	kA				
Lne 132 NYAHURU		BB 132 NYA				0.00	MVA	0.00	kA	0.00	0.00	kA				
Shnt RUMURUTI 1						0.00	MVA	0.00	kA	0.00	0.00	kA				
BB 132 SAMBURU (P		132.00	0.00	0.00	1.10	713.55	MVA	3.12	kA	-71.32	6.12	kA	3.12	713.55	3.12	3.14
Lne 132 SAMBURU		BB 132 MAU				224.62	MVA	0.98	kA	105.95	1.93	kA				
Lne 132 SAMBURU		BB 132 MAR				489.30	MVA	2.14	kA	109.93	4.19	kA				
BB 132 SANGORO (P		132.00	0.00	0.00	1.10	867.23	MVA	3.79	kA	-78.28	8.57	kA	3.69	842.61	3.75	3.83
Lne 132 SONDU		BB 132 SON				771.07	MVA	3.37	kA	102.90	7.62	kA				
TR SANGORO 132/		BB 11 SANG				97.64	MVA	0.43	kA	92.29	0.97	kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 12			
		rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
BB 132 SONDU (PSS	132.00	0.00	0.00	1.10	944.71 MVA	4.13 kA	-79.39		9.54 kA	3.99	912.97	4.09	4.18		
Lne 132 KISUMU	BB 132 KIS				415.04 MVA	1.82 kA	104.38		4.19 kA						
Lne 132 SONDU	BB 132 SAN				96.58 MVA	0.42 kA	92.57		0.98 kA						
Lne 132 SONDU	BB 132 HOM				142.89 MVA	0.62 kA	110.91		1.44 kA						
TR SONDU 132/11	BB 11 SOND				148.49 MVA	0.65 kA	92.99		1.50 kA						
TR SONDU 132/11	BB 11 SOND				148.49 MVA	0.65 kA	92.99		1.50 kA						
BB 132 SOTIK (PSS	132.00	0.00	0.00	1.10	837.63 MVA	3.66 kA	-70.92		7.15 kA	3.66	837.63	3.66	3.68		
Lne 132 CHEMOSI	BB 132 CHE				353.05 MVA	1.54 kA	109.67		3.01 kA						
Lne 132 BOMET	BB 132 BOM				328.44 MVA	1.44 kA	109.57		2.80 kA						
Lne 132 KISII	BB 132 KIS				156.30 MVA	0.68 kA	106.74		1.33 kA						
BB 132 SULTAN HAM	132.00	0.00	0.00	1.10	762.57 MVA	3.34 kA	-70.59		6.45 kA	3.34	762.57	3.34	3.35		
Lne 132 SULTAN	BB 132 WOT				178.39 MVA	0.78 kA	108.39		1.51 kA						
Lne 132 SULTAN	BB 132 KIB				137.23 MVA	0.60 kA	110.25		1.16 kA						
Lne 132 SULTAN	BB 132 KON				446.99 MVA	1.96 kA	109.56		3.78 kA						
TR SULTAN 132/3	BB 33 SULT				0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 132 TAVETA (PS	132.00	0.00	0.00	1.10	245.92 MVA	1.08 kA	-69.77		2.06 kA	1.08	245.92	1.08	1.08		
Lne 132 VOI -	BB 132 VOI				245.92 MVA	1.08 kA	110.23		2.06 kA						
BB 132 THIKA (PSS	132.00	0.00	0.00	1.10	1509.46 MVA	6.60 kA	-74.52		13.72 kA	6.60	1509.46	6.60	6.65		
Lne 132 THIKA -	BB 132 KIL				0.00 MVA	0.00 kA	0.00		0.00 kA						
Lne 132 JUJA -	BB 132 JUJ				1312.93 MVA	5.74 kA	106.77		11.93 kA						
TR THIKA 132/66	BB 66 THIK				199.07 MVA	0.87 kA	96.93		1.81 kA						
BB 132 ULU (PSS/E	132.00	0.00	0.00	1.10	1466.97 MVA	6.42 kA	-74.70		13.35 kA	6.42	1466.97	6.42	6.46		
Lne 132 ULU -	BB 132 JUJ				525.10 MVA	2.30 kA	109.95		4.78 kA						
Lne 132 ULU -	BB 132 KON				944.57 MVA	4.13 kA	102.71		8.59 kA						
BB 132 VOI (PSS/E	132.00	0.00	0.00	1.10	674.50 MVA	2.95 kA	-74.30		6.14 kA	2.95	674.50	2.95	2.97		
Lne 132 RABAI -	BB 132 RAB				293.99 MVA	1.29 kA	98.36		2.68 kA						
Lne 132 MANYANI	BB 132 MAN				142.81 MVA	0.62 kA	111.82		1.30 kA						
Lne 132 VOI -	BB 132 MAU				241.95 MVA	1.06 kA	110.99		2.20 kA						
Lne 132 VOI -	BB 132 TAV				0.00 MVA	0.00 kA	0.00		0.00 kA						
Shn VOI 132kv (					0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 132 WAJIR (PSS	132.00	0.00	0.00	1.10	103.64 MVA	0.45 kA	-72.22		0.90 kA	0.45	103.64	0.45	0.46		
Lne 132 WAJIR	BB 132 GAR				103.64 MVA	0.45 kA	107.78		0.90 kA						
TR WAJIR 132/33	BB 33 WAJI				0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 132 WEBUYE (PS	132.00	0.00	0.00	1.10	660.57 MVA	2.89 kA	-69.26		5.54 kA	2.87	656.69	2.83	2.90		
Lne 132 WEBUYE	BB 132 MUS				660.57 MVA	2.89 kA	110.74		5.54 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 13				
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB	132 WOTE (PSS/ Lne 132 SULTAN Lne 132 SULTAN TR WOTE 132/33	132.00 BB 132 KIT BB 132 SUL BB 33 WOTE	0.00	0.00	1.10	588.02 MVA 220.14 MVA 368.07 MVA 0.00 MVA	2.57 kA 0.96 kA 1.61 kA 0.00 kA	-70.35 107.81 110.75 0.00	4.96 kA 1.86 kA 3.10 kA 0.00 kA	2.57	588.02	2.57	2.58			
BB	132MENENGAI Lne 132 MENENGA Lne 132 MENENGA TR MENENGAI 132	132.00 BB 132 NAK BB 132 NAK BB 11 MENE	0.00	0.00	1.10	1633.83 MVA 482.29 MVA 482.29 MVA 687.35 MVA	7.15 kA 2.11 kA 2.11 kA 3.01 kA	-76.42 110.73 110.73 93.51	15.75 kA 4.65 kA 4.65 kA 6.62 kA	6.83	1561.73	7.08	7.21			
BB	220 0RTUM (PSS Lne 220 KAINUK Lne 220 0RTUM	220.00 BB 220 KAI BB 220 KIT	0.00	0.00	1.10	772.42 MVA 535.81 MVA 238.23 MVA	2.03 kA 1.41 kA 0.63 kA	-79.42 98.11 106.14	4.59 kA 3.18 kA 1.42 kA	2.02	768.35	2.00	2.05			
BB	220 ATHI RIVER Lne 220 EMBAKAS Lne 220 EMBAKAS Lne 220 ISINYA Lne 220 ISINYA TR ATHI 220/BB TR ATHI 220/BB	220.00 BB 220 EMB BB 220 EMB BB 220 ISI BB 220 ISI BB 66 ATHI BB 66 ATHI	0.00	0.00	1.10	6609.98 MVA 1747.64 MVA 1747.64 MVA 1308.21 MVA 1308.21 MVA 250.15 MVA 250.15 MVA	17.35 kA 4.59 kA 4.59 kA 3.43 kA 3.43 kA 0.66 kA 0.66 kA	-82.90 98.44 98.44 95.54 95.54 95.90 95.90	41.76 kA 11.04 kA 11.04 kA 8.26 kA 8.26 kA 1.58 kA 1.58 kA	17.18	6545.92	17.16	17.59			
BB	220 DANDORA (P Lne 220 DANDORA Lne 220 DANDORA Lne 220 KAMBURU Lne 220 KAMBURU Lne 220 KIAMBER Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 ISINYA Lne 220 ISINYA TR DANDORA 220/ TR DANDORA 220/	220.00 BB 220 NBE BB 220 NBE BB 220 KAM BB 220 KAM BB 220 KIA BB 220 KOM BB 220 KOM BB 220 EMB BB 220 EMB BB 220 THI BB 220 THI BB 220 ISI BB 220 ISI BB 132 DAN BB 132 DAN	0.00	0.00	1.10	8043.36 MVA 413.60 MVA 413.60 MVA 483.35 MVA 474.44 MVA 356.72 MVA 0.00 MVA 0.00 MVA 681.07 MVA 681.07 MVA 1168.41 MVA 1168.41 MVA 658.82 MVA 658.82 MVA 443.64 MVA 443.64 MVA	21.11 kA 1.09 kA 1.09 kA 1.27 kA 1.25 kA 0.94 kA 0.00 kA 0.00 kA 1.79 kA 1.79 kA 3.07 kA 3.07 kA 1.73 kA 1.73 kA 1.16 kA 1.16 kA	-83.58 94.17 94.17 96.78 96.77 96.75 0.00 0.00 96.37 96.37 96.98 96.98 94.77 94.77 99.01 99.01	51.55 kA 2.65 kA 2.65 kA 3.10 kA 3.04 kA 2.29 kA 0.00 kA 0.00 kA 4.36 kA 4.36 kA 7.49 kA 7.49 kA 4.22 kA 4.22 kA 2.84 kA 2.84 kA	20.93	7974.03	20.86	21.44			
BB	220 EMBAKASI (Lne 220 DANDORA Lne 220 DANDORA Lne 220 EMBAKAS Lne 220 EMBAKAS TR EMBAKASI 220	220.00 BB 220 DAN BB 220 DAN BB 220 ATH BB 220 ATH BB 66 EMBA	0.00	0.00	1.10	6784.22 MVA 2130.41 MVA 2130.41 MVA 1262.92 MVA 1262.92 MVA 0.00 MVA	17.80 kA 5.59 kA 5.59 kA 3.31 kA 3.31 kA 0.00 kA	-82.72 98.46 98.46 95.28 95.28 0.00	42.70 kA 13.41 kA 13.41 kA 7.95 kA 7.95 kA 0.00 kA	17.66	6727.54	17.61	18.05			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 14			
		rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
TR EMBAKASI 220		BB 66	EMBA			0.00 MVA	0.00	kA	0.00	0.00 kA					
TR EMBAKASI 220		BB 66	EMBA			0.00 MVA	0.00	kA	0.00	0.00 kA					
Shnt EMBAKASI 2						0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 220	GARISSA (P	220.00	0.00	0.00	1.10	487.06 MVA	1.28	kA	-77.46	2.81 kA	1.28	487.06	1.28	1.29	
	Lne 220 GARISSA	BB 220	HOL			331.43 MVA	0.87	kA	98.49	1.91 kA					
	TR GARISSA 220/	BB 132	GAR			158.20 MVA	0.42	kA	111.04	0.91 kA					
	Shnt GARISA 220					0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 220	GARSEN (PS	220.00	0.00	0.00	1.10	1322.85 MVA	3.47	kA	-78.69	7.67 kA	3.47	1322.85	3.47	3.50	
	Lne 220 MALINDI	BB 220	MAL			465.67 MVA	1.22	kA	102.18	2.70 kA					
	Lne 220 GARSEN	BB 220	LAM			742.75 MVA	1.95	kA	99.83	4.31 kA					
	Lne 220 GARSEN	BB 220	HOL			115.35 MVA	0.30	kA	107.30	0.67 kA					
	TR GARSEN 220/3	BB 33	GARS			0.00 MVA	0.00	kA	0.00	0.00 kA					
	Shnt GARSEN 220					0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 220	GITARU (PS	220.00	0.00	0.00	1.10	3332.87 MVA	8.75	kA	-82.55	20.90 kA	8.60	3275.67	8.43	8.86	
	Lne 220 KAMBURU	BB 220	KAM			2940.66 MVA	7.72	kA	98.00	18.44 kA					
	TR GITARU 220/1	BB 15	GITA			393.35 MVA	1.03	kA	93.35	2.47 kA					
BB 220	HOLA (PSS/	220.00	0.00	0.00	1.10	716.38 MVA	1.88	kA	-79.11	4.21 kA	1.88	716.38	1.88	1.90	
	Lne 220 GARSEN	BB 220	GAR			587.32 MVA	1.54	kA	99.16	3.45 kA					
	Lne 220 GARISSA	BB 220	GAR			130.52 MVA	0.34	kA	108.66	0.77 kA					
	TR HOLA 220/33	BB 33	HOLA			0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 220	ISINYA (PS	220.00	0.00	0.00	1.10	7079.00 MVA	18.58	kA	-83.76	45.57 kA	18.41	7015.83	18.40	18.88	
	Lne 220 ISINYA	BB 220	DAN			1007.82 MVA	2.64	kA	97.23	6.49 kA					
	Lne 220 ISINYA	BB 220	DAN			1007.82 MVA	2.64	kA	97.23	6.49 kA					
	Lne 220 ISINYA	BB 220	KIP			411.50 MVA	1.08	kA	94.03	2.65 kA					
	Lne 220 ISINYA	BB 220	ATH			976.16 MVA	2.56	kA	98.15	6.28 kA					
	Lne 220 ISINYA	BB 220	ATH			976.16 MVA	2.56	kA	98.15	6.28 kA					
	TR ISINYA 400/2	BB 400	ISI			1246.17 MVA	3.27	kA	93.40	8.02 kA					
	TR ISINYA 400/2	BB 400	ISI			1246.17 MVA	3.27	kA	93.40	8.02 kA					
	TR ISINYA 220/1	BB 132	ISI			215.71 MVA	0.57	kA	106.94	1.39 kA					
BB 220	KAINUK (PS	220.00	0.00	0.00	1.10	1043.23 MVA	2.74	kA	-80.96	6.40 kA	2.65	1008.74	2.71	2.77	
	Lne 220 TURKWEL	BB 220	TUR			853.17 MVA	2.24	kA	97.73	5.23 kA					
	Lne 220 KAINUK	BB 220	ORT			191.27 MVA	0.50	kA	104.86	1.17 kA					
	TR KAINUK 220/6	BB 66	KAIN			0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 220	KAMBURU (P	220.00	0.00	0.00	1.10	4136.93 MVA	10.86	kA	-82.90	26.15 kA	10.61	4043.99	10.46	11.01	
	Lne 220 KAMBURU	BB 220	KIA			954.14 MVA	2.50	kA	98.55	6.03 kA					
	Lne 220 KAMBURU	BB 220	GIT			382.32 MVA	1.00	kA	93.54	2.42 kA					
	Lne 220 KAMBURU	BB 220	DAN			798.03 MVA	2.09	kA	98.39	5.04 kA					
	Lne 220 KAMBURU	BB 220	DAN			783.33 MVA	2.06	kA	98.39	4.95 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 15	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
TR KAMBURU 220/ TR KAMBURU 220/		BB 132 KAM BB 132 KAM				610.55 MVA 610.55 MVA	1.60 kA 1.60 kA	95.42 95.42	3.86 kA 3.86 kA				
BB 220 KIAMBERE (	220.00	0.00	0.00	1.10	3082.98 MVA	8.09 kA	-81.62	18.99 kA	7.97	3038.74	7.87	8.19	
Lne 220 KAMBURU	BB 220 KAM				1614.94 MVA	4.24 kA	99.94	9.95 kA					
Lne 220 KIAMBER	BB 220 DAN				634.60 MVA	1.67 kA	98.50	3.91 kA					
Lne 220 KIAMBER	BB 220 RAB				242.30 MVA	0.64 kA	102.72	1.49 kA					
TR KIAMBERE 220	BB 11 KIAM				279.32 MVA	0.73 kA	92.34	1.72 kA					
TR KIAMBERE 220	BB 11 KIAM				316.50 MVA	0.83 kA	92.20	1.95 kA					
Shnt KIAMBERE 2					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 KIPETO (PS	220.00	0.00	0.00	1.10	2981.08 MVA	7.82 kA	-82.35	18.59 kA	7.70	2935.14	7.76	7.92	
Lne 220 ISINYA	BB 220 ISI				2524.96 MVA	6.63 kA	98.43	15.74 kA					
TR KIPETO 220/1	BB 11 KIPE				228.81 MVA	0.60 kA	93.40	1.43 kA					
TR KIPETO 220/1	BB 11 KIPE				228.81 MVA	0.60 kA	93.40	1.43 kA					
BB 220 KISUMU (PS	220.00	0.00	0.00	1.10	1540.01 MVA	4.04 kA	-81.31	9.49 kA	4.04	1539.34	3.98	4.09	
Lne 220 LESSOS	BB 220 LES				544.82 MVA	1.43 kA	97.43	3.36 kA					
Lne 220 LESSOS	BB 220 LES				544.82 MVA	1.43 kA	97.43	3.36 kA					
TR KISUMU 220/1	BB 132 KIS				225.64 MVA	0.59 kA	101.73	1.39 kA					
TR KISUMU 220/1	BB 132 KIS				225.64 MVA	0.59 kA	101.73	1.39 kA					
BB 220 KITALE (PS	220.00	0.00	0.00	1.10	690.64 MVA	1.81 kA	-78.08	4.01 kA	1.81	690.64	1.81	1.83	
Lne 220 0RTUM	BB 220 0RT				409.62 MVA	1.07 kA	98.15	2.38 kA					
TR KITALE 220/1	BB 132 KIT				283.20 MVA	0.74 kA	107.39	1.64 kA					
Shn KITALE 220k					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 KOMOROCK (	220.00	0.00	0.00	1.10	7808.86 MVA	20.49 kA	-83.62	50.08 kA	20.33	7747.01	20.25	20.81	
Lne 220 DANDORA	BB 220 DAN				3904.43 MVA	10.25 kA	96.38	25.04 kA					
Lne 220 DANDORA	BB 220 DAN				3904.43 MVA	10.25 kA	96.38	25.04 kA					
TR KOMOROCK 220	BB 66 KOMO				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR KOMOROCK 220	BB 66 KOMO				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 LAMU (PSS/	220.00	0.00	0.00	1.10	2446.62 MVA	6.42 kA	-85.56	16.43 kA	6.34	2415.12	6.39	6.57	
TR LAMU 400/220	BB 400 LAM				1036.46 MVA	2.72 kA	92.81	6.96 kA					
TR LAMU 400/220	BB 400 LAM				1036.46 MVA	2.72 kA	92.81	6.96 kA					
Lne 220 GARSEN	BB 220 GAR				379.19 MVA	1.00 kA	103.41	2.55 kA					
TR LAMU 220/33	BB 33 LAMU				0.00 MVA	0.00 kA	0.00	0.00 kA					
Shnt LAMU 220kV					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 LAMU CPP	220.00	0.00	0.00	1.10	6026.52 MVA	15.82 kA	-86.58	41.19 kA	11.84	4510.09	15.78	16.27	
TR LAMU CPP 400	BB 400 LAM				542.00 MVA	1.42 kA	95.96	3.70 kA					
TR LAMU CPP 400	BB 400 LAM				542.00 MVA	1.42 kA	95.96	3.70 kA					
Sym LAMU CPP G1					4943.82 MVA	12.97 kA	-87.14	33.79 kA					

Grid: 1 KENYA						System Stage: 1 KENYA						Annex: LF.001 / 16			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		ip [kA/kA]		Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 220 LESSOS (PS TR LESSOS 400/2 TR LESSOS 400/2 Lne 220 TURKWEL Lne 220 OLKARIA Lne 220 OLKARIA Lne 220 LESSOS Lne 220 LESSOS TR LESSOS 220/1 TR LESSOS 220/1 TR LESSOS 220/1 TR LESSOS 220/1	BB 400 LES BB 400 LES BB 220 TUR BB 220 OLK BB 220 OLK BB 220 KIS BB 220 KIS BB 132 LES BB 132 LES BB 132 LES BB 132 LES	220.00	0.00	0.00	1.10	2741.55 MVA	7.19 kA	-81.58		17.09 kA		7.17	2733.62	7.08	7.29
						302.66 MVA	0.79 kA	91.34		1.89 kA					
						302.66 MVA	0.79 kA	91.34		1.89 kA					
						218.33 MVA	0.57 kA	97.50		1.36 kA					
						448.49 MVA	1.18 kA	96.90		2.79 kA					
						448.49 MVA	1.18 kA	96.90		2.79 kA					
						136.46 MVA	0.36 kA	97.28		0.85 kA					
						136.46 MVA	0.36 kA	97.28		0.85 kA					
						190.16 MVA	0.50 kA	106.54		1.19 kA					
						190.16 MVA	0.50 kA	106.54		1.19 kA					
						190.16 MVA	0.50 kA	106.54		1.19 kA					
						190.16 MVA	0.50 kA	106.54		1.19 kA					
						190.16 MVA	0.50 kA	106.54		1.19 kA					
BB 220 LOYANGALAN TR LOIYANGALANI TR LOIYANGALANI TR LOYANGALANI TR LOYANGALANI TR LOYANGALANI Shnt LOIYANGALA	BB 400 LOI BB 400 LOI BB 33 LOYA BB 33 LOYA BB 33 LOYA BB 33 LOYA	220.00	0.00	0.00	1.10	1238.12 MVA	3.25 kA	-86.23		8.38 kA		3.25	1238.12	3.25	3.33
						619.06 MVA	1.62 kA	93.77		4.19 kA					
						619.06 MVA	1.62 kA	93.77		4.19 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 220 MALINDI (P Lne 220 RABAI Lne 220 MALINDI TR MALINDI 220/ TR MALINDI 220/ Shnt MALINDI 22	BB 220 RAB BB 220 GAR BB 33 MALI BB 33 MALI	220.00	0.00	0.00	1.10	1308.99 MVA	3.44 kA	-78.58		7.57 kA		3.44	1308.94	3.42	3.46
						836.97 MVA	2.20 kA	101.04		4.84 kA					
						472.06 MVA	1.24 kA	102.08		2.73 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 220 MARIAKANI TR MARIAKANI 40 Lne 220 RABAI Lne 220 RABAI TR MARIAKANI 40	BB 400 MAR BB 220 RAB BB 220 RAB BB 400 MAR	220.00	0.00	0.00	1.10	2586.68 MVA	6.79 kA	-83.25		16.52 kA		6.69	2549.17	6.75	6.89
						546.96 MVA	1.44 kA	94.29		3.49 kA					
						747.25 MVA	1.96 kA	98.55		4.77 kA					
						747.25 MVA	1.96 kA	98.55		4.77 kA					
						546.96 MVA	1.44 kA	94.29		3.49 kA					
BB 220 MATASIA (P Lne 220 MATASIA Lne 220 MATASIA TR MATASIA 220/ TR MATASIA 220/	BB 220 NGO BB 220 NGO BB 66 MATA BB 66 MATA	220.00	0.00	0.00	1.10	3513.69 MVA	9.22 kA	-82.61		22.00 kA		9.22	3511.88	9.16	9.34
						1756.85 MVA	4.61 kA	97.39		11.00 kA					
						1756.85 MVA	4.61 kA	97.39		11.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
						0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 220 NBEAST (MT Lne 220 DANDORA Lne 220 DANDORA TR NBEAST 400/2 TR NBEAST 400/2	BB 220 DAN BB 220 DAN BB 400 NBE BB 400 NBE	220.00	0.00	0.00	1.10	5840.21 MVA	15.33 kA	-82.90		36.85 kA		15.30	5828.34	15.16	15.54
						2478.30 MVA	6.50 kA	97.66		15.64 kA					
						2478.30 MVA	6.50 kA	97.66		15.64 kA					
						442.56 MVA	1.16 kA	94.01		2.79 kA					
						442.56 MVA	1.16 kA	94.01		2.79 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 17				
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 220 NBNORTH (P	220.00	0.00	0.00	1.10	6890.86 MVA	18.08 kA	-83.53	44.04 kA	18.01	6862.48	17.92	18.36				
Lne 220 SUSWA	BB 220 SUS				1903.69 MVA	5.00 kA	95.04	12.17 kA								
Lne 220 SUSWA	BB 220 SUS				1903.69 MVA	5.00 kA	95.04	12.17 kA								
Lne 220 NBNORTH	BB 220 THI				1542.84 MVA	4.05 kA	98.22	9.86 kA								
Lne 220 NBNORTH	BB 220 THI				1542.84 MVA	4.05 kA	98.22	9.86 kA								
TR NBNORTH 220/	BB 66 NBNO				6.87 MVA	0.02 kA	-88.90	0.04 kA								
TR NBNORTH 220/	BB 66 NBNO				6.87 MVA	0.02 kA	-88.90	0.04 kA								
TR NBNORTH 220/	BB 66 NBNO				14.17 MVA	0.04 kA	91.10	0.09 kA								
BB 220 NGONG (PSS	220.00	0.00	0.00	1.10	4444.18 MVA	11.66 kA	-83.17	28.17 kA	11.65	4438.65	11.58	11.83				
Lne 220 MATASIA	BB 220 MAT				0.00 MVA	0.00 kA	0.00	0.00 kA								
Lne 220 MATASIA	BB 220 MAT				0.00 MVA	0.00 kA	0.00	0.00 kA								
Lne 220 SUSWA	BB 220 SUS				2197.51 MVA	5.77 kA	96.87	13.93 kA								
Lne 220 SUSWA	BB 220 SUS				2197.51 MVA	5.77 kA	96.87	13.93 kA								
TR NGONG 220/66	BB 66 NGON				24.63 MVA	0.06 kA	93.13	0.16 kA								
TR NGONG 220/66	BB 66 NGON				24.63 MVA	0.06 kA	93.13	0.16 kA								
BB 220 OLKARIA IE	220.00	0.00	0.00	1.10	6693.70 MVA	17.57 kA	-84.78	43.97 kA	17.21	6556.09	17.44	17.90				
Lne 220 OLKARIA	BB 220 OLK				1565.61 MVA	4.11 kA	96.12	10.28 kA								
Lne 220 OLKARIA	BB 220 OLK				1565.61 MVA	4.11 kA	96.12	10.28 kA								
Lne 220 SUSWA	BB 220 SUS				1147.14 MVA	3.01 kA	94.84	7.54 kA								
Lne 220 SUSWA	BB 220 SUS				1147.14 MVA	3.01 kA	94.84	7.54 kA								
TR OLKARIA 220/	BB 11 OLKA				237.89 MVA	0.62 kA	93.70	1.56 kA								
TR OLKARIA 220/	BB 11 OLKA				237.89 MVA	0.62 kA	93.70	1.56 kA								
TR OLKARIA 220/	BB 11 OLKA				237.89 MVA	0.62 kA	93.70	1.56 kA								
TR OLKARIA 220/	BB 132 OLK				555.41 MVA	1.46 kA	93.68	3.65 kA								
BB 220 OLKARIA II	220.00	0.00	0.00	1.10	6700.60 MVA	17.58 kA	-84.70	43.94 kA	17.24	6569.17	17.46	17.91				
Lne 220 OLKARIA	BB 220 SUS				1141.85 MVA	3.00 kA	96.38	7.49 kA								
Lne 220 OLKARIA	BB 220 SUS				1141.85 MVA	3.00 kA	96.38	7.49 kA								
Lne 220 OLKARIA	BB 220 OLK				1539.01 MVA	4.04 kA	94.59	10.09 kA								
Lne 220 OLKARIA	BB 220 OLK				1539.01 MVA	4.04 kA	94.59	10.09 kA								
Lne 220 OLKARIA	BB 220 LES				312.85 MVA	0.82 kA	97.09	2.05 kA								
Lne 220 OLKARIA	BB 220 LES				312.85 MVA	0.82 kA	97.09	2.05 kA								
Lne 220 OLKARIA	BB 220 OLK				193.90 MVA	0.51 kA	93.77	1.27 kA								
TR OLKARIA 220/	BB 11 OLKN				165.33 MVA	0.43 kA	93.20	1.08 kA								
TR OLKARIA 220/	BB 11 OLKN				165.33 MVA	0.43 kA	93.20	1.08 kA								
TR OLKARIA 220/	BB 11 OLKN				189.98 MVA	0.50 kA	93.20	1.25 kA								
BB 220 OLKARIA II	220.00	0.00	0.00	1.10	4933.22 MVA	12.95 kA	-83.64	31.59 kA	12.85	4897.39	12.85	13.15				
TR OLKARIA 220/	BB 11 OLKA				98.04 MVA	0.26 kA	93.70	0.63 kA								
Lne 220 OLKARIA	BB 220 OLK				4737.36 MVA	12.43 kA	96.47	30.34 kA								
TR OLKARIA 220/	BB 11 OLKA				98.04 MVA	0.26 kA	93.70	0.63 kA								

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 18				
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 220 OLKARIA IV	220.00	0.00	0.00	1.10	4909.77 MVA	12.88 kA	-84.45	32.00 kA	12.68	4833.10	12.80	13.11				
TR OLKARIA 220/	BB 11 OLKA				352.96 MVA	0.93 kA	93.61	2.30 kA								
Lne 220 SUSWA	BB 220 SUS				1979.72 MVA	5.20 kA	96.13	12.90 kA								
Lne 220 SUSWA	BB 220 SUS				1979.72 MVA	5.20 kA	96.13	12.90 kA								
TR OLKARIA 220/	BB 11 OLKA				299.28 MVA	0.79 kA	94.08	1.95 kA								
TR OLKARIA 220/	BB 11 OLKA				299.30 MVA	0.79 kA	91.63	1.95 kA								
BB 220 RABAI (PSS	220.00	0.00	0.00	1.10	2734.93 MVA	7.18 kA	-83.23	17.46 kA	7.00	2668.80	7.14	7.29				
TR RABAI 220/13	BB 132 1RA				584.53 MVA	1.53 kA	95.14	3.73 kA								
TR RABAI 220/13	BB 132 RAB				584.53 MVA	1.53 kA	95.14	3.73 kA								
Lne 220 KIAMBER	BB 220 KIA				246.96 MVA	0.65 kA	103.11	1.58 kA								
Lne 220 RABAI	BB 220 MAR				493.33 MVA	1.29 kA	95.18	3.15 kA								
Lne 220 RABAI	BB 220 MAR				493.33 MVA	1.29 kA	95.18	3.15 kA								
Lne 220 RABAI	BB 220 MAL				336.25 MVA	0.88 kA	102.43	2.15 kA								
Shnt RABAI 220k					0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 220 SUSWA (PSS	220.00	0.00	0.00	1.10	8052.10 MVA	21.13 kA	-85.32	53.58 kA	20.77	7913.80	20.98	21.58				
TR SUSWA 400/22	BB 400 SUS				1308.96 MVA	3.44 kA	91.32	8.71 kA								
TR SUSWA 400/22	BB 400 SUS				1308.96 MVA	3.44 kA	91.32	8.71 kA								
Lne 220 OLKARIA	BB 220 OLK				552.41 MVA	1.45 kA	95.70	3.68 kA								
Lne 220 OLKARIA	BB 220 OLK				552.41 MVA	1.45 kA	95.70	3.68 kA								
Lne 220 SUSWA	BB 220 OLK				551.98 MVA	1.45 kA	93.96	3.67 kA								
Lne 220 SUSWA	BB 220 OLK				551.98 MVA	1.45 kA	93.96	3.67 kA								
Lne 220 SUSWA	BB 220 NBN				1164.18 MVA	3.06 kA	98.75	7.75 kA								
Lne 220 SUSWA	BB 220 NBN				1164.18 MVA	3.06 kA	98.75	7.75 kA								
Lne 220 SUSWA	BB 220 OLK				429.41 MVA	1.13 kA	93.59	2.86 kA								
Lne 220 SUSWA	BB 220 OLK				429.41 MVA	1.13 kA	93.59	2.86 kA								
Lne 220 SUSWA	BB 220 NGO				24.51 MVA	0.06 kA	93.16	0.16 kA								
Lne 220 SUSWA	BB 220 NGO				24.51 MVA	0.06 kA	93.16	0.16 kA								
Shnt SUSWA (PSS					0.00 MVA	0.00 kA	0.00	0.00 kA								
Shnt SUSWA 220k					0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 220 THIKA RD (	220.00	0.00	0.00	1.10	7086.23 MVA	18.60 kA	-82.96	44.76 kA	18.53	7061.63	18.40	18.86				
Lne 220 DANDORA	BB 220 DAN				2135.50 MVA	5.60 kA	97.71	13.49 kA								
Lne 220 DANDORA	BB 220 DAN				2135.50 MVA	5.60 kA	97.71	13.49 kA								
Lne 220 NBNORTH	BB 220 NBN				1407.99 MVA	3.70 kA	96.02	8.89 kA								
Lne 220 NBNORTH	BB 220 NBN				1407.99 MVA	3.70 kA	96.02	8.89 kA								
TR THIKA 220/66	BB 66 THIK				0.00 MVA	0.00 kA	0.00	0.00 kA								
TR THIKA 220/66	BB 66 THIK				0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 220 TORORO (PS	220.00	0.00	0.00	1.10	10495.99 MVA	27.54 kA	-84.41	68.21 kA	27.54	10495.99	27.54	28.02				
TR TORORO 400/2	BB 400 TOR				248.22 MVA	0.65 kA	93.22	1.61 kA								
TR TORORO 400/2	BB 400 TOR				248.22 MVA	0.65 kA	93.22	1.61 kA								
External Grid (					10000.00 MVA	26.24 kA	-84.29	64.98 kA								

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 19			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
BB 220 TURKWEL (P Lne 220 TURKWEL Lne 220 TURKWEL TR TURKWEL 220/ TR TURKWEL 220/		220.00	0.00	0.00	1.10	1049.55 MVA	2.75	kA	-80.93	6.43 kA	2.66	1014.07	2.72	2.79	
	BB 220 KAI					190.63 MVA	0.50	kA	104.81	1.17 kA					
	BB 220 LES					434.36 MVA	1.14	kA	102.31	2.66 kA					
	BB 11 TURK					214.21 MVA	0.56	kA	93.23	1.31 kA					
	BB 11 TURK					214.21 MVA	0.56	kA	93.23	1.31 kA					
BB 33 MERU WPP-S/ CB MERU WPP S/S TR MERU-WPP 132 Lne 33UGC F1 Lne 33UGC F2 Lne 33UGC F3		33.00	0.00	0.00	1.10	945.11 MVA	16.54	kA	-74.74	34.34 kA	14.21	812.18	6.28	11.76	
	BB 33 MERU					519.29 MVA	9.09	kA	105.54	18.87 kA					
	WPP-S/S ME					179.38 MVA	3.14	kA	100.43	6.52 kA					
	BB 33 MERU					82.47 MVA	1.44	kA	108.17	3.00 kA					
	BB 33 MERU					82.47 MVA	1.44	kA	108.17	3.00 kA					
BB 33 MERU WPP-S/ CB MERU WPP S/S TR MERU-WPP 132 Lne 33UGC F4 Lne 33UGC F5 Lne 33UGC F6 Lne 33UGC F7		33.00	0.00	0.00	1.10	945.11 MVA	16.54	kA	-74.74	34.34 kA	14.21	812.18	6.28	11.76	
	BB 33 MERU					425.83 MVA	7.45	kA	104.92	15.47 kA					
	WPP-S/S ME					179.38 MVA	3.14	kA	100.43	6.52 kA					
	BB 33 MERU					82.47 MVA	1.44	kA	108.17	3.00 kA					
	BB 33 MERU					82.47 MVA	1.44	kA	108.17	3.00 kA					
BB 400 ISINYA (PS Lne 400 ISINYA Lne 400 ISINYA Lne 400 MARIKA Lne 400 MARIKA TR ISINYA 400/2 TR ISINYA 400/2 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400		400.00	0.00	0.00	1.10	7927.08 MVA	11.44	kA	-84.69	28.53 kA	11.44	7922.91	11.38	11.65	
	BB 400 SUS					2546.45 MVA	3.68	kA	95.42	9.17 kA					
	BB 400 SUS					2546.45 MVA	3.68	kA	95.42	9.17 kA					
	BB 400 MAR					322.15 MVA	0.46	kA	95.66	1.16 kA					
	BB 400 MAR					322.15 MVA	0.46	kA	95.66	1.16 kA					
	BB 220 ISI					1094.97 MVA	1.58	kA	94.95	3.94 kA					
	BB 220 ISI					1094.97 MVA	1.58	kA	94.95	3.94 kA					
						0.00 MVA	0.00	kA	0.00	0.00 kA					
						0.00 MVA	0.00	kA	0.00	0.00 kA					
						0.00 MVA	0.00	kA	0.00	0.00 kA					
						0.00 MVA	0.00	kA	0.00	0.00 kA					
						0.00 MVA	0.00	kA	0.00	0.00 kA					
						0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 400 LAMU CPP TR LAMU 400/220 TR LAMU 400/220 TR LAMU CPP 400 TR LAMU CPP 400 Lne 400 LAMU CP Lne 400 LAMU CP		400.00	0.00	0.00	1.10	3873.67 MVA	5.59	kA	-85.88	14.36 kA	5.24	3629.79	5.57	5.73	
	BB 220 LAM					172.92 MVA	0.25	kA	102.54	0.64 kA					
	BB 220 LAM					172.92 MVA	0.25	kA	102.54	0.64 kA					
	BB 220 LAM					1248.34 MVA	1.80	kA	92.53	4.63 kA					
	BB 220 LAM					1248.34 MVA	1.80	kA	92.53	4.63 kA					
	BB 400 NBE					518.01 MVA	0.75	kA	95.15	1.92 kA					
BB 400 LESSOS TR LESSOS 400/2		400.00	0.00	0.00	1.10	1913.26 MVA	2.76	kA	-86.95	7.27 kA	2.76	1913.26	2.76	2.85	
	BB 220 LES					426.74 MVA	0.62	kA	94.52	1.62 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 20									
		rtd.V. [kV]		Voltage [kV]		c- Factor		Sk" [MVA/MVA]		Ik" [kA/kA]		ip [kA/kA]		Ib [kA]		Sb [MVA]		Ik [kA]		Ith [kA]	
Lne 400 LESSOS		BB 400 TOR						530.15 MVA		0.77 kA		91.88		2.01 kA							
Lne 400 LESSOS		BB 400 TOR						530.15 MVA		0.77 kA		91.88		2.01 kA							
TR LESSOS 400/2		BB 220 LES						426.74 MVA		0.62 kA		94.52		1.62 kA							
BB 400 LOIYANGALA		400.00		0.00		0.00		1.10		1890.03 MVA		2.73 kA		-84.50		6.77 kA		2.73		2.78	
TR LOIYANGALANI		BB 220 LOY								0.00 MVA		0.00 kA		0.00		0.00 kA					
TR LOIYANGALANI		BB 220 LOY								0.00 MVA		0.00 kA		0.00		0.00 kA					
Lne 400 SUSWA -		BB 400 SUS								945.02 MVA		1.36 kA		95.50		3.38 kA					
Lne 400 SUSWA -		BB 400 SUS								945.02 MVA		1.36 kA		95.50		3.38 kA					
BB 400 MARIAKANI		400.00		0.00		0.00		1.10		2684.72 MVA		3.88 kA		-84.17		9.57 kA		3.87		3.94	
TR MARIAKANI 40		BB 220 MAR								507.38 MVA		0.73 kA		96.54		1.81 kA					
Lne 400 MARIAKA		BB 400 ISI								835.04 MVA		1.21 kA		95.40		2.98 kA					
Lne 400 MARIAKA		BB 400 ISI								835.04 MVA		1.21 kA		95.40		2.98 kA					
TR MARIAKANI 40		BB 220 MAR								507.38 MVA		0.73 kA		96.54		1.81 kA					
Shnt MARIAKANI										0.00 MVA		0.00 kA		0.00		0.00 kA					
BB 400 NBEAST (MT		400.00		0.00		0.00		1.10		3587.71 MVA		5.18 kA		-85.16		13.05 kA		5.18		5.28	
TR NBEAST 400/2		BB 220 NBE								1247.12 MVA		1.80 kA		94.90		4.54 kA					
TR NBEAST 400/2		BB 220 NBE								1247.12 MVA		1.80 kA		94.90		4.54 kA					
Lne 400 LAMU CP		BB 400 LAM								546.74 MVA		0.79 kA		94.72		1.99 kA					
Lne 400 LAMU CP		BB 400 LAM								546.74 MVA		0.79 kA		94.72		1.99 kA					
BB 400 SUSWA		400.00		0.00		0.00		1.10		13789.84 MVA		19.90 kA		-84.80		49.75 kA		19.90		20.28	
Lne 400 ISINYA		BB 400 ISI								947.05 MVA		1.37 kA		95.41		3.42 kA					
Lne 400 ISINYA		BB 400 ISI								947.05 MVA		1.37 kA		95.41		3.42 kA					
Lne 400 SUSWA -		BB 400 LOI								0.00 MVA		0.00 kA		0.00		0.00 kA					
TR SUSWA 400/22		BB 220 SUS								949.31 MVA		1.37 kA		92.27		3.42 kA					
TR SUSWA 400/22		BB 220 SUS								949.31 MVA		1.37 kA		92.27		3.42 kA					
Lne 400 SUSWA -		BB 400 LOI								0.00 MVA		0.00 kA		0.00		0.00 kA					
Ethiopia										10000.00 MVA		14.43 kA		-84.29		36.08 kA					
BB 400 TORORO		400.00		0.00		0.00		1.10		2001.27 MVA		2.89 kA		-87.45		7.69 kA		2.89		3.00	
Lne 400 LESSOS		BB 400 LES								382.70 MVA		0.55 kA		94.63		1.47 kA					
Lne 400 LESSOS		BB 400 LES								382.70 MVA		0.55 kA		94.63		1.47 kA					
TR TORORO 400/2		BB 220 TOR								618.34 MVA		0.89 kA		91.26		2.38 kA					
TR TORORO 400/2		BB 220 TOR								618.34 MVA		0.89 kA		91.26		2.38 kA					

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DIgSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

Fault Locations with Feeders Short-Circuit Calculation / Method : IEC 60909				3-Phase Short-Circuit / Min. Short-Circuit Currents	
Asynchronous Motors Always Considered	Decaying Aperiodic Component (idc) Using Method B	Grid Identification Automatic	Conductor Temperature User Defined No	Short-Circuit Duration	
				Break Time	0.08 s
				Fault Clearing Time (Ith)	1.00 s
				c-Voltage Factor	
				User Defined	No

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 1					
	rtd.V. [kV]	Voltage [kV]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	Ik" [deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]		
WPP-S/S MERU (HV)													
BB 132 MERU WF	132.00	0.00	0.00	1.00	800.11 MVA	3.50 kA	-74.49	7.21 kA	3.27	748.76	1.84	2.83	
Lne 132 MERU WF	BB 132 ISI				210.61 MVA	0.92 kA	106.55	1.90 kA					
Lne 132 MERU WF	BB 132 ISI				210.61 MVA	0.92 kA	106.55	1.90 kA					
TR MERU-WPP 132	BB 33 MERU				189.52 MVA	0.83 kA	104.36	1.71 kA					
TR MERU-WPP 132	BB 33 MERU				189.52 MVA	0.83 kA	104.36	1.71 kA					
BB 132 1RABTRF (P	132.00	0.00	0.00	1.00	2163.84 MVA	9.46 kA	-80.15	21.83 kA	9.14	2088.77	9.41	9.57	
TR RABAI 220/13	BB 220 RAB				427.77 MVA	1.87 kA	89.24	4.32 kA					
TR 1RABTRF 132/	BB 11 1RAB				0.00 MVA	0.00 kA	0.00	0.00 kA					
zpu_1126_1726_1	BB 132 RAB				1745.17 MVA	7.63 kA	102.44	17.61 kA					
BB 132 AEOLOUS (P	132.00	0.00	0.00	1.00	1019.02 MVA	4.46 kA	-78.36	9.99 kA	4.36	996.84	4.42	4.50	
Lne 132 NAIVASH	BB 132 NAI				787.62 MVA	3.44 kA	104.03	7.72 kA					
TR AEOLOUS 132/	BB 11 AEOL				234.39 MVA	1.03 kA	93.59	2.30 kA					
BB 132 AWENDO (PS	132.00	0.00	0.00	1.00	473.80 MVA	2.07 kA	-67.08	3.85 kA	2.07	473.80	2.07	2.08	
Lne 132 KISII	BB 132 KIS				255.77 MVA	1.12 kA	115.25	2.08 kA					
Lne 132 AWENDO	BB 132 NDH				218.49 MVA	0.96 kA	110.18	1.78 kA					
TR AWENDO 132/3	BB 33 AWEN				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 BAMBURI (P	132.00	0.00	0.00	1.00	1224.83 MVA	5.36 kA	-72.63	10.72 kA	5.34	1221.39	5.33	5.39	
Lne 132 MTWAPA	BB 132 MTW				0.00 MVA	0.00 kA	0.00	0.00 kA					
Lne 132 RABAI	BB 132 RAB				612.42 MVA	2.68 kA	107.37	5.36 kA					
Lne 132 RABAI	BB 132 RAB				612.42 MVA	2.68 kA	107.37	5.36 kA					
TR BAMBURI 132/	BB 33 BAMB				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR BAMBURI 132/	BB 33 BAMB				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 BOMET (PSS	132.00	0.00	0.00	1.00	696.13 MVA	3.04 kA	-67.39	5.70 kA	3.04	696.13	3.04	3.06	

Grid: 1 KENYA				System Stage: 1 KENYA						Annex: LF.001 / 2				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA] [deg]		ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 BOMET		BB 132 SOT				316.03 MVA	1.38 kA	114.59	2.59 kA					
Lne 132 BOMET		BB 132 NAR				182.70 MVA	0.80 kA	115.28	1.50 kA					
Lne 132 BOMET		BB 132 NAR				198.74 MVA	0.87 kA	107.00	1.63 kA					
TR BOMET 132/33		BB 33 BOME				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 CHEMOSIT (		132.00	0.00	0.00	1.00	725.37 MVA	3.17 kA	-66.67	5.85 kA	3.17	725.37	3.17	3.19	
Lne 132 MUHORON		BB 132 MUH				425.51 MVA	1.86 kA	114.79	3.43 kA					
Lne 132 CHEMOSI		BB 132 SOT				300.20 MVA	1.31 kA	111.27	2.42 kA					
TR CHEMOSIT 132		BB 33 CHEM				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR CHEMOSIT 132		BB 33 CHEM				0.00 MVA	0.00 kA	0.00	0.00 kA					
Shn CHEMO 33 (M						0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 CHOGORIA (		132.00	0.00	0.00	1.00	503.94 MVA	2.20 kA	-72.67	4.38 kA	2.20	503.94	1.91	2.22	
Lne 132 CHOGORI		BB 132 ISH				503.94 MVA	2.20 kA	107.33	4.38 kA					
TR CHOGORIA 132		BB 33 CHOG				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 DANDORA (P		132.00	0.00	0.00	1.00	3467.22 MVA	15.17 kA	-82.34	37.20 kA	15.14	3462.31	14.98	15.41	
Lne 132 JUJA -		BB 132 JUJ				647.76 MVA	2.83 kA	107.88	6.95 kA					
Lne 132 JUJA -		BB 132 JUJ				647.76 MVA	2.83 kA	107.88	6.95 kA					
TR DANDORA 132/		BB 11 1DAN				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR DANDORA 132/		BB 11 1DAN				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR DANDORA 220/		BB 220 DAN				1102.14 MVA	4.82 kA	91.67	11.82 kA					
TR DANDORA 220/		BB 220 DAN				1102.14 MVA	4.82 kA	91.67	11.82 kA					
BB 132 DOMES (PSS		132.00	0.00	0.00	1.00	1503.63 MVA	6.58 kA	-80.87	15.51 kA	6.53	1492.92	6.52	6.66	
Lne 132 DOMES		BB 132 OLK				1290.51 MVA	5.64 kA	100.22	13.31 kA					
TR DOMES 132/11		BB 11 DOME				107.39 MVA	0.47 kA	92.51	1.11 kA					
TR DOMES 132/11		BB 11 DOME				107.39 MVA	0.47 kA	92.51	1.11 kA					
BB 132 ELDORET (P		132.00	0.00	0.00	1.00	815.72 MVA	3.57 kA	-67.98	6.77 kA	3.57	815.72	3.57	3.58	
Lne 132 ELDORET		BB 132 LES				657.34 MVA	2.88 kA	114.66	5.45 kA					
Lne 132 ELDORET		BB 132 KIT				161.94 MVA	0.71 kA	101.25	1.34 kA					
TR ELDORET 132/		BB 33 ELD3				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR ELDORET 132/		BB 33 ELD3				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 GALU (PSS/		132.00	0.00	0.00	1.00	601.04 MVA	2.63 kA	-67.53	5.00 kA	2.61	596.69	2.61	2.64	
Lne 132 RABAI		BB 132 RAB				529.66 MVA	2.32 kA	115.31	4.41 kA					
Lne 132 GALU -		BB 132 LUN				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR GALU 132/11		BB 11 KWAL				76.65 MVA	0.34 kA	92.49	0.64 kA					
TR GALU 132/33		BB 33 GALU				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR GALU 132/33		BB 33 GALU				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 GARISSA (P		132.00	0.00	0.00	1.00	431.38 MVA	1.89 kA	-74.93	4.00 kA	1.89	431.38	1.89	1.90	
Lne 132 WAJIR		BB 132 WAJ				0.00 MVA	0.00 kA	0.00	0.00 kA					
Lne 132 MWINGI		BB 132 MWI				136.21 MVA	0.60 kA	115.33	1.26 kA					

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 3					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	Ik" [deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
TR GARISSA 132/ TR GARISSA 220/ Shnt GARISSA 13	BB 33 GARI BB 220 GAR				0.00 MVA 298.34 MVA 0.00 MVA	0.00 kA 1.30 kA 0.00 kA	0.00 100.40 0.00	0.00 kA 2.76 kA 0.00 kA					
BB 132 GATUNDU (P Lne 132 MANGU TR GATUNDU 132/	132.00 0.00 BB 132 MAN BB 33 GATU	0.00	0.00	1.00	727.67 MVA 727.67 MVA 0.00 MVA	3.18 kA 3.18 kA 0.00 kA	-69.06 110.94 0.00	6.15 kA 6.15 kA 0.00 kA	3.18	727.67	3.18	3.20	
BB 132 GITARU (PS Lne 132 GITARU Lne 132 GITARU TR GITARU 132/1 TR GITARU 132/1	132.00 0.00 BB 132 KAM BB 132 KAM BB 15 GITA BB 15 GITA	0.00	0.00	1.00	2477.26 MVA 957.58 MVA 962.86 MVA 281.18 MVA 281.18 MVA	10.84 kA 4.19 kA 4.21 kA 1.23 kA 1.23 kA	-80.25 102.12 101.52 92.68 92.68	24.92 kA 9.63 kA 9.68 kA 2.83 kA 2.83 kA	10.69	2444.88	10.22	10.95	
BB 132 GITHAMBO (Lne 132 MANGU TR GITHAMBO 132	132.00 0.00 BB 132 MAN BB 33 GITH	0.00	0.00	1.00	497.89 MVA 497.89 MVA 0.00 MVA	2.18 kA 2.18 kA 0.00 kA	-66.97 113.03 0.00	4.05 kA 4.05 kA 0.00 kA	2.18	497.89	2.18	2.19	
BB 132 HOMABAY (P Lne 132 SONDU Lne 132 HOMABAY	132.00 0.00 BB 132 SON BB 132 NDH	0.00	0.00	1.00	479.61 MVA 275.85 MVA 204.39 MVA	2.10 kA 1.21 kA 0.89 kA	-68.23 109.25 115.19	3.97 kA 2.29 kA 1.69 kA	2.10	479.61	2.10	2.11	
BB 132 ISHIARA (P Lne 132 KAMBURU Lne 132 CHOGORI Lne 132 KYENI Lne 132 ISHIARA	132.00 0.00 BB 132 KAM BB 132 CHO BB 132 KYE BB 132 MER	0.00	0.00	1.00	1049.10 MVA 861.05 MVA 0.00 MVA 0.00 MVA 188.53 MVA	4.59 kA 3.77 kA 0.00 kA 0.00 kA 0.82 kA	-79.25 99.94 0.00 0.00 104.45	10.25 kA 8.41 kA 0.00 kA 0.00 kA 1.84 kA	4.59	1049.10	3.98	4.63	
BB 132 ISINYA (PS Lne 132 KONZA Lne 132 KAJIADO TR ISINYA 220/1	132.00 0.00 BB 132 KON BB 132 KAJ BB 220 ISI	0.00	0.00	1.00	1681.25 MVA 277.15 MVA 140.59 MVA 1286.99 MVA	7.35 kA 1.21 kA 0.61 kA 5.63 kA	-81.82 113.46 117.68 92.83	17.97 kA 2.96 kA 1.50 kA 13.76 kA	7.35	1681.25	7.35	7.47	
BB 132 ISIOLO (PS Lne 132 MERU WF Lne 132 MERU WF Lne 132 NANYUKI Lne 132 MERU - TR ISIOLO 132/3	132.00 0.00 WPP-S/S ME WPP-S/S ME BB 132 NAN BB 132 MER BB 33 ISIO	0.00	0.00	1.00	815.63 MVA 173.76 MVA 173.76 MVA 252.37 MVA 217.30 MVA 0.00 MVA	3.57 kA 0.76 kA 0.76 kA 1.10 kA 0.95 kA 0.00 kA	-74.20 104.26 104.26 110.96 102.26 0.00	7.33 kA 1.56 kA 1.56 kA 2.27 kA 1.95 kA 0.00 kA	3.39	774.57	2.05	2.98	
BB 132 JUJA RD (P Lne 132 ULU - Lne 132 MANGU Lne 132 JUJA - Lne 132 JUJA -	132.00 0.00 BB 132 ULU BB 132 MAN BB 132 THI BB 132 DAN	0.00	0.00	1.00	3400.72 MVA 242.08 MVA 176.74 MVA 61.56 MVA 1038.10 MVA	14.87 kA 1.06 kA 0.77 kA 0.27 kA 4.54 kA	-81.63 112.79 107.95 95.40 92.09	35.99 kA 2.56 kA 1.87 kA 0.65 kA 10.99 kA	14.85	3394.47	14.70	15.09	

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 4	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA] [deg]		ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
Lne 132 JUJA -	BB 132 DAN					1038.10 MVA	4.54 kA	92.09	10.99 kA				
Lne 132 JUJA -	BB 132 RUA					262.49 MVA	1.15 kA	113.13	2.78 kA				
Lne 132 JUJA -	BB 132 RUA					262.49 MVA	1.15 kA	113.13	2.78 kA				
TR JUJA 132/66	BB 66 JUJA					82.97 MVA	0.36 kA	99.51	0.88 kA				
TR JUJA 132/66	BB 66 JUJA					20.71 MVA	0.09 kA	99.51	0.22 kA				
TR JUJA 132/66	BB 66 JUJA					41.61 MVA	0.18 kA	99.51	0.44 kA				
TR JUJA 132/66	BB 66 JUJA					20.71 MVA	0.09 kA	99.51	0.22 kA				
TR JUJA 132/66	BB 66 JUJA					88.02 MVA	0.39 kA	99.51	0.93 kA				
TR JUJA 132/66	BB 66 JUJA					20.69 MVA	0.09 kA	99.51	0.22 kA				
TR JUJA 132/66	BB 66 JUJA					84.49 MVA	0.37 kA	99.51	0.89 kA				
BB 132 KABARNET (	132.00	0.00	0.00	1.00	623.89 MVA	2.73 kA	-76.89	5.85 kA	2.73	623.89	2.49	2.75	
Lne 132 NYAHURU	BB 132 RUM				170.21 MVA	0.74 kA	104.50	1.60 kA					
Lne 132 LESSOS	BB 132 LES				453.75 MVA	1.98 kA	102.59	4.26 kA					
TR KABARNET 132	BB 33 KABA				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 KAJIADO (P	132.00	0.00	0.00	1.00	1274.95 MVA	5.58 kA	-75.92	12.04 kA	5.58	1274.95	5.58	5.62	
Lne 132 KONZA	BB 132 KON				247.65 MVA	1.08 kA	111.45	2.34 kA					
Lne 132 KAJIADO	BB 132 ISI				1029.84 MVA	4.50 kA	102.32	9.73 kA					
TR KAJIADO 132/	BB 33 KAJI				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 KAMBTRF (P	132.00	0.00	0.00	1.00	2887.67 MVA	12.63 kA	-82.98	30.60 kA	12.44	2844.09	11.83	12.82	
TR KAMBURU 220/	BB 220 KAM				846.11 MVA	3.70 kA	96.57	8.97 kA					
TR KAMBURU 220/	BB 220 KAM				846.11 MVA	3.70 kA	96.57	8.97 kA					
zpu_1103_1723_1	BB 132 KAM				597.79 MVA	2.61 kA	97.65	6.33 kA					
zpu_1103_1723_2	BB 132 KAM				597.79 MVA	2.61 kA	97.65	6.33 kA					
BB 132 KAMBURU (P	132.00	0.00	0.00	1.00	2909.94 MVA	12.73 kA	-82.82	30.72 kA	12.55	2868.95	11.96	12.91	
Lne 132 KAMBURU	BB 132 KIG				92.35 MVA	0.40 kA	104.95	0.97 kA					
Lne 132 GITARU	BB 132 GIT				266.09 MVA	1.16 kA	94.34	2.81 kA					
Lne 132 GITARU	BB 132 GIT				267.56 MVA	1.17 kA	93.75	2.82 kA					
Lne 132 KAMBURU	BB 132 MAS				164.94 MVA	0.72 kA	107.74	1.74 kA					
Lne 132 KAMBURU	BB 132 ISH				124.06 MVA	0.54 kA	101.38	1.31 kA					
TR KAMBURU 132/	BB 11 KAMB				88.63 MVA	0.39 kA	92.57	0.94 kA					
TR KAMBURU 132/	BB 11 KAMB				88.63 MVA	0.39 kA	92.57	0.94 kA					
TR KAMBURU 132/	BB 11 KAMB				88.63 MVA	0.39 kA	92.57	0.94 kA					
TR KAMBURU 132/	BB 33 KAMB				0.00 MVA	0.00 kA	0.00	0.00 kA					
zpu_1103_1723_1	BB 132 KAM				867.35 MVA	3.79 kA	97.14	9.16 kA					
zpu_1103_1723_2	BB 132 KAM				867.35 MVA	3.79 kA	97.14	9.16 kA					
BB 132 KIBOKO (PS	132.00	0.00	0.00	1.00	470.42 MVA	2.06 kA	-65.51	3.71 kA	2.06	470.42	2.06	2.07	
Lne 132 SULTAN	BB 132 SUL				329.90 MVA	1.44 kA	114.73	2.60 kA					
Lne 132 KIBOKO	BB 132 MTI				140.52 MVA	0.61 kA	113.90	1.11 kA					
BB 132 KIGANJO (P	132.00	0.00	0.00	1.00	871.59 MVA	3.81 kA	-71.93	7.65 kA	3.81	871.59	3.26	3.83	

Grid: 1 KENYA				System Stage: 1 KENYA						Annex: LF.001 / 5					
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 KAMBURU		BB 132 KAM				355.37 MVA	1.55 kA	99.87		3.12 kA					
Lne 132 KIGANJO		BB 132 NAN				257.08 MVA	1.12 kA	111.58		2.26 kA					
Lne 132 KIGANJO		BB 132 KUT				265.57 MVA	1.16 kA	115.64		2.33 kA					
TR KIGANJO 132/		BB 33 KIGA				0.00 MVA	0.00 kA	0.00		0.00 kA					
TR KIGANJO 132/		BB 33 KIGA				0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 132 KILIFI (PS	132.00	0.00	0.00	1.00	458.78 MVA	2.01 kA	-63.67			3.54 kA	2.01	458.78	2.01	2.01	
Lne 132 MTWAPA	BB 132 MTW				458.78 MVA	2.01 kA	116.33			3.54 kA					
TR KILIFI 132/3	BB 33 KILI				0.00 MVA	0.00 kA	0.00			0.00 kA					
TR KILIFI 132/3	BB 33 KILI				0.00 MVA	0.00 kA	0.00			0.00 kA					
Shn KILIFI 132k					0.00 MVA	0.00 kA	0.00			0.00 kA					
BB 132 KILIMAMBOG	132.00	0.00	0.00	1.00	813.23 MVA	3.56 kA	-68.07			6.69 kA	3.56	813.23	3.56	3.57	
Lne 132 THIKA -	BB 132 THI				813.23 MVA	3.56 kA	111.93			6.69 kA					
BB 132 KINDARUMA	132.00	0.00	0.00	1.00	722.19 MVA	3.16 kA	-73.54			6.72 kA	3.11	710.88	3.14	3.18	
Lne 132 KINDARU	BB 132 MAN				250.01 MVA	1.09 kA	114.24			2.33 kA					
Lne 132 KINDARU	BB 132 MWI				217.53 MVA	0.95 kA	113.42			2.02 kA					
TR KINDARUMA 13	BB 11 1KIN				89.36 MVA	0.39 kA	93.36			0.83 kA					
TR KINDARUMA 13	BB 11 1KIN				89.36 MVA	0.39 kA	93.36			0.83 kA					
TR KINDARUMA 13	BB 11 1KIN				86.72 MVA	0.38 kA	93.37			0.81 kA					
BB 132 KIPEVU (PS	132.00	0.00	0.00	1.00	1865.53 MVA	8.16 kA	-81.61			19.37 kA	7.93	1813.96	8.11	8.26	
Lne 132 KIPEVU	BB 132 KIP				634.42 MVA	2.77 kA	94.01			6.59 kA					
Lne 132 KIPEVU	BB 132 RAB				319.31 MVA	1.40 kA	107.74			3.32 kA					
Lne 132 KIPEVU	BB 132 RAB				319.31 MVA	1.40 kA	107.74			3.32 kA					
Lne 132 KIPEVU	BB 132 RAB				342.27 MVA	1.50 kA	92.93			3.55 kA					
TR KIPEVU 132/1	BB 11 1KIP				0.00 MVA	0.00 kA	0.00			0.00 kA					
TR KIPEVU 132/1	BB 11 2KIP				0.00 MVA	0.00 kA	0.00			0.00 kA					
TR KIPEVU 132/1	BB 11 3KIP				0.00 MVA	0.00 kA	0.00			0.00 kA					
TR KIPEVU 132/1	BB 11 KIPE				131.54 MVA	0.58 kA	93.44			1.37 kA					
TR KIPEVU 132/1	BB 11 KIPE				131.54 MVA	0.58 kA	93.44			1.37 kA					
TR KIPEVU 132/3	BB 33 1KIP				0.00 MVA	0.00 kA	0.00			0.00 kA					
TR KIPEVU 132/3	BB 33 1KIP				0.00 MVA	0.00 kA	0.00			0.00 kA					
TR KIPEVU 132/3	BB 33 1KIP				0.00 MVA	0.00 kA	0.00			0.00 kA					
BB 132 KIPEVU DII	132.00	0.00	0.00	1.00	1839.06 MVA	8.04 kA	-81.51			19.06 kA	7.82	1787.29	8.00	8.15	
Lne 132 KIPEVU	BB 132 KIP				1129.63 MVA	4.94 kA	101.62			11.71 kA					
Lne 132 KIPEVU	BB 132 RAB				377.86 MVA	1.65 kA	93.59			3.92 kA					
TR KIPEVU 132/1	BB 11 1KIP				128.10 MVA	0.56 kA	93.60			1.33 kA					
TR KIPEVU 132/1	BB 11 2KIP				207.84 MVA	0.91 kA	93.35			2.15 kA					
BB 132 KISII (PSS	132.00	0.00	0.00	1.00	556.17 MVA	2.43 kA	-67.53			4.53 kA	2.43	556.17	2.43	2.44	
Lne 132 KISII	BB 132 SOT				394.83 MVA	1.73 kA	112.86			3.22 kA					
Lne 132 KISII	BB 132 AWE				161.37 MVA	0.71 kA	111.52			1.31 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 6			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
TR KISII 132/33		BB 33	KISI			0.00 MVA	0.00	kA	0.00	0.00 kA					
TR KISII 132/33		BB 33	KISI			0.00 MVA	0.00	kA	0.00	0.00 kA					
Shn KISUMU 132k						0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 132	KISUMU (PS	132.00	0.00	0.00	1.00	1013.10 MVA	4.43	kA	-77.57	10.06 kA	4.43	1013.10	4.43	4.48	
	Lne 132 MUHORON	BB 132	MUH			266.09 MVA	1.16	kA	118.43	2.64 kA					
	Lne 132 KISUMU	BB 132	SON			235.81 MVA	1.03	kA	102.48	2.34 kA					
	TR KISUMU 132/3	BB 33	KISU			0.00 MVA	0.00	kA	0.00	0.00 kA					
	TR KISUMU 132/3	BB 33	KISU			0.00 MVA	0.00	kA	0.00	0.00 kA					
	TR KISUMU 220/1	BB 220	KIS			263.33 MVA	1.15	kA	94.41	2.61 kA					
	TR KISUMU 220/1	BB 220	KIS			263.33 MVA	1.15	kA	94.41	2.61 kA					
BB 132	KITALE (PS	132.00	0.00	0.00	1.00	546.75 MVA	2.39	kA	-72.39	4.96 kA	2.39	546.75	2.39	2.41	
	Lne 132 ELDORET	BB 132	ELD			301.31 MVA	1.32	kA	116.16	2.73 kA					
	TR KITALE 132/3	BB 33	KITA			0.00 MVA	0.00	kA	0.00	0.00 kA					
	TR KITALE 220/1	BB 220	KIT			252.78 MVA	1.11	kA	97.40	2.29 kA					
BB 132	KITUI (PSS	132.00	0.00	0.00	1.00	518.96 MVA	2.27	kA	-68.09	4.29 kA	2.27	518.96	2.27	2.28	
	Lne 132 SULTAN	BB 132	WOT			184.29 MVA	0.81	kA	113.87	1.52 kA					
	Lne 132 MWINGI	BB 132	MWI			334.84 MVA	1.46	kA	110.84	2.77 kA					
	TR KITUI 132/33	BB 33	KITU			0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 132	KOKOTONI (	132.00	0.00	0.00	1.00	1348.05 MVA	5.90	kA	-73.97	12.08 kA	5.87	1341.76	5.86	5.93	
	Lne 132 KOKOTON	BB 132	RAB			1255.68 MVA	5.49	kA	105.86	11.25 kA					
	Lne 132 KOKOTON	BB 132	MAR			92.45 MVA	0.40	kA	108.29	0.83 kA					
BB 132	KONZA (PSS	132.00	0.00	0.00	1.00	1320.72 MVA	5.78	kA	-72.47	11.67 kA	5.78	1320.72	5.78	5.81	
	Lne 132 ULU -	BB 132	ULU			437.22 MVA	1.91	kA	114.00	3.86 kA					
	Lne 132 SULTAN	BB 132	SUL			178.47 MVA	0.78	kA	113.53	1.58 kA					
	Lne 132 KONZA	BB 132	KAJ			239.78 MVA	1.05	kA	104.85	2.12 kA					
	Lne 132 KONZA	BB 132	ISI			472.69 MVA	2.07	kA	100.63	4.18 kA					
	Lne 132 KONZA	BB 132	MAC			0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 132	KUTUS (PSS	132.00	0.00	0.00	1.00	790.97 MVA	3.46	kA	-68.02	6.46 kA	3.46	790.97	3.09	3.47	
	Lne 132 MASINGA	BB 132	MAS			469.54 MVA	2.05	kA	112.50	3.83 kA					
	Lne 132 KIGANJO	BB 132	KIG			321.33 MVA	1.41	kA	111.22	2.62 kA					
	TR KUTUS 132/33	BB 33	KUTU			7.07 MVA	0.03	kA	97.04	0.06 kA					
	TR KUTUS 132/33	BB 33	KUTU			6.93 MVA	0.03	kA	-82.96	0.06 kA					
BB 132	KYENI (PSS	132.00	0.00	0.00	1.00	541.47 MVA	2.37	kA	-71.03	4.59 kA	2.37	541.47	2.05	2.38	
	Lne 132 KYENI	BB 132	ISH			541.47 MVA	2.37	kA	108.97	4.59 kA					
	TR KYENI 132/33	BB 33	KYEN			0.00 MVA	0.00	kA	0.00	0.00 kA					
BB 132	LANET (PSS	132.00	0.00	0.00	1.00	1452.71 MVA	6.35	kA	-70.76	12.73 kA	6.29	1437.69	6.28	6.39	
	Lne 132 LANET	BB 132	NAI			317.73 MVA	1.39	kA	114.22	2.78 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 7	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA] [deg]		ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
Lne 132 LANET	BB 132 NAI					317.73 MVA	1.39 kA	114.22	2.78 kA				
Lne 132 LANET	BB 132 NAK					410.74 MVA	1.80 kA	105.39	3.60 kA				
Lne 132 LANET	BB 132 NAK					410.74 MVA	1.80 kA	105.39	3.60 kA				
TR LANET 132/33	BB 33 LANE					0.00 MVA	0.00 kA	0.00	0.00 kA				
TR LANET 132/33	BB 33 LANE					0.00 MVA	0.00 kA	0.00	0.00 kA				
TR LANET 132/33	BB 33 LANE					0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 LESSOS (PS	132.00	0.00	0.00	1.00		1822.72 MVA	7.97 kA	-76.05	17.18 kA	7.96	1819.19	7.77	8.03
Lne 132 ELDORET	BB 132 ELD					98.62 MVA	0.43 kA	101.09	0.93 kA				
Lne 132 MUHORON	BB 132 MUH					185.77 MVA	0.81 kA	113.80	1.75 kA				
Lne 132 MUSAGA	BB 132 MUS					54.23 MVA	0.24 kA	98.63	0.51 kA				
Lne 132 MUSAGA	BB 132 MUS					54.23 MVA	0.24 kA	98.63	0.51 kA				
Lne 132 LESSOS	BB 132 KAB					131.30 MVA	0.57 kA	103.61	1.24 kA				
Lne 132 LESSOS	BB 132 NAK					189.73 MVA	0.83 kA	113.39	1.79 kA				
Lne 132 LESSOS	BB 132 MAK					189.73 MVA	0.83 kA	113.39	1.79 kA				
Lne 132 LESSOS	BB 132 LES					465.44 MVA	2.04 kA	99.12	4.39 kA				
Lne 132 LESSOS	BB 132 LES					465.44 MVA	2.04 kA	99.12	4.39 kA				
TR LESSOS 132/3	BB 33 LESS					0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 LESSTRF (P	132.00	0.00	0.00	1.00		1822.78 MVA	7.97 kA	-76.06	17.18 kA	7.96	1819.27	7.77	8.03
Lne 132 LESSOS	BB 132 LES					449.01 MVA	1.96 kA	108.93	4.23 kA				
Lne 132 LESSOS	BB 132 LES					449.01 MVA	1.96 kA	108.93	4.23 kA				
TR LESSOS 220/1	BB 220 LES					232.86 MVA	1.02 kA	99.13	2.19 kA				
TR LESSOS 220/1	BB 220 LES					232.86 MVA	1.02 kA	99.13	2.19 kA				
TR LESSOS 220/1	BB 220 LES					232.86 MVA	1.02 kA	99.13	2.19 kA				
TR LESSOS 220/1	BB 220 LES					232.86 MVA	1.02 kA	99.13	2.19 kA				
TR LESSTRF 132/	BB 11 LESS					0.00 MVA	0.00 kA	0.00	0.00 kA				
TR LESSTRF 132/	BB 11 LESS					0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 LUNGA LUNG	132.00	0.00	0.00	1.00		301.06 MVA	1.32 kA	-64.99	2.39 kA	1.32	301.06	1.32	1.32
Lne 132 GALU -	BB 132 GAL					301.06 MVA	1.32 kA	115.01	2.39 kA				
TR LUNGA 132/33	BB 33 LUNG					0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 MACHAKOS (	132.00	0.00	0.00	1.00		765.70 MVA	3.35 kA	-68.24	6.30 kA	3.35	765.70	3.35	3.36
Lne 132 KONZA	BB 132 KON					765.70 MVA	3.35 kA	111.76	6.30 kA				
TR MACHAKOS 132	BB 33 MACH					0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 MAKUTANO (	132.00	0.00	0.00	1.00		830.67 MVA	3.63 kA	-66.20	6.65 kA	3.63	830.67	3.63	3.65
Lne 132 LESSOS	BB 132 LES					404.30 MVA	1.77 kA	113.69	3.24 kA				
Lne 132 NAKURU	BB 132 NAK					426.37 MVA	1.86 kA	113.90	3.41 kA				
TR MAKUTANO 132	BB 33 MAKU					0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 MANGU (PSS	132.00	0.00	0.00	1.00		1210.16 MVA	5.29 kA	-73.47	11.11 kA	5.29	1210.16	5.29	5.33
Lne 132 KINDARU	BB 132 KIN					191.85 MVA	0.84 kA	110.28	1.76 kA				
Lne 132 MANGU	BB 132 JUJ					572.71 MVA	2.50 kA	113.41	5.26 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 8			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
Lne 132 MANGU		BB 132 GAT				0.00	MVA	0.00	kA	0.00	0.00	kA			
Lne 132 MANGU		BB 132 GIT				0.00	MVA	0.00	kA	0.00	0.00	kA			
TR MANGU 132/66		BB 66 MANG				228.67	MVA	1.00	kA	96.32	2.10	kA			
TR MANGU 132/66		BB 66 MANG				228.70	MVA	1.00	kA	96.32	2.10	kA			
BB 132 MANYANI (P		132.00	0.00	0.00	1.00	440.15	MVA	1.93	kA	-67.61	3.60	kA	1.93	440.15	1.93
Lne 132 MANYANI		BB 132 MTI				148.78	MVA	0.65	kA	116.12	1.22	kA			
Lne 132 MANYANI		BB 132 VOI				291.84	MVA	1.28	kA	110.49	2.39	kA			
BB 132 MARIAKANI		132.00	0.00	0.00	1.00	1022.63	MVA	4.47	kA	-70.27	8.64	kA	4.47	1022.09	4.45
Lne 132 SAMBURU		BB 132 SAM				121.13	MVA	0.53	kA	107.89	1.02	kA			
Lne 132 KOKOTON		BB 132 KOK				901.57	MVA	3.94	kA	109.97	7.62	kA			
BB 132 MASINGA (P		132.00	0.00	0.00	1.00	1453.37	MVA	6.36	kA	-78.91	14.26	kA	6.33	1448.32	5.92
Lne 132 KAMBURU		BB 132 KAM				1160.10	MVA	5.07	kA	98.77	11.38	kA			
Lne 132 MASINGA		BB 132 KUT				171.98	MVA	0.75	kA	115.48	1.69	kA			
TR MASINGA 132/		BB 11 MASI				63.85	MVA	0.28	kA	102.93	0.63	kA			
TR MASINGA 132/		BB 11 MASI				63.85	MVA	0.28	kA	102.93	0.63	kA			
BB 132 MAUA (PSS/		132.00	0.00	0.00	1.00	348.67	MVA	1.53	kA	-68.73	2.88	kA	1.53	348.67	0.99
Lne 132 MERU -		BB 132 MER				348.67	MVA	1.53	kA	111.27	2.88	kA			
TR MAUA 132/33		BB 33 MAUA				0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 MAUNGU (PS		132.00	0.00	0.00	1.00	542.28	MVA	2.37	kA	-69.12	4.55	kA	2.37	542.28	2.37
Lne 132 SAMBURU		BB 132 SAM				261.38	MVA	1.14	kA	114.42	2.19	kA			
Lne 132 VOI -		BB 132 VOI				281.86	MVA	1.23	kA	107.60	2.36	kA			
BB 132 MERU (PSS/		132.00	0.00	0.00	1.00	666.74	MVA	2.92	kA	-74.54	6.04	kA	2.86	652.92	1.89
Lne 132 ISHIARA		BB 132 ISH				274.65	MVA	1.20	kA	100.30	2.49	kA			
Lne 132 MERU -		BB 132 ISI				393.98	MVA	1.72	kA	109.06	3.57	kA			
Lne 132 MERU -		BB 132 MAU				0.00	MVA	0.00	kA	0.00	0.00	kA			
TR MERU 132/33		BB 33 MERU				0.00	MVA	0.00	kA	0.00	0.00	kA			
Shn MERU 132kV						0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 MTITO ANDE		132.00	0.00	0.00	1.00	397.23	MVA	1.74	kA	-66.04	3.17	kA	1.74	397.23	1.74
Lne 132 MANYANI		BB 132 MAN				213.64	MVA	0.93	kA	112.30	1.70	kA			
Lne 132 KIBOKO		BB 132 KIB				183.78	MVA	0.80	kA	115.88	1.47	kA			
BB 132 MTWAPA (PS		132.00	0.00	0.00	1.00	669.15	MVA	2.93	kA	-66.11	5.32	kA	2.93	669.15	2.93
Lne 132 MTWAPA		BB 132 KIL				0.00	MVA	0.00	kA	0.00	0.00	kA			
Lne 132 MTWAPA		BB 132 BAM				669.15	MVA	2.93	kA	113.89	5.32	kA			
TR MTWAPA 132/3		BB 33 MTWA				0.00	MVA	0.00	kA	0.00	0.00	kA			
TR MTWAPA 132/3		BB 33 MTWA				0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 MUHORONI (		132.00	0.00	0.00	1.00	934.92	MVA	4.09	kA	-68.35	7.74	kA	4.09	934.92	4.09

Grid: 1 KENYA				System Stage: 1 KENYA						Annex: LF.001 / 9				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA] [deg]		ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 MUHORON		BB 132 KIS				319.03 MVA	1.40 kA	106.83	2.64 kA					
Lne 132 MUHORON		BB 132 CHE				215.66 MVA	0.94 kA	111.72	1.78 kA					
Lne 132 MUHORON		BB 132 LES				402.23 MVA	1.76 kA	115.42	3.33 kA					
TR MUHORONI 132		BB 33 MUHO				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR MUHORONI 132		BB 33 MUHO				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 MUMIAS (PS	132.00	0.00	0.00	1.00	564.97 MVA	2.47 kA	-68.05	4.85 kA	2.44	556.76	2.42	2.48		
Lne 132 MUSAGA	BB 132 MUS				443.37 MVA	1.94 kA	117.22	3.80 kA						
Lne 132 MUMIAS	BB 132 RAN				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR MUMIAS 132/1	BB 11 MUMI				130.02 MVA	0.57 kA	93.69	1.12 kA						
BB 132 MUSAGA (PS	132.00	0.00	0.00	1.00	782.21 MVA	3.42 kA	-67.92	6.55 kA	3.40	776.49	3.34	3.44		
Lne 132 WEBUYE	BB 132 WEB				0.00 MVA	0.00 kA	0.00	0.00 kA						
Lne 132 MUSAGA	BB 132 LES				334.07 MVA	1.46 kA	114.89	2.80 kA						
Lne 132 MUSAGA	BB 132 LES				334.07 MVA	1.46 kA	114.89	2.80 kA						
Lne 132 MUSAGA	BB 132 MUM				119.45 MVA	0.52 kA	96.15	1.00 kA						
TR MUSAGA 132/3	BB 33 MUSA				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR MUSAGA 132/3	BB 33 MUSA				0.00 MVA	0.00 kA	0.00	0.00 kA						
Shn MUSAGA 132k					0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 MWINGI (PS	132.00	0.00	0.00	1.00	622.43 MVA	2.72 kA	-70.14	5.36 kA	2.72	622.03	2.70	2.74		
Lne 132 KINDARU	BB 132 KIN				350.28 MVA	1.53 kA	107.69	3.01 kA						
Lne 132 MWINGI	BB 132 GAR				114.80 MVA	0.50 kA	110.61	0.99 kA						
Lne 132 MWINGI	BB 132 KIT				158.04 MVA	0.69 kA	114.13	1.36 kA						
TR MWINGI 132/3	BB 33 MWIN				0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 NAIVASHA (	132.00	0.00	0.00	1.00	2090.06 MVA	9.14 kA	-74.44	19.54 kA	9.09	2078.55	9.05	9.21		
Lne 132 OLKARIA	BB 132 OLK				776.58 MVA	3.40 kA	96.77	7.26 kA						
Lne 132 LANET	BB 132 LAN				223.57 MVA	0.98 kA	111.62	2.09 kA						
Lne 132 LANET	BB 132 LAN				223.57 MVA	0.98 kA	111.62	2.09 kA						
Lne 132 NAIVASH	BB 132 RUA				345.05 MVA	1.51 kA	114.60	3.23 kA						
Lne 132 NAIVASH	BB 132 RUA				345.05 MVA	1.51 kA	114.60	3.23 kA						
Lne 132 NAIVASH	BB 132 AEO				199.92 MVA	0.87 kA	94.86	1.87 kA						
TR NAIVASHA 132	BB 33 NAIV				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR NAIVASHA 132	BB 33 NAIV				0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 NAKURU WES	132.00	0.00	0.00	1.00	1501.41 MVA	6.57 kA	-72.09	13.53 kA	6.45	1474.21	6.49	6.61		
Lne 132 MENENGA	BB 132MENE				255.44 MVA	1.12 kA	96.01	2.30 kA						
Lne 132 MENENGA	BB 132MENE				255.44 MVA	1.12 kA	96.01	2.30 kA						
Lne 132 LESSOS	BB 132 LES				212.97 MVA	0.93 kA	113.06	1.92 kA						
Lne 132 LANET	BB 132 LAN				290.58 MVA	1.27 kA	114.53	2.62 kA						
Lne 132 LANET	BB 132 LAN				290.58 MVA	1.27 kA	114.53	2.62 kA						
Lne 132 NAKURU	BB 132 MAK				212.98 MVA	0.93 kA	113.06	1.92 kA						
TR NAKURU 132/3	BB 33 NAKU				0.00 MVA	0.00 kA	0.00	0.00 kA						
TR NAKURU 132/3	BB 33 NAKU				0.00 MVA	0.00 kA	0.00	0.00 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 10		
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 132 NANYUKI (P	132.00	0.00	0.00	1.00	751.50 MVA	3.29 kA	-71.01			6.46 kA	3.29	751.50	2.48	2.99
Lne 132 NANYUKI	BB 132 RUM				155.53 MVA	0.68 kA	102.10			1.34 kA				
Lne 132 KIGANJO	BB 132 KIG				316.33 MVA	1.38 kA	113.49			2.72 kA				
Lne 132 NANYUKI	BB 132 ISI				281.81 MVA	1.23 kA	107.75			2.42 kA				
TR NANYUKI 132/	BB 33 NANY				0.00 MVA	0.00 kA	0.00			0.00 kA				
BB 132 NAROK (PSS	132.00	0.00	0.00	1.00	928.82 MVA	4.06 kA	-71.76			8.26 kA	4.06	928.82	4.06	4.09
Lne 132 OLKARIA	BB 132 OLK				388.76 MVA	1.70 kA	97.70			3.46 kA				
Lne 132 OLKARIA	BB 132 OLK				327.88 MVA	1.43 kA	116.18			2.92 kA				
Lne 132 BOMET	BB 132 BOM				107.27 MVA	0.47 kA	119.18			0.95 kA				
Lne 132 BOMET	BB 132 BOM				116.69 MVA	0.51 kA	110.91			1.04 kA				
TR NAROK 132/33	BB 33 NARO				0.00 MVA	0.00 kA	0.00			0.00 kA				
BB 132 NDHIWA (PS	132.00	0.00	0.00	1.00	471.42 MVA	2.06 kA	-67.57			3.86 kA	2.06	471.42	2.06	2.07
Lne 132 AWENDO	BB 132 AWE				227.69 MVA	1.00 kA	115.24			1.87 kA				
Lne 132 HOMABAY	BB 132 HOM				244.27 MVA	1.07 kA	109.81			2.00 kA				
BB 132 NYAHURURU	132.00	0.00	0.00	1.00	401.22 MVA	1.75 kA	-76.06			3.70 kA	1.75	401.22	1.45	1.77
Lne 132 NYAHURU	BB 132 RUM				401.22 MVA	1.75 kA	103.94			3.70 kA				
TR NYAHURURU 13	BB 33 NYAH				0.00 MVA	0.00 kA	0.00			0.00 kA				
BB 132 OLKARIA 1	132.00	0.00	0.00	1.00	2098.51 MVA	9.18 kA	-81.29			22.04 kA	9.10	2080.60	9.10	9.31
Lne 132 OLKARIA	BB 132 NAR				93.74 MVA	0.41 kA	105.07			0.98 kA				
Lne 132 OLKARIA	BB 132 OLK				204.08 MVA	0.89 kA	93.00			2.14 kA				
Lne 132 OLKARIA	BB 132 OLK				1549.09 MVA	6.78 kA	98.45			16.27 kA				
Lne 132 OLKARIA	BB 132 NAR				79.06 MVA	0.35 kA	123.56			0.83 kA				
TR OLKARIA 132/	BB 11 OLKA				182.19 MVA	0.80 kA	93.55			1.91 kA				
BB 132 OLKARIA 1A	132.00	0.00	0.00	1.00	1803.13 MVA	7.89 kA	-81.03			18.75 kA	7.83	1790.07	7.82	7.99
Lne 132 OLKARIA	BB 132 OLK				1596.25 MVA	6.98 kA	99.77			16.60 kA				
Lne 132 DOMES	BB 132 DOM				208.24 MVA	0.91 kA	92.81			2.17 kA				
BB 132 OLKARIA IE	132.00	0.00	0.00	1.00	2152.81 MVA	9.42 kA	-81.40			22.68 kA	9.34	2136.01	9.33	9.55
Lne 132 OLKARIA	BB 132 OLK				541.01 MVA	2.37 kA	99.42			5.70 kA				
Lne 132 OLKARIA	BB 132 NAI				742.51 MVA	3.25 kA	106.64			7.82 kA				
TR OLKARIA 220/	BB 220 OLK				883.72 MVA	3.87 kA	91.34			9.31 kA				
BB 132 RABAI (PSS	132.00	0.00	0.00	1.00	2058.12 MVA	9.00 kA	-82.81			21.83 kA	8.76	2001.95	8.95	9.14
Lne 132 RABAI -	BB 132 VOI				53.70 MVA	0.23 kA	108.54			0.57 kA				
Lne 132 KIPEVU	BB 132 KIP				134.12 MVA	0.59 kA	102.52			1.42 kA				
Lne 132 KIPEVU	BB 132 KIP				134.12 MVA	0.59 kA	102.52			1.42 kA				
Lne 132 KIPEVU	BB 132 KIP				143.76 MVA	0.63 kA	87.72			1.52 kA				
Lne 132 KIPEVU	BB 132 KIP				153.74 MVA	0.67 kA	87.90			1.63 kA				
Lne 132 KOKOTON	BB 132 KOK				42.83 MVA	0.19 kA	123.49			0.45 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 11	
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 132 RABAI	BB 132 BAM				0.00 MVA	0.00 kA	0.00	0.00 kA					
Lne 132 RABAI	BB 132 BAM				0.00 MVA	0.00 kA	0.00	0.00 kA					
Lne 132 RABAI	BB 132 GAL				69.92 MVA	0.31 kA	95.25	0.74 kA					
TR RABAI 132/11	BB 11 RABA				131.41 MVA	0.57 kA	93.53	1.39 kA					
TR RABAI 132/11	BB 11 RABA				170.41 MVA	0.75 kA	93.39	1.81 kA					
TR RABAI 132/33	BB 33 RABA				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR RABAI 132/33	BB 33 RABA				0.00 MVA	0.00 kA	0.00	0.00 kA					
zpu_1126_1726_1	BB 132 1RA				517.78 MVA	2.26 kA	98.09	5.49 kA					
zpu_1126_1727_2	BB 132 RAB				517.78 MVA	2.26 kA	98.09	5.49 kA					
BB 132 RABAITRF (	132.00	0.00	0.00	1.00	2163.84 MVA	9.46 kA	-80.15	21.83 kA	9.14	2088.77	9.41	9.57	
TR RABAI 220/13	BB 220 RAB				427.77 MVA	1.87 kA	89.24	4.32 kA					
zpu_1126_1727_2	BB 132 RAB				1745.17 MVA	7.63 kA	102.44	17.61 kA					
BB 132 RANGALA (P	132.00	0.00	0.00	1.00	384.13 MVA	1.68 kA	-71.21	3.39 kA	1.68	383.53	1.64	1.69	
Lne 132 MUMIAS	BB 132 MUM				384.13 MVA	1.68 kA	108.79	3.39 kA					
TR RANGALA 132/	BB 33 RANG				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 RUARAKA (P	132.00	0.00	0.00	1.00	2809.00 MVA	12.29 kA	-76.63	26.76 kA	12.28	2807.72	12.14	12.39	
Lne 132 RUARAKA	BB 132 RUA				1404.50 MVA	6.14 kA	103.37	13.38 kA					
Lne 132 RUARAKA	BB 132 RUA				1404.50 MVA	6.14 kA	103.37	13.38 kA					
TR RUARAKA 132/	BB 66 RUAR				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR RUARAKA 132/	BB 66 RUAR				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 RUARAKA TE	132.00	0.00	0.00	1.00	2976.44 MVA	13.02 kA	-77.77	28.99 kA	13.01	2974.50	12.86	13.14	
Lne 132 JUJA -	BB 132 JUJ				1216.22 MVA	5.32 kA	99.90	11.85 kA					
Lne 132 JUJA -	BB 132 JUJ				1216.22 MVA	5.32 kA	99.90	11.85 kA					
Lne 132 NAIVASH	BB 132 NAI				277.46 MVA	1.21 kA	112.51	2.70 kA					
Lne 132 NAIVASH	BB 132 NAI				277.46 MVA	1.21 kA	112.51	2.70 kA					
Lne 132 RUARAKA	BB 132 RUA				0.00 MVA	0.00 kA	0.00	0.00 kA					
Lne 132 RUARAKA	BB 132 RUA				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 RUMURUTI (	132.00	0.00	0.00	1.00	500.59 MVA	2.19 kA	-75.61	4.59 kA	2.19	500.59	1.81	2.20	
Lne 132 NANYUKI	BB 132 NAN				275.76 MVA	1.21 kA	106.08	2.53 kA					
Lne 132 NYAHURU	BB 132 KAB				225.10 MVA	0.98 kA	102.31	2.07 kA					
Lne 132 NYAHURU	BB 132 NYA				0.00 MVA	0.00 kA	0.00	0.00 kA					
Shnt RUMURUTI 1					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 132 SAMBURU (P	132.00	0.00	0.00	1.00	607.50 MVA	2.66 kA	-67.98	4.98 kA	2.66	607.50	2.66	2.67	
Lne 132 SAMBURU	BB 132 MAU				193.85 MVA	0.85 kA	109.01	1.59 kA					
Lne 132 SAMBURU	BB 132 MAR				414.05 MVA	1.81 kA	113.43	3.39 kA					
BB 132 SANGORO (P	132.00	0.00	0.00	1.00	703.18 MVA	3.08 kA	-75.50	6.71 kA	3.04	696.06	3.04	3.10	
Lne 132 SONDU	BB 132 SON				634.14 MVA	2.77 kA	105.86	6.05 kA					
TR SANGORO 132/	BB 11 SANG				70.81 MVA	0.31 kA	92.29	0.68 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 12			
		rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]		Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 132 SONDU (PSS	132.00	0.00	0.00	1.00	763.08 MVA	3.34 kA	-76.74		7.46 kA		3.29	752.66		3.30	3.37
Lne 132 KISUMU	BB 132 KIS				366.32 MVA	1.60 kA	107.19		3.58 kA						
Lne 132 SONDU	BB 132 SAN				70.20 MVA	0.31 kA	92.57		0.69 kA						
Lne 132 SONDU	BB 132 HOM				124.29 MVA	0.54 kA	115.04		1.21 kA						
TR SONDU 132/11	BB 11 SOND				105.17 MVA	0.46 kA	92.99		1.03 kA						
TR SONDU 132/11	BB 11 SOND				105.17 MVA	0.46 kA	92.99		1.03 kA						
BB 132 SOTIK (PSS	132.00	0.00	0.00	1.00	721.74 MVA	3.16 kA	-67.32		5.88 kA		3.16	721.74		3.16	3.17
Lne 132 CHEMOSI	BB 132 CHE				304.84 MVA	1.33 kA	113.39		2.48 kA						
Lne 132 BOMET	BB 132 BOM				285.01 MVA	1.25 kA	113.31		2.32 kA						
Lne 132 KISII	BB 132 KIS				132.11 MVA	0.58 kA	109.69		1.08 kA						
BB 132 SULTAN HAM	132.00	0.00	0.00	1.00	663.92 MVA	2.90 kA	-66.70		5.33 kA		2.90	663.92		2.90	2.92
Lne 132 SULTAN	BB 132 WOT				153.29 MVA	0.67 kA	112.10		1.23 kA						
Lne 132 SULTAN	BB 132 KIB				119.10 MVA	0.52 kA	114.21		0.96 kA						
Lne 132 SULTAN	BB 132 KON				391.59 MVA	1.71 kA	113.50		3.14 kA						
TR SULTAN 132/3	BB 33 SULT				0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 132 TAVETA (PS	132.00	0.00	0.00	1.00	214.04 MVA	0.94 kA	-65.73		1.70 kA		0.94	214.04		0.94	0.94
Lne 132 VOI -	BB 132 VOI				214.04 MVA	0.94 kA	114.27		1.70 kA						
BB 132 THIKA (PSS	132.00	0.00	0.00	1.00	1311.14 MVA	5.73 kA	-71.54		11.44 kA		5.73	1311.14		5.73	5.77
Lne 132 THIKA -	BB 132 KIL				0.00 MVA	0.00 kA	0.00		0.00 kA						
Lne 132 JUJA -	BB 132 JUJ				1141.83 MVA	4.99 kA	110.07		9.96 kA						
TR THIKA 132/66	BB 66 THIK				172.75 MVA	0.76 kA	97.79		1.51 kA						
BB 132 ULU (PSS/E	132.00	0.00	0.00	1.00	1285.20 MVA	5.62 kA	-71.83		11.22 kA		5.62	1285.20		5.62	5.65
Lne 132 ULU -	BB 132 JUJ				454.78 MVA	1.99 kA	113.88		3.97 kA						
Lne 132 ULU -	BB 132 KON				833.91 MVA	3.65 kA	105.06		7.28 kA						
BB 132 VOI (PSS/E	132.00	0.00	0.00	1.00	580.71 MVA	2.54 kA	-71.37		5.08 kA		2.54	580.71		2.54	2.55
Lne 132 RABAI -	BB 132 RAB				256.80 MVA	1.12 kA	99.93		2.25 kA						
Lne 132 MANYANI	BB 132 MAN				124.34 MVA	0.54 kA	116.27		1.09 kA						
Lne 132 VOI -	BB 132 MAU				204.85 MVA	0.90 kA	114.88		1.79 kA						
Lne 132 VOI -	BB 132 TAV				0.00 MVA	0.00 kA	0.00		0.00 kA						
Shn VOI 132kv (					0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 132 WAJIR (PSS	132.00	0.00	0.00	1.00	91.70 MVA	0.40 kA	-68.41		0.75 kA		0.40	91.70		0.40	0.40
Lne 132 WAJIR	BB 132 GAR				91.70 MVA	0.40 kA	111.59		0.75 kA						
TR WAJIR 132/33	BB 33 WAJI				0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 132 WEBUYE (PS	132.00	0.00	0.00	1.00	559.90 MVA	2.45 kA	-65.23		4.48 kA		2.45	559.57		2.39	2.46
Lne 132 WEBUYE	BB 132 MUS				559.90 MVA	2.45 kA	114.77		4.48 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 13				
				rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB	132 WOTE (PSS/ Lne 132 SULTAN Lne 132 SULTAN TR WOTE 132/33	132.00 BB 132 KIT BB 132 SUL BB 33 WOTE	0.00	0.00	1.00	510.25 MVA 188.85 MVA 321.62 MVA 0.00 MVA	2.23 kA 0.83 kA 1.41 kA 0.00 kA	-66.34 111.48 114.94 0.00	4.08 kA 1.51 kA 2.57 kA 0.00 kA	2.23	510.25	2.23	2.24			
BB	132MENENGAI Lne 132 MENENGA Lne 132 MENENGA TR MENENGAI 132	132.00 BB 132 NAK BB 132 NAK BB 11 MENE	0.00	0.00	1.00	1377.34 MVA 417.40 MVA 417.40 MVA 565.35 MVA	6.02 kA 1.83 kA 1.83 kA 2.47 kA	-73.88 114.62 114.62 93.51	12.97 kA 3.93 kA 3.93 kA 5.32 kA	5.84	1335.41	5.96	6.07			
BB	220 0RTUM (PSS Lne 220 KAINUK Lne 220 0RTUM	220.00 BB 220 KAI BB 220 KIT	0.00	0.00	1.00	656.59 MVA 449.09 MVA 209.42 MVA	1.72 kA 1.18 kA 0.55 kA	-77.01 100.00 109.39	3.76 kA 2.57 kA 1.20 kA	1.72	656.59	1.72	1.74			
BB	220 ATHI RIVER Lne 220 EMBAKAS Lne 220 EMBAKAS Lne 220 ISINYA Lne 220 ISINYA TR ATHI 220/BB TR ATHI 220/BB	220.00 BB 220 EMB BB 220 EMB BB 220 ISI BB 220 ISI BB 66 ATHI BB 66 ATHI	0.00	0.00	1.00	5581.07 MVA 1490.79 MVA 1490.79 MVA 1121.92 MVA 1121.92 MVA 179.18 MVA 179.18 MVA	14.65 kA 3.91 kA 3.91 kA 2.94 kA 2.94 kA 0.47 kA 0.47 kA	-81.77 99.89 99.89 96.24 96.24 96.88 96.88	34.52 kA 9.22 kA 9.22 kA 6.94 kA 6.94 kA 1.11 kA 1.11 kA	14.59	5559.57	14.46	14.83			
BB	220 DANDORA (P Lne 220 DANDORA Lne 220 DANDORA Lne 220 KAMBURU Lne 220 KAMBURU Lne 220 KIAMBER Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 DANDORA Lne 220 ISINYA Lne 220 ISINYA TR DANDORA 220/ TR DANDORA 220/	220.00 BB 220 NBE BB 220 NBE BB 220 KAM BB 220 KAM BB 220 KIA BB 220 KOM BB 220 KOM BB 220 EMB BB 220 EMB BB 220 THI BB 220 THI BB 220 ISI BB 220 ISI BB 132 DAN BB 132 DAN	0.00	0.00	1.00	6736.93 MVA 373.34 MVA 373.34 MVA 391.39 MVA 384.19 MVA 287.72 MVA 0.00 MVA 0.00 MVA 557.50 MVA 557.50 MVA 992.18 MVA 992.18 MVA 555.73 MVA 555.73 MVA 359.64 MVA 359.64 MVA	17.68 kA 0.98 kA 0.98 kA 1.03 kA 1.01 kA 0.76 kA 0.00 kA 0.00 kA 1.46 kA 1.46 kA 2.60 kA 2.60 kA 1.46 kA 1.46 kA 0.94 kA 0.94 kA	-82.67 94.79 94.79 97.80 97.80 97.82 0.00 0.00 97.14 97.14 98.03 98.03 95.19 95.19 100.97 100.97	42.44 kA 2.35 kA 2.35 kA 2.47 kA 2.42 kA 1.81 kA 0.00 kA 0.00 kA 3.51 kA 3.51 kA 6.25 kA 6.25 kA 3.50 kA 3.50 kA 2.27 kA 2.27 kA	17.62	6714.83	17.43	17.92			
BB	220 EMBAKASI (Lne 220 DANDORA Lne 220 DANDORA Lne 220 EMBAKAS Lne 220 EMBAKAS TR EMBAKASI 220	220.00 BB 220 DAN BB 220 DAN BB 220 ATH BB 220 ATH BB 66 EMBA	0.00	0.00	1.00	5727.89 MVA 1811.66 MVA 1811.66 MVA 1053.91 MVA 1053.91 MVA 0.00 MVA	15.03 kA 4.75 kA 4.75 kA 2.77 kA 2.77 kA 0.00 kA	-81.58 99.89 99.89 95.90 95.90 0.00	35.29 kA 11.16 kA 11.16 kA 6.49 kA 6.49 kA 0.00 kA	14.99	5710.34	14.83	15.21			

Grid: 1 KENYA			System Stage: 1 KENYA						Annex: LF.001 / 14						
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]			
TR EMBAKASI 220	BB 66	EMBA			0.00 MVA	0.00 kA	0.00	0.00 kA							
TR EMBAKASI 220	BB 66	EMBA			0.00 MVA	0.00 kA	0.00	0.00 kA							
Shnt EMBAKASI 2					0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 220 GARISSA (P	220.00	0.00	0.00	1.00	431.46 MVA	1.13 kA	-74.93	2.40 kA	1.13	431.46	1.13	1.14			
Lne 220 GARISSA	BB 220	HOL			298.43 MVA	0.78 kA	100.41	1.66 kA							
TR GARISSA 220/	BB 132	GAR			136.19 MVA	0.36 kA	115.33	0.76 kA							
Shnt GARISA 220					0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 220 GARSEN (PS	220.00	0.00	0.00	1.00	1175.33 MVA	3.08 kA	-76.36	6.55 kA	3.08	1175.33	3.08	3.11			
Lne 220 MALINDI	BB 220	MAL			407.51 MVA	1.07 kA	104.68	2.27 kA							
Lne 220 GARSEN	BB 220	LAM			668.82 MVA	1.76 kA	101.92	3.73 kA							
Lne 220 GARSEN	BB 220	HOL			100.19 MVA	0.26 kA	110.93	0.56 kA							
TR GARSEN 220/3	BB 33	GARS			0.00 MVA	0.00 kA	0.00	0.00 kA							
Shnt GARSEN 220					0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 220 GITARU (PS	220.00	0.00	0.00	1.00	2775.89 MVA	7.28 kA	-81.00	16.92 kA	7.22	2751.68	6.98	7.37			
Lne 220 KAMBURU	BB 220	KAM			2475.26 MVA	6.50 kA	99.69	15.08 kA							
TR GITARU 220/1	BB 15	GITA			302.28 MVA	0.79 kA	93.35	1.84 kA							
BB 220 HOLA (PSS/	220.00	0.00	0.00	1.00	638.59 MVA	1.68 kA	-76.81	3.61 kA	1.68	638.59	1.68	1.69			
Lne 220 GARSEN	BB 220	GAR			527.18 MVA	1.38 kA	101.18	2.98 kA							
Lne 220 GARISSA	BB 220	GAR			113.26 MVA	0.30 kA	112.59	0.64 kA							
TR HOLA 220/33	BB 33	HOLA			0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 220 ISINYA (PS	220.00	0.00	0.00	1.00	5978.71 MVA	15.69 kA	-82.86	37.87 kA	15.63	5957.01	15.50	15.91			
Lne 220 ISINYA	BB 220	DAN			854.87 MVA	2.24 kA	98.49	5.41 kA							
Lne 220 ISINYA	BB 220	DAN			854.87 MVA	2.24 kA	98.49	5.41 kA							
Lne 220 ISINYA	BB 220	KIP			303.56 MVA	0.80 kA	94.10	1.92 kA							
Lne 220 ISINYA	BB 220	ATH			814.07 MVA	2.14 kA	99.68	5.16 kA							
Lne 220 ISINYA	BB 220	ATH			814.07 MVA	2.14 kA	99.68	5.16 kA							
TR ISINYA 400/2	BB 400	ISI			1085.47 MVA	2.85 kA	93.56	6.87 kA							
TR ISINYA 400/2	BB 400	ISI			1085.47 MVA	2.85 kA	93.56	6.87 kA							
TR ISINYA 220/1	BB 132	ISI			177.56 MVA	0.47 kA	110.08	1.12 kA							
BB 220 KAINUK (PS	220.00	0.00	0.00	1.00	856.46 MVA	2.25 kA	-78.73	5.07 kA	2.22	844.75	2.22	2.27			
Lne 220 TURKWEL	BB 220	TUR			689.01 MVA	1.81 kA	99.65	4.08 kA							
Lne 220 KAINUK	BB 220	ORT			168.87 MVA	0.44 kA	107.92	1.00 kA							
TR KAINUK 220/6	BB 66	KAIN			0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 220 KAMBURU (P	220.00	0.00	0.00	1.00	3397.13 MVA	8.92 kA	-81.43	20.90 kA	8.83	3366.04	8.54	9.02			
Lne 220 KAMBURU	BB 220	KIA			787.50 MVA	2.07 kA	100.39	4.85 kA							
Lne 220 KAMBURU	BB 220	GIT			295.07 MVA	0.77 kA	93.57	1.82 kA							
Lne 220 KAMBURU	BB 220	DAN			703.65 MVA	1.85 kA	100.09	4.33 kA							
Lne 220 KAMBURU	BB 220	DAN			690.69 MVA	1.81 kA	100.09	4.25 kA							

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 15	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
TR KAMBURU 220/ TR KAMBURU 220/		BB 132 KAM BB 132 KAM				461.47 MVA 461.47 MVA	1.21 kA 1.21 kA	96.32 96.32	2.84 kA 2.84 kA				
BB 220 KIAMBERE (	220.00	0.00	0.00	1.00	2564.93 MVA	6.73 kA	-79.76	15.27 kA	6.70	2553.25	6.52	6.80	
Lne 220 KAMBURU	BB 220 KAM				1374.86 MVA	3.61 kA	101.89	8.19 kA					
Lne 220 KIAMBER	BB 220 DAN				560.93 MVA	1.47 kA	100.26	3.34 kA					
Lne 220 KIAMBER	BB 220 RAB				212.07 MVA	0.56 kA	105.35	1.26 kA					
TR KIAMBERE 220	BB 11 KIAM				198.10 MVA	0.52 kA	92.34	1.18 kA					
TR KIAMBERE 220	BB 11 KIAM				224.47 MVA	0.59 kA	92.20	1.34 kA					
Shnt KIAMBERE 2					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 KIPETO (PS	220.00	0.00	0.00	1.00	2557.16 MVA	6.71 kA	-80.75	15.47 kA	6.66	2538.65	6.64	6.78	
Lne 220 ISINYA	BB 220 ISI				2228.46 MVA	5.85 kA	100.12	13.48 kA					
TR KIPETO 220/1	BB 11 KIPE				165.34 MVA	0.43 kA	93.40	1.00 kA					
TR KIPETO 220/1	BB 11 KIPE				165.34 MVA	0.43 kA	93.40	1.00 kA					
BB 220 KISUMU (PS	220.00	0.00	0.00	1.00	1340.22 MVA	3.52 kA	-79.65	8.04 kA	3.52	1340.22	3.52	3.55	
Lne 220 LESSOS	BB 220 LES				482.36 MVA	1.27 kA	98.77	2.89 kA					
Lne 220 LESSOS	BB 220 LES				482.36 MVA	1.27 kA	98.77	2.89 kA					
TR KISUMU 220/1	BB 132 KIS				188.40 MVA	0.49 kA	104.40	1.13 kA					
TR KISUMU 220/1	BB 132 KIS				188.40 MVA	0.49 kA	104.40	1.13 kA					
BB 220 KITALE (PS	220.00	0.00	0.00	1.00	594.13 MVA	1.56 kA	-75.48	3.32 kA	1.56	594.13	1.56	1.57	
Lne 220 0RTUM	BB 220 0RT				348.42 MVA	0.91 kA	100.02	1.95 kA					
TR KITALE 220/1	BB 132 KIT				248.29 MVA	0.65 kA	110.83	1.39 kA					
Shn KITALE 220k					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 KOMOROCK (	220.00	0.00	0.00	1.00	6555.15 MVA	17.20 kA	-82.69	41.31 kA	17.15	6536.48	16.96	17.44	
Lne 220 DANDORA	BB 220 DAN				3277.57 MVA	8.60 kA	97.31	20.65 kA					
Lne 220 DANDORA	BB 220 DAN				3277.57 MVA	8.60 kA	97.31	20.65 kA					
TR KOMOROCK 220	BB 66 KOMO				0.00 MVA	0.00 kA	0.00	0.00 kA					
TR KOMOROCK 220	BB 66 KOMO				0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 LAMU (PSS/	220.00	0.00	0.00	1.00	2202.19 MVA	5.78 kA	-85.06	14.69 kA	5.73	2181.89	5.75	5.91	
TR LAMU 400/220	BB 400 LAM				938.78 MVA	2.46 kA	92.96	6.26 kA					
TR LAMU 400/220	BB 400 LAM				938.78 MVA	2.46 kA	92.96	6.26 kA					
Lne 220 GARSEN	BB 220 GAR				332.21 MVA	0.87 kA	106.26	2.22 kA					
TR LAMU 220/33	BB 33 LAMU				0.00 MVA	0.00 kA	0.00	0.00 kA					
Shnt LAMU 220kV					0.00 MVA	0.00 kA	0.00	0.00 kA					
BB 220 LAMU CPP	220.00	0.00	0.00	1.00	5459.35 MVA	14.33 kA	-86.39	37.19 kA	10.84	4129.14	14.29	14.72	
TR LAMU CPP 400	BB 400 LAM				483.55 MVA	1.27 kA	97.07	3.29 kA					
TR LAMU CPP 400	BB 400 LAM				483.55 MVA	1.27 kA	97.07	3.29 kA					
Sym LAMU CPP G1					4494.39 MVA	11.79 kA	-87.14	30.61 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 16				
				rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 220 LESSOS (PS TR LESSOS 400/2 TR LESSOS 400/2 Lne 220 TURKWEL Lne 220 OLKARIA Lne 220 OLKARIA Lne 220 LESSOS Lne 220 LESSOS TR LESSOS 220/1 TR LESSOS 220/1 TR LESSOS 220/1 TR LESSOS 220/1	220.00	0.00	0.00	1.00	2364.07 MVA	6.20 kA	-80.39	14.48 kA	6.20	2363.12	6.09	6.28				
	BB 400 LES				272.89 MVA	0.72 kA	91.49	1.67 kA								
	BB 400 LES				272.89 MVA	0.72 kA	91.49	1.67 kA								
	BB 220 TUR				171.87 MVA	0.45 kA	98.60	1.05 kA								
	BB 220 OLK				397.59 MVA	1.04 kA	98.36	2.44 kA								
	BB 220 OLK				397.59 MVA	1.04 kA	98.36	2.44 kA								
	BB 220 KIS				112.45 MVA	0.30 kA	99.14	0.69 kA								
	BB 220 KIS				112.45 MVA	0.30 kA	99.14	0.69 kA								
	BB 132 LES				159.95 MVA	0.42 kA	108.55	0.98 kA								
	BB 132 LES				159.95 MVA	0.42 kA	108.55	0.98 kA								
	BB 132 LES				159.95 MVA	0.42 kA	108.55	0.98 kA								
	BB 132 LES				159.95 MVA	0.42 kA	108.55	0.98 kA								
	BB 220 LOYANGALAN TR LOIYANGALANI TR LOIYANGALANI TR LOYANGALANI TR LOYANGALANI TR LOYANGALANI Shnt LOIYANGALA	220.00	0.00	0.00	1.00	1112.21 MVA	2.92 kA	-85.44	7.39 kA	2.92	1112.21	2.92	2.98			
BB 400 LOI					556.11 MVA	1.46 kA	94.56	3.70 kA								
BB 400 LOI					556.11 MVA	1.46 kA	94.56	3.70 kA								
BB 33 LOYA					0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 33 LOYA					0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 33 LOYA					0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 33 LOYA					0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 220 MALINDI (P Lne 220 RABAI Lne 220 MALINDI TR MALINDI 220/ TR MALINDI 220/ Shnt MALINDI 22	220.00	0.00	0.00	1.00	1144.16 MVA	3.00 kA	-76.26	6.36 kA	3.00	1144.16	3.00	3.02				
	BB 220 RAB				722.09 MVA	1.89 kA	103.18	4.01 kA								
	BB 220 GAR				422.17 MVA	1.11 kA	104.69	2.35 kA								
	BB 33 MALI				0.00 MVA	0.00 kA	0.00	0.00 kA								
	BB 33 MALI				0.00 MVA	0.00 kA	0.00	0.00 kA								
	BB 33 MALI				0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 220 MARIAKANI TR MARIAKANI 40 Lne 220 RABAI Lne 220 RABAI TR MARIAKANI 40	220.00	0.00	0.00	1.00	2156.12 MVA	5.66 kA	-82.07	13.51 kA	5.63	2144.30	5.62	5.73				
	BB 400 MAR				490.49 MVA	1.29 kA	94.98	3.07 kA								
	BB 220 RAB				588.75 MVA	1.55 kA	100.38	3.69 kA								
	BB 220 RAB				588.75 MVA	1.55 kA	100.38	3.69 kA								
	BB 400 MAR				490.49 MVA	1.29 kA	94.98	3.07 kA								
BB 220 MATASIA (P Lne 220 MATASIA Lne 220 MATASIA TR MATASIA 220/ TR MATASIA 220/	220.00	0.00	0.00	1.00	3055.77 MVA	8.02 kA	-81.22	18.62 kA	8.02	3055.22	7.95	8.11				
	BB 220 NGO				1527.89 MVA	4.01 kA	98.78	9.31 kA								
	BB 220 NGO				1527.89 MVA	4.01 kA	98.78	9.31 kA								
	BB 66 MATA				0.00 MVA	0.00 kA	0.00	0.00 kA								
	BB 66 MATA				0.00 MVA	0.00 kA	0.00	0.00 kA								
BB 220 NBEAST (MT Lne 220 DANDORA Lne 220 DANDORA TR NBEAST 400/2 TR NBEAST 400/2	220.00	0.00	0.00	1.00	5017.54 MVA	13.17 kA	-81.74	30.96 kA	13.17	5016.76	12.99	13.33				
	BB 220 DAN				2109.88 MVA	5.54 kA	98.96	13.02 kA								
	BB 220 DAN				2109.88 MVA	5.54 kA	98.96	13.02 kA								
	BB 400 NBE				399.86 MVA	1.05 kA	94.59	2.47 kA								
	BB 400 NBE				399.86 MVA	1.05 kA	94.59	2.47 kA								

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 17				
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 220 NBNORTH (P	220.00	0.00	0.00	1.00	5831.88 MVA	15.30 kA	-82.57	36.57 kA	15.30	5830.61	15.14	15.51				
Lne 220 SUSWA	BB 220 SUS				1601.41 MVA	4.20 kA	95.60	10.04 kA								
Lne 220 SUSWA	BB 220 SUS				1601.41 MVA	4.20 kA	95.60	10.04 kA								
Lne 220 NBNORTH	BB 220 THI				1316.15 MVA	3.45 kA	99.66	8.25 kA								
Lne 220 NBNORTH	BB 220 THI				1316.15 MVA	3.45 kA	99.66	8.25 kA								
TR NBNORTH 220/	BB 66 NBNO				6.24 MVA	0.02 kA	-88.90	0.04 kA								
TR NBNORTH 220/	BB 66 NBNO				6.24 MVA	0.02 kA	-88.90	0.04 kA								
TR NBNORTH 220/	BB 66 NBNO				12.88 MVA	0.03 kA	91.10	0.08 kA								
BB 220 NGONG (PSS	220.00	0.00	0.00	1.00	3827.36 MVA	10.04 kA	-81.97	23.69 kA	10.04	3825.42	9.95	10.17				
Lne 220 MATASIA	BB 220 MAT				0.00 MVA	0.00 kA	0.00	0.00 kA								
Lne 220 MATASIA	BB 220 MAT				0.00 MVA	0.00 kA	0.00	0.00 kA								
Lne 220 SUSWA	BB 220 SUS				1895.26 MVA	4.97 kA	98.08	11.73 kA								
Lne 220 SUSWA	BB 220 SUS				1895.26 MVA	4.97 kA	98.08	11.73 kA								
TR NGONG 220/66	BB 66 NGON				18.49 MVA	0.05 kA	93.16	0.11 kA								
TR NGONG 220/66	BB 66 NGON				18.49 MVA	0.05 kA	93.16	0.11 kA								
BB 220 OLKARIA IE	220.00	0.00	0.00	1.00	5520.24 MVA	14.49 kA	-83.92	35.65 kA	14.37	5476.21	14.36	14.73				
Lne 220 OLKARIA	BB 220 OLK				1268.54 MVA	3.33 kA	97.29	8.19 kA								
Lne 220 OLKARIA	BB 220 OLK				1268.54 MVA	3.33 kA	97.29	8.19 kA								
Lne 220 SUSWA	BB 220 SUS				993.77 MVA	2.61 kA	95.59	6.42 kA								
Lne 220 SUSWA	BB 220 SUS				993.77 MVA	2.61 kA	95.59	6.42 kA								
TR OLKARIA 220/	BB 11 OLKA				177.18 MVA	0.46 kA	93.70	1.14 kA								
TR OLKARIA 220/	BB 11 OLKA				177.18 MVA	0.46 kA	93.70	1.14 kA								
TR OLKARIA 220/	BB 11 OLKA				177.18 MVA	0.46 kA	93.70	1.14 kA								
TR OLKARIA 220/	BB 132 OLK				465.40 MVA	1.22 kA	94.34	3.01 kA								
BB 220 OLKARIA II	220.00	0.00	0.00	1.00	5515.96 MVA	14.48 kA	-83.81	35.54 kA	14.37	5477.44	14.34	14.71				
Lne 220 OLKARIA	BB 220 SUS				989.37 MVA	2.60 kA	97.48	6.38 kA								
Lne 220 OLKARIA	BB 220 SUS				989.37 MVA	2.60 kA	97.48	6.38 kA								
Lne 220 OLKARIA	BB 220 OLK				1293.62 MVA	3.39 kA	95.23	8.34 kA								
Lne 220 OLKARIA	BB 220 OLK				1293.62 MVA	3.39 kA	95.23	8.34 kA								
Lne 220 OLKARIA	BB 220 LES				273.04 MVA	0.72 kA	98.16	1.76 kA								
Lne 220 OLKARIA	BB 220 LES				273.04 MVA	0.72 kA	98.16	1.76 kA								
Lne 220 OLKARIA	BB 220 OLK				116.50 MVA	0.31 kA	93.76	0.75 kA								
TR OLKARIA 220/	BB 11 OLKN				98.96 MVA	0.26 kA	93.20	0.64 kA								
TR OLKARIA 220/	BB 11 OLKN				98.96 MVA	0.26 kA	93.20	0.64 kA								
TR OLKARIA 220/	BB 11 OLKN				91.17 MVA	0.24 kA	93.20	0.59 kA								
BB 220 OLKARIA II	220.00	0.00	0.00	1.00	4137.91 MVA	10.86 kA	-82.48	25.89 kA	10.84	4132.32	10.76	11.00				
TR OLKARIA 220/	BB 11 OLKA				58.68 MVA	0.15 kA	93.70	0.37 kA								
Lne 220 OLKARIA	BB 220 OLK				4020.82 MVA	10.55 kA	97.63	25.16 kA								
TR OLKARIA 220/	BB 11 OLKA				58.68 MVA	0.15 kA	93.70	0.37 kA								

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 18			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
BB 220 OLKARIA IV	220.00	0.00	0.00	1.00	4196.02 MVA	11.01 kA	-83.53		26.86 kA	10.91	4155.72	10.92	11.18		
TR OLKARIA 220/	BB 11 OLKA				237.65 MVA	0.62 kA	93.61		1.52 kA						
Lne 220 SUSWA	BB 220 SUS				1708.01 MVA	4.48 kA	97.24		10.93 kA						
Lne 220 SUSWA	BB 220 SUS				1708.01 MVA	4.48 kA	97.24		10.93 kA						
TR OLKARIA 220/	BB 11 OLKA				272.07 MVA	0.71 kA	94.08		1.74 kA						
TR OLKARIA 220/	BB 11 OLKA				272.09 MVA	0.71 kA	91.63		1.74 kA						
BB 220 RABAI (PSS	220.00	0.00	0.00	1.00	2235.58 MVA	5.87 kA	-81.89		13.96 kA	5.80	2211.49	5.82	5.94		
TR RABAI 220/13	BB 132 1RA				419.52 MVA	1.10 kA	95.70		2.62 kA						
TR RABAI 220/13	BB 132 RAB				419.52 MVA	1.10 kA	95.70		2.62 kA						
Lne 220 KIAMBER	BB 220 KIA				217.35 MVA	0.57 kA	105.97		1.36 kA						
Lne 220 RABAI	BB 220 MAR				442.43 MVA	1.16 kA	96.09		2.76 kA						
Lne 220 RABAI	BB 220 MAR				442.43 MVA	1.16 kA	96.09		2.76 kA						
Lne 220 RABAI	BB 220 MAL				299.89 MVA	0.79 kA	105.12		1.87 kA						
Shnt RABAI 220k					0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 220 SUSWA (PSS	220.00	0.00	0.00	1.00	6688.36 MVA	17.55 kA	-84.71		44.00 kA	17.42	6637.14	17.39	17.89		
TR SUSWA 400/22	BB 400 SUS				1140.04 MVA	2.99 kA	91.28		7.50 kA						
TR SUSWA 400/22	BB 400 SUS				1140.04 MVA	2.99 kA	91.28		7.50 kA						
Lne 220 OLKARIA	BB 220 OLK				418.84 MVA	1.10 kA	96.51		2.76 kA						
Lne 220 OLKARIA	BB 220 OLK				418.84 MVA	1.10 kA	96.51		2.76 kA						
Lne 220 SUSWA	BB 220 OLK				422.02 MVA	1.11 kA	94.35		2.78 kA						
Lne 220 SUSWA	BB 220 OLK				422.02 MVA	1.11 kA	94.35		2.78 kA						
Lne 220 SUSWA	BB 220 NBN				995.83 MVA	2.61 kA	100.39		6.55 kA						
Lne 220 SUSWA	BB 220 NBN				995.83 MVA	2.61 kA	100.39		6.55 kA						
Lne 220 SUSWA	BB 220 OLK				356.08 MVA	0.93 kA	93.66		2.34 kA						
Lne 220 SUSWA	BB 220 OLK				356.08 MVA	0.93 kA	93.66		2.34 kA						
Lne 220 SUSWA	BB 220 NGO				18.42 MVA	0.05 kA	93.20		0.12 kA						
Lne 220 SUSWA	BB 220 NGO				18.42 MVA	0.05 kA	93.20		0.12 kA						
Shnt SUSWA (PSS					0.00 MVA	0.00 kA	0.00		0.00 kA						
Shnt SUSWA 220k					0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 220 THIKA RD (	220.00	0.00	0.00	1.00	5996.15 MVA	15.74 kA	-81.90		37.10 kA	15.73	5992.62	15.53	15.93		
Lne 220 DANDORA	BB 220 DAN				1803.61 MVA	4.73 kA	98.94		11.16 kA						
Lne 220 DANDORA	BB 220 DAN				1803.61 MVA	4.73 kA	98.94		11.16 kA						
Lne 220 NBNORTH	BB 220 NBN				1194.96 MVA	3.14 kA	96.83		7.39 kA						
Lne 220 NBNORTH	BB 220 NBN				1194.96 MVA	3.14 kA	96.83		7.39 kA						
TR THIKA 220/66	BB 66 THIK				0.00 MVA	0.00 kA	0.00		0.00 kA						
TR THIKA 220/66	BB 66 THIK				0.00 MVA	0.00 kA	0.00		0.00 kA						
BB 220 TORORO (PS	220.00	0.00	0.00	1.00	8444.61 MVA	22.16 kA	-84.39		54.86 kA	22.16	8444.61	22.16	22.54		
TR TORORO 400/2	BB 400 TOR				222.42 MVA	0.58 kA	93.81		1.44 kA						
TR TORORO 400/2	BB 400 TOR				222.42 MVA	0.58 kA	93.81		1.44 kA						
External Grid (					8000.00 MVA	20.99 kA	-84.29		51.97 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 19			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]	[deg]	ip [kA/kA]		Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]
BB 220 TURKWEL (P Lne 220 TURKWEL Lne 220 TURKWEL TR TURKWEL 220/ TR TURKWEL 220/		220.00	0.00	0.00	1.00	860.94 MVA		2.26 kA	-78.69	5.10 kA		2.23	848.78	2.23	2.28
	BB 220 KAI					168.34 MVA		0.44 kA	107.86	1.00 kA					
	BB 220 LES					386.39 MVA		1.01 kA	104.95	2.29 kA					
	BB 11 TURK					155.59 MVA		0.41 kA	93.23	0.92 kA					
	BB 11 TURK					155.59 MVA		0.41 kA	93.23	0.92 kA					
BB 33 MERU WPP-S/ CB MERU WPP S/S TR MERU-WPP 132 Lne 33UGC F1 Lne 33UGC F2 Lne 33UGC F3		33.00	0.00	0.00	1.00	846.80 MVA		14.82 kA	-72.77	29.81 kA		12.86	735.30	5.59	10.49
	BB 33 MERU					465.37 MVA		8.14 kA	107.51	16.38 kA					
	WPP-S/S ME					159.69 MVA		2.79 kA	102.62	5.62 kA					
	BB 33 MERU					74.17 MVA		1.30 kA	109.94	2.61 kA					
	BB 33 MERU					74.17 MVA		1.30 kA	109.94	2.61 kA					
BB 33 MERU WPP-S/ CB MERU WPP S/S TR MERU-WPP 132 Lne 33UGC F4 Lne 33UGC F5 Lne 33UGC F6 Lne 33UGC F7		33.00	0.00	0.00	1.00	846.80 MVA		14.82 kA	-72.77	29.81 kA		12.86	735.30	5.59	10.49
	BB 33 MERU					381.44 MVA		6.67 kA	106.88	13.43 kA					
	WPP-S/S ME					159.69 MVA		2.79 kA	102.62	5.62 kA					
	BB 33 MERU					74.17 MVA		1.30 kA	109.94	2.61 kA					
	BB 33 MERU					74.17 MVA		1.30 kA	109.94	2.61 kA					
BB 400 ISINYA (PS Lne 400 ISINYA Lne 400 ISINYA Lne 400 MARIKA Lne 400 MARIKA TR ISINYA 400/2 TR ISINYA 400/2 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400 Shnt ISINYA 400		400.00	0.00	0.00	1.00	6750.71 MVA		9.74 kA	-83.97	23.94 kA		9.74	6750.71	9.74	9.90
	BB 400 SUS					2177.02 MVA		3.14 kA	96.11	7.72 kA					
	BB 400 SUS					2177.02 MVA		3.14 kA	96.11	7.72 kA					
	BB 400 MAR					266.61 MVA		0.38 kA	96.70	0.95 kA					
	BB 400 MAR					266.61 MVA		0.38 kA	96.70	0.95 kA					
	BB 220 ISI					931.76 MVA		1.34 kA	95.63	3.30 kA					
	BB 220 ISI					931.76 MVA		1.34 kA	95.63	3.30 kA					
						0.00 MVA		0.00 kA	0.00	0.00 kA					
						0.00 MVA		0.00 kA	0.00	0.00 kA					
						0.00 MVA		0.00 kA	0.00	0.00 kA					
						0.00 MVA		0.00 kA	0.00	0.00 kA					
						0.00 MVA		0.00 kA	0.00	0.00 kA					
						0.00 MVA		0.00 kA	0.00	0.00 kA					
BB 400 LAMU CPP TR LAMU 400/220 TR LAMU 400/220 TR LAMU CPP 400 TR LAMU CPP 400 Lne 400 LAMU CP Lne 400 LAMU CP		400.00	0.00	0.00	1.00	3489.68 MVA		5.04 kA	-85.43	12.84 kA		4.75	3292.06	5.01	5.15
	BB 220 LAM					151.19 MVA		0.22 kA	105.17	0.56 kA					
	BB 220 LAM					151.19 MVA		0.22 kA	105.17	0.56 kA					
	BB 220 LAM					1134.85 MVA		1.64 kA	92.53	4.17 kA					
	BB 220 LAM					1134.85 MVA		1.64 kA	92.53	4.17 kA					
	BB 400 NBE					462.27 MVA		0.67 kA	96.15	1.70 kA					
BB 400 LESSOS TR LESSOS 400/2		400.00	0.00	0.00	1.00	1706.24 MVA		2.46 kA	-86.46	6.42 kA		2.46	1706.24	2.46	2.53
	BB 220 LES					378.41 MVA		0.55 kA	95.34	1.42 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 20				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	Ik [kA]	Ith [kA]	
Lne 400 LESSOS		BB 400	TOR			475.04 MVA		0.69	kA	92.12	1.79	kA				
Lne 400 LESSOS		BB 400	TOR			475.04 MVA		0.69	kA	92.12	1.79	kA				
TR LESSOS 400/2		BB 220	LES			378.41 MVA		0.55	kA	95.34	1.42	kA				
BB 400	LOIYANGALA	400.00	0.00	0.00	1.00	1686.92	MVA	2.43	kA	-83.36	5.89	kA	2.43	1686.92	2.43	2.47
TR LOIYANGALANI		BB 220	LOY			0.00 MVA		0.00	kA	0.00	0.00	kA				
TR LOIYANGALANI		BB 220	LOY			0.00 MVA		0.00	kA	0.00	0.00	kA				
Lne 400 SUSWA -		BB 400	SUS			843.46 MVA		1.22	kA	96.64	2.95	kA				
Lne 400 SUSWA -		BB 400	SUS			843.46 MVA		1.22	kA	96.64	2.95	kA				
BB 400	MARIAKANI	400.00	0.00	0.00	1.00	2321.90	MVA	3.35	kA	-82.97	8.08	kA	3.35	2320.92	3.33	3.40
TR MARIAKANI 40		BB 220	MAR			416.25 MVA		0.60	kA	97.95	1.45	kA				
Lne 400 MARIAKA		BB 400	ISI			744.79 MVA		1.08	kA	96.52	2.59	kA				
Lne 400 MARIAKA		BB 400	ISI			744.79 MVA		1.08	kA	96.52	2.59	kA				
TR MARIAKANI 40		BB 220	MAR			416.25 MVA		0.60	kA	97.95	1.45	kA				
Shnt MARIAKANI						0.00 MVA		0.00	kA	0.00	0.00	kA				
BB 400	NBEAST (MT	400.00	0.00	0.00	1.00	3180.96	MVA	4.59	kA	-84.38	11.39	kA	4.59	3180.96	4.59	4.67
TR NBEAST 400/2		BB 220	NBE			1096.21 MVA		1.58	kA	95.64	3.92	kA				
TR NBEAST 400/2		BB 220	NBE			1096.21 MVA		1.58	kA	95.64	3.92	kA				
Lne 400 LAMU CP		BB 400	LAM			494.27 MVA		0.71	kA	95.57	1.77	kA				
Lne 400 LAMU CP		BB 400	LAM			494.27 MVA		0.71	kA	95.57	1.77	kA				
BB 400	SUSWA	400.00	0.00	0.00	1.00	11194.89	MVA	16.16	kA	-84.64	40.26	kA	16.16	11194.89	16.16	16.45
Lne 400 ISINYA		BB 400	ISI			798.45 MVA		1.15	kA	96.33	2.87	kA				
Lne 400 ISINYA		BB 400	ISI			798.45 MVA		1.15	kA	96.33	2.87	kA				
Lne 400 SUSWA -		BB 400	LOI			0.00 MVA		0.00	kA	0.00	0.00	kA				
TR SUSWA 400/22		BB 220	SUS			800.10 MVA		1.15	kA	92.63	2.88	kA				
TR SUSWA 400/22		BB 220	SUS			800.10 MVA		1.15	kA	92.63	2.88	kA				
Lne 400 SUSWA -		BB 400	LOI			0.00 MVA		0.00	kA	0.00	0.00	kA				
Ethiopia						8000.00 MVA		11.55	kA	-84.29	28.77	kA				
BB 400	TORORO	400.00	0.00	0.00	1.00	1784.84	MVA	2.58	kA	-87.08	6.81	kA	2.58	1784.84	2.58	2.67
Lne 400 LESSOS		BB 400	LES			340.14 MVA		0.49	kA	95.49	1.30	kA				
Lne 400 LESSOS		BB 400	LES			340.14 MVA		0.49	kA	95.49	1.30	kA				
TR TORORO 400/2		BB 220	TOR			552.83 MVA		0.80	kA	91.34	2.11	kA				
TR TORORO 400/2		BB 220	TOR			552.83 MVA		0.80	kA	91.34	2.11	kA				

Annex 8.H Short circuit results MTP (Single Ph to Ground)

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DIgSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

Fault Locations with Feeders Short-Circuit Calculation / Method : IEC 60909				Single Phase to Ground / Max. Short-Circuit Currents			
Asynchronous Motors Always Considered		Grid Identification Automatic		Short-Circuit Duration Break Time		0.08 s	
		Conductor Temperature User Defined		Fault Clearing Time (Ith)		1.00 s	
		No		c-Voltage Factor User Defined		No	

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 1			
		rtd.V. [kV]	Voltage [kV]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
WPP-S/S MERU (HV)											
BB 132 MERU WF	A	132.00	0.00	0.00	1.10	230.15 MVA	3.02 kA	-76.03	6.44 kA	3.02	230.15 0.00
	B		94.41	-130.30		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00 1.13
	C		95.49	129.81		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00 1.14
Lne 132 MERU WF BB 132 ISI											
	A					75.15 MVA	0.99 kA	104.93	2.10 kA		
	B					14.01 MVA	0.18 kA	107.53	0.39 kA		
	C					13.97 MVA	0.18 kA	108.09	0.39 kA		
Lne 132 MERU WF BB 132 ISI											
	A					75.15 MVA	0.99 kA	104.93	2.10 kA		
	B					14.01 MVA	0.18 kA	107.53	0.39 kA		
	C					13.97 MVA	0.18 kA	108.09	0.39 kA		
TR MERU-WPP 132 BB 33 MERU											
	A					39.95 MVA	0.52 kA	102.17	1.12 kA		
	B					14.01 MVA	0.18 kA	-72.47	0.39 kA		
	C					13.97 MVA	0.18 kA	-71.91	0.39 kA		
TR MERU-WPP 132 BB 33 MERU											
	A					39.95 MVA	0.52 kA	102.17	1.12 kA		
	B					14.01 MVA	0.18 kA	-72.47	0.39 kA		
	C					13.97 MVA	0.18 kA	-71.91	0.39 kA		
BB 132 1RABTRF											
	A	132.00	0.00	0.00	1.10	1107.98 MVA	14.54 kA	-79.74	33.46 kA	14.54	1107.98 0.00
	B		76.34	-106.41		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00 0.88
	C		82.19	106.76		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00 0.94

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 2			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]			
TR RABAI 220/13		BB 220 RAB			A	160.56 MVA	2.11 kA	59.03	4.85 kA						
					B	90.01 MVA	1.18 kA	-38.83	2.72 kA						
					C	97.92 MVA	1.28 kA	-31.14	2.96 kA						
TR 1RABTRF 132/		BB 11 1RAB			A	0.51 MVA	0.01 kA	83.11	0.02 kA						
					B	0.51 MVA	0.01 kA	83.11	0.02 kA						
					C	0.51 MVA	0.01 kA	83.11	0.02 kA						
zpu_1126_1726_1		BB 132 RAB			A	992.43 MVA	13.02 kA	106.39	29.97 kA						
					B	89.74 MVA	1.18 kA	141.44	2.71 kA						
					C	97.71 MVA	1.28 kA	149.13	2.95 kA						
BB 132 AEOLOUS		A	132.00	0.00	0.00	1.10	428.66 MVA	5.62 kA	-81.32	12.98 kA	5.62	428.66	0.00		
		B		81.08	-113.73		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96		
		C		79.55	114.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94		
Lne 132 NAIVASH		BB 132 NAI			A	306.79 MVA	4.03 kA	101.51	9.29 kA						
					B	23.14 MVA	0.30 kA	-91.81	0.70 kA						
					C	20.87 MVA	0.27 kA	-83.76	0.63 kA						
TR AEOLOUS 132/		BB 11 AEOL			A	123.19 MVA	1.62 kA	91.61	3.73 kA						
					B	23.14 MVA	0.30 kA	88.19	0.70 kA						
					C	20.87 MVA	0.27 kA	96.24	0.63 kA						
BB 132 AWENDO (		A	132.00	0.00	0.00	1.10	195.64 MVA	2.57 kA	-70.98	5.01 kA	2.57	195.64	0.00		
		B		81.33	-116.37		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97		
		C		81.51	116.55		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97		
Lne 132 KISII		BB 132 KIS			A	103.75 MVA	1.36 kA	110.74	2.65 kA						
					B	1.11 MVA	0.01 kA	-52.27	0.03 kA						
					C	1.16 MVA	0.02 kA	-29.35	0.03 kA						
Lne 132 AWENDO		BB 132 NDH			A	91.17 MVA	1.20 kA	107.24	2.33 kA						
					B	0.68 MVA	0.01 kA	178.41	0.02 kA						
					C	1.06 MVA	0.01 kA	-164.07	0.03 kA						
TR AWENDO 132/3		BB 33 AWEN			A	0.86 MVA	0.01 kA	89.96	0.02 kA						
					B	0.86 MVA	0.01 kA	89.96	0.02 kA						
					C	0.86 MVA	0.01 kA	89.96	0.02 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 3			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 BAMBURI	A	132.00	0.00	0.00	1.10			547.37 MVA	7.18 kA	-74.79	14.84 kA	7.18	547.37	0.00	
	B		79.40	-112.91				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94	
	C		81.74	113.11				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96	
Lne 132 MTWAPA		BB 132 MTW				A		5.29 MVA	0.07 kA	89.63	0.14 kA				
						B		5.29 MVA	0.07 kA	89.63	0.14 kA				
						C		5.29 MVA	0.07 kA	89.63	0.14 kA				
Lne 132 RABAI		BB 132 RAB				A		268.25 MVA	3.52 kA	105.55	7.27 kA				
						B		5.67 MVA	0.07 kA	-91.17	0.15 kA				
						C		5.67 MVA	0.07 kA	-91.17	0.15 kA				
Lne 132 RABAI		BB 132 RAB				A		268.25 MVA	3.52 kA	105.55	7.27 kA				
						B		5.67 MVA	0.07 kA	-91.17	0.15 kA				
						C		5.67 MVA	0.07 kA	-91.17	0.15 kA				
TR BAMBURI 132/		BB 33 BAMB				A		3.03 MVA	0.04 kA	88.14	0.08 kA				
						B		3.03 MVA	0.04 kA	88.14	0.08 kA				
						C		3.03 MVA	0.04 kA	88.14	0.08 kA				
TR BAMBURI 132/		BB 33 BAMB				A		3.03 MVA	0.04 kA	88.14	0.08 kA				
						B		3.03 MVA	0.04 kA	88.14	0.08 kA				
						C		3.03 MVA	0.04 kA	88.14	0.08 kA				
BB 132 BOMET (P	A	132.00	0.00	0.00	1.10			275.60 MVA	3.62 kA	-70.45	7.09 kA	3.62	275.60	0.00	
	B		81.79	-118.67				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98	
	C		83.70	118.16				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00	
Lne 132 BOMET		BB 132 SOT				A		132.10 MVA	1.73 kA	110.33	3.40 kA				
						B		6.55 MVA	0.09 kA	93.26	0.17 kA				
						C		6.49 MVA	0.09 kA	93.38	0.17 kA				
Lne 132 BOMET		BB 132 NAR				A		69.21 MVA	0.91 kA	112.68	1.78 kA				
						B		3.67 MVA	0.05 kA	-83.66	0.09 kA				
						C		3.64 MVA	0.05 kA	-83.56	0.09 kA				
Lne 132 BOMET		BB 132 NAR				A		73.63 MVA	0.97 kA	105.47	1.89 kA				
						B		3.91 MVA	0.05 kA	-90.87	0.10 kA				
						C		3.88 MVA	0.05 kA	-90.77	0.10 kA				

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 4			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
TR BOMET 132/33	BB 33 BOME				A	1.02 MVA	0.01 kA	88.52	0.03 kA				
					B	1.02 MVA	0.01 kA	88.52	0.03 kA				
					C	1.02 MVA	0.01 kA	88.52	0.03 kA				
BB 132 CHEMOSIT A	132.00	0.00	0.00	1.10		300.06 MVA	3.94 kA	-70.59	7.62 kA	3.94	300.06	0.00	
B		81.17	-116.05			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97	
C		81.07	116.32			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96	
Lne 132 MUHORON	BB 132 MUH				A	173.28 MVA	2.27 kA	111.15	4.40 kA				
					B	3.52 MVA	0.05 kA	-93.35	0.09 kA				
					C	3.46 MVA	0.05 kA	-91.77	0.09 kA				
Lne 132 CHEMOSI	BB 132 SOT				A	120.79 MVA	1.58 kA	107.93	3.07 kA				
					B	2.96 MVA	0.04 kA	-85.56	0.08 kA				
					C	3.01 MVA	0.04 kA	-87.52	0.08 kA				
TR CHEMOSIT 132	BB 33 CHEM				A	3.23 MVA	0.04 kA	90.20	0.08 kA				
					B	3.23 MVA	0.04 kA	90.20	0.08 kA				
					C	3.23 MVA	0.04 kA	90.20	0.08 kA				
TR CHEMOSIT 132	BB 33 CHEM				A	3.23 MVA	0.04 kA	90.20	0.08 kA				
					B	3.23 MVA	0.04 kA	90.20	0.08 kA				
					C	3.23 MVA	0.04 kA	90.20	0.08 kA				
Shn CHEMO 33 (M					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 CHOGORIA A	132.00	0.00	0.00	1.10		193.97 MVA	2.55 kA	-75.72	5.32 kA	2.55	193.97	0.00	
B		83.06	-118.80			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99	
C		83.24	118.86			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99	
Lne 132 CHOGORI	BB 132 ISH				A	193.36 MVA	2.54 kA	104.33	5.30 kA				
					B	0.63 MVA	0.01 kA	-90.09	0.02 kA				
					C	0.63 MVA	0.01 kA	-90.09	0.02 kA				
TR CHOGORIA 132	BB 33 CHOG				A	0.63 MVA	0.01 kA	89.91	0.02 kA				
					B	0.63 MVA	0.01 kA	89.91	0.02 kA				
					C	0.63 MVA	0.01 kA	89.91	0.02 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 5			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Ld CHOGORIA (13							A	0.00 MVA	0.00 kA	0.00		0.00 kA			
							B	0.00 MVA	0.00 kA	0.00		0.00 kA			
							C	0.00 MVA	0.00 kA	0.00		0.00 kA			
BB 132 DANDORA	A	132.00	0.00	0.00	1.10		1652.08 MVA	21.68 kA	-83.78		53.78 kA	21.68	1652.08	0.00	
	B		76.42	-107.67			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.91	
	C		76.17	108.19			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.91	
Lne 132 JUJA -	BB 132 JUJ					A	294.91 MVA	3.87 kA	103.67		9.60 kA				
					B	28.23 MVA	0.37 kA	-76.75		0.92 kA					
					C	30.61 MVA	0.40 kA	-69.60		1.00 kA					
Lne 132 JUJA -	BB 132 JUJ					A	294.91 MVA	3.87 kA	103.67		9.60 kA				
					B	28.23 MVA	0.37 kA	-76.75		0.92 kA					
					C	30.61 MVA	0.40 kA	-69.60		1.00 kA					
TR DANDORA 132/	BB 11 1DAN					A	0.52 MVA	0.01 kA	90.56		0.02 kA				
					B	0.52 MVA	0.01 kA	90.56		0.02 kA					
					C	0.52 MVA	0.01 kA	90.56		0.02 kA					
TR DANDORA 132/	BB 11 1DAN					A	0.52 MVA	0.01 kA	90.56		0.02 kA				
					B	0.52 MVA	0.01 kA	90.56		0.02 kA					
					C	0.52 MVA	0.01 kA	90.56		0.02 kA					
TR DANDORA 220/	BB 220 DAN					A	534.47 MVA	7.01 kA	92.12		17.40 kA				
					B	27.72 MVA	0.36 kA	103.49		0.90 kA					
					C	30.12 MVA	0.40 kA	110.73		0.98 kA					
TR DANDORA 220/	BB 220 DAN					A	534.47 MVA	7.01 kA	92.12		17.40 kA				
					B	27.72 MVA	0.36 kA	103.49		0.90 kA					
					C	30.12 MVA	0.40 kA	110.73		0.98 kA					
BB 132 DOMES (P	A	132.00	0.00	0.00	1.10		694.21 MVA	9.11 kA	-83.25		22.02 kA	9.11	694.21	0.00	
	B		79.03	-110.47			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94	
	C		78.09	111.22			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.92	
Lne 132 DOMES	BB 132 OLK					A	552.78 MVA	7.25 kA	98.22		17.54 kA				
					B	16.70 MVA	0.22 kA	-92.50		0.53 kA					
					C	14.39 MVA	0.19 kA	-82.09		0.46 kA					

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 6				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR DOMES 132/11	BB 11 DOME											
					A	71.16 MVA	0.93 kA	91.06	2.26 kA			
					B	8.35 MVA	0.11 kA	87.50	0.26 kA			
					C	7.20 MVA	0.09 kA	97.91	0.23 kA			
TR DOMES 132/11	BB 11 DOME				A	71.16 MVA	0.93 kA	91.06	2.26 kA			
					B	8.35 MVA	0.11 kA	87.50	0.26 kA			
					C	7.20 MVA	0.09 kA	97.91	0.23 kA			
BB 132 ELDORET	A	132.00	0.00	0.00	1.10	342.86 MVA	4.50 kA	-71.85	8.90 kA	4.50	342.86	0.00
	B		80.89	-115.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		80.04	115.63		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 ELDORET	BB 132 LES				A	265.19 MVA	3.48 kA	110.91	6.88 kA			
					B	10.87 MVA	0.14 kA	-80.43	0.28 kA			
					C	10.73 MVA	0.14 kA	-81.23	0.28 kA			
Lne 132 ELDORET	BB 132 KIT				A	69.59 MVA	0.91 kA	99.94	1.81 kA			
					B	2.03 MVA	0.03 kA	144.35	0.05 kA			
					C	1.83 MVA	0.02 kA	144.02	0.05 kA			
TR ELDORET 132/	BB 33 ELD3				A	4.76 MVA	0.06 kA	90.92	0.12 kA			
					B	4.76 MVA	0.06 kA	90.92	0.12 kA			
					C	4.76 MVA	0.06 kA	90.92	0.12 kA			
TR ELDORET 132/	BB 33 ELD3				A	4.76 MVA	0.06 kA	90.92	0.12 kA			
					B	4.76 MVA	0.06 kA	90.92	0.12 kA			
					C	4.76 MVA	0.06 kA	90.92	0.12 kA			
BB 132 GALU (PS	A	132.00	0.00	0.00	1.10	262.52 MVA	3.44 kA	-72.04	6.89 kA	3.44	262.52	0.00
	B		81.69	-114.72		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		81.06	115.37		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 RABAI	BB 132 RAB				A	214.42 MVA	2.81 kA	111.95	5.63 kA			
					B	11.37 MVA	0.15 kA	-95.25	0.30 kA			
					C	10.61 MVA	0.14 kA	-83.16	0.28 kA			
Lne 132 GALU -	BB 132 LUN				A	0.49 MVA	0.01 kA	90.97	0.01 kA			
					B	0.49 MVA	0.01 kA	90.97	0.01 kA			
					C	0.49 MVA	0.01 kA	90.97	0.01 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 7				
		rtd.V. [kV]	Voltage [kV]	Angle [deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	Angle [deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR GALU 132/11	BB 11 KWAL					48.74 MVA	0.64 kA	90.90	1.28 kA			
						9.26 MVA	0.12 kA	83.36	0.24 kA			
						8.51 MVA	0.11 kA	98.33	0.22 kA			
TR GALU 132/33	BB 33 GALU					0.81 MVA	0.01 kA	90.80	0.02 kA			
						0.81 MVA	0.01 kA	90.80	0.02 kA			
						0.81 MVA	0.01 kA	90.80	0.02 kA			
TR GALU 132/33	BB 33 GALU					0.81 MVA	0.01 kA	90.80	0.02 kA			
						0.81 MVA	0.01 kA	90.80	0.02 kA			
						0.81 MVA	0.01 kA	90.80	0.02 kA			
BB 132 GARISSA	A	132.00	0.00	0.00	1.10	166.91 MVA	2.19 kA	-77.91	4.82 kA	2.19	166.91	0.00
	B		83.15	-117.96		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
	C		82.24	118.41		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 WAJIR	BB 132 WAJ					0.82 MVA	0.01 kA	91.94	0.02 kA			
						0.82 MVA	0.01 kA	91.94	0.02 kA			
						0.82 MVA	0.01 kA	91.94	0.02 kA			
Lne 132 MWINGI	BB 132 MWI					53.66 MVA	0.70 kA	111.04	1.55 kA			
						0.62 MVA	0.01 kA	-107.90	0.02 kA			
						0.69 MVA	0.01 kA	-112.70	0.02 kA			
TR GARISSA 132/	BB 33 GARI					0.90 MVA	0.01 kA	90.81	0.03 kA			
						0.90 MVA	0.01 kA	90.81	0.03 kA			
						0.90 MVA	0.01 kA	90.81	0.03 kA			
TR GARISSA 220/	BB 220 GAR					112.50 MVA	1.48 kA	98.00	3.25 kA			
						1.15 MVA	0.02 kA	-78.39	0.03 kA			
						1.12 MVA	0.01 kA	-74.11	0.03 kA			
Shnt GARISSA 13						0.00 MVA	0.00 kA	0.00	0.00 kA			
						0.00 MVA	0.00 kA	0.00	0.00 kA			
						0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 GATUNDU	A	132.00	0.00	0.00	1.10	310.69 MVA	4.08 kA	-72.84	8.25 kA	4.08	310.69	0.00
	B		79.45	-114.84		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		80.01	115.10		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 8			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
Lne 132 MANGU	BB 132 MAN			A	309.90 MVA	4.07 kA	107.21	8.23 kA					
				B	0.83 MVA	0.01 kA	-90.30	0.02 kA					
				C	0.83 MVA	0.01 kA	-90.30	0.02 kA					
TR GATUNDU 132/	BB 33 GATU			A	0.83 MVA	0.01 kA	89.70	0.02 kA					
				B	0.83 MVA	0.01 kA	89.70	0.02 kA					
				C	0.83 MVA	0.01 kA	89.70	0.02 kA					
BB 132 GITARU (A	132.00	0.00	0.00	1.10	1157.35 MVA	15.19 kA	-82.28	35.98 kA	15.19	1157.35	0.00		
					B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93	
					C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93	
Lne 132 GITARU	BB 132 KAM			A	422.05 MVA	5.54 kA	100.42	13.12 kA					
				B	16.12 MVA	0.21 kA	-119.08	0.50 kA					
				C	13.02 MVA	0.17 kA	-65.36	0.40 kA					
Lne 132 GITARU	BB 132 KAM			A	423.68 MVA	5.56 kA	99.89	13.17 kA					
				B	16.18 MVA	0.21 kA	-119.60	0.50 kA					
				C	13.08 MVA	0.17 kA	-65.88	0.41 kA					
TR GITARU 132/1	BB 15 GITA			A	157.22 MVA	2.06 kA	91.18	4.89 kA					
				B	16.15 MVA	0.21 kA	60.66	0.50 kA					
				C	13.05 MVA	0.17 kA	114.38	0.41 kA					
TR GITARU 132/1	BB 15 GITA			A	157.22 MVA	2.06 kA	91.18	4.89 kA					
				B	16.15 MVA	0.21 kA	60.66	0.50 kA					
				C	13.05 MVA	0.17 kA	114.38	0.41 kA					
BB 132 GITHAMBO A	132.00	0.00	0.00	1.10	205.20 MVA	2.69 kA	-70.96	5.27 kA	2.69	205.20	0.00		
					B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97	
					C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97	
Lne 132 MANGU	BB 132 MAN			A	204.33 MVA	2.68 kA	109.12	5.25 kA					
				B	0.92 MVA	0.01 kA	-90.34	0.02 kA					
				C	0.92 MVA	0.01 kA	-90.34	0.02 kA					
TR GITHAMBO 132	BB 33 GITH			A	0.92 MVA	0.01 kA	89.66	0.02 kA					
				B	0.92 MVA	0.01 kA	89.66	0.02 kA					
				C	0.92 MVA	0.01 kA	89.66	0.02 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 9					
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]		Ib [kA]	Sb [MVA]	EFF [-]
BB 132 HOMABAY	A			132.00	0.00	0.00	1.10	199.78	MVA	2.62	kA	-71.88	5.20	kA	2.62	199.78	0.00
	B				81.08	-116.15		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97
	C				81.61	116.26		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97
Lne 132 SONDU				BB 132 SON				116.99	MVA	1.54	kA	106.35	3.05	kA			
							A	1.27	MVA	0.02	kA	128.85	0.03	kA			
							C	1.36	MVA	0.02	kA	152.77	0.04	kA			
Lne 132 HOMABAY				BB 132 NDH				82.92	MVA	1.09	kA	110.63	2.16	kA			
							B	1.27	MVA	0.02	kA	-51.15	0.03	kA			
							C	1.36	MVA	0.02	kA	-27.23	0.04	kA			
BB 132 ISHIARA	A			132.00	0.00	0.00	1.10	412.65	MVA	5.41	kA	-81.23	12.51	kA	5.41	412.65	0.00
	B				82.63	-117.64		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.98
	C				82.63	117.83		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.98
Lne 132 KAMBURU				BB 132 KAM				344.06	MVA	4.51	kA	98.22	10.43	kA			
							B	4.65	MVA	0.06	kA	106.09	0.14	kA			
							C	4.64	MVA	0.06	kA	114.05	0.14	kA			
Lne 132 CHOGORI				BB 132 CHO				0.60	MVA	0.01	kA	90.20	0.02	kA			
							B	0.60	MVA	0.01	kA	90.20	0.02	kA			
							C	0.60	MVA	0.01	kA	90.20	0.02	kA			
Lne 132 KYENI				BB 132 KYE				0.91	MVA	0.01	kA	90.25	0.03	kA			
							B	0.91	MVA	0.01	kA	90.25	0.03	kA			
							C	0.91	MVA	0.01	kA	90.25	0.03	kA			
Lne 132 ISHIARA				BB 132 MER				67.21	MVA	0.88	kA	101.80	2.04	kA			
							B	6.11	MVA	0.08	kA	-77.76	0.19	kA			
							C	6.05	MVA	0.08	kA	-71.71	0.18	kA			
BB 132 ISINYA (	A			132.00	0.00	0.00	1.10	802.56	MVA	10.53	kA	-83.41	25.90	kA	10.53	802.56	0.00
	B				76.36	-104.88		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.91
	C				74.42	105.43		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.89
Lne 132 KONZA				BB 132 KON				106.91	MVA	1.40	kA	109.34	3.45	kA			
							B	28.02	MVA	0.37	kA	-73.54	0.90	kA			
							C	28.09	MVA	0.37	kA	-73.58	0.91	kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 10				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 KAJIADO	BB 132 KAJ											
					A	55.48 MVA	0.73 kA	112.72	1.79 kA			
					B	13.69 MVA	0.18 kA	-69.04	0.44 kA			
					C	13.72 MVA	0.18 kA	-69.08	0.44 kA			
TR ISINYA 220/1	BB 220 ISI											
					A	646.17 MVA	8.48 kA	93.13	20.85 kA			
					B	41.68 MVA	0.55 kA	107.93	1.34 kA			
					C	41.78 MVA	0.55 kA	107.90	1.35 kA			
BB 132 ISIOLO (	A	132.00	0.00	0.00	1.10	267.06 MVA	3.50 kA	-76.78	7.46 kA	3.50	267.06	0.00
	B		89.87	-125.58		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.07
	C		89.30	125.91		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.06
Lne 132 MERU WF	WPP-S/S ME											
					A	40.68 MVA	0.53 kA	101.61	1.14 kA			
					B	15.50 MVA	0.20 kA	-75.36	0.43 kA			
					C	15.44 MVA	0.20 kA	-74.72	0.43 kA			
Lne 132 MERU WF	WPP-S/S ME											
					A	40.68 MVA	0.53 kA	101.61	1.14 kA			
					B	15.50 MVA	0.20 kA	-75.36	0.43 kA			
					C	15.44 MVA	0.20 kA	-74.72	0.43 kA			
Lne 132 NANYUKI	BB 132 NAN											
					A	96.90 MVA	1.27 kA	107.59	2.71 kA			
					B	12.96 MVA	0.17 kA	110.47	0.36 kA			
					C	12.89 MVA	0.17 kA	110.99	0.36 kA			
Lne 132 MERU -	BB 132 MER											
					A	87.94 MVA	1.15 kA	100.08	2.46 kA			
					B	16.85 MVA	0.22 kA	101.28	0.47 kA			
					C	16.78 MVA	0.22 kA	102.06	0.47 kA			
TR ISIOLO 132/3	BB 33 ISIO											
					A	1.33 MVA	0.02 kA	90.42	0.04 kA			
					B	1.33 MVA	0.02 kA	90.42	0.04 kA			
					C	1.33 MVA	0.02 kA	90.42	0.04 kA			
BB 132 JUJA RD	A	132.00	0.00	0.00	1.10	1607.37 MVA	21.09 kA	-83.13	51.70 kA	21.09	1607.37	0.00
	B		76.59	-108.46		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
	C		76.58	108.94		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 ULU -	BB 132 ULU											
					A	96.28 MVA	1.26 kA	109.14	3.10 kA			
					B	17.19 MVA	0.23 kA	-71.26	0.55 kA			
					C	17.01 MVA	0.22 kA	-75.07	0.55 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 11				
	rtd.V. [kV]	Voltage [kV]	c- [deg] Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MANGU	BB 132 MAN		A	87.12 MVA	1.14 kA	103.14	2.80 kA			
			B	6.17 MVA	0.08 kA	-92.01	0.20 kA			
			C	8.21 MVA	0.11 kA	-59.27	0.26 kA			
Lne 132 JUJA -	BB 132 THI		A	38.92 MVA	0.51 kA	94.98	1.25 kA			
			B	4.84 MVA	0.06 kA	118.51	0.16 kA			
			C	4.08 MVA	0.05 kA	79.10	0.13 kA			
Lne 132 JUJA -	BB 132 DAN		A	493.92 MVA	6.48 kA	92.50	15.89 kA			
			B	21.96 MVA	0.29 kA	104.83	0.71 kA			
			C	24.54 MVA	0.32 kA	113.72	0.79 kA			
Lne 132 JUJA -	BB 132 DAN		A	493.92 MVA	6.48 kA	92.50	15.89 kA			
			B	21.96 MVA	0.29 kA	104.83	0.71 kA			
			C	24.54 MVA	0.32 kA	113.72	0.79 kA			
Lne 132 JUJA -	BB 132 RUA		A	107.46 MVA	1.41 kA	109.23	3.46 kA			
			B	15.96 MVA	0.21 kA	-69.66	0.51 kA			
			C	16.05 MVA	0.21 kA	-73.44	0.52 kA			
Lne 132 JUJA -	BB 132 RUA		A	107.46 MVA	1.41 kA	109.23	3.46 kA			
			B	15.96 MVA	0.21 kA	-69.66	0.51 kA			
			C	16.05 MVA	0.21 kA	-73.44	0.52 kA			
TR JUJA 132/66	BB 66 JUJA		A	44.88 MVA	0.59 kA	97.08	1.44 kA			
			B	1.77 MVA	0.02 kA	113.17	0.06 kA			
			C	1.57 MVA	0.02 kA	80.96	0.05 kA			
TR JUJA 132/66	BB 66 JUJA		A	11.21 MVA	0.15 kA	97.08	0.36 kA			
			B	0.45 MVA	0.01 kA	112.90	0.01 kA			
			C	0.40 MVA	0.01 kA	81.27	0.01 kA			
TR JUJA 132/66	BB 66 JUJA		A	22.48 MVA	0.29 kA	97.08	0.72 kA			
			B	0.87 MVA	0.01 kA	113.63	0.03 kA			
			C	0.76 MVA	0.01 kA	80.43	0.02 kA			
TR JUJA 132/66	BB 66 JUJA		A	11.21 MVA	0.15 kA	97.08	0.36 kA			
			B	0.45 MVA	0.01 kA	112.90	0.01 kA			
			C	0.40 MVA	0.01 kA	81.27	0.01 kA			
TR JUJA 132/66	BB 66 JUJA		A	46.55 MVA	0.61 kA	97.08	1.50 kA			
			B	0.91 MVA	0.01 kA	132.06	0.03 kA			
			C	0.71 MVA	0.01 kA	55.98	0.02 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 12						
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR JUJA 132/66	BB 66 JUJA											
					A	11.20 MVA	0.15 kA	97.08	0.36 kA			
					B	0.45 MVA	0.01 kA	112.96	0.01 kA			
					C	0.40 MVA	0.01 kA	81.12	0.01 kA			
TR JUJA 132/66	BB 66 JUJA				A	45.37 MVA	0.60 kA	97.08	1.46 kA			
					B	1.49 MVA	0.02 kA	116.71	0.05 kA			
					C	1.28 MVA	0.02 kA	76.70	0.04 kA			
BB 132 KABARNET A	132.00	0.00	0.00	1.10		239.67 MVA	3.14 kA	-79.41	7.01 kA	3.14	239.67	0.00
B		83.08	-118.43			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		82.48	118.75			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 NYAHURU	BB 132 RUM				A	62.86 MVA	0.82 kA	101.90	1.84 kA			
					B	2.31 MVA	0.03 kA	-85.38	0.07 kA			
					C	2.27 MVA	0.03 kA	-84.91	0.07 kA			
Lne 132 LESSOS	BB 132 LES				A	175.97 MVA	2.31 kA	100.17	5.15 kA			
					B	1.44 MVA	0.02 kA	97.10	0.04 kA			
					C	1.40 MVA	0.02 kA	97.96	0.04 kA			
TR KABARNET 132	BB 33 KABA				A	0.88 MVA	0.01 kA	90.54	0.03 kA			
					B	0.88 MVA	0.01 kA	90.54	0.03 kA			
					C	0.88 MVA	0.01 kA	90.54	0.03 kA			
BB 132 KAJIADO A	132.00	0.00	0.00	1.10		564.38 MVA	7.41 kA	-77.66	16.46 kA	7.41	564.38	0.00
B		76.98	-110.79			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
C		78.43	110.52			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 KONZA	BB 132 KON				A	101.86 MVA	1.34 kA	107.74	2.97 kA			
					B	9.65 MVA	0.13 kA	-64.47	0.28 kA			
					C	9.68 MVA	0.13 kA	-64.52	0.28 kA			
Lne 132 KAJIADO	BB 132 ISI				A	461.89 MVA	6.06 kA	101.19	13.47 kA			
					B	8.59 MVA	0.11 kA	119.23	0.25 kA			
					C	8.61 MVA	0.11 kA	119.15	0.25 kA			
TR KAJIADO 132/	BB 33 KAJI				A	1.22 MVA	0.02 kA	88.44	0.04 kA			
					B	1.22 MVA	0.02 kA	88.44	0.04 kA			
					C	1.22 MVA	0.02 kA	88.44	0.04 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 13					
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]		Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KAMBTRF	A	132.00	0.00	0.00	1.10	1376.86	MVA	18.07	kA	-84.63	44.56	kA	18.07	1376.86	0.00		
	B		79.51	-108.68		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.93		
	C		78.89	109.42		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.92		
TR KAMBURU 220/		BB 220 KAM				376.46	MVA	4.94	kA	95.50	12.18	kA					
						9.98	MVA	0.13	kA	-143.67	0.32	kA					
						3.90	MVA	0.05	kA	-47.98	0.13	kA					
TR KAMBURU 220/		BB 220 KAM				376.46	MVA	4.94	kA	95.50	12.18	kA					
						9.98	MVA	0.13	kA	-143.67	0.32	kA					
						3.90	MVA	0.05	kA	-47.98	0.13	kA					
zpu_1103_1723_1		BB 132 KAM				311.97	MVA	4.09	kA	95.21	10.10	kA					
						9.98	MVA	0.13	kA	36.33	0.32	kA					
						3.90	MVA	0.05	kA	132.02	0.13	kA					
zpu_1103_1723_2		BB 132 KAM				311.97	MVA	4.09	kA	95.21	10.10	kA					
						9.98	MVA	0.13	kA	36.33	0.32	kA					
						3.90	MVA	0.05	kA	132.02	0.13	kA					
BB 132 KAMBURU	A	132.00	0.00	0.00	1.10	1384.86	MVA	18.17	kA	-84.48	44.73	kA	18.17	1384.86	0.00		
	B		79.39	-108.70		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.93		
	C		78.89	109.37		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.92		
Lne 132 KAMBURU		BB 132 KIG				31.33	MVA	0.41	kA	102.70	1.01	kA					
						10.44	MVA	0.14	kA	-83.09	0.34	kA					
						10.30	MVA	0.14	kA	-74.08	0.33	kA					
Lne 132 GITARU		BB 132 GIT				141.60	MVA	1.86	kA	93.52	4.57	kA					
						6.89	MVA	0.09	kA	43.04	0.22	kA					
						7.37	MVA	0.10	kA	161.58	0.24	kA					
Lne 132 GITARU		BB 132 GIT				142.15	MVA	1.87	kA	93.00	4.59	kA					
						6.91	MVA	0.09	kA	42.51	0.22	kA					
						7.40	MVA	0.10	kA	161.06	0.24	kA					
Lne 132 KAMBURU		BB 132 MAS				84.73	MVA	1.11	kA	100.86	2.74	kA					
						5.10	MVA	0.07	kA	35.70	0.16	kA					
						5.72	MVA	0.08	kA	24.15	0.18	kA					

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 14				
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 132 KAMBURU	BB 132 ISH			A	44.58 MVA	0.58 kA	98.51	1.44 kA				
				B	10.16 MVA	0.13 kA	-83.05	0.33 kA				
				C	10.00 MVA	0.13 kA	-69.42	0.32 kA				
TR KAMBURU 132/	BB 11 KAMB			A	54.52 MVA	0.72 kA	91.24	1.76 kA				
				B	4.93 MVA	0.06 kA	85.79	0.16 kA				
				C	4.41 MVA	0.06 kA	91.80	0.14 kA				
TR KAMBURU 132/	BB 11 KAMB			A	54.52 MVA	0.72 kA	91.24	1.76 kA				
				B	4.93 MVA	0.06 kA	85.79	0.16 kA				
				C	4.41 MVA	0.06 kA	91.80	0.14 kA				
TR KAMBURU 132/	BB 11 KAMB			A	54.52 MVA	0.72 kA	91.24	1.76 kA				
				B	4.93 MVA	0.06 kA	85.79	0.16 kA				
				C	4.41 MVA	0.06 kA	91.80	0.14 kA				
TR KAMBURU 132/	BB 33 KAMB			A	0.19 MVA	0.00 kA	90.86	0.01 kA				
				B	0.19 MVA	0.00 kA	90.86	0.01 kA				
				C	0.19 MVA	0.00 kA	90.86	0.01 kA				
zpu_1103_1723_1	BB 132 KAM			A	389.07 MVA	5.11 kA	96.20	12.57 kA				
				B	9.55 MVA	0.13 kA	-159.02	0.31 kA				
				C	1.55 MVA	0.02 kA	-23.25	0.05 kA				
zpu_1103_1723_2	BB 132 KAM			A	389.07 MVA	5.11 kA	96.20	12.57 kA				
				B	9.55 MVA	0.13 kA	-159.02	0.31 kA				
				C	1.55 MVA	0.02 kA	-23.25	0.05 kA				
BB 132 KIBOKO (	A	132.00	0.00	0.00	1.10	181.07 MVA	2.38 kA	-69.29	4.52 kA	2.38	181.07	0.00
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
Lne 132 SULTAN	BB 132 SUL			A	129.05 MVA	1.69 kA	110.73	3.22 kA				
				B	2.14 MVA	0.03 kA	102.14	0.05 kA				
				C	2.21 MVA	0.03 kA	100.14	0.06 kA				
Lne 132 KIBOKO	BB 132 MTI			A	52.02 MVA	0.68 kA	110.64	1.30 kA				
				B	2.14 MVA	0.03 kA	-77.86	0.05 kA				
				C	2.21 MVA	0.03 kA	-79.86	0.06 kA				
Ld KIBOKO (132				A	0.00 MVA	0.00 kA	0.00	0.00 kA				
				B	0.00 MVA	0.00 kA	0.00	0.00 kA				
				C	0.00 MVA	0.00 kA	0.00	0.00 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 15			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 KIGANJO	A	132.00	0.00	0.00	1.10	313.96 MVA	4.12 kA	-73.59	8.61 kA	4.12	313.96	0.00			
	B		84.89	-123.11		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.01			
	C		88.10	121.96		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.05			
Lne 132 KAMBURU	BB 132 KAM				A	102.28 MVA	1.34 kA	101.10	2.80 kA						
					B	23.95 MVA	0.31 kA	-87.70	0.66 kA						
					C	24.06 MVA	0.32 kA	-88.31	0.66 kA						
Lne 132 KIGANJO	BB 132 NAN				A	95.60 MVA	1.25 kA	107.12	2.62 kA						
					B	4.89 MVA	0.06 kA	66.16	0.13 kA						
					C	5.37 MVA	0.07 kA	63.55	0.15 kA						
Lne 132 KIGANJO	BB 132 KUT				A	112.96 MVA	1.48 kA	111.30	3.10 kA						
					B	15.58 MVA	0.20 kA	101.48	0.43 kA						
					C	15.39 MVA	0.20 kA	102.25	0.42 kA						
TR KIGANJO 132/	BB 33 KIGA				A	2.10 MVA	0.03 kA	87.76	0.06 kA						
					B	2.10 MVA	0.03 kA	87.76	0.06 kA						
					C	2.10 MVA	0.03 kA	87.76	0.06 kA						
TR KIGANJO 132/	BB 33 KIGA				A	2.10 MVA	0.03 kA	87.76	0.06 kA						
					B	2.10 MVA	0.03 kA	87.76	0.06 kA						
					C	2.10 MVA	0.03 kA	87.76	0.06 kA						
BB 132 KILIFI (	A	132.00	0.00	0.00	1.10	190.10 MVA	2.49 kA	-67.96	4.61 kA	2.49	190.10	0.00			
	B		81.66	-116.32		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97			
	C		81.75	116.70		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97			
Lne 132 MTWAPA	BB 132 MTW				A	185.61 MVA	2.44 kA	112.60	4.50 kA						
					B	4.85 MVA	0.06 kA	-89.86	0.12 kA						
					C	4.85 MVA	0.06 kA	-89.86	0.12 kA						
TR KILIFI 132/3	BB 33 KILI				A	2.42 MVA	0.03 kA	90.14	0.06 kA						
					B	2.42 MVA	0.03 kA	90.14	0.06 kA						
					C	2.42 MVA	0.03 kA	90.14	0.06 kA						
TR KILIFI 132/3	BB 33 KILI				A	2.42 MVA	0.03 kA	90.14	0.06 kA						
					B	2.42 MVA	0.03 kA	90.14	0.06 kA						
					C	2.42 MVA	0.03 kA	90.14	0.06 kA						

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 16			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Shn KILIFI 132k											
				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KILIMAMB	132.00	0.00	0.00	1.10	330.40 MVA	4.34 kA	-71.44	8.56 kA	4.34	330.40	0.00
		80.78	-117.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
		81.87	116.83		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 THIKA -	BB 132 THI										
				A	330.40 MVA	4.34 kA	108.56	8.56 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Ld KILIMAMBOGO											
				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KINDARUM	132.00	0.00	0.00	1.10	328.26 MVA	4.31 kA	-78.06	9.53 kA	4.31	328.26	0.00
		82.08	-111.49		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
		78.87	112.47		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 KINDARU	BB 132 MAN										
				A	99.45 MVA	1.30 kA	110.32	2.89 kA			
				B	11.45 MVA	0.15 kA	-97.04	0.33 kA			
				C	10.38 MVA	0.14 kA	-70.12	0.30 kA			
Lne 132 KINDARU	BB 132 MWI										
				A	84.09 MVA	1.10 kA	109.33	2.44 kA			
				B	10.57 MVA	0.14 kA	-90.87	0.31 kA			
				C	9.95 MVA	0.13 kA	-69.56	0.29 kA			
TR KINDARUMA 13	BB 11 1KIN										
				A	50.18 MVA	0.66 kA	92.15	1.46 kA			
				B	7.51 MVA	0.10 kA	86.15	0.22 kA			
				C	6.95 MVA	0.09 kA	109.75	0.20 kA			
TR KINDARUMA 13	BB 11 1KIN										
				A	50.18 MVA	0.66 kA	92.15	1.46 kA			
				B	7.51 MVA	0.10 kA	86.15	0.22 kA			
				C	6.95 MVA	0.09 kA	109.75	0.20 kA			
TR KINDARUMA 13	BB 11 1KIN										
				A	48.28 MVA	0.63 kA	92.13	1.40 kA			
				B	6.97 MVA	0.09 kA	85.43	0.20 kA			
				C	6.43 MVA	0.08 kA	111.03	0.19 kA			

Grid: 1 KENYA		System Stage: 1 KENYA							Annex: LF.001 / 17			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KIPEVU (	A	132.00	0.00	0.00	1.10	928.24 MVA	12.18 kA	-83.74	29.58 kA	12.18	928.24	0.00
	B		80.09	-107.72		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
	C		79.80	108.55		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 KIPEVU	BB 132 KIP				A	307.57 MVA	4.04 kA	92.69	9.80 kA			
					B	14.47 MVA	0.19 kA	-47.49	0.46 kA			
					C	17.73 MVA	0.23 kA	-125.20	0.57 kA			
Lne 132 KIPEVU	BB 132 RAB				A	145.41 MVA	1.91 kA	105.06	4.63 kA			
					B	9.13 MVA	0.12 kA	-106.94	0.29 kA			
					C	7.41 MVA	0.10 kA	-62.88	0.24 kA			
Lne 132 KIPEVU	BB 132 RAB				A	145.41 MVA	1.91 kA	105.06	4.63 kA			
					B	9.13 MVA	0.12 kA	-106.94	0.29 kA			
					C	7.41 MVA	0.10 kA	-62.88	0.24 kA			
Lne 132 KIPEVU	BB 132 RAB				A	150.41 MVA	1.97 kA	92.36	4.79 kA			
					B	9.45 MVA	0.12 kA	-119.64	0.30 kA			
					C	7.66 MVA	0.10 kA	-75.59	0.24 kA			
TR KIPEVU 132/1	BB 11 1KIP				A	0.65 MVA	0.01 kA	90.73	0.02 kA			
					B	0.65 MVA	0.01 kA	90.73	0.02 kA			
					C	0.65 MVA	0.01 kA	90.73	0.02 kA			
TR KIPEVU 132/1	BB 11 2KIP				A	0.72 MVA	0.01 kA	90.73	0.02 kA			
					B	0.72 MVA	0.01 kA	90.73	0.02 kA			
					C	0.72 MVA	0.01 kA	90.73	0.02 kA			
TR KIPEVU 132/1	BB 11 3KIP				A	0.72 MVA	0.01 kA	90.73	0.02 kA			
					B	0.72 MVA	0.01 kA	90.73	0.02 kA			
					C	0.72 MVA	0.01 kA	90.73	0.02 kA			
TR KIPEVU 132/1	BB 11 KIPE				A	89.01 MVA	1.17 kA	91.59	2.84 kA			
					B	14.97 MVA	0.20 kA	89.42	0.48 kA			
					C	14.37 MVA	0.19 kA	86.72	0.46 kA			
TR KIPEVU 132/1	BB 11 KIPE				A	89.01 MVA	1.17 kA	91.59	2.84 kA			
					B	14.97 MVA	0.20 kA	89.42	0.48 kA			
					C	14.37 MVA	0.19 kA	86.72	0.46 kA			
TR KIPEVU 132/3	BB 33 1KIP				A	1.44 MVA	0.02 kA	90.73	0.05 kA			
					B	1.44 MVA	0.02 kA	90.73	0.05 kA			
					C	1.44 MVA	0.02 kA	90.73	0.05 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 18			
	rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
TR KIPEVU 132/3	BB 33 1KIP			A	1.44 MVA	0.02 kA	90.73	0.05 kA					
				B	1.44 MVA	0.02 kA	90.73	0.05 kA					
				C	1.44 MVA	0.02 kA	90.73	0.05 kA					
TR KIPEVU 132/3	BB 33 1KIP			A	1.44 MVA	0.02 kA	90.73	0.05 kA					
				B	1.44 MVA	0.02 kA	90.73	0.05 kA					
				C	1.44 MVA	0.02 kA	90.73	0.05 kA					
BB 132 KIPEVU D	A	132.00	0.00	0.00	1.10	910.39 MVA	11.95 kA	-83.60	28.98 kA	11.95	910.39	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 KIPEVU	BB 132 KIP			A	564.53 MVA	7.41 kA	99.00	17.97 kA					
				B	13.70 MVA	0.18 kA	140.90	0.44 kA					
				C	15.87 MVA	0.21 kA	51.48	0.51 kA					
Lne 132 KIPEVU	BB 132 RAB			A	167.47 MVA	2.20 kA	92.90	5.33 kA					
				B	9.06 MVA	0.12 kA	-124.78	0.29 kA					
				C	7.18 MVA	0.09 kA	-67.67	0.23 kA					
TR KIPEVU 132/1	BB 11 1KIP			A	66.70 MVA	0.88 kA	91.53	2.12 kA					
				B	6.84 MVA	0.09 kA	-8.24	0.22 kA					
				C	6.27 MVA	0.08 kA	-151.83	0.20 kA					
TR KIPEVU 132/1	BB 11 2KIP			A	113.25 MVA	1.49 kA	91.47	3.61 kA					
				B	9.03 MVA	0.12 kA	-1.41	0.29 kA					
				C	7.62 MVA	0.10 kA	-158.36	0.24 kA					
BB 132 KISII (P	A	132.00	0.00	0.00	1.10	230.22 MVA	3.02 kA	-71.64	5.91 kA	3.02	230.22	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 KISII	BB 132 SOT			A	154.66 MVA	2.03 kA	109.27	3.97 kA					
				B	7.97 MVA	0.10 kA	-84.07	0.20 kA					
				C	7.74 MVA	0.10 kA	-81.81	0.20 kA					
Lne 132 KISII	BB 132 AWE			A	67.41 MVA	0.88 kA	108.49	1.73 kA					
				B	0.95 MVA	0.01 kA	-137.84	0.02 kA					
				C	1.34 MVA	0.02 kA	-137.27	0.03 kA					

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 19			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR KISII 132/33	BB 33 KISI			A	4.29 MVA	0.06 kA	90.78	0.11 kA			
				B	4.29 MVA	0.06 kA	90.78	0.11 kA			
				C	4.29 MVA	0.06 kA	90.78	0.11 kA			
TR KISII 132/33	BB 33 KISI			A	4.29 MVA	0.06 kA	90.78	0.11 kA			
				B	4.29 MVA	0.06 kA	90.78	0.11 kA			
				C	4.29 MVA	0.06 kA	90.78	0.11 kA			
Shn KISUMU 132k				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KISUMU (A	132.00	0.00	0.00	1.10	454.44 MVA	5.96 kA	-79.90	13.78 kA	5.96	454.44	0.00
B		78.94	-111.19		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		78.09	111.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 MUHORON	BB 132 MUH			A	106.86 MVA	1.40 kA	113.42	3.24 kA			
				B	13.57 MVA	0.18 kA	-69.06	0.41 kA			
				C	13.28 MVA	0.17 kA	-66.51	0.40 kA			
Lne 132 KISUMU	BB 132 SON			A	110.74 MVA	1.45 kA	100.49	3.36 kA			
				B	1.49 MVA	0.02 kA	-93.31	0.05 kA			
				C	3.63 MVA	0.05 kA	-130.04	0.11 kA			
TR KISUMU 132/3	BB 33 KISU			A	6.91 MVA	0.09 kA	91.10	0.21 kA			
				B	6.91 MVA	0.09 kA	91.10	0.21 kA			
				C	6.91 MVA	0.09 kA	91.10	0.21 kA			
TR KISUMU 132/3	BB 33 KISU			A	6.91 MVA	0.09 kA	91.10	0.21 kA			
				B	6.91 MVA	0.09 kA	91.10	0.21 kA			
				C	6.91 MVA	0.09 kA	91.10	0.21 kA			
TR KISUMU 220/1	BB 220 KIS			A	113.63 MVA	1.49 kA	94.23	3.44 kA			
				B	2.26 MVA	0.03 kA	175.66	0.07 kA			
				C	1.46 MVA	0.02 kA	157.18	0.04 kA			
TR KISUMU 220/1	BB 220 KIS			A	113.63 MVA	1.49 kA	94.23	3.44 kA			
				B	2.26 MVA	0.03 kA	175.66	0.07 kA			
				C	1.46 MVA	0.02 kA	157.18	0.04 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 20				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KITALE (	A	132.00	0.00	0.00	1.10	231.46 MVA	3.04 kA	-76.04	6.52 kA	3.04	231.46	0.00
	B		80.92	-114.68		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		79.49	115.41		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 ELDORET		BB 132 ELD				119.91 MVA	1.57 kA	111.64	3.38 kA			
						7.15 MVA	0.09 kA	-74.64	0.20 kA			
						6.94 MVA	0.09 kA	-75.06	0.20 kA			
TR KITALE 132/3		BB 33 KITA				0.78 MVA	0.01 kA	91.46	0.02 kA			
						0.78 MVA	0.01 kA	91.46	0.02 kA			
						0.78 MVA	0.01 kA	91.46	0.02 kA			
TR KITALE 220/1		BB 220 KIT				112.98 MVA	1.48 kA	95.90	3.18 kA			
						6.40 MVA	0.08 kA	107.03	0.18 kA			
						6.18 MVA	0.08 kA	106.62	0.17 kA			
BB 132 KITUI (P	A	132.00	0.00	0.00	1.10	211.24 MVA	2.77 kA	-72.00	5.50 kA	2.77	211.24	0.00
	B		82.16	-116.89		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
	C		82.25	117.06		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 SULTAN		BB 132 WOT				70.93 MVA	0.93 kA	109.95	1.85 kA			
						3.09 MVA	0.04 kA	-84.96	0.08 kA			
						2.85 MVA	0.04 kA	-65.56	0.07 kA			
Lne 132 MWINGI		BB 132 MWI				139.59 MVA	1.83 kA	107.12	3.63 kA			
						2.27 MVA	0.03 kA	96.87	0.06 kA			
						2.13 MVA	0.03 kA	123.67	0.06 kA			
TR KITUI 132/33		BB 33 KITU				0.83 MVA	0.01 kA	90.03	0.02 kA			
						0.83 MVA	0.01 kA	90.03	0.02 kA			
						0.83 MVA	0.01 kA	90.03	0.02 kA			
BB 132 KOKOTONI	A	132.00	0.00	0.00	1.10	601.24 MVA	7.89 kA	-75.64	16.64 kA	7.89	601.24	0.00
	B		79.22	-113.31		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
	C		82.50	113.24		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 KOKOTON		BB 132 RAB				564.39 MVA	7.41 kA	104.24	15.62 kA			
						3.80 MVA	0.05 kA	99.62	0.11 kA			
						3.44 MVA	0.05 kA	108.59	0.10 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 21				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 KOKOTON	BB 132 MAR											
					A	36.87 MVA	0.48 kA	106.19	1.02 kA			
					B	3.80 MVA	0.05 kA	-80.38	0.11 kA			
					C	3.44 MVA	0.05 kA	-71.41	0.10 kA			
Ld KOKOTONI (13					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KONZA (P A	132.00	0.00	0.00	1.10		555.20 MVA	7.29 kA	-74.77	15.31 kA	7.29	555.20	0.00
B		78.96	-114.55			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		80.66	114.14			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 ULU -	BB 132 ULU				A	172.77 MVA	2.27 kA	110.19	4.76 kA			
					B	13.69 MVA	0.18 kA	-66.29	0.38 kA			
					C	13.69 MVA	0.18 kA	-64.81	0.38 kA			
Lne 132 SULTAN	BB 132 SUL				A	69.79 MVA	0.92 kA	109.71	1.92 kA			
					B	6.30 MVA	0.08 kA	-64.03	0.17 kA			
					C	6.40 MVA	0.08 kA	-68.04	0.18 kA			
Lne 132 KONZA	BB 132 KAJ				A	105.77 MVA	1.39 kA	104.00	2.92 kA			
					B	6.09 MVA	0.08 kA	120.05	0.17 kA			
					C	6.11 MVA	0.08 kA	119.74	0.17 kA			
Lne 132 KONZA	BB 132 ISI				A	206.12 MVA	2.70 kA	100.37	5.68 kA			
					B	11.71 MVA	0.15 kA	116.76	0.32 kA			
					C	11.76 MVA	0.15 kA	116.44	0.32 kA			
Lne 132 KONZA	BB 132 MAC				A	2.48 MVA	0.03 kA	88.75	0.07 kA			
					B	2.48 MVA	0.03 kA	88.75	0.07 kA			
					C	2.48 MVA	0.03 kA	88.75	0.07 kA			
Ld KONZA (132kV					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KUTUS (P A	132.00	0.00	0.00	1.10		312.13 MVA	4.10 kA	-71.57	8.02 kA	4.10	312.13	0.00
B		82.84	-118.43			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		83.26	118.56			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 22			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MASINGA	BB 132 MAS			A	191.29 MVA	2.51 kA	109.23	4.91 kA			
				B	5.23 MVA	0.07 kA	118.95	0.13 kA			
				C	5.08 MVA	0.07 kA	122.35	0.13 kA			
Lne 132 KIGANJO	BB 132 KIG			A	115.34 MVA	1.51 kA	108.03	2.96 kA			
				B	10.63 MVA	0.14 kA	-76.36	0.27 kA			
				C	10.41 MVA	0.14 kA	-74.99	0.27 kA			
TR KUTUS 132/33	BB 33 KUTU			A	7.73 MVA	0.10 kA	91.48	0.20 kA			
				B	5.08 MVA	0.07 kA	88.65	0.13 kA			
				C	5.09 MVA	0.07 kA	88.40	0.13 kA			
TR KUTUS 132/33	BB 33 KUTU			A	1.93 MVA	0.03 kA	-83.58	0.05 kA			
				B	0.69 MVA	0.01 kA	98.14	0.02 kA			
				C	0.68 MVA	0.01 kA	100.15	0.02 kA			
BB 132 KYENI (P A	132.00	0.00	0.00	1.10	209.69 MVA	2.75 kA	-74.31	5.61 kA	2.75	209.69	0.00
B		82.96	-118.68		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		83.19	118.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
Lne 132 KYENI	BB 132 ISH			A	208.78 MVA	2.74 kA	105.76	5.59 kA			
				B	0.95 MVA	0.01 kA	-90.12	0.03 kA			
				C	0.95 MVA	0.01 kA	-90.12	0.03 kA			
TR KYENI 132/33	BB 33 KYEN			A	0.95 MVA	0.01 kA	89.88	0.03 kA			
				B	0.95 MVA	0.01 kA	89.88	0.03 kA			
				C	0.95 MVA	0.01 kA	89.88	0.03 kA			
BB 132 LANET (P A	132.00	0.00	0.00	1.10	623.58 MVA	8.18 kA	-74.22	16.95 kA	8.18	623.58	0.00
B		80.22	-113.76		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
C		80.14	114.37		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 LANET	BB 132 NAI			A	127.56 MVA	1.67 kA	110.68	3.47 kA			
				B	9.04 MVA	0.12 kA	-81.81	0.25 kA			
				C	8.22 MVA	0.11 kA	-74.51	0.22 kA			
Lne 132 LANET	BB 132 NAI			A	127.56 MVA	1.67 kA	110.68	3.47 kA			
				B	9.04 MVA	0.12 kA	-81.81	0.25 kA			
				C	8.22 MVA	0.11 kA	-74.51	0.22 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 23					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LANET	BB 132 NAK			A	183.78 MVA	2.41 kA	102.49	4.99 kA			
				B	7.80 MVA	0.10 kA	99.45	0.21 kA			
				C	7.01 MVA	0.09 kA	108.17	0.19 kA			
Lne 132 LANET	BB 132 NAK			A	183.78 MVA	2.41 kA	102.49	4.99 kA			
				B	7.80 MVA	0.10 kA	99.45	0.21 kA			
				C	7.01 MVA	0.09 kA	108.17	0.19 kA			
TR LANET 132/33	BB 33 LANE			A	0.84 MVA	0.01 kA	90.37	0.02 kA			
				B	0.84 MVA	0.01 kA	90.37	0.02 kA			
				C	0.84 MVA	0.01 kA	90.37	0.02 kA			
TR LANET 132/33	BB 33 LANE			A	0.84 MVA	0.01 kA	90.37	0.02 kA			
				B	0.84 MVA	0.01 kA	90.37	0.02 kA			
				C	0.84 MVA	0.01 kA	90.37	0.02 kA			
TR LANET 132/33	BB 33 LANE			A	0.84 MVA	0.01 kA	90.37	0.02 kA			
				B	0.84 MVA	0.01 kA	90.37	0.02 kA			
				C	0.84 MVA	0.01 kA	90.37	0.02 kA			
BB 132 LESSOS (	A 132.00	0.00	0.00	1.10	805.16 MVA	10.56 kA	-78.69	23.16 kA	10.56	805.16	0.00
	B	80.10	-111.77		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C	77.66	112.94		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 ELDORET	BB 132 ELD			A	48.74 MVA	0.64 kA	99.77	1.40 kA			
				B	3.67 MVA	0.05 kA	127.41	0.11 kA			
				C	3.37 MVA	0.04 kA	123.01	0.10 kA			
Lne 132 MUHORON	BB 132 MUH			A	76.65 MVA	1.01 kA	110.14	2.20 kA			
				B	7.88 MVA	0.10 kA	-87.48	0.23 kA			
				C	7.99 MVA	0.10 kA	-88.09	0.23 kA			
Lne 132 MUSAGA	BB 132 MUS			A	29.08 MVA	0.38 kA	98.66	0.84 kA			
				B	2.68 MVA	0.04 kA	105.12	0.08 kA			
				C	2.85 MVA	0.04 kA	139.43	0.08 kA			
Lne 132 MUSAGA	BB 132 MUS			A	29.08 MVA	0.38 kA	98.66	0.84 kA			
				B	2.68 MVA	0.04 kA	105.12	0.08 kA			
				C	2.85 MVA	0.04 kA	139.43	0.08 kA			
Lne 132 LESSOS	BB 132 KAB			A	49.24 MVA	0.65 kA	101.13	1.42 kA			
				B	6.90 MVA	0.09 kA	-86.76	0.20 kA			
				C	6.61 MVA	0.09 kA	-84.49	0.19 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 24				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LESS0S	BB 132 NAK					76.78 MVA	1.01 kA	109.83	2.21 kA			
						7.17 MVA	0.09 kA	-85.34	0.21 kA			
						7.24 MVA	0.10 kA	-85.68	0.21 kA			
Lne 132 LESS0S	BB 132 MAK					76.97 MVA	1.01 kA	109.80	2.21 kA			
						6.98 MVA	0.09 kA	-85.36	0.20 kA			
						7.05 MVA	0.09 kA	-85.70	0.20 kA			
Lne 132 LESS0S	BB 132 LES					209.06 MVA	2.74 kA	97.24	6.01 kA			
						8.31 MVA	0.11 kA	83.28	0.24 kA			
						9.27 MVA	0.12 kA	76.30	0.27 kA			
Lne 132 LESS0S	BB 132 LES					209.06 MVA	2.74 kA	97.24	6.01 kA			
						8.31 MVA	0.11 kA	83.28	0.24 kA			
						9.27 MVA	0.12 kA	76.30	0.27 kA			
TR LESS0S 132/3	BB 33 LESS					4.27 MVA	0.06 kA	92.74	0.12 kA			
						4.27 MVA	0.06 kA	92.74	0.12 kA			
						4.27 MVA	0.06 kA	92.74	0.12 kA			
BB 132 LESSTRF	A	132.00	0.00	0.00	1.10	805.20 MVA	10.57 kA	-78.69	23.16 kA	10.57	805.20	0.00
	B		80.10	-111.77		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		77.66	112.93		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 LESS0S	BB 132 LES					194.47 MVA	2.55 kA	105.68	5.59 kA			
						8.33 MVA	0.11 kA	-96.67	0.24 kA			
						9.29 MVA	0.12 kA	-103.64	0.27 kA			
Lne 132 LESS0S	BB 132 LES					194.47 MVA	2.55 kA	105.68	5.59 kA			
						8.33 MVA	0.11 kA	-96.67	0.24 kA			
						9.29 MVA	0.12 kA	-103.64	0.27 kA			
TR LESS0S 220/1	BB 220 LES					104.28 MVA	1.37 kA	97.26	3.00 kA			
						3.84 MVA	0.05 kA	82.52	0.11 kA			
						4.33 MVA	0.06 kA	75.12	0.12 kA			
TR LESS0S 220/1	BB 220 LES					104.28 MVA	1.37 kA	97.26	3.00 kA			
						3.84 MVA	0.05 kA	82.52	0.11 kA			
						4.33 MVA	0.06 kA	75.12	0.12 kA			
TR LESS0S 220/1	BB 220 LES					104.28 MVA	1.37 kA	97.26	3.00 kA			
						3.84 MVA	0.05 kA	82.52	0.11 kA			
						4.33 MVA	0.06 kA	75.12	0.12 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 25				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR LESSOS 220/1	BB 220 LES					104.28 MVA	1.37 kA	97.26	3.00 kA			
						3.84 MVA	0.05 kA	82.52	0.11 kA			
						4.33 MVA	0.06 kA	75.12	0.12 kA			
TR LESSTRF 132/	BB 11 LESS					0.66 MVA	0.01 kA	92.74	0.02 kA			
						0.66 MVA	0.01 kA	92.74	0.02 kA			
						0.66 MVA	0.01 kA	92.74	0.02 kA			
TR LESSTRF 132/	BB 11 LESS					0.66 MVA	0.01 kA	92.74	0.02 kA			
						0.66 MVA	0.01 kA	92.74	0.02 kA			
						0.66 MVA	0.01 kA	92.74	0.02 kA			
BB 132 LUNGA LU A	132.00	0.00	0.00	1.10		122.95 MVA	1.61 kA	-69.52	3.08 kA	1.61	122.95	0.00
B		82.56	-117.40			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
C		82.39	117.70			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 GALU -	BB 132 GAL					122.43 MVA	1.61 kA	110.57	3.07 kA			
						0.55 MVA	0.01 kA	-89.74	0.01 kA			
						0.55 MVA	0.01 kA	-89.74	0.01 kA			
TR LUNGA 132/33	BB 33 LUNG					0.55 MVA	0.01 kA	90.26	0.01 kA			
						0.55 MVA	0.01 kA	90.26	0.01 kA			
						0.55 MVA	0.01 kA	90.26	0.01 kA			
BB 132 MACHAKOS A	132.00	0.00	0.00	1.10		309.73 MVA	4.06 kA	-71.52	8.03 kA	4.06	309.73	0.00
B		80.74	-116.79			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
C		81.84	116.49			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 KONZA	BB 132 KON					307.11 MVA	4.03 kA	108.66	7.97 kA			
						2.78 MVA	0.04 kA	-90.92	0.07 kA			
						2.78 MVA	0.04 kA	-90.92	0.07 kA			
TR MACHAKOS 132	BB 33 MACH					2.78 MVA	0.04 kA	89.08	0.07 kA			
						2.78 MVA	0.04 kA	89.08	0.07 kA			
						2.78 MVA	0.04 kA	89.08	0.07 kA			
BB 132 MAKUTANO A	132.00	0.00	0.00	1.10		335.03 MVA	4.40 kA	-69.93	8.44 kA	4.40	335.03	0.00
B		81.60	-117.32			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		82.29	117.34			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 26					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LESSOS	BB 132 LES			A	161.72 MVA	2.12 kA	110.15	4.07 kA			
				B	1.16 MVA	0.02 kA	-84.76	0.03 kA			
				C	0.93 MVA	0.01 kA	-67.61	0.02 kA			
Lne 132 NAKURU	BB 132 NAK			A	172.47 MVA	2.26 kA	110.10	4.34 kA			
				B	0.29 MVA	0.00 kA	113.22	0.01 kA			
				C	0.36 MVA	0.00 kA	-174.79	0.01 kA			
TR MAKUTANO 132	BB 33 MAKU			A	0.89 MVA	0.01 kA	89.54	0.02 kA			
				B	0.89 MVA	0.01 kA	89.54	0.02 kA			
				C	0.89 MVA	0.01 kA	89.54	0.02 kA			
BB 132 MANGU (P	132.00	0.00	0.00	1.10	560.85 MVA	7.36 kA	-77.36	16.02 kA	7.36	560.85	0.00
A											
B		77.56	-110.14		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
C		76.54	111.30		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 KINDARU	BB 132 KIN			A	79.13 MVA	1.04 kA	107.02	2.26 kA			
				B	9.25 MVA	0.12 kA	-69.37	0.26 kA			
				C	9.32 MVA	0.12 kA	-91.02	0.27 kA			
Lne 132 MANGU	BB 132 JUJ			A	225.97 MVA	2.97 kA	109.62	6.46 kA			
				B	34.60 MVA	0.45 kA	-73.20	0.99 kA			
				C	32.49 MVA	0.43 kA	-77.56	0.93 kA			
Lne 132 MANGU	BB 132 GAT			A	0.67 MVA	0.01 kA	91.68	0.02 kA			
				B	0.67 MVA	0.01 kA	91.68	0.02 kA			
				C	0.67 MVA	0.01 kA	91.68	0.02 kA			
Lne 132 MANGU	BB 132 GIT			A	0.69 MVA	0.01 kA	91.80	0.02 kA			
				B	0.69 MVA	0.01 kA	91.80	0.02 kA			
				C	0.69 MVA	0.01 kA	91.80	0.02 kA			
TR MANGU 132/66	BB 66 MANG			A	129.23 MVA	1.70 kA	95.25	3.69 kA			
				B	21.27 MVA	0.28 kA	108.11	0.61 kA			
				C	20.13 MVA	0.26 kA	99.70	0.58 kA			
TR MANGU 132/66	BB 66 MANG			A	129.24 MVA	1.70 kA	95.25	3.69 kA			
				B	21.27 MVA	0.28 kA	108.11	0.61 kA			
				C	20.14 MVA	0.26 kA	99.71	0.58 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 27		
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 MANYANI	A	132.00	0.00	0.00	1.10			161.84 MVA	2.12 kA	-70.15	4.17 kA	2.12	161.84	0.00
	B		84.14	-122.34				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
	C		87.25	121.22				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04
Lne 132 MANYANI	BB 132 MTI						A	57.61 MVA	0.76 kA	111.77	1.48 kA			
							B	3.09 MVA	0.04 kA	93.72	0.08 kA			
							C	3.27 MVA	0.04 kA	90.25	0.08 kA			
Lne 132 MANYANI	BB 132 VOI						A	104.28 MVA	1.37 kA	108.79	2.69 kA			
							B	3.09 MVA	0.04 kA	-86.28	0.08 kA			
							C	3.27 MVA	0.04 kA	-89.75	0.08 kA			
Ld MANYANI (132							A	0.00 MVA	0.00 kA	0.00	0.00 kA			
							B	0.00 MVA	0.00 kA	0.00	0.00 kA			
							C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 MARIAKAN	A	132.00	0.00	0.00	1.10			435.16 MVA	5.71 kA	-72.40	11.44 kA	5.71	435.16	0.00
	B		80.08	-115.71				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		83.41	115.35				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 SAMBURU	BB 132 SAM						A	46.19 MVA	0.61 kA	106.31	1.21 kA			
							B	4.65 MVA	0.06 kA	-81.43	0.12 kA			
							C	4.34 MVA	0.06 kA	-76.69	0.11 kA			
Lne 132 KOKOTON	BB 132 KOK						A	388.98 MVA	5.10 kA	107.75	10.23 kA			
							B	4.65 MVA	0.06 kA	98.57	0.12 kA			
							C	4.34 MVA	0.06 kA	103.31	0.11 kA			
Ld MARIAKANI (1							A	0.00 MVA	0.00 kA	0.00	0.00 kA			
							B	0.00 MVA	0.00 kA	0.00	0.00 kA			
							C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 MASINGA	A	132.00	0.00	0.00	1.10			622.51 MVA	8.17 kA	-81.28	18.82 kA	8.17	622.51	0.00
	B		81.39	-113.96				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		80.25	114.78				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 KAMBURU	BB 132 KAM						A	475.44 MVA	6.24 kA	97.43	14.38 kA			
							B	14.48 MVA	0.19 kA	-112.65	0.44 kA			
							C	12.87 MVA	0.17 kA	-111.30	0.39 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 28			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MASINGA	BB 132 KUT			A	69.24 MVA	0.91 kA	110.32	2.09 kA			
				B	4.61 MVA	0.06 kA	-68.14	0.14 kA			
				C	4.34 MVA	0.06 kA	-58.51	0.13 kA			
TR MASINGA 132/	BB 11 MASI			A	39.72 MVA	0.52 kA	96.38	1.20 kA			
				B	9.03 MVA	0.12 kA	77.66	0.27 kA			
				C	7.93 MVA	0.10 kA	81.27	0.24 kA			
TR MASINGA 132/	BB 11 MASI			A	39.72 MVA	0.52 kA	96.38	1.20 kA			
				B	9.03 MVA	0.12 kA	77.66	0.27 kA			
				C	7.93 MVA	0.10 kA	81.27	0.24 kA			
BB 132 MAUA (PS A	132.00	0.00	0.00	1.10	128.50 MVA	1.69 kA	-72.89	3.35 kA	1.69	128.50	0.00
B		85.50	-120.78		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02
C		84.18	121.36		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
Lne 132 MERU -	BB 132 MER			A	127.85 MVA	1.68 kA	107.19	3.33 kA			
				B	0.67 MVA	0.01 kA	-88.97	0.02 kA			
				C	0.67 MVA	0.01 kA	-88.97	0.02 kA			
TR MAUA 132/33	BB 33 MAUA			A	0.67 MVA	0.01 kA	91.03	0.02 kA			
				B	0.67 MVA	0.01 kA	91.03	0.02 kA			
				C	0.67 MVA	0.01 kA	91.03	0.02 kA			
BB 132 MAUNGU (A	132.00	0.00	0.00	1.10	201.95 MVA	2.65 kA	-71.03	5.31 kA	2.65	201.95	0.00
B		83.57	-122.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
C		87.59	120.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04
Lne 132 SAMBURU	BB 132 SAM			A	107.28 MVA	1.41 kA	110.78	2.82 kA			
				B	9.32 MVA	0.12 kA	97.71	0.24 kA			
				C	9.18 MVA	0.12 kA	98.59	0.24 kA			
Lne 132 VOI -	BB 132 VOI			A	94.78 MVA	1.24 kA	106.92	2.49 kA			
				B	9.32 MVA	0.12 kA	-82.29	0.24 kA			
				C	9.18 MVA	0.12 kA	-81.41	0.24 kA			
Ld MAUNGU (132				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 29										
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]								
BB 132 MERU (PS A	B	C	132.00	0.00	0.00	0.00	1.10	237.43 MVA	3.12 kA	-77.67	6.71 kA	3.12	237.43	0.00								
				86.82	-121.96		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04								
				85.32	122.67		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02								
Lne 132 ISHIARA	BB 132 ISH	A	105.29 MVA	1.38 kA	98.58	2.98 kA	0.23 kA	0.23 kA														
															B	8.06 MVA	0.11 kA	107.98	0.23 kA			
															C	8.03 MVA	0.11 kA	109.77	0.23 kA			
Lne 132 MERU -	BB 132 ISI	A	127.40 MVA	1.67 kA	105.89	3.60 kA	0.37 kA	0.37 kA														
															B	13.24 MVA	0.17 kA	-78.69	0.37 kA			
															C	13.18 MVA	0.17 kA	-77.63	0.37 kA			
Lne 132 MERU -	BB 132 MAU	A	0.70 MVA	0.01 kA	91.30	0.02 kA	0.02 kA	0.02 kA														
															B	0.70 MVA	0.01 kA	91.30	0.02 kA			
															C	0.70 MVA	0.01 kA	91.30	0.02 kA			
TR MERU 132/33	BB 33 MERU	A	4.62 MVA	0.06 kA	91.14	0.13 kA	0.13 kA	0.13 kA														
															B	4.62 MVA	0.06 kA	91.14	0.13 kA			
															C	4.62 MVA	0.06 kA	91.14	0.13 kA			
Shn MERU 132kV		A	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00 kA	0.00 kA														
															B	0.00 MVA	0.00 kA	0.00	0.00 kA			
															C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 MTITO AN A	B	C	132.00	0.00	0.00	0.00	1.10	148.86 MVA	1.95 kA	-69.36	3.75 kA	1.95	148.86	0.00								
				83.79	-121.18		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00								
				85.75	120.53		0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02								
Lne 132 MANYANI	BB 132 MAN	A	77.65 MVA	1.02 kA	109.76	1.96 kA	0.06 kA	0.07 kA														
															B	2.47 MVA	0.03 kA	-83.64	0.06 kA			
															C	2.59 MVA	0.03 kA	-86.80	0.07 kA			
Lne 132 KIBOKO	BB 132 KIB	A	71.23 MVA	0.93 kA	111.59	1.79 kA	0.06 kA	0.07 kA														
															B	2.47 MVA	0.03 kA	96.36	0.06 kA			
															C	2.59 MVA	0.03 kA	93.20	0.07 kA			
Ld MTITO (132 k		A	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00 kA	0.00 kA														
															B	0.00 MVA	0.00 kA	0.00	0.00 kA			
															C	0.00 MVA	0.00 kA	0.00	0.00 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 30				
		rtd.V. [kV]	Voltage [kV]	c- [deg] Factor		Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 MTWAPA (	A	132.00	0.00	0.00	1.10	281.96 MVA	3.70 kA	-69.63	7.03 kA	3.70	281.96	0.00
	B		80.91	-115.66		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		82.03	115.86		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 MTWAPA		BB 132 KIL										
	A					4.59 MVA	0.06 kA	90.02	0.11 kA			
	B					4.59 MVA	0.06 kA	90.02	0.11 kA			
	C					4.59 MVA	0.06 kA	90.02	0.11 kA			
Lne 132 MTWAPA		BB 132 BAM										
	A					276.21 MVA	3.62 kA	110.81	6.88 kA			
	B					6.15 MVA	0.08 kA	-90.17	0.15 kA			
	C					6.15 MVA	0.08 kA	-90.17	0.15 kA			
TR MTWAPA 132/3		BB 33 MTWA										
	A					0.78 MVA	0.01 kA	89.28	0.02 kA			
	B					0.78 MVA	0.01 kA	89.28	0.02 kA			
	C					0.78 MVA	0.01 kA	89.28	0.02 kA			
TR MTWAPA 132/3		BB 33 MTWA										
	A					0.78 MVA	0.01 kA	89.28	0.02 kA			
	B					0.78 MVA	0.01 kA	89.28	0.02 kA			
	C					0.78 MVA	0.01 kA	89.28	0.02 kA			
BB 132 MUHORONI	A	132.00	0.00	0.00	1.10	391.70 MVA	5.14 kA	-71.73	10.16 kA	5.14	391.70	0.00
	B		80.44	-115.50		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		81.02	115.60		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 MUHORON		BB 132 KIS										
	A					135.18 MVA	1.77 kA	105.32	3.51 kA			
	B					3.22 MVA	0.04 kA	155.76	0.08 kA			
	C					3.29 MVA	0.04 kA	161.96	0.09 kA			
Lne 132 MUHORON		BB 132 CHE										
	A					91.17 MVA	1.20 kA	107.90	2.36 kA			
	B					1.00 MVA	0.01 kA	72.77	0.03 kA			
	C					0.94 MVA	0.01 kA	77.09	0.02 kA			
Lne 132 MUHORON		BB 132 LES										
	A					161.39 MVA	2.12 kA	111.48	4.19 kA			
	B					7.38 MVA	0.10 kA	-69.28	0.19 kA			
	C					7.17 MVA	0.09 kA	-66.24	0.19 kA			
TR MUHORONI 132		BB 33 MUHO										
	A					2.31 MVA	0.03 kA	89.62	0.06 kA			
	B					2.31 MVA	0.03 kA	89.62	0.06 kA			
	C					2.31 MVA	0.03 kA	89.62	0.06 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 31			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR MUHORONI 132	BB 33 MUHO										
				A	2.31 MVA	0.03 kA	89.62	0.06 kA			
				B	2.31 MVA	0.03 kA	89.62	0.06 kA			
				C	2.31 MVA	0.03 kA	89.62	0.06 kA			
BB 132 MUMIAS (A	132.00	0.00	0.00	1.10	249.88 MVA	3.28 kA	-73.37	6.73 kA	3.28	249.88	0.00
B		82.22	-113.44		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		79.02	114.57		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 MUSAGA	BB 132 MUS										
				A	176.30 MVA	2.31 kA	112.91	4.75 kA			
				B	13.84 MVA	0.18 kA	-92.15	0.37 kA			
				C	12.60 MVA	0.17 kA	-74.87	0.34 kA			
Lne 132 MUMIAS	BB 132 RAN										
				A	2.21 MVA	0.03 kA	93.31	0.06 kA			
				B	2.21 MVA	0.03 kA	93.31	0.06 kA			
				C	2.21 MVA	0.03 kA	93.31	0.06 kA			
TR MUMIAS 132/1	BB 11 MUMI										
				A	74.87 MVA	0.98 kA	92.10	2.02 kA			
				B	11.64 MVA	0.15 kA	86.81	0.31 kA			
				C	10.44 MVA	0.14 kA	107.62	0.28 kA			
BB 132 MUSAGA (A	132.00	0.00	0.00	1.10	336.19 MVA	4.41 kA	-72.20	8.81 kA	4.41	336.19	0.00
B		81.33	-114.49		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		80.06	115.14		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 WEBUYE	BB 132 WEB										
				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Lne 132 MUSAGA	BB 132 LES										
				A	133.79 MVA	1.76 kA	111.12	3.51 kA			
				B	7.10 MVA	0.09 kA	-88.66	0.19 kA			
				C	6.54 MVA	0.09 kA	-73.85	0.17 kA			
Lne 132 MUSAGA	BB 132 LES										
				A	133.79 MVA	1.76 kA	111.12	3.51 kA			
				B	7.10 MVA	0.09 kA	-88.66	0.19 kA			
				C	6.54 MVA	0.09 kA	-73.85	0.17 kA			
Lne 132 MUSAGA	BB 132 MUM										
				A	66.83 MVA	0.88 kA	95.37	1.75 kA			
				B	10.24 MVA	0.13 kA	91.36	0.27 kA			
				C	9.31 MVA	0.12 kA	112.40	0.24 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 32			
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR MUSAGA 132/3	BB 33 MUSA			A	1.56 MVA	0.02 kA	91.30	0.04 kA			
				B	1.56 MVA	0.02 kA	91.30	0.04 kA			
				C	1.56 MVA	0.02 kA	91.30	0.04 kA			
TR MUSAGA 132/3	BB 33 MUSA			A	2.39 MVA	0.03 kA	91.30	0.06 kA			
				B	2.39 MVA	0.03 kA	91.30	0.06 kA			
				C	2.39 MVA	0.03 kA	91.30	0.06 kA			
Shn MUSAGA 132k				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 MWINGI (A	132.00	0.00	0.00	1.10	262.18 MVA	3.44 kA	-74.04	7.07 kA	3.44	262.18	0.00
B		81.85	-115.24		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		81.32	115.63		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 KINDARU	BB 132 KIN			A	156.39 MVA	2.05 kA	104.20	4.22 kA			
				B	5.88 MVA	0.08 kA	94.70	0.16 kA			
				C	5.59 MVA	0.07 kA	118.90	0.15 kA			
Lne 132 MWINGI	BB 132 GAR			A	43.79 MVA	0.57 kA	106.88	1.18 kA			
				B	2.93 MVA	0.04 kA	-86.01	0.08 kA			
				C	2.80 MVA	0.04 kA	-67.14	0.08 kA			
Lne 132 MWINGI	BB 132 KIT			A	61.40 MVA	0.81 kA	110.00	1.66 kA			
				B	3.81 MVA	0.05 kA	-85.69	0.10 kA			
				C	3.56 MVA	0.05 kA	-62.94	0.10 kA			
TR MWINGI 132/3	BB 33 MWIN			A	0.86 MVA	0.01 kA	90.58	0.02 kA			
				B	0.86 MVA	0.01 kA	90.58	0.02 kA			
				C	0.86 MVA	0.01 kA	90.58	0.02 kA			
BB 132 NAIVASHA A	132.00	0.00	0.00	1.10	902.70 MVA	11.84 kA	-77.05	25.99 kA	11.84	902.70	0.00
B		79.77	-113.68		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
C		80.11	114.04		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 OLKARIA	BB 132 OLK			A	344.81 MVA	4.52 kA	96.16	9.93 kA			
				B	11.58 MVA	0.15 kA	107.77	0.33 kA			
				C	11.78 MVA	0.15 kA	111.90	0.34 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 33					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LANET	BB 132 LAN			A	93.37 MVA	1.23 kA	108.51	2.69 kA			
				B	3.00 MVA	0.04 kA	-88.49	0.09 kA			
				C	3.29 MVA	0.04 kA	-87.09	0.09 kA			
Lne 132 LANET	BB 132 LAN			A	93.37 MVA	1.23 kA	108.51	2.69 kA			
				B	3.00 MVA	0.04 kA	-88.49	0.09 kA			
				C	3.29 MVA	0.04 kA	-87.09	0.09 kA			
Lne 132 NAIVASH	BB 132 RUA			A	138.92 MVA	1.82 kA	111.24	4.00 kA			
				B	10.47 MVA	0.14 kA	-83.04	0.30 kA			
				C	9.53 MVA	0.12 kA	-73.77	0.27 kA			
Lne 132 NAIVASH	BB 132 RUA			A	138.92 MVA	1.82 kA	111.24	4.00 kA			
				B	10.47 MVA	0.14 kA	-83.04	0.30 kA			
				C	9.53 MVA	0.12 kA	-73.77	0.27 kA			
Lne 132 NAIVASH	BB 132 AEO			A	95.85 MVA	1.26 kA	93.15	2.76 kA			
				B	10.62 MVA	0.14 kA	85.51	0.31 kA			
				C	8.85 MVA	0.12 kA	98.28	0.25 kA			
TR NAIVASHA 132	BB 33 NAIV			A	2.59 MVA	0.03 kA	89.90	0.07 kA			
				B	2.59 MVA	0.03 kA	89.90	0.07 kA			
				C	2.59 MVA	0.03 kA	89.90	0.07 kA			
TR NAIVASHA 132	BB 33 NAIV			A	2.59 MVA	0.03 kA	89.90	0.07 kA			
				B	2.59 MVA	0.03 kA	89.90	0.07 kA			
				C	2.59 MVA	0.03 kA	89.90	0.07 kA			
BB 132 NAKURU W A	132.00	0.00	0.00	1.10	655.95 MVA	8.61 kA	-75.68	18.25 kA	8.61	655.95	0.00
B		80.18	-112.58		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
C		79.22	113.52		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 MENENGA	BB 132MENE			A	126.24 MVA	1.66 kA	94.91	3.51 kA			
				B	15.05 MVA	0.20 kA	97.86	0.42 kA			
				C	13.45 MVA	0.18 kA	108.02	0.37 kA			
Lne 132 MENENGA	BB 132MENE			A	126.24 MVA	1.66 kA	94.91	3.51 kA			
				B	15.05 MVA	0.20 kA	97.86	0.42 kA			
				C	13.45 MVA	0.18 kA	108.02	0.37 kA			
Lne 132 LESSOS	BB 132 LES			A	85.04 MVA	1.12 kA	109.77	2.37 kA			
				B	7.58 MVA	0.10 kA	-84.04	0.21 kA			
				C	6.85 MVA	0.09 kA	-75.09	0.19 kA			

Grid: 1 KENYA			System Stage: 1 KENYA								Annex: LF.001 / 34		
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 132 LANET	BB 132 LAN				A	117.03 MVA	1.54 kA	110.77	3.26 kA				
					B	10.01 MVA	0.13 kA	-82.35	0.28 kA				
					C	9.07 MVA	0.12 kA	-74.24	0.25 kA				
Lne 132 LANET	BB 132 LAN				A	117.03 MVA	1.54 kA	110.77	3.26 kA				
					B	10.01 MVA	0.13 kA	-82.35	0.28 kA				
					C	9.07 MVA	0.12 kA	-74.24	0.25 kA				
Lne 132 NAKURU	BB 132 MAK				A	85.29 MVA	1.12 kA	109.72	2.37 kA				
					B	7.33 MVA	0.10 kA	-83.96	0.20 kA				
					C	6.60 MVA	0.09 kA	-74.66	0.18 kA				
TR NAKURU 132/3	BB 33 NAKU				A	2.42 MVA	0.03 kA	91.27	0.07 kA				
					B	2.42 MVA	0.03 kA	91.27	0.07 kA				
					C	2.42 MVA	0.03 kA	91.27	0.07 kA				
TR NAKURU 132/3	BB 33 NAKU				A	2.42 MVA	0.03 kA	91.27	0.07 kA				
					B	2.42 MVA	0.03 kA	91.27	0.07 kA				
					C	2.42 MVA	0.03 kA	91.27	0.07 kA				
BB 132 NANYUKI	A	132.00	0.00	0.00	1.10	272.93 MVA	3.58 kA	-74.24	7.35 kA	3.58	272.93	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02
Lne 132 NANYUKI	BB 132 RUM				A	59.23 MVA	0.78 kA	99.75	1.60 kA				
					B	3.65 MVA	0.05 kA	101.17	0.10 kA				
					C	3.71 MVA	0.05 kA	98.62	0.10 kA				
Lne 132 KIGANJO	BB 132 KIG				A	116.93 MVA	1.53 kA	110.63	3.15 kA				
					B	2.21 MVA	0.03 kA	-167.51	0.06 kA				
					C	2.51 MVA	0.03 kA	-163.81	0.07 kA				
Lne 132 NANYUKI	BB 132 ISI				A	94.67 MVA	1.24 kA	103.97	2.55 kA				
					B	6.75 MVA	0.09 kA	-64.73	0.18 kA				
					C	6.67 MVA	0.09 kA	-63.43	0.18 kA				
TR NANYUKI 132/	BB 33 NANY				A	3.00 MVA	0.04 kA	90.29	0.08 kA				
					B	3.00 MVA	0.04 kA	90.29	0.08 kA				
					C	3.00 MVA	0.04 kA	90.29	0.08 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 35				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 NAROK (P	A	132.00	0.00	0.00	1.10	353.15 MVA	4.63 kA	-72.53	9.76 kA	4.63	353.15	0.00
	B		81.67	-121.49		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		87.37	119.47		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04
Lne 132 OLKARIA	BB 132 OLK					117.45 MVA	1.54 kA	99.66	3.24 kA			
	B					26.81 MVA	0.35 kA	-87.29	0.74 kA			
	C					26.86 MVA	0.35 kA	-87.54	0.74 kA			
Lne 132 OLKARIA	BB 132 OLK					143.91 MVA	1.89 kA	112.06	3.98 kA			
	B					17.92 MVA	0.24 kA	97.31	0.49 kA			
	C					17.86 MVA	0.23 kA	97.61	0.49 kA			
Lne 132 BOMET	BB 132 BOM					44.93 MVA	0.59 kA	114.15	1.24 kA			
	B					3.92 MVA	0.05 kA	87.05	0.11 kA			
	C					3.99 MVA	0.05 kA	85.75	0.11 kA			
Lne 132 BOMET	BB 132 BOM					47.80 MVA	0.63 kA	106.94	1.32 kA			
	B					4.18 MVA	0.05 kA	79.84	0.12 kA			
	C					4.25 MVA	0.06 kA	78.54	0.12 kA			
TR NAROK 132/33	BB 33 NARO					0.98 MVA	0.01 kA	85.71	0.03 kA			
	B					0.98 MVA	0.01 kA	85.71	0.03 kA			
	C					0.98 MVA	0.01 kA	85.71	0.03 kA			
BB 132 NDHIWA (	A	132.00	0.00	0.00	1.10	195.19 MVA	2.56 kA	-71.35	5.03 kA	2.56	195.19	0.00
	B		81.24	-116.34		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		81.62	116.47		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 AWENDO	BB 132 AWE					92.66 MVA	1.22 kA	110.62	2.39 kA			
	B					0.88 MVA	0.01 kA	-33.79	0.02 kA			
	C					1.11 MVA	0.01 kA	-8.11	0.03 kA			
Lne 132 HOMABAY	BB 132 HOM					102.63 MVA	1.35 kA	106.87	2.65 kA			
	B					0.88 MVA	0.01 kA	146.21	0.02 kA			
	C					1.11 MVA	0.01 kA	171.89	0.03 kA			
BB 132 NYAHURUR	A	132.00	0.00	0.00	1.10	149.84 MVA	1.97 kA	-78.67	4.33 kA	1.97	149.84	0.00
	B		83.90	-119.76		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
	C		83.63	119.91		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 36			
		rtd.V. [kV]	Voltage [kV]		c- Factor		Sk" [MVA/MVA]	Ik" [kA/kA]			[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 NYAHURU	BB 132 RUM				A	148.87 MVA	1.95 kA	101.40	4.31 kA						
						0.99 MVA	0.01 kA	-89.77	0.03 kA						
						0.99 MVA	0.01 kA	-89.77	0.03 kA						
TR NYAHURURU 13	BB 33 NYAH			A	0.99 MVA	0.01 kA	90.23	0.03 kA							
					0.99 MVA	0.01 kA	90.23	0.03 kA							
					0.99 MVA	0.01 kA	90.23	0.03 kA							
BB 132 OLKARIA	A	132.00	0.00	0.00	1.10	1011.97 MVA	13.28 kA	-83.51	32.39 kA	13.28	1011.97	0.00			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.90			
Lne 132 OLKARIA	BB 132 NAR			A	32.53 MVA	0.43 kA	102.72	1.04 kA							
					11.27 MVA	0.15 kA	-82.84	0.36 kA							
					11.14 MVA	0.15 kA	-79.38	0.36 kA							
Lne 132 OLKARIA	BB 132 OLK			A	123.18 MVA	1.62 kA	92.14	3.94 kA							
					0.83 MVA	0.01 kA	-155.15	0.03 kA							
					3.74 MVA	0.05 kA	-136.42	0.12 kA							
Lne 132 OLKARIA	BB 132 OLK			A	737.25 MVA	9.67 kA	96.51	23.60 kA							
					16.56 MVA	0.22 kA	120.32	0.53 kA							
					18.51 MVA	0.24 kA	74.72	0.59 kA							
Lne 132 OLKARIA	BB 132 NAR			A	35.26 MVA	0.46 kA	116.65	1.13 kA							
					3.22 MVA	0.04 kA	-58.67	0.10 kA							
					3.23 MVA	0.04 kA	-47.89	0.10 kA							
TR OLKARIA 132/	BB 11 OLKA			A	86.71 MVA	1.14 kA	92.09	2.78 kA							
					6.03 MVA	0.08 kA	-0.14	0.19 kA							
					6.68 MVA	0.09 kA	-163.20	0.21 kA							
BB 132 OLKARIA	A	132.00	0.00	0.00	1.10	845.84 MVA	11.10 kA	-83.26	26.92 kA	11.10	845.84	0.00			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91			
Lne 132 OLKARIA	BB 132 OLK			A	715.32 MVA	9.39 kA	97.67	22.76 kA							
					7.95 MVA	0.10 kA	-89.87	0.25 kA							
					6.11 MVA	0.08 kA	-67.71	0.19 kA							

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 37							
		rtd.V. [kV]	Voltage [kV]		c- Factor		Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]		ip [kA/kA]		Ib [kA]		Sb [MVA]		EFF [-]
Lne 132 DOMES		BB 132 DOM				A	131.12 MVA		1.72 kA		91.68		4.17 kA						
						B	7.95 MVA		0.10 kA		90.13		0.25 kA						
						C	6.11 MVA		0.08 kA		112.29		0.19 kA						
BB 132 OLKARIA	A	132.00	0.00	0.00	1.10		1045.40 MVA		13.72 kA		-83.63		33.52 kA		13.72		1045.40		0.00
	B		77.65	-106.14			0.00 MVA		0.00 kA		0.00		0.00 kA		0.00		0.00		0.92
	C		75.86	107.05			0.00 MVA		0.00 kA		0.00		0.00 kA		0.00		0.00		0.89
Lne 132 OLKARIA	BB 132 OLK				A	267.60 MVA		3.51 kA		96.52		8.58 kA							
					B	20.47 MVA		0.27 kA		-66.54		0.66 kA							
					C	22.83 MVA		0.30 kA		-102.62		0.73 kA							
Lne 132 OLKARIA	BB 132 NAI				A	291.45 MVA		3.82 kA		103.55		9.34 kA							
					B	59.67 MVA		0.78 kA		-81.71		1.91 kA							
					C	58.70 MVA		0.77 kA		-77.42		1.88 kA							
TR OLKARIA 220/	BB 220 OLK				A	490.04 MVA		6.43 kA		92.03		15.71 kA							
					B	79.61 MVA		1.04 kA		102.15		2.55 kA							
					C	79.95 MVA		1.05 kA		95.59		2.56 kA							
BB 132 RABAI (P	A	132.00	0.00	0.00	1.10		1023.32 MVA		13.43 kA		-84.51		33.08 kA		13.43		1023.32		0.00
	B		79.43	-107.34			0.00 MVA		0.00 kA		0.00		0.00 kA		0.00		0.00		0.92
	C		79.48	108.21			0.00 MVA		0.00 kA		0.00		0.00 kA		0.00		0.00		0.91
Lne 132 RABAI -	BB 132 VOI				A	17.95 MVA		0.24 kA		105.90		0.58 kA							
					B	6.74 MVA		0.09 kA		-83.24		0.22 kA							
					C	6.43 MVA		0.08 kA		-71.21		0.21 kA							
Lne 132 KIPEVU	BB 132 KIP				A	78.07 MVA		1.02 kA		100.19		2.52 kA							
					B	4.37 MVA		0.06 kA		62.85		0.14 kA							
					C	3.81 MVA		0.05 kA		151.29		0.12 kA							
Lne 132 KIPEVU	BB 132 KIP				A	78.07 MVA		1.02 kA		100.19		2.52 kA							
					B	4.37 MVA		0.06 kA		62.85		0.14 kA							
					C	3.81 MVA		0.05 kA		151.29		0.12 kA							
Lne 132 KIPEVU	BB 132 KIP				A	80.75 MVA		1.06 kA		87.48		2.61 kA							
					B	4.52 MVA		0.06 kA		50.15		0.15 kA							
					C	3.94 MVA		0.05 kA		138.58		0.13 kA							

Grid: 1 KENYA		System Stage: 1 KENYA					Annex: LF.001 / 38			
	rtd.V. [kV]	Voltage [kV]	c- [deg] Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 KIPEVU	BB 132 KIP		A	85.23 MVA	1.12 kA	87.68	2.76 kA			
			B	4.29 MVA	0.06 kA	38.62	0.14 kA			
			C	4.03 MVA	0.05 kA	154.15	0.13 kA			
Lne 132 KOKOTON	BB 132 KOK		A	18.06 MVA	0.24 kA	116.47	0.58 kA			
			B	2.21 MVA	0.03 kA	-67.49	0.07 kA			
			C	2.20 MVA	0.03 kA	-36.92	0.07 kA			
Lne 132 RABAI	BB 132 BAM		A	4.21 MVA	0.06 kA	92.06	0.14 kA			
			B	4.21 MVA	0.06 kA	92.06	0.14 kA			
			C	4.21 MVA	0.06 kA	92.06	0.14 kA			
Lne 132 RABAI	BB 132 BAM		A	4.21 MVA	0.06 kA	92.06	0.14 kA			
			B	4.21 MVA	0.06 kA	92.06	0.14 kA			
			C	4.21 MVA	0.06 kA	92.06	0.14 kA			
Lne 132 RABAI	BB 132 GAL		A	39.39 MVA	0.52 kA	94.96	1.27 kA			
			B	0.47 MVA	0.01 kA	149.89	0.02 kA			
			C	0.92 MVA	0.01 kA	-156.58	0.03 kA			
TR RABAI 132/11	BB 11 RABA		A	74.28 MVA	0.97 kA	91.44	2.40 kA			
			B	2.81 MVA	0.04 kA	51.68	0.09 kA			
			C	0.97 MVA	0.01 kA	114.27	0.03 kA			
TR RABAI 132/11	BB 11 RABA		A	98.89 MVA	1.30 kA	91.44	3.20 kA			
			B	4.66 MVA	0.06 kA	67.98	0.15 kA			
			C	2.96 MVA	0.04 kA	89.55	0.10 kA			
TR RABAI 132/33	BB 33 RABA		A	2.69 MVA	0.04 kA	90.38	0.09 kA			
			B	2.69 MVA	0.04 kA	90.38	0.09 kA			
			C	2.69 MVA	0.04 kA	90.38	0.09 kA			
TR RABAI 132/33	BB 33 RABA		A	2.69 MVA	0.04 kA	90.38	0.09 kA			
			B	2.69 MVA	0.04 kA	90.38	0.09 kA			
			C	2.69 MVA	0.04 kA	90.38	0.09 kA			
zpu_1126_1726_1	BB 132 1RA		A	221.96 MVA	2.91 kA	97.32	7.17 kA			
			B	14.54 MVA	0.19 kA	-120.81	0.47 kA			
			C	10.09 MVA	0.13 kA	-57.96	0.33 kA			
zpu_1126_1727_2	BB 132 RAB		A	221.16 MVA	2.90 kA	97.28	7.15 kA			
			B	15.07 MVA	0.20 kA	-118.42	0.49 kA			
			C	10.89 MVA	0.14 kA	-58.88	0.35 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 39			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 RABAITRF	A	132.00	0.00	0.00	1.10		1108.16 MVA	14.54 kA	-79.73		33.46 kA	14.54	1108.16	0.00	
	B		76.31	-106.40			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.88	
	C		82.21	106.74			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94	
TR RABAI 220/13		BB 220 RAB				A	160.55 MVA	2.11 kA	58.91		4.85 kA				
						B	90.39 MVA	1.19 kA	-38.81		2.73 kA				
						C	98.30 MVA	1.29 kA	-31.15		2.97 kA				
zpu_1126_1727_2		BB 132 RAB				A	993.34 MVA	13.03 kA	106.41		30.00 kA				
						B	90.39 MVA	1.19 kA	141.19		2.73 kA				
						C	98.30 MVA	1.29 kA	148.85		2.97 kA				
BB 132 RANGALA	A	132.00	0.00	0.00	1.10		160.89 MVA	2.11 kA	-75.90		4.47 kA	2.11	160.89	0.00	
	B		82.72	-115.29			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.98	
	C		80.01	116.24			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.95	
Lne 132 MUMIAS		BB 132 MUM				A	158.51 MVA	2.08 kA	104.28		4.40 kA				
						B	2.43 MVA	0.03 kA	-87.55		0.07 kA				
						C	2.43 MVA	0.03 kA	-87.55		0.07 kA				
TR RANGALA 132/		BB 33 RANG				A	2.43 MVA	0.03 kA	92.45		0.07 kA				
						B	2.43 MVA	0.03 kA	92.45		0.07 kA				
						C	2.43 MVA	0.03 kA	92.45		0.07 kA				
BB 132 RUARAKA	A	132.00	0.00	0.00	1.10		1259.61 MVA	16.53 kA	-78.17		37.03 kA	16.53	1259.61	0.00	
	B		77.06	-111.93			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.92	
	C		79.24	111.66			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94	
Lne 132 RUARAKA		BB 132 RUA				A	627.45 MVA	8.23 kA	101.88		18.44 kA				
						B	2.42 MVA	0.03 kA	-92.02		0.07 kA				
						C	2.42 MVA	0.03 kA	-92.02		0.07 kA				
Lne 132 RUARAKA		BB 132 RUA				A	627.45 MVA	8.23 kA	101.88		18.44 kA				
						B	2.42 MVA	0.03 kA	-92.02		0.07 kA				
						C	2.42 MVA	0.03 kA	-92.02		0.07 kA				
TR RUARAKA 132/		BB 66 RUAR				A	2.42 MVA	0.03 kA	87.98		0.07 kA				
						B	2.42 MVA	0.03 kA	87.98		0.07 kA				
						C	2.42 MVA	0.03 kA	87.98		0.07 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 40			
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
TR RUARAKA 132/				BB 66 RUAR			A	2.42 MVA	0.03 kA	87.98	0.07 kA				
							B	2.42 MVA	0.03 kA	87.98	0.07 kA				
							C	2.42 MVA	0.03 kA	87.98	0.07 kA				
BB 132 RUARAKA	A	132.00	0.00	0.00	1.10	1348.98 MVA	17.70 kA	-79.24	40.42 kA	17.70	1348.98	0.00			
	B		76.87	-111.25		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92			
	C		78.77	111.11		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94			
Lne 132 JUJA -	BB 132 JUJ			A	561.15 MVA	7.36 kA	99.16	16.81 kA							
				B	11.01 MVA	0.14 kA	118.41	0.33 kA							
				C	11.08 MVA	0.15 kA	113.18	0.33 kA							
Lne 132 JUJA -	BB 132 JUJ			A	561.15 MVA	7.36 kA	99.16	16.81 kA							
				B	11.01 MVA	0.14 kA	118.41	0.33 kA							
				C	11.08 MVA	0.15 kA	113.18	0.33 kA							
Lne 132 NAIVASH	BB 132 NAI			A	112.45 MVA	1.48 kA	109.06	3.37 kA							
				B	13.09 MVA	0.17 kA	-66.76	0.39 kA							
				C	13.24 MVA	0.17 kA	-71.10	0.40 kA							
Lne 132 NAIVASH	BB 132 NAI			A	112.45 MVA	1.48 kA	109.06	3.37 kA							
				B	13.09 MVA	0.17 kA	-66.76	0.39 kA							
				C	13.24 MVA	0.17 kA	-71.10	0.40 kA							
Lne 132 RUARAKA	BB 132 RUA			A	2.35 MVA	0.03 kA	88.26	0.07 kA							
				B	2.35 MVA	0.03 kA	88.26	0.07 kA							
				C	2.35 MVA	0.03 kA	88.26	0.07 kA							
Lne 132 RUARAKA	BB 132 RUA			A	2.35 MVA	0.03 kA	88.26	0.07 kA							
				B	2.35 MVA	0.03 kA	88.26	0.07 kA							
				C	2.35 MVA	0.03 kA	88.26	0.07 kA							
BB 132 RUMURUTI	A	132.00	0.00	0.00	1.10	186.91 MVA	2.45 kA	-78.27	5.37 kA	2.45	186.91	0.00			
	B		84.00	-119.86		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00			
	C		83.74	120.02		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00			
Lne 132 NANYUKI	BB 132 NAN			A	100.53 MVA	1.32 kA	103.36	2.89 kA							
				B	2.65 MVA	0.03 kA	-84.15	0.08 kA							
				C	2.66 MVA	0.03 kA	-85.28	0.08 kA							

Grid: 1 KENYA			System Stage: 1 KENYA								Annex: LF.001 / 41			
		rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 132 NYAHURU	BB 132 KAB				A	85.49 MVA	1.12 kA	99.95		2.46 kA				
						1.67 MVA	0.02 kA	99.15		0.05 kA				
						1.67 MVA	0.02 kA	97.34		0.05 kA				
Lne 132 NYAHURU	BB 132 NYA				A	0.99 MVA	0.01 kA	90.27		0.03 kA				
						0.99 MVA	0.01 kA	90.27		0.03 kA				
						0.99 MVA	0.01 kA	90.27		0.03 kA				
Shnt RUMURUTI 1					A	0.00 MVA	0.00 kA	0.00		0.00 kA				
						0.00 MVA	0.00 kA	0.00		0.00 kA				
						0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 SAMBURU	A	132.00	0.00	0.00	1.10	238.76 MVA	3.13 kA	-70.59		6.14 kA	3.13	238.76	0.00	
						0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.98	
						0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	1.01	
Lne 132 SAMBURU	BB 132 MAU				A	68.70 MVA	0.90 kA	107.50		1.77 kA				
						6.78 MVA	0.09 kA	-81.43		0.17 kA				
						6.62 MVA	0.09 kA	-79.88		0.17 kA				
Lne 132 SAMBURU	BB 132 MAR				A	170.11 MVA	2.23 kA	110.18		4.37 kA				
						6.78 MVA	0.09 kA	98.57		0.17 kA				
						6.62 MVA	0.09 kA	100.12		0.17 kA				
Ld SAMBURU (132					A	0.00 MVA	0.00 kA	0.00		0.00 kA				
						0.00 MVA	0.00 kA	0.00		0.00 kA				
						0.00 MVA	0.00 kA	0.00		0.00 kA				
BB 132 SANGORO	A	132.00	0.00	0.00	1.10	328.37 MVA	4.31 kA	-79.23		9.74 kA	4.31	328.37	0.00	
						0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.95	
						0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.92	
Lne 132 SONDU	BB 132 SON				A	284.39 MVA	3.73 kA	102.27		8.43 kA				
						7.75 MVA	0.10 kA	-84.39		0.23 kA				
						7.12 MVA	0.09 kA	-86.86		0.21 kA				
TR SANGORO 132/	BB 11 SANG				A	44.70 MVA	0.59 kA	91.19		1.33 kA				
						7.75 MVA	0.10 kA	95.61		0.23 kA				
						7.12 MVA	0.09 kA	93.14		0.21 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 42				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 SONDU (P	A	132.00	0.00	0.00	1.10	360.11 MVA	4.73 kA	-80.46	10.91 kA	4.73	360.11	0.00
	B		79.94	-110.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
	C		77.82	111.15		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 KISUMU		BB 132 KIS				147.14 MVA	1.93 kA	104.56	4.46 kA			
						15.57 MVA	0.20 kA	-93.14	0.47 kA			
						14.07 MVA	0.18 kA	-78.67	0.43 kA			
Lne 132 SONDU		BB 132 SAN				43.52 MVA	0.57 kA	91.84	1.32 kA			
						6.71 MVA	0.09 kA	100.15	0.20 kA			
						6.04 MVA	0.08 kA	96.87	0.18 kA			
Lne 132 SONDU		BB 132 HOM				49.78 MVA	0.65 kA	110.68	1.51 kA			
						6.09 MVA	0.08 kA	-80.89	0.18 kA			
						5.69 MVA	0.07 kA	-68.24	0.17 kA			
TR SONDU 132/11		BB 11 SOND				61.34 MVA	0.80 kA	91.73	1.86 kA			
						7.50 MVA	0.10 kA	85.90	0.23 kA			
						6.86 MVA	0.09 kA	107.61	0.21 kA			
TR SONDU 132/11		BB 11 SOND				61.34 MVA	0.80 kA	91.73	1.86 kA			
						7.50 MVA	0.10 kA	85.90	0.23 kA			
						6.86 MVA	0.09 kA	107.61	0.21 kA			
BB 132 SOTIK (P	A	132.00	0.00	0.00	1.10	295.73 MVA	3.88 kA	-71.06	7.57 kA	3.88	295.73	0.00
	B		81.38	-116.59		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		81.59	116.76		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 CHEMOSI		BB 132 CHE				125.96 MVA	1.65 kA	109.34	3.23 kA			
						1.22 MVA	0.02 kA	92.22	0.03 kA			
						1.31 MVA	0.02 kA	86.61	0.03 kA			
Lne 132 BOMET		BB 132 BOM				108.30 MVA	1.42 kA	110.41	2.77 kA			
						8.11 MVA	0.11 kA	-83.81	0.21 kA			
						7.95 MVA	0.10 kA	-82.65	0.20 kA			
Lne 132 KISII		BB 132 KIS				61.62 MVA	0.81 kA	105.52	1.58 kA			
						6.90 MVA	0.09 kA	96.88	0.18 kA			
						6.68 MVA	0.09 kA	99.44	0.17 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 43			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 SULTAN H	A	132.00	0.00	0.00	1.10	261.01 MVA	3.42 kA	-70.29	6.62 kA	3.42	261.01	0.00			
	B		82.19	-118.55		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98			
	C		83.29	118.26		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99			
Lne 132 SULTAN		BB 132 WOT			A	61.39 MVA	0.81 kA	108.32	1.56 kA						
					B	0.93 MVA	0.01 kA	73.67	0.02 kA						
					C	0.67 MVA	0.01 kA	101.03	0.02 kA						
Lne 132 SULTAN		BB 132 KIB			A	44.43 MVA	0.58 kA	110.78	1.13 kA						
					B	2.49 MVA	0.03 kA	-73.94	0.06 kA						
					C	2.53 MVA	0.03 kA	-74.75	0.06 kA						
Lne 132 SULTAN		BB 132 KON			A	154.93 MVA	2.03 kA	109.99	3.93 kA						
					B	1.54 MVA	0.02 kA	128.45	0.04 kA						
					C	1.58 MVA	0.02 kA	110.06	0.04 kA						
TR SULTAN 132/3		BB 33 SULT			A	0.30 MVA	0.00 kA	89.15	0.01 kA						
					B	0.30 MVA	0.00 kA	89.15	0.01 kA						
					C	0.30 MVA	0.00 kA	89.15	0.01 kA						
BB 132 TAVETA (	A	132.00	0.00	0.00	1.10	79.33 MVA	1.04 kA	-69.05	1.99 kA	1.04	79.33	0.00			
	B		84.19	-121.73		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00			
	C		86.24	121.01		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.03			
Lne 132 VOI -		BB 132 VOI			A	79.33 MVA	1.04 kA	110.95	1.99 kA						
					B	0.00 MVA	0.00 kA	0.00	0.00 kA						
					C	0.00 MVA	0.00 kA	0.00	0.00 kA						
Ld TAVETA (132					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
					B	0.00 MVA	0.00 kA	0.00	0.00 kA						
					C	0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 THIKA (P	A	132.00	0.00	0.00	1.10	556.23 MVA	7.30 kA	-74.36	15.16 kA	7.30	556.23	0.00			
	B		79.20	-114.81		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95			
	C		80.29	114.69		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96			
Lne 132 THIKA -		BB 132 KIL			A	0.00 MVA	0.00 kA	0.00	0.00 kA						
					B	0.00 MVA	0.00 kA	0.00	0.00 kA						
					C	0.00 MVA	0.00 kA	0.00	0.00 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 44				
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
Lne 132 JUJA -				BB 132 JUJ				A	462.90 MVA	6.07 kA	107.12	12.62 kA				
								B	19.96 MVA	0.26 kA	-74.40	0.54 kA				
								C	19.60 MVA	0.26 kA	-78.40	0.53 kA				
TR THIKA 132/66				BB 66 THIK				A	94.25 MVA	1.24 kA	98.35	2.57 kA				
								B	19.96 MVA	0.26 kA	105.60	0.54 kA				
								C	19.60 MVA	0.26 kA	101.60	0.53 kA				
BB 132 ULU (PSS				A	132.00	0.00	0.00	1.10	536.47 MVA	7.04 kA	-74.22	14.64 kA	7.04	536.47	0.00	
									B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
									C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 ULU -				BB 132 JUJ				A	179.87 MVA	2.36 kA	110.13	4.91 kA				
								B	12.50 MVA	0.16 kA	-65.80	0.34 kA				
								C	12.50 MVA	0.16 kA	-64.23	0.34 kA				
Lne 132 ULU -				BB 132 KON				A	357.38 MVA	4.69 kA	103.59	9.75 kA				
								B	12.50 MVA	0.16 kA	114.20	0.34 kA				
								C	12.50 MVA	0.16 kA	115.77	0.34 kA				
Ld ULU (132 kV)				A				0.00 MVA	0.00 kA	0.00	0.00 kA					
								B	0.00 MVA	0.00 kA	0.00			0.00 kA		
								C	0.00 MVA	0.00 kA	0.00			0.00 kA		
BB 132 VOI (PSS				A	132.00	0.00	0.00	1.10	206.45 MVA	2.71 kA	-72.04	5.64 kA	2.71	206.45	0.00	
									B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.01
									C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.07
Lne 132 RABAI -				BB 132 RAB				A	73.51 MVA	0.96 kA	101.91	2.01 kA				
								B	16.35 MVA	0.21 kA	-85.13	0.45 kA				
								C	16.47 MVA	0.22 kA	-85.80	0.45 kA				
Lne 132 MANYANI				BB 132 MAN				A	48.24 MVA	0.63 kA	111.85	1.32 kA				
								B	4.46 MVA	0.06 kA	90.41	0.12 kA				
								C	4.75 MVA	0.06 kA	86.72	0.13 kA				
Lne 132 VOI -				BB 132 MAU				A	85.34 MVA	1.12 kA	110.96	2.33 kA				
								B	11.91 MVA	0.16 kA	96.55	0.33 kA				
								C	11.78 MVA	0.15 kA	97.21	0.32 kA				

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 45			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 132 VOI -	BB 132 TAV				A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shn VOI 132kV (					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Ld VOI (132 kV)					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 WAJIR (P	A	132.00	0.00	0.00	1.10	35.55 MVA	0.47 kA	-72.68	0.92 kA	0.47	35.55	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 WAJIR	BB 132 GAR				A	34.71 MVA	0.46 kA	107.73	0.90 kA				
					B	0.87 MVA	0.01 kA	-89.05	0.02 kA				
					C	0.87 MVA	0.01 kA	-89.05	0.02 kA				
TR WAJIR 132/33	BB 33 WAJI				A	0.87 MVA	0.01 kA	90.95	0.02 kA				
					B	0.87 MVA	0.01 kA	90.95	0.02 kA				
					C	0.87 MVA	0.01 kA	90.95	0.02 kA				
Ld WAJIR (PSS/E					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 WEBUYE (	A	132.00	0.00	0.00	1.10	232.89 MVA	3.06 kA	-69.58	5.86 kA	3.06	232.89	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 WEBUYE	BB 132 MUS				A	232.89 MVA	3.06 kA	110.42	5.86 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Ld WEBUYE (PSS/					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 46				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 WOTE (PS A	A	132.00	0.00	0.00	1.10	200.71 MVA	2.63 kA	-70.24	5.08 kA	2.63	200.71	0.00
	B		82.57	-118.50		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
	C		83.14	118.40		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
Lne 132 SULTAN		BB 132 KIT				75.80 MVA	0.99 kA	107.73	1.92 kA			
						1.27 MVA	0.02 kA	87.80	0.03 kA			
						1.09 MVA	0.01 kA	113.76	0.03 kA			
Lne 132 SULTAN		BB 132 SUL				124.71 MVA	1.64 kA	111.04	3.16 kA			
						1.56 MVA	0.02 kA	-91.86	0.04 kA			
						1.36 MVA	0.02 kA	-71.32	0.03 kA			
TR WOTE 132/33		BB 33 WOTE				0.30 MVA	0.00 kA	89.59	0.01 kA			
						0.30 MVA	0.00 kA	89.59	0.01 kA			
						0.30 MVA	0.00 kA	89.59	0.01 kA			
BB 132MENENGAI A	A	132.00	0.00	0.00	1.10	617.16 MVA	8.10 kA	-77.94	17.84 kA	8.10	617.16	0.00
	B		80.57	-110.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		77.68	112.35		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 MENENGA		BB 132 NAK				166.97 MVA	2.19 kA	110.77	4.83 kA			
						19.37 MVA	0.25 kA	-85.57	0.56 kA			
						17.45 MVA	0.23 kA	-76.49	0.50 kA			
Lne 132 MENENGA		BB 132 NAK				166.97 MVA	2.19 kA	110.77	4.83 kA			
						19.37 MVA	0.25 kA	-85.57	0.56 kA			
						17.45 MVA	0.23 kA	-76.49	0.50 kA			
TR MENENGAI 132		BB 11 MENE				291.49 MVA	3.82 kA	92.07	8.43 kA			
						38.74 MVA	0.51 kA	94.43	1.12 kA			
						34.91 MVA	0.46 kA	103.51	1.01 kA			
BB 220 0RTUM (P A	A	220.00	0.00	0.00	1.10	277.01 MVA	2.18 kA	-79.93	4.94 kA	2.18	277.01	0.00
	B		135.00	-115.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		134.50	116.29		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 KAINUK		BB 220 KAI				187.94 MVA	1.48 kA	97.37	3.35 kA			
						4.12 MVA	0.03 kA	-76.88	0.07 kA			
						4.50 MVA	0.04 kA	-76.21	0.08 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 47				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 0RTUM	BB 220 KIT											
					A	89.71 MVA	0.71 kA	105.74	1.60 kA			
					B	4.12 MVA	0.03 kA	103.12	0.07 kA			
					C	4.50 MVA	0.04 kA	103.79	0.08 kA			
Ld 0RTUM (220 k					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 ATHI RIV A	220.00	0.00	0.00	1.10		2479.79 MVA	19.52 kA	-83.16	47.00 kA	19.52	2479.79	0.00
B		131.76	-112.32			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		132.41	112.67			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 EMBAKAS	BB 220 EMB				A	640.19 MVA	5.04 kA	98.33	12.13 kA			
					B	17.82 MVA	0.14 kA	-90.37	0.34 kA			
					C	17.39 MVA	0.14 kA	-82.77	0.33 kA			
Lne 220 EMBAKAS	BB 220 EMB				A	640.19 MVA	5.04 kA	98.33	12.13 kA			
					B	17.82 MVA	0.14 kA	-90.37	0.34 kA			
					C	17.39 MVA	0.14 kA	-82.77	0.33 kA			
Lne 220 ISINYA	BB 220 ISI				A	495.77 MVA	3.90 kA	95.51	9.40 kA			
					B	3.78 MVA	0.03 kA	132.09	0.07 kA			
					C	3.74 MVA	0.03 kA	101.62	0.07 kA			
Lne 220 ISINYA	BB 220 ISI				A	495.77 MVA	3.90 kA	95.51	9.40 kA			
					B	3.78 MVA	0.03 kA	132.09	0.07 kA			
					C	3.74 MVA	0.03 kA	101.62	0.07 kA			
TR ATHI 220/BB	BB 66 ATHI				A	104.42 MVA	0.82 kA	94.05	1.98 kA			
					B	15.25 MVA	0.12 kA	79.99	0.29 kA			
					C	13.66 MVA	0.11 kA	96.03	0.26 kA			
TR ATHI 220/BB	BB 66 ATHI				A	104.42 MVA	0.82 kA	94.05	1.98 kA			
					B	15.25 MVA	0.12 kA	79.99	0.29 kA			
					C	13.66 MVA	0.11 kA	96.03	0.26 kA			
BB 220 DANDORA A	220.00	0.00	0.00	1.10		3059.36 MVA	24.09 kA	-83.84	58.82 kA	24.09	3059.36	0.00
B		130.80	-111.33			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
C		131.80	111.72			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 48				
	rtd.V. [kV]	Voltage [kV]	c- [deg] Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 DANDORA	BB 220 NBE		A	147.78 MVA	1.16 kA	94.78	2.84 kA			
			B	4.17 MVA	0.03 kA	-74.54	0.08 kA			
			C	6.85 MVA	0.05 kA	-138.69	0.13 kA			
Lne 220 DANDORA	BB 220 NBE		A	147.78 MVA	1.16 kA	94.78	2.84 kA			
			B	4.17 MVA	0.03 kA	-74.54	0.08 kA			
			C	6.85 MVA	0.05 kA	-138.69	0.13 kA			
Lne 220 KAMBURU	BB 220 KAM		A	173.21 MVA	1.36 kA	96.36	3.33 kA			
			B	6.52 MVA	0.05 kA	-58.62	0.13 kA			
			C	6.78 MVA	0.05 kA	-104.95	0.13 kA			
Lne 220 KAMBURU	BB 220 KAM		A	170.02 MVA	1.34 kA	96.36	3.27 kA			
			B	6.40 MVA	0.05 kA	-58.62	0.12 kA			
			C	6.65 MVA	0.05 kA	-104.95	0.13 kA			
Lne 220 KIAMBER	BB 220 KIA		A	128.31 MVA	1.01 kA	96.33	2.47 kA			
			B	4.78 MVA	0.04 kA	-63.30	0.09 kA			
			C	5.04 MVA	0.04 kA	-100.72	0.10 kA			
Lne 220 DANDORA	BB 220 KOM		A	5.86 MVA	0.05 kA	89.64	0.11 kA			
			B	5.86 MVA	0.05 kA	89.64	0.11 kA			
			C	5.86 MVA	0.05 kA	89.64	0.11 kA			
Lne 220 DANDORA	BB 220 KOM		A	5.86 MVA	0.05 kA	89.64	0.11 kA			
			B	5.86 MVA	0.05 kA	89.64	0.11 kA			
			C	5.86 MVA	0.05 kA	89.64	0.11 kA			
Lne 220 DANDORA	BB 220 EMB		A	268.44 MVA	2.11 kA	95.88	5.16 kA			
			B	11.06 MVA	0.09 kA	86.48	0.21 kA			
			C	10.77 MVA	0.08 kA	95.17	0.21 kA			
Lne 220 DANDORA	BB 220 EMB		A	268.44 MVA	2.11 kA	95.88	5.16 kA			
			B	11.06 MVA	0.09 kA	86.48	0.21 kA			
			C	10.77 MVA	0.08 kA	95.17	0.21 kA			
Lne 220 DANDORA	BB 220 THI		A	420.39 MVA	3.31 kA	96.82	8.08 kA			
			B	33.67 MVA	0.27 kA	-91.41	0.65 kA			
			C	32.67 MVA	0.26 kA	-73.86	0.63 kA			
Lne 220 DANDORA	BB 220 THI		A	420.39 MVA	3.31 kA	96.82	8.08 kA			
			B	33.67 MVA	0.27 kA	-91.41	0.65 kA			
			C	32.67 MVA	0.26 kA	-73.86	0.63 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 49	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 ISINYA	BB 220 ISI				A	255.97 MVA	2.02 kA	94.59	4.92 kA				
					B	4.90 MVA	0.04 kA	95.56	0.09 kA				
					C	5.36 MVA	0.04 kA	92.35	0.10 kA				
Lne 220 ISINYA	BB 220 ISI				A	255.97 MVA	2.02 kA	94.59	4.92 kA				
					B	4.90 MVA	0.04 kA	95.56	0.09 kA				
					C	5.36 MVA	0.04 kA	92.35	0.10 kA				
TR DANDORA 220/	BB 132 DAN				A	195.80 MVA	1.54 kA	98.19	3.76 kA				
					B	24.07 MVA	0.19 kA	101.89	0.46 kA				
					C	22.92 MVA	0.18 kA	91.46	0.44 kA				
TR DANDORA 220/	BB 132 DAN				A	195.80 MVA	1.54 kA	98.19	3.76 kA				
					B	24.07 MVA	0.19 kA	101.89	0.46 kA				
					C	22.92 MVA	0.18 kA	91.46	0.44 kA				
BB 220 EMBAKASI A	220.00	0.00	0.00	1.10		2543.25 MVA	20.02 kA	-82.93	48.02 kA	20.02	2543.25	0.00	
					B		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
					C		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 DANDORA	BB 220 DAN				A	781.91 MVA	6.16 kA	98.41	14.76 kA				
					B	18.89 MVA	0.15 kA	-91.18	0.36 kA				
					C	18.48 MVA	0.15 kA	-84.87	0.35 kA				
Lne 220 DANDORA	BB 220 DAN				A	781.91 MVA	6.16 kA	98.41	14.76 kA				
					B	18.89 MVA	0.15 kA	-91.18	0.36 kA				
					C	18.48 MVA	0.15 kA	-84.87	0.35 kA				
Lne 220 EMBAKAS	BB 220 ATH				A	485.21 MVA	3.82 kA	94.98	9.16 kA				
					B	13.80 MVA	0.11 kA	88.51	0.26 kA				
					C	13.42 MVA	0.11 kA	97.20	0.25 kA				
Lne 220 EMBAKAS	BB 220 ATH				A	485.21 MVA	3.82 kA	94.98	9.16 kA				
					B	13.80 MVA	0.11 kA	88.51	0.26 kA				
					C	13.42 MVA	0.11 kA	97.20	0.25 kA				
TR EMBAKASI 220	BB 66 EMBA				A	3.39 MVA	0.03 kA	89.66	0.06 kA				
					B	3.39 MVA	0.03 kA	89.66	0.06 kA				
					C	3.39 MVA	0.03 kA	89.66	0.06 kA				
TR EMBAKASI 220	BB 66 EMBA				A	3.39 MVA	0.03 kA	89.66	0.06 kA				
					B	3.39 MVA	0.03 kA	89.66	0.06 kA				
					C	3.39 MVA	0.03 kA	89.66	0.06 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 50				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR EMBAKASI 220	BB 66 EMBA											
					A	3.39 MVA	0.03 kA	89.66	0.06 kA			
					B	3.39 MVA	0.03 kA	89.66	0.06 kA			
					C	3.39 MVA	0.03 kA	89.66	0.06 kA			
Shnt EMBAKASI 2					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 GARISSA	A	220.00	0.00	0.00	1.10	168.87 MVA	1.33 kA	-77.95	2.92 kA	1.33	168.87	0.00
	B		137.91	-117.33		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
	C		136.18	117.81		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 220 GARISSA	BB 220 HOL				A	112.05 MVA	0.88 kA	98.53	1.94 kA			
					B	3.13 MVA	0.02 kA	-101.05	0.05 kA			
					C	3.07 MVA	0.02 kA	-99.82	0.05 kA			
TR GARISSA 220/	BB 132 GAR				A	57.45 MVA	0.45 kA	108.95	0.99 kA			
					B	3.13 MVA	0.02 kA	78.95	0.05 kA			
					C	3.07 MVA	0.02 kA	80.18	0.05 kA			
Shnt GARISA 220					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 GARSEN (	A	220.00	0.00	0.00	1.10	465.01 MVA	3.66 kA	-78.65	8.09 kA	3.66	465.01	0.00
	B		135.51	-116.03		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		136.96	116.03		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 220 MALINDI	BB 220 MAL				A	159.84 MVA	1.26 kA	102.23	2.78 kA			
					B	5.36 MVA	0.04 kA	-84.81	0.09 kA			
					C	5.20 MVA	0.04 kA	-67.67	0.09 kA			
Lne 220 GARSEN	BB 220 LAM				A	263.62 MVA	2.08 kA	100.18	4.59 kA			
					B	4.50 MVA	0.04 kA	110.27	0.08 kA			
					C	4.89 MVA	0.04 kA	134.48	0.09 kA			
Lne 220 GARSEN	BB 220 HOL				A	40.96 MVA	0.32 kA	105.59	0.71 kA			
					B	1.11 MVA	0.01 kA	16.36	0.02 kA			
					C	1.54 MVA	0.01 kA	19.70	0.03 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 51			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR GARSEN 220/3	BB 33 GARS										
				A	0.80 MVA	0.01 kA	89.38	0.01 kA			
				B	0.80 MVA	0.01 kA	89.38	0.01 kA			
				C	0.80 MVA	0.01 kA	89.38	0.01 kA			
Shnt GARSEN 220				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 GITARU (A	220.00	0.00	0.00	1.10	1213.39 MVA	9.55 kA	-83.13	22.83 kA	9.55	1213.39	0.00
B		134.98	-112.59		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
C		133.66	113.19		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 KAMBURU	BB 220 KAM										
				A	1066.74 MVA	8.40 kA	97.61	20.07 kA			
				B	20.67 MVA	0.16 kA	-112.80	0.39 kA			
				C	17.51 MVA	0.14 kA	-65.58	0.33 kA			
TR GITARU 220/1	BB 15 GITA										
				A	147.38 MVA	1.16 kA	91.49	2.77 kA			
				B	20.67 MVA	0.16 kA	67.20	0.39 kA			
				C	17.51 MVA	0.14 kA	114.42	0.33 kA			
BB 220 HOLA (PS A	220.00	0.00	0.00	1.10	247.17 MVA	1.95 kA	-79.35	4.36 kA	1.95	247.17	0.00
B		137.63	-117.52		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
C		137.14	117.76		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 220 GARSEN	BB 220 GAR										
				A	200.65 MVA	1.58 kA	99.23	3.54 kA			
				B	2.18 MVA	0.02 kA	-109.68	0.04 kA			
				C	2.24 MVA	0.02 kA	-111.20	0.04 kA			
Lne 220 GARISSA	BB 220 GAR										
				A	46.60 MVA	0.37 kA	106.83	0.82 kA			
				B	1.94 MVA	0.02 kA	67.67	0.03 kA			
				C	2.00 MVA	0.02 kA	66.06	0.04 kA			
TR HOLA 220/33	BB 33 HOLA										
				A	0.26 MVA	0.00 kA	90.32	0.00 kA			
				B	0.26 MVA	0.00 kA	90.32	0.00 kA			
				C	0.26 MVA	0.00 kA	90.32	0.00 kA			
BB 220 ISINYA (A	220.00	0.00	0.00	1.10	2713.09 MVA	21.36 kA	-84.11	52.40 kA	21.36	2713.09	0.00
B		130.79	-110.91		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
C		130.85	111.35		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 52					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 ISINYA	BB 220 DAN			A	361.51 MVA	2.85 kA	97.04	6.98 kA			
				B	25.13 MVA	0.20 kA	-86.57	0.49 kA			
				C	25.32 MVA	0.20 kA	-85.37	0.49 kA			
Lne 220 ISINYA	BB 220 DAN			A	361.51 MVA	2.85 kA	97.04	6.98 kA			
				B	25.13 MVA	0.20 kA	-86.57	0.49 kA			
				C	25.32 MVA	0.20 kA	-85.37	0.49 kA			
Lne 220 ISINYA	BB 220 KIP			A	160.52 MVA	1.26 kA	92.56	3.10 kA			
				B	12.80 MVA	0.10 kA	69.09	0.25 kA			
				C	9.75 MVA	0.08 kA	114.38	0.19 kA			
Lne 220 ISINYA	BB 220 ATH			A	354.83 MVA	2.79 kA	97.74	6.85 kA			
				B	18.03 MVA	0.14 kA	-80.66	0.35 kA			
				C	18.52 MVA	0.15 kA	-84.38	0.36 kA			
Lne 220 ISINYA	BB 220 ATH			A	354.83 MVA	2.79 kA	97.74	6.85 kA			
				B	18.03 MVA	0.14 kA	-80.66	0.35 kA			
				C	18.52 MVA	0.15 kA	-84.38	0.36 kA			
TR ISINYA 400/2	BB 400 ISI			A	519.23 MVA	4.09 kA	93.54	10.03 kA			
				B	36.71 MVA	0.29 kA	101.00	0.71 kA			
				C	38.48 MVA	0.30 kA	93.41	0.74 kA			
TR ISINYA 400/2	BB 400 ISI			A	519.23 MVA	4.09 kA	93.54	10.03 kA			
				B	36.71 MVA	0.29 kA	101.00	0.71 kA			
				C	38.48 MVA	0.30 kA	93.41	0.74 kA			
TR ISINYA 220/1	BB 132 ISI			A	84.32 MVA	0.66 kA	105.69	1.63 kA			
				B	1.82 MVA	0.01 kA	71.42	0.04 kA			
				C	1.87 MVA	0.01 kA	61.56	0.04 kA			
BB 220 KAINUK (A	220.00	0.00	0.00	1.10	378.93 MVA	2.98 kA	-82.00	6.97 kA	2.98	378.93	0.00
B		134.85	-114.69		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		133.02	115.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 TURKWEL	BB 220 TUR			A	307.33 MVA	2.42 kA	96.54	5.65 kA			
				B	2.38 MVA	0.02 kA	-77.16	0.04 kA			
				C	2.99 MVA	0.02 kA	-76.28	0.06 kA			
Lne 220 KAINUK	BB 220 0RT			A	70.66 MVA	0.56 kA	104.50	1.30 kA			
				B	0.95 MVA	0.01 kA	121.26	0.02 kA			
				C	1.55 MVA	0.01 kA	115.65	0.03 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 53						
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR KAINUK 220/6	BB 66 KAIN					A 1.51 MVA	0.01 kA	91.39	0.03 kA			
						B 1.51 MVA	0.01 kA	91.39	0.03 kA			
						C 1.51 MVA	0.01 kA	91.39	0.03 kA			
BB 220 KAMBURU	A	220.00	0.00	0.00	1.10	1539.51 MVA	12.12 kA	-83.59	29.19 kA	12.12	1539.51	0.00
	B		133.97	-111.02		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		132.23	111.73		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 220 KAMBURU	BB 220 KIA					A 349.38 MVA	2.75 kA	98.23	6.63 kA			
						B 12.64 MVA	0.10 kA	-108.04	0.24 kA			
						C 11.40 MVA	0.09 kA	-77.03	0.22 kA			
Lne 220 KAMBURU	BB 220 GIT					A 140.01 MVA	1.10 kA	91.91	2.66 kA			
						B 13.81 MVA	0.11 kA	59.37	0.26 kA			
						C 11.60 MVA	0.09 kA	130.02	0.22 kA			
Lne 220 KAMBURU	BB 220 DAN					A 274.42 MVA	2.16 kA	98.43	5.20 kA			
						B 32.82 MVA	0.26 kA	-95.85	0.62 kA			
						C 30.92 MVA	0.24 kA	-77.74	0.59 kA			
Lne 220 KAMBURU	BB 220 DAN					A 269.37 MVA	2.12 kA	98.43	5.11 kA			
						B 32.21 MVA	0.25 kA	-95.85	0.61 kA			
						C 30.35 MVA	0.24 kA	-77.74	0.58 kA			
TR KAMBURU 220/	BB 132 KAM					A 253.83 MVA	2.00 kA	94.22	4.81 kA			
						B 32.46 MVA	0.26 kA	86.90	0.62 kA			
						C 31.31 MVA	0.25 kA	97.44	0.59 kA			
TR KAMBURU 220/	BB 132 KAM					A 253.83 MVA	2.00 kA	94.22	4.81 kA			
						B 32.46 MVA	0.26 kA	86.90	0.62 kA			
						C 31.31 MVA	0.25 kA	97.44	0.59 kA			
BB 220 KIAMBERE	A	220.00	0.00	0.00	1.10	1134.97 MVA	8.94 kA	-82.27	20.97 kA	8.94	1134.97	0.00
	B		134.22	-112.60		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		132.67	113.28		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 KAMBURU	BB 220 KAM					A 568.32 MVA	4.47 kA	99.83	10.50 kA			
						B 26.99 MVA	0.21 kA	-91.67	0.50 kA			
						C 26.63 MVA	0.21 kA	-91.61	0.49 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 54											
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]										
Lne 220 KIAMBER	BB 220 DAN			A	216.83 MVA	1.71 kA	98.56	4.01 kA													
				B	21.50 MVA	0.17 kA	-93.43	0.40 kA													
				C	20.28 MVA	0.16 kA	-81.41	0.37 kA													
Lne 220 KIAMBER	BB 220 RAB			A	82.01 MVA	0.65 kA	102.75	1.52 kA													
				B	8.66 MVA	0.07 kA	-87.75	0.16 kA													
				C	8.30 MVA	0.07 kA	-78.44	0.15 kA													
TR KIAMBERE 220	BB 11 KIAM			A	130.71 MVA	1.03 kA	91.16	2.41 kA													
				B	30.75 MVA	0.24 kA	88.55	0.57 kA													
				C	29.72 MVA	0.23 kA	93.63	0.55 kA													
TR KIAMBERE 220	BB 11 KIAM			A	139.63 MVA	1.10 kA	91.08	2.58 kA													
				B	26.37 MVA	0.21 kA	87.93	0.49 kA													
				C	25.22 MVA	0.20 kA	94.69	0.47 kA													
Shnt KIAMBERE 2				A	0.00 MVA	0.00 kA	0.00	0.00 kA													
				B	0.00 MVA	0.00 kA	0.00	0.00 kA													
				C	0.00 MVA	0.00 kA	0.00	0.00 kA													
BB 220 KIPETO (	A	220.00	0.00	0.00	1.10																
												B	135.05	-114.61	1074.39 MVA	8.46 kA	-82.82	20.10 kA	8.46	1074.39	0.00
												C	134.13	115.11	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 ISINYA	BB 220 ISI			A	881.24 MVA	6.94 kA	98.47	16.48 kA													
				B	40.34 MVA	0.32 kA	-98.05	0.75 kA													
				C	36.62 MVA	0.29 kA	-83.38	0.68 kA													
TR KIPETO 220/1	BB 11 KIPE			A	97.19 MVA	0.77 kA	91.36	1.82 kA													
				B	20.17 MVA	0.16 kA	81.95	0.38 kA													
				C	18.31 MVA	0.14 kA	96.62	0.34 kA													
TR KIPETO 220/1	BB 11 KIPE			A	97.19 MVA	0.77 kA	91.36	1.82 kA													
				B	20.17 MVA	0.16 kA	81.95	0.38 kA													
				C	18.31 MVA	0.14 kA	96.62	0.34 kA													
BB 220 KISUMU (	A	220.00	0.00	0.00	1.10																
												B	132.78	-113.71	570.04 MVA	4.49 kA	-81.55	10.54 kA	4.49	570.04	0.00
												C	132.76	113.99	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 55			
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 LESSOS	BB 220 LES			A	187.71 MVA	1.48 kA	97.17	3.47 kA			
				B	14.74 MVA	0.12 kA	-83.42	0.27 kA			
				C	14.57 MVA	0.11 kA	-80.29	0.27 kA			
Lne 220 LESSOS	BB 220 LES			A	187.71 MVA	1.48 kA	97.17	3.47 kA			
				B	14.74 MVA	0.12 kA	-83.42	0.27 kA			
				C	14.57 MVA	0.11 kA	-80.29	0.27 kA			
TR KISUMU 220/1	BB 132 KIS			A	97.45 MVA	0.77 kA	100.93	1.80 kA			
				B	14.74 MVA	0.12 kA	96.58	0.27 kA			
				C	14.57 MVA	0.11 kA	99.71	0.27 kA			
TR KISUMU 220/1	BB 132 KIS			A	97.45 MVA	0.77 kA	100.93	1.80 kA			
				B	14.74 MVA	0.12 kA	96.58	0.27 kA			
				C	14.57 MVA	0.11 kA	99.71	0.27 kA			
BB 220 KITALE (	A 220.00	0.00	0.00	1.10	249.74 MVA	1.97 kA	-78.31	4.35 kA	1.97	249.74	0.00
	B	134.05	-115.40		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C	134.35	115.67		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 0RTUM	BB 220 0RT			A	141.83 MVA	1.12 kA	97.57	2.47 kA			
				B	6.25 MVA	0.05 kA	-76.87	0.11 kA			
				C	6.55 MVA	0.05 kA	-76.34	0.11 kA			
TR KITALE 220/1	BB 132 KIT			A	108.76 MVA	0.86 kA	107.07	1.89 kA			
				B	6.25 MVA	0.05 kA	103.13	0.11 kA			
				C	6.55 MVA	0.05 kA	103.66	0.11 kA			
Shn KITALE 220k				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 KOMOROCK	A 220.00	0.00	0.00	1.10	2958.76 MVA	23.29 kA	-83.87	56.92 kA	23.29	2958.76	0.00
	B	131.04	-111.62		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
	C	131.99	111.99		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 DANDORA	BB 220 DAN			A	1473.48 MVA	11.60 kA	96.15	28.35 kA			
				B	5.94 MVA	0.05 kA	-90.33	0.11 kA			
				C	5.94 MVA	0.05 kA	-90.33	0.11 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 56			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 DANDORA	BB 220 DAN			A	1473.48 MVA	11.60 kA	96.15	28.35 kA			
				B	5.94 MVA	0.05 kA	-90.33	0.11 kA			
				C	5.94 MVA	0.05 kA	-90.33	0.11 kA			
TR KOMOROCK 220	BB 66 KOMO			A	5.94 MVA	0.05 kA	89.67	0.11 kA			
				B	5.94 MVA	0.05 kA	89.67	0.11 kA			
				C	5.94 MVA	0.05 kA	89.67	0.11 kA			
TR KOMOROCK 220	BB 66 KOMO			A	5.94 MVA	0.05 kA	89.67	0.11 kA			
				B	5.94 MVA	0.05 kA	89.67	0.11 kA			
				C	5.94 MVA	0.05 kA	89.67	0.11 kA			
BB 220 LAMU (PS A	220.00	0.00	0.00	1.10	964.63 MVA	7.59 kA	-86.13	19.43 kA	7.59	964.63	0.00
B		132.07	-105.36		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
C		130.06	105.87		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.90
TR LAMU 400/220	BB 400 LAM			A	419.06 MVA	3.30 kA	92.45	8.44 kA			
				B	14.30 MVA	0.11 kA	93.39	0.29 kA			
				C	14.09 MVA	0.11 kA	109.88	0.28 kA			
TR LAMU 400/220	BB 400 LAM			A	419.06 MVA	3.30 kA	92.45	8.44 kA			
				B	14.30 MVA	0.11 kA	93.39	0.29 kA			
				C	14.09 MVA	0.11 kA	109.88	0.28 kA			
Lne 220 GARSEN	BB 220 GAR			A	128.02 MVA	1.01 kA	103.26	2.58 kA			
				B	29.06 MVA	0.23 kA	-86.64	0.59 kA			
				C	28.63 MVA	0.23 kA	-70.41	0.58 kA			
TR LAMU 220/33	BB 33 LAMU			A	0.47 MVA	0.00 kA	91.83	0.01 kA			
				B	0.47 MVA	0.00 kA	91.83	0.01 kA			
				C	0.47 MVA	0.00 kA	91.83	0.01 kA			
Ld LAMU (220kV)				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt LAMU 220kV				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 57			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 220 LAMU CPP A	B	C		220.00	0.00	0.00	1.10	1854.37 MVA	14.60 kA	-87.85	38.02 kA	14.60	1854.37	0.00	
					147.58	-108.83		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97	
					147.68	109.97		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95	
TR LAMU CPP 400	BB 400 LAM		A					215.81 MVA	1.70 kA	96.18	4.43 kA				
								25.96 MVA	0.20 kA	170.03	0.53 kA				
								23.96 MVA	0.19 kA	31.72	0.49 kA				
TR LAMU CPP 400	BB 400 LAM		A					215.81 MVA	1.70 kA	96.18	4.43 kA				
								25.96 MVA	0.20 kA	170.03	0.53 kA				
								23.96 MVA	0.19 kA	31.72	0.49 kA				
Sym LAMU CPP G1			A					1424.14 MVA	11.21 kA	-89.08	29.20 kA				
								51.93 MVA	0.41 kA	170.03	1.06 kA				
								47.91 MVA	0.38 kA	31.72	0.98 kA				
BB 220 LESSOS (A	B	C		220.00	0.00	0.00	1.10	1012.83 MVA	7.97 kA	-81.98	18.94 kA	7.97	1012.83	0.00	
					133.05	-113.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95	
					132.69	114.28		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95	
TR LESSOS 400/2	BB 400 LES		A					101.44 MVA	0.80 kA	91.20	1.90 kA				
								11.09 MVA	0.09 kA	-89.98	0.21 kA				
								10.49 MVA	0.08 kA	-87.44	0.20 kA				
TR LESSOS 400/2	BB 400 LES		A					101.44 MVA	0.80 kA	91.20	1.90 kA				
								11.09 MVA	0.09 kA	-89.98	0.21 kA				
								10.49 MVA	0.08 kA	-87.44	0.20 kA				
Lne 220 TURKWEL	BB 220 TUR		A					77.97 MVA	0.61 kA	96.66	1.46 kA				
								2.62 MVA	0.02 kA	-87.51	0.05 kA				
								3.34 MVA	0.03 kA	-80.88	0.06 kA				
Lne 220 OLKARIA	BB 220 OLK		A					153.03 MVA	1.20 kA	96.86	2.86 kA				
								14.07 MVA	0.11 kA	-88.18	0.26 kA				
								13.50 MVA	0.11 kA	-82.97	0.25 kA				
Lne 220 OLKARIA	BB 220 OLK		A					153.03 MVA	1.20 kA	96.86	2.86 kA				
								14.07 MVA	0.11 kA	-88.18	0.26 kA				
								13.50 MVA	0.11 kA	-82.97	0.25 kA				

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 58					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 LESSOS	BB 220 KIS			A	56.92 MVA	0.45 kA	96.65	1.06 kA			
				B	7.29 MVA	0.06 kA	93.20	0.14 kA			
				C	7.11 MVA	0.06 kA	99.45	0.13 kA			
Lne 220 LESSOS	BB 220 KIS			A	56.92 MVA	0.45 kA	96.65	1.06 kA			
				B	7.29 MVA	0.06 kA	93.20	0.14 kA			
				C	7.11 MVA	0.06 kA	99.45	0.13 kA			
TR LESSOS 220/1	BB 132 LES			A	78.89 MVA	0.62 kA	104.36	1.47 kA			
				B	9.59 MVA	0.08 kA	90.30	0.18 kA			
				C	9.28 MVA	0.07 kA	93.77	0.17 kA			
TR LESSOS 220/1	BB 132 LES			A	78.89 MVA	0.62 kA	104.36	1.47 kA			
				B	9.59 MVA	0.08 kA	90.30	0.18 kA			
				C	9.28 MVA	0.07 kA	93.77	0.17 kA			
TR LESSOS 220/1	BB 132 LES			A	78.89 MVA	0.62 kA	104.36	1.47 kA			
				B	9.59 MVA	0.08 kA	90.30	0.18 kA			
				C	9.28 MVA	0.07 kA	93.77	0.17 kA			
TR LESSOS 220/1	BB 132 LES			A	78.89 MVA	0.62 kA	104.36	1.47 kA			
				B	9.59 MVA	0.08 kA	90.30	0.18 kA			
				C	9.28 MVA	0.07 kA	93.77	0.17 kA			
BB 220 LOYANGAL A	220.00	0.00	0.00	1.10	431.06 MVA	3.39 kA	-86.40	8.76 kA	3.39	431.06	0.00
B		137.09	-117.65		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
C		136.35	117.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
TR LOIYANGALANI	BB 400 LOI			A	208.92 MVA	1.64 kA	93.70	4.24 kA			
				B	6.62 MVA	0.05 kA	-89.62	0.13 kA			
				C	6.62 MVA	0.05 kA	-89.62	0.13 kA			
TR LOIYANGALANI	BB 400 LOI			A	208.92 MVA	1.64 kA	93.70	4.24 kA			
				B	6.62 MVA	0.05 kA	-89.62	0.13 kA			
				C	6.62 MVA	0.05 kA	-89.62	0.13 kA			
TR LOYANGALANI	BB 33 LOYA			A	4.41 MVA	0.03 kA	90.38	0.09 kA			
				B	4.41 MVA	0.03 kA	90.38	0.09 kA			
				C	4.41 MVA	0.03 kA	90.38	0.09 kA			
TR LOYANGALANI	BB 33 LOYA			A	4.41 MVA	0.03 kA	90.38	0.09 kA			
				B	4.41 MVA	0.03 kA	90.38	0.09 kA			
				C	4.41 MVA	0.03 kA	90.38	0.09 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 59				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR LOYANGALANI	BB 33 LOYA											
					A	4.41 MVA	0.03 kA	90.38	0.09 kA			
					B	4.41 MVA	0.03 kA	90.38	0.09 kA			
					C	4.41 MVA	0.03 kA	90.38	0.09 kA			
Shnt LOIYANGALA					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 MALINDI	A	220.00	0.00	0.00	1.10	458.09 MVA	3.61 kA	-78.52	7.95 kA	3.61	458.09	0.00
	B		135.73	-116.56		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		137.24	116.53		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 220 RABAI	BB 220 RAB				A	293.73 MVA	2.31 kA	101.18	5.10 kA			
					B	1.01 MVA	0.01 kA	129.74	0.02 kA			
					C	0.95 MVA	0.01 kA	133.50	0.02 kA			
Lne 220 MALINDI	BB 220 GAR				A	162.79 MVA	1.28 kA	102.13	2.82 kA			
					B	2.48 MVA	0.02 kA	-75.35	0.04 kA			
					C	2.39 MVA	0.02 kA	-74.65	0.04 kA			
TR MALINDI 220/	BB 33 MALI				A	0.81 MVA	0.01 kA	89.35	0.01 kA			
					B	0.81 MVA	0.01 kA	89.35	0.01 kA			
					C	0.81 MVA	0.01 kA	89.35	0.01 kA			
TR MALINDI 220/	BB 33 MALI				A	0.81 MVA	0.01 kA	89.35	0.01 kA			
					B	0.81 MVA	0.01 kA	89.35	0.01 kA			
					C	0.81 MVA	0.01 kA	89.35	0.01 kA			
Shnt MALINDI 22					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 MARIAKAN	A	220.00	0.00	0.00	1.10	982.11 MVA	7.73 kA	-83.54	18.81 kA	7.73	982.11	0.00
	B		131.50	-110.38		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
	C		132.08	110.77		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
TR MARIAKANI 40	BB 400 MAR				A	206.56 MVA	1.63 kA	94.27	3.96 kA			
					B	7.35 MVA	0.06 kA	-108.44	0.14 kA			
					C	6.35 MVA	0.05 kA	-57.34	0.12 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 60				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 RABAI	BB 220 RAB											
					A	284.76 MVA	2.24 kA	98.06	5.45 kA			
					B	7.35 MVA	0.06 kA	71.56	0.14 kA			
					C	6.35 MVA	0.05 kA	122.66	0.12 kA			
Lne 220 RABAI	BB 220 RAB				A	284.76 MVA	2.24 kA	98.06	5.45 kA			
					B	7.35 MVA	0.06 kA	71.56	0.14 kA			
					C	6.35 MVA	0.05 kA	122.66	0.12 kA			
TR MARIAKANI 40	BB 400 MAR				A	206.56 MVA	1.63 kA	94.27	3.96 kA			
					B	7.35 MVA	0.06 kA	-108.44	0.14 kA			
					C	6.35 MVA	0.05 kA	-57.34	0.12 kA			
BB 220 MATASIA	A	220.00	0.00	0.00	1.10	1258.07 MVA	9.90 kA	-82.78	23.63 kA	9.90	1258.07	0.00
	B		134.65	-116.26		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		134.97	116.46		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 220 MATASIA	BB 220 NGO				A	622.17 MVA	4.90 kA	97.30	11.69 kA			
					B	6.92 MVA	0.05 kA	-90.04	0.13 kA			
					C	6.92 MVA	0.05 kA	-90.04	0.13 kA			
Lne 220 MATASIA	BB 220 NGO				A	622.17 MVA	4.90 kA	97.30	11.69 kA			
					B	6.92 MVA	0.05 kA	-90.04	0.13 kA			
					C	6.92 MVA	0.05 kA	-90.04	0.13 kA			
TR MATASIA 220/	BB 66 MATA				A	6.92 MVA	0.05 kA	89.96	0.13 kA			
					B	6.92 MVA	0.05 kA	89.96	0.13 kA			
					C	6.92 MVA	0.05 kA	89.96	0.13 kA			
TR MATASIA 220/	BB 66 MATA				A	6.92 MVA	0.05 kA	89.96	0.13 kA			
					B	6.92 MVA	0.05 kA	89.96	0.13 kA			
					C	6.92 MVA	0.05 kA	89.96	0.13 kA			
BB 220 NBEAST (	A	220.00	0.00	0.00	1.10	1880.80 MVA	14.81 kA	-81.12	35.60 kA	14.81	1880.80	0.00
	B		137.78	-121.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
	C		146.53	120.07		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04
Lne 220 DANDORA	BB 220 DAN				A	759.62 MVA	5.98 kA	100.37	14.38 kA			
					B	46.13 MVA	0.36 kA	-100.01	0.87 kA			
					C	44.67 MVA	0.35 kA	-93.01	0.85 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 61				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 DANDORA	BB 220 DAN					759.62 MVA	5.98 kA	100.37	14.38 kA			
						46.13 MVA	0.36 kA	-100.01	0.87 kA			
						44.67 MVA	0.35 kA	-93.01	0.85 kA			
TR NBEAST 400/2	BB 400 NBE					182.10 MVA	1.43 kA	92.67	3.45 kA			
						46.13 MVA	0.36 kA	79.99	0.87 kA			
						44.67 MVA	0.35 kA	86.99	0.85 kA			
TR NBEAST 400/2	BB 400 NBE					182.10 MVA	1.43 kA	92.67	3.45 kA			
						46.13 MVA	0.36 kA	79.99	0.87 kA			
						44.67 MVA	0.35 kA	86.99	0.85 kA			
BB 220 NBNORTH	A	220.00	0.00	0.00	1.10	2542.01 MVA	20.01 kA	-83.70	48.74 kA	20.01	2542.01	0.00
	B		132.29	-114.27		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		133.52	114.51		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 SUSWA	BB 220 SUS					705.29 MVA	5.55 kA	94.91	13.52 kA			
						5.73 MVA	0.05 kA	-132.41	0.11 kA			
						5.28 MVA	0.04 kA	-40.64	0.10 kA			
Lne 220 SUSWA	BB 220 SUS					705.29 MVA	5.55 kA	94.91	13.52 kA			
						5.73 MVA	0.05 kA	-132.41	0.11 kA			
						5.28 MVA	0.04 kA	-40.64	0.10 kA			
Lne 220 NBNORTH	BB 220 THI					561.62 MVA	4.42 kA	98.11	10.77 kA			
						3.84 MVA	0.03 kA	-4.54	0.07 kA			
						4.19 MVA	0.03 kA	-164.81	0.08 kA			
Lne 220 NBNORTH	BB 220 THI					561.62 MVA	4.42 kA	98.11	10.77 kA			
						3.84 MVA	0.03 kA	-4.54	0.07 kA			
						4.19 MVA	0.03 kA	-164.81	0.08 kA			
TR NBNORTH 220/	BB 66 NBNO					1.96 MVA	0.02 kA	-88.98	0.04 kA			
						0.58 MVA	0.00 kA	92.01	0.01 kA			
						0.56 MVA	0.00 kA	92.18	0.01 kA			
TR NBNORTH 220/	BB 66 NBNO					1.96 MVA	0.02 kA	-88.98	0.04 kA			
						0.58 MVA	0.00 kA	92.01	0.01 kA			
						0.56 MVA	0.00 kA	92.18	0.01 kA			
TR NBNORTH 220/	BB 66 NBNO					13.16 MVA	0.10 kA	89.99	0.25 kA			
						7.92 MVA	0.06 kA	89.16	0.15 kA			
						7.95 MVA	0.06 kA	89.15	0.15 kA			

Grid: 1 KENYA		System Stage: 1 KENYA							Annex: LF.001 / 62			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 220 NGONG (P	A	220.00	0.00	0.00	1.10	1614.15 MVA	12.71 kA	-83.39	30.70 kA	12.71	1614.15	0.00
	B		133.66	-115.44		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		134.05	115.71		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 MATASIA		BB 220 MAT				A	6.62 MVA	0.05 kA	90.04	0.13 kA		
						B	6.62 MVA	0.05 kA	90.04	0.13 kA		
						C	6.62 MVA	0.05 kA	90.04	0.13 kA		
Lne 220 MATASIA		BB 220 MAT				A	6.62 MVA	0.05 kA	90.04	0.13 kA		
						B	6.62 MVA	0.05 kA	90.04	0.13 kA		
						C	6.62 MVA	0.05 kA	90.04	0.13 kA		
Lne 220 SUSWA		BB 220 SUS				A	782.84 MVA	6.16 kA	96.78	14.89 kA		
						B	16.08 MVA	0.13 kA	-90.88	0.31 kA		
						C	15.90 MVA	0.13 kA	-88.55	0.30 kA		
Lne 220 SUSWA		BB 220 SUS				A	782.84 MVA	6.16 kA	96.78	14.89 kA		
						B	16.08 MVA	0.13 kA	-90.88	0.31 kA		
						C	15.90 MVA	0.13 kA	-88.55	0.30 kA		
TR NGONG 220/66		BB 66 NGON				A	17.74 MVA	0.14 kA	91.20	0.34 kA		
						B	9.46 MVA	0.07 kA	88.47	0.18 kA		
						C	9.28 MVA	0.07 kA	92.46	0.18 kA		
TR NGONG 220/66		BB 66 NGON				A	17.74 MVA	0.14 kA	91.20	0.34 kA		
						B	9.46 MVA	0.07 kA	88.47	0.18 kA		
						C	9.28 MVA	0.07 kA	92.46	0.18 kA		
BB 220 OLKARIA	A	220.00	0.00	0.00	1.10	2619.26 MVA	20.62 kA	-85.50	51.62 kA	20.62	2619.26	0.00
	B		129.15	-111.37		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
	C		128.63	112.27		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 220 OLKARIA		BB 220 OLK				A	627.68 MVA	4.94 kA	95.18	12.37 kA		
						B	9.74 MVA	0.08 kA	-157.20	0.19 kA		
						C	12.71 MVA	0.10 kA	-12.88	0.25 kA		
Lne 220 OLKARIA		BB 220 OLK				A	627.68 MVA	4.94 kA	95.18	12.37 kA		
						B	9.74 MVA	0.08 kA	-157.20	0.19 kA		
						C	12.71 MVA	0.10 kA	-12.88	0.25 kA		

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 63	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 SUSWA	BB 220 SUS				A	405.13 MVA	3.19 kA	94.64	7.98 kA				
					B	36.89 MVA	0.29 kA	-81.27	0.73 kA				
					C	35.09 MVA	0.28 kA	-96.43	0.69 kA				
Lne 220 SUSWA	BB 220 SUS				A	405.13 MVA	3.19 kA	94.64	7.98 kA				
					B	36.89 MVA	0.29 kA	-81.27	0.73 kA				
					C	35.09 MVA	0.28 kA	-96.43	0.69 kA				
TR OLKARIA 220/	BB 11 OLKA				A	100.05 MVA	0.79 kA	91.55	1.97 kA				
					B	12.77 MVA	0.10 kA	75.87	0.25 kA				
					C	10.76 MVA	0.08 kA	100.70	0.21 kA				
TR OLKARIA 220/	BB 11 OLKA				A	100.05 MVA	0.79 kA	91.55	1.97 kA				
					B	12.77 MVA	0.10 kA	75.87	0.25 kA				
					C	10.76 MVA	0.08 kA	100.70	0.21 kA				
TR OLKARIA 220/	BB 11 OLKA				A	100.05 MVA	0.79 kA	91.55	1.97 kA				
					B	12.77 MVA	0.10 kA	75.87	0.25 kA				
					C	10.76 MVA	0.08 kA	100.70	0.21 kA				
TR OLKARIA 220/	BB 132 OLK				A	253.99 MVA	2.00 kA	94.12	5.01 kA				
					B	43.39 MVA	0.34 kA	93.43	0.86 kA				
					C	45.02 MVA	0.35 kA	104.04	0.89 kA				
BB 220 OLKARIA	A	220.00	0.00	0.00	1.10	2631.86 MVA	20.72 kA	-85.46	51.78 kA	20.72	2631.86	0.00	
			128.85	-111.36		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94	
			128.30	112.31		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92	
Lne 220 OLKARIA	BB 220 SUS				A	401.59 MVA	3.16 kA	96.20	7.90 kA				
					B	37.16 MVA	0.29 kA	-77.22	0.73 kA				
					C	35.39 MVA	0.28 kA	-98.16	0.70 kA				
Lne 220 OLKARIA	BB 220 SUS				A	401.59 MVA	3.16 kA	96.20	7.90 kA				
					B	37.16 MVA	0.29 kA	-77.22	0.73 kA				
					C	35.39 MVA	0.28 kA	-98.16	0.70 kA				
Lne 220 OLKARIA	BB 220 OLK				A	582.82 MVA	4.59 kA	94.11	11.47 kA				
					B	9.31 MVA	0.07 kA	-13.96	0.18 kA				
					C	13.51 MVA	0.11 kA	-167.39	0.27 kA				
Lne 220 OLKARIA	BB 220 OLK				A	582.82 MVA	4.59 kA	94.11	11.47 kA				
					B	9.31 MVA	0.07 kA	-13.96	0.18 kA				
					C	13.51 MVA	0.11 kA	-167.39	0.27 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 64				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 OLKARIA	BB 220 LES				A	108.60 MVA	0.86 kA	96.81	2.14 kA			
					B	11.85 MVA	0.09 kA	-77.43	0.23 kA			
					C	11.29 MVA	0.09 kA	-93.80	0.22 kA			
Lne 220 OLKARIA	BB 220 LES				A	108.60 MVA	0.86 kA	96.81	2.14 kA			
					B	11.85 MVA	0.09 kA	-77.43	0.23 kA			
					C	11.29 MVA	0.09 kA	-93.80	0.22 kA			
Lne 220 OLKARIA	BB 220 OLK				A	218.51 MVA	1.72 kA	91.73	4.30 kA			
					B	79.89 MVA	0.63 kA	124.88	1.57 kA			
					C	78.97 MVA	0.62 kA	57.55	1.55 kA			
TR OLKARIA 220/	BB 11 OLKN				A	72.59 MVA	0.57 kA	91.40	1.43 kA			
					B	11.17 MVA	0.09 kA	80.14	0.22 kA			
					C	10.24 MVA	0.08 kA	97.96	0.20 kA			
TR OLKARIA 220/	BB 11 OLKN				A	72.59 MVA	0.57 kA	91.40	1.43 kA			
					B	11.17 MVA	0.09 kA	80.14	0.22 kA			
					C	10.24 MVA	0.08 kA	97.96	0.20 kA			
TR OLKARIA 220/	BB 11 OLKN				A	83.32 MVA	0.66 kA	91.40	1.64 kA			
					B	12.74 MVA	0.10 kA	80.06	0.25 kA			
					C	11.68 MVA	0.09 kA	98.02	0.23 kA			
BB 220 OLKARIA	A	220.00	0.00	0.00	1.10	1934.72 MVA	15.23 kA	-84.42	37.17 kA	15.23	1934.72	0.00
	B		128.56	-112.68		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
	C		128.06	113.65		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
TR OLKARIA 220/	BB 11 OLKA				A	118.63 MVA	0.93 kA	91.13	2.28 kA			
					B	47.47 MVA	0.37 kA	117.80	0.91 kA			
					C	47.55 MVA	0.37 kA	62.66	0.91 kA			
Lne 220 OLKARIA	BB 220 OLK				A	1698.28 MVA	13.37 kA	96.21	32.63 kA			
					B	94.95 MVA	0.75 kA	-62.20	1.82 kA			
					C	95.11 MVA	0.75 kA	-117.34	1.83 kA			
TR OLKARIA 220/	BB 11 OLKA				A	118.63 MVA	0.93 kA	91.13	2.28 kA			
					B	47.47 MVA	0.37 kA	117.80	0.91 kA			
					C	47.55 MVA	0.37 kA	62.66	0.91 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 65			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 220 OLKARIA	A	220.00	0.00	0.00	1.10	1829.32 MVA	14.40 kA	-85.07	35.77 kA	14.40	1829.32	0.00			
	B		132.70	-113.35		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95			
	C		131.90	114.05		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94			
TR OLKARIA 220/		BB 11 OLKA				155.98 MVA	1.23 kA	91.50	3.05 kA						
						29.71 MVA	0.23 kA	84.50	0.58 kA						
						27.18 MVA	0.21 kA	93.15	0.53 kA						
Lne 220 SUSWA		BB 220 SUS				701.07 MVA	5.52 kA	96.06	13.71 kA						
						43.76 MVA	0.34 kA	-94.35	0.86 kA						
						40.60 MVA	0.32 kA	-86.49	0.79 kA						
Lne 220 SUSWA		BB 220 SUS				701.07 MVA	5.52 kA	96.06	13.71 kA						
						43.76 MVA	0.34 kA	-94.35	0.86 kA						
						40.60 MVA	0.32 kA	-86.49	0.79 kA						
TR OLKARIA 220/		BB 11 OLKA				136.18 MVA	1.07 kA	91.76	2.66 kA						
						29.02 MVA	0.23 kA	84.77	0.57 kA						
						26.95 MVA	0.21 kA	92.01	0.53 kA						
TR OLKARIA 220/		BB 11 OLKA				136.20 MVA	1.07 kA	90.46	2.66 kA						
						28.81 MVA	0.23 kA	87.72	0.56 kA						
						27.09 MVA	0.21 kA	95.35	0.53 kA						
BB 220 RABAI (P	A	220.00	0.00	0.00	1.10	1051.88 MVA	8.28 kA	-83.67	20.14 kA	8.28	1051.88	0.00			
	B		131.40	-108.85		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93			
	C		131.28	109.39		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92			
TR RABAI 220/13		BB 132 1RA				246.16 MVA	1.94 kA	94.53	4.71 kA						
						31.27 MVA	0.25 kA	87.53	0.60 kA						
						29.53 MVA	0.23 kA	106.53	0.57 kA						
TR RABAI 220/13		BB 132 RAB				246.36 MVA	1.94 kA	94.57	4.72 kA						
						31.44 MVA	0.25 kA	87.91	0.60 kA						
						29.76 MVA	0.23 kA	106.79	0.57 kA						
Lne 220 KIAMBER		BB 220 KIA				82.91 MVA	0.65 kA	103.05	1.59 kA						
						15.11 MVA	0.12 kA	-83.65	0.29 kA						
						14.59 MVA	0.11 kA	-71.62	0.28 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 66						
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
Lne 220 RABAI				BB 220 MAR				A	181.83 MVA	1.43 kA	95.32		3.48 kA					
								B	15.15 MVA	0.12 kA	-101.60	0.29 kA						
								C	13.59 MVA	0.11 kA	-73.89	0.26 kA						
Lne 220 RABAI				BB 220 MAR				A	181.83 MVA	1.43 kA	95.32		3.48 kA					
								B	15.15 MVA	0.12 kA	-101.60	0.29 kA						
								C	13.59 MVA	0.11 kA	-73.89	0.26 kA						
Lne 220 RABAI				BB 220 MAL				A	114.29 MVA	0.90 kA	102.34		2.19 kA					
								B	18.06 MVA	0.14 kA	-83.88	0.35 kA						
								C	17.54 MVA	0.14 kA	-73.91	0.34 kA						
Shnt RABAI 220k								A	0.00 MVA	0.00 kA	0.00		0.00 kA					
								B	0.00 MVA	0.00 kA	0.00	0.00 kA						
								C	0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 220 SUSWA (P A				220.00				0.00	0.00	0.00	1.10	3073.24 MVA	24.20 kA	-85.83	61.35 kA	24.20	3073.24	0.00
								B	130.54	-112.45		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
								C	130.72	113.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
TR SUSWA 400/22				BB 400 SUS				A	440.52 MVA	3.47 kA	91.16		8.79 kA					
								B	57.10 MVA	0.45 kA	-86.06	1.14 kA						
								C	53.04 MVA	0.42 kA	-90.89	1.06 kA						
TR SUSWA 400/22				BB 400 SUS				A	440.52 MVA	3.47 kA	91.16		8.79 kA					
								B	57.10 MVA	0.45 kA	-86.06	1.14 kA						
								C	53.04 MVA	0.42 kA	-90.89	1.06 kA						
Lne 220 OLKARIA				BB 220 OLK				A	242.01 MVA	1.91 kA	94.81		4.83 kA					
								B	22.66 MVA	0.18 kA	109.58	0.45 kA						
								C	21.16 MVA	0.17 kA	78.81	0.42 kA						
Lne 220 OLKARIA				BB 220 OLK				A	242.01 MVA	1.91 kA	94.81		4.83 kA					
								B	22.66 MVA	0.18 kA	109.58	0.45 kA						
								C	21.16 MVA	0.17 kA	78.81	0.42 kA						
Lne 220 SUSWA				BB 220 OLK				A	239.89 MVA	1.89 kA	93.12		4.79 kA					
								B	22.58 MVA	0.18 kA	105.02	0.45 kA						
								C	21.06 MVA	0.17 kA	80.93	0.42 kA						
Lne 220 SUSWA				BB 220 OLK				A	239.89 MVA	1.89 kA	93.12		4.79 kA					
								B	22.58 MVA	0.18 kA	105.02	0.45 kA						
								C	21.06 MVA	0.17 kA	80.93	0.42 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 67			
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 SUSWA				BB 220 NBN				A	414.25 MVA	3.26 kA	98.60	8.27 kA			
								B	23.17 MVA	0.18 kA	-73.68	0.46 kA			
								C	22.19 MVA	0.17 kA	-97.17	0.44 kA			
Lne 220 SUSWA				BB 220 NBN				A	414.25 MVA	3.26 kA	98.60	8.27 kA			
								B	23.17 MVA	0.18 kA	-73.68	0.46 kA			
								C	22.19 MVA	0.17 kA	-97.17	0.44 kA			
Lne 220 SUSWA				BB 220 OLK				A	180.38 MVA	1.42 kA	92.19	3.60 kA			
								B	23.29 MVA	0.18 kA	82.90	0.46 kA			
								C	20.96 MVA	0.17 kA	98.94	0.42 kA			
Lne 220 SUSWA				BB 220 OLK				A	180.38 MVA	1.42 kA	92.19	3.60 kA			
								B	23.29 MVA	0.18 kA	82.90	0.46 kA			
								C	20.96 MVA	0.17 kA	98.94	0.42 kA			
Lne 220 SUSWA				BB 220 NGO				A	21.60 MVA	0.17 kA	91.38	0.43 kA			
								B	12.94 MVA	0.10 kA	89.42	0.26 kA			
								C	12.79 MVA	0.10 kA	92.58	0.26 kA			
Lne 220 SUSWA				BB 220 NGO				A	21.60 MVA	0.17 kA	91.38	0.43 kA			
								B	12.94 MVA	0.10 kA	89.42	0.26 kA			
								C	12.79 MVA	0.10 kA	92.58	0.26 kA			
Shnt SUSWA (PSS								A	0.00 MVA	0.00 kA	0.00	0.00 kA			
								B	0.00 MVA	0.00 kA	0.00	0.00 kA			
								C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt SUSWA 220k								A	0.00 MVA	0.00 kA	0.00	0.00 kA			
								B	0.00 MVA	0.00 kA	0.00	0.00 kA			
								C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 THIKA RD A				220.00	0.00	0.00	1.10	2629.63 MVA	20.70 kA	-83.08	49.83 kA	20.70	2629.63	0.00	
					131.89	-113.46		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.00	0.94
					133.39	113.67		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.00	0.95
Lne 220 DANDORA				BB 220 DAN				A	796.66 MVA	6.27 kA	97.66	15.10 kA			
								B	12.12 MVA	0.10 kA	83.90	0.23 kA			
								C	12.60 MVA	0.10 kA	123.98	0.24 kA			
Lne 220 DANDORA				BB 220 DAN				A	796.66 MVA	6.27 kA	97.66	15.10 kA			
								B	12.12 MVA	0.10 kA	83.90	0.23 kA			
								C	12.60 MVA	0.10 kA	123.98	0.24 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 68				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]		Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 NBNORTH	BB 220 NBN				A	508.53 MVA	4.00 kA	95.91			9.64 kA					
						21.95 MVA	0.17 kA	-93.65		0.42 kA						
						21.46 MVA	0.17 kA	-71.15		0.41 kA						
Lne 220 NBNORTH	BB 220 NBN				A	508.53 MVA	4.00 kA	95.91			9.64 kA					
						21.95 MVA	0.17 kA	-93.65		0.42 kA						
						21.46 MVA	0.17 kA	-71.15		0.41 kA						
TR THIKA 220/66	BB 66 THIK				A	9.85 MVA	0.08 kA	89.36			0.19 kA					
						9.85 MVA	0.08 kA	89.36		0.19 kA						
						9.85 MVA	0.08 kA	89.36		0.19 kA						
TR THIKA 220/66	BB 66 THIK				A	9.85 MVA	0.08 kA	89.36			0.19 kA					
						9.85 MVA	0.08 kA	89.36		0.19 kA						
						9.85 MVA	0.08 kA	89.36		0.19 kA						
BB 220 TORORO (	A	220.00	0.00	0.00	1.10	3504.72 MVA	27.59 kA	-84.44			68.32 kA	27.59	3504.72	0.00		
		B		139.66	-119.89		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00		0.00	1.00	
		C		139.54	119.93		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00		0.00	1.00	
TR TORORO 400/2	BB 400 TOR				A	85.81 MVA	0.68 kA	92.67			1.67 kA					
						3.17 MVA	0.02 kA	79.57		0.06 kA						
						3.03 MVA	0.02 kA	81.26		0.06 kA						
TR TORORO 400/2	BB 400 TOR				A	85.81 MVA	0.68 kA	92.67			1.67 kA					
						3.17 MVA	0.02 kA	79.57		0.06 kA						
						3.03 MVA	0.02 kA	81.26		0.06 kA						
External Grid (					A	3333.33 MVA	26.24 kA	-84.29			64.98 kA					
						6.33 MVA	0.05 kA	79.57		0.12 kA						
						6.07 MVA	0.05 kA	81.26		0.12 kA						
BB 220 TURKWEL	A	220.00	0.00	0.00	1.10	381.39 MVA	3.00 kA	-81.98			7.01 kA	3.00	381.39	0.00		
		B		134.82	-114.67		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00		0.00	0.97	
		C		132.99	115.80		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00		0.00	0.95	
Lne 220 TURKWEL	BB 220 KAI				A	71.87 MVA	0.57 kA	104.18			1.32 kA					
						2.31 MVA	0.02 kA	102.81		0.04 kA						
						2.94 MVA	0.02 kA	103.72		0.05 kA						

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 69					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 TURKWEL	BB 220 LES										
				A	147.38 MVA	1.16 kA	102.30	2.71 kA			
				B	11.33 MVA	0.09 kA	-85.91	0.21 kA			
				C	9.88 MVA	0.08 kA	-86.76	0.18 kA			
TR TURKWEL 220/	BB 11 TURK										
				A	82.02 MVA	0.65 kA	91.48	1.51 kA			
				B	4.53 MVA	0.04 kA	91.87	0.08 kA			
				C	3.50 MVA	0.03 kA	88.87	0.06 kA			
TR TURKWEL 220/	BB 11 TURK										
				A	82.02 MVA	0.65 kA	91.48	1.51 kA			
				B	4.53 MVA	0.04 kA	91.87	0.08 kA			
				C	3.50 MVA	0.03 kA	88.87	0.06 kA			
BB 33 MERU WPP- A	33.00	0.00	0.00	1.10	229.03 MVA	12.02 kA	-75.67	24.97 kA	12.02	229.03	0.00
B		24.51	-131.32		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.17
C		24.15	132.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.15
CB MERU WPP S/S	BB 33 MERU										
				A	122.04 MVA	6.41 kA	104.53	13.30 kA			
				B	3.83 MVA	0.20 kA	-72.87	0.42 kA			
				C	3.82 MVA	0.20 kA	-72.63	0.42 kA			
TR MERU-WPP 132	WPP-S/S ME										
				A	67.33 MVA	3.53 kA	102.18	7.34 kA			
				B	24.09 MVA	1.26 kA	106.97	2.63 kA			
				C	24.07 MVA	1.26 kA	107.20	2.62 kA			
Lne 33UGC F1	BB 33 MERU										
				A	13.26 MVA	0.70 kA	107.36	1.45 kA			
				B	6.75 MVA	0.35 kA	-73.07	0.74 kA			
				C	6.75 MVA	0.35 kA	-72.83	0.74 kA			
Lne 33UGC F2	.										
				A	13.26 MVA	0.70 kA	107.36	1.45 kA			
				B	6.75 MVA	0.35 kA	-73.07	0.74 kA			
				C	6.75 MVA	0.35 kA	-72.83	0.74 kA			
Lne 33UGC F3	BB 33 MERU										
				A	13.26 MVA	0.70 kA	107.36	1.45 kA			
				B	6.75 MVA	0.35 kA	-73.07	0.74 kA			
				C	6.75 MVA	0.35 kA	-72.83	0.74 kA			
BB 33 MERU WPP- A	33.00	0.00	0.00	1.10	229.03 MVA	12.02 kA	-75.67	24.97 kA	12.02	229.03	0.00
B		24.51	-131.32		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.17
C		24.15	132.09		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.15

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 70			
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
CB MERU WPP S/S	BB 33 MERU			A	107.00 MVA	5.62 kA	104.10	11.66 kA					
				B	3.83 MVA	0.20 kA	107.13	0.42 kA					
				C	3.82 MVA	0.20 kA	107.37	0.42 kA					
TR MERU-WPP 132	WPP-S/S ME			A	67.33 MVA	3.53 kA	102.18	7.34 kA					
				B	24.09 MVA	1.26 kA	106.97	2.63 kA					
				C	24.07 MVA	1.26 kA	107.20	2.62 kA					
Lne 33UGC F4	BB 33 MERU			A	13.26 MVA	0.70 kA	107.36	1.45 kA					
				B	6.75 MVA	0.35 kA	-73.07	0.74 kA					
				C	6.75 MVA	0.35 kA	-72.83	0.74 kA					
Lne 33UGC F5	BB 33 MERU			A	13.26 MVA	0.70 kA	107.36	1.45 kA					
				B	6.75 MVA	0.35 kA	-73.07	0.74 kA					
				C	6.75 MVA	0.35 kA	-72.83	0.74 kA					
Lne 33UGC F6	BB 33 MERU			A	13.26 MVA	0.70 kA	107.36	1.45 kA					
				B	6.75 MVA	0.35 kA	-73.07	0.74 kA					
				C	6.75 MVA	0.35 kA	-72.83	0.74 kA					
Lne 33UGC F7	BB 33 MERU			A	15.06 MVA	0.79 kA	107.53	1.64 kA					
				B	7.66 MVA	0.40 kA	-72.87	0.83 kA					
				C	7.65 MVA	0.40 kA	-72.63	0.83 kA					
BB 400 ISINYA (	A	400.00	0.00	0.00	1.10	2957.24 MVA	12.81 kA	-84.81	31.93 kA	12.81	2957.24	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 400 ISINYA	BB 400 SUS			A	854.38 MVA	3.70 kA	95.30	9.23 kA					
				B	101.50 MVA	0.44 kA	-85.54	1.10 kA					
				C	99.95 MVA	0.43 kA	-82.19	1.08 kA					
Lne 400 ISINYA	BB 400 SUS			A	854.38 MVA	3.70 kA	95.30	9.23 kA					
				B	101.50 MVA	0.44 kA	-85.54	1.10 kA					
				C	99.95 MVA	0.43 kA	-82.19	1.08 kA					
Lne 400 MARIKA	BB 400 MAR			A	124.41 MVA	0.54 kA	95.35	1.34 kA					
				B	7.54 MVA	0.03 kA	82.94	0.08 kA					
				C	7.06 MVA	0.03 kA	109.35	0.08 kA					
Lne 400 MARIKA	BB 400 MAR			A	124.41 MVA	0.54 kA	95.35	1.34 kA					
				B	7.54 MVA	0.03 kA	82.94	0.08 kA					
				C	7.06 MVA	0.03 kA	109.35	0.08 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 71	
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
TR ISINYA 400/2	BB 220 ISI				A	499.84 MVA	2.16 kA	94.97	5.40 kA				
					B	94.13 MVA	0.41 kA	95.38	1.02 kA				
					C	93.04 MVA	0.40 kA	96.94	1.00 kA				
TR ISINYA 400/2	BB 220 ISI				A	499.84 MVA	2.16 kA	94.97	5.40 kA				
					B	94.13 MVA	0.41 kA	95.38	1.02 kA				
					C	93.04 MVA	0.40 kA	96.94	1.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 400 LAMU CPP	A	400.00	0.00	0.00	1.10	1404.41 MVA	6.08 kA	-86.62	15.62 kA	6.08	1404.41	0.00	
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93	
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92	
TR LAMU 400/220	BB 220 LAM				A	68.15 MVA	0.30 kA	101.05	0.76 kA				
					B	2.09 MVA	0.01 kA	-155.91	0.02 kA				
					C	4.53 MVA	0.02 kA	11.18	0.05 kA				
TR LAMU 400/220	BB 220 LAM				A	68.15 MVA	0.30 kA	101.05	0.76 kA				
					B	2.09 MVA	0.01 kA	-155.91	0.02 kA				
					C	4.53 MVA	0.02 kA	11.18	0.05 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 72			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]			
TR LAMU CPP 400	BB 220 LAM				A	457.30 MVA	1.98 kA	91.30	5.09 kA						
					B	33.32 MVA	0.14 kA	66.73	0.37 kA						
					C	29.36 MVA	0.13 kA	118.23	0.33 kA						
TR LAMU CPP 400	BB 220 LAM				A	457.30 MVA	1.98 kA	91.30	5.09 kA						
					B	33.32 MVA	0.14 kA	66.73	0.37 kA						
					C	29.36 MVA	0.13 kA	118.23	0.33 kA						
Lne 400 LAMU CP	BB 400 NBE				A	177.83 MVA	0.77 kA	95.80	1.98 kA						
					B	31.81 MVA	0.14 kA	-110.72	0.35 kA						
					C	28.36 MVA	0.12 kA	-70.56	0.32 kA						
Lne 400 LAMU CP	BB 400 NBE				A	177.83 MVA	0.77 kA	95.80	1.98 kA						
					B	31.81 MVA	0.14 kA	-110.72	0.35 kA						
					C	28.36 MVA	0.12 kA	-70.56	0.32 kA						
BB 400 LESSOS	A	400.00	0.00	0.00	1.10	652.25 MVA	2.82 kA	-87.32	7.43 kA	2.82	652.25	0.00			
	B		252.41	-118.61		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99			
	C		250.00	118.98		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98			
TR LESSOS 400/2	BB 220 LES				A	149.42 MVA	0.65 kA	93.81	1.70 kA						
					B	4.29 MVA	0.02 kA	83.33	0.05 kA						
					C	4.07 MVA	0.02 kA	85.70	0.05 kA						
Lne 400 LESSOS	BB 400 TOR				A	176.75 MVA	0.77 kA	91.72	2.01 kA						
					B	4.29 MVA	0.02 kA	-96.67	0.05 kA						
					C	4.07 MVA	0.02 kA	-94.30	0.05 kA						
Lne 400 LESSOS	BB 400 TOR				A	176.75 MVA	0.77 kA	91.72	2.01 kA						
					B	4.29 MVA	0.02 kA	-96.67	0.05 kA						
					C	4.07 MVA	0.02 kA	-94.30	0.05 kA						
TR LESSOS 400/2	BB 220 LES				A	149.42 MVA	0.65 kA	93.81	1.70 kA						
					B	4.29 MVA	0.02 kA	83.33	0.05 kA						
					C	4.07 MVA	0.02 kA	85.70	0.05 kA						
BB 400 LOIYANGA	A	400.00	0.00	0.00	1.10	650.93 MVA	2.82 kA	-84.65	6.99 kA	2.82	650.93	0.00			
	B		250.47	-118.23		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99			
	C		249.38	118.39		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 73			
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
TR LOIYANGALANI	BB 220 LOY			A	8.54 MVA	0.04 kA	90.31	0.09 kA					
				B	8.54 MVA	0.04 kA	90.31	0.09 kA					
				C	8.54 MVA	0.04 kA	90.31	0.09 kA					
TR LOIYANGALANI	BB 220 LOY			A	8.54 MVA	0.04 kA	90.31	0.09 kA					
				B	8.54 MVA	0.04 kA	90.31	0.09 kA					
				C	8.54 MVA	0.04 kA	90.31	0.09 kA					
Lne 400 SUSWA -	BB 400 SUS			A	316.96 MVA	1.37 kA	95.48	3.40 kA					
				B	8.54 MVA	0.04 kA	-89.69	0.09 kA					
				C	8.54 MVA	0.04 kA	-89.69	0.09 kA					
Lne 400 SUSWA -	BB 400 SUS			A	316.96 MVA	1.37 kA	95.48	3.40 kA					
				B	8.54 MVA	0.04 kA	-89.69	0.09 kA					
				C	8.54 MVA	0.04 kA	-89.69	0.09 kA					
BB 400 MARIAKAN	A	400.00	0.00	0.00	1.10	1007.63 MVA	4.36 kA	-84.24	10.77 kA	4.36	1007.63	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
TR MARIAKANI 40	BB 220 MAR			A	220.21 MVA	0.95 kA	96.27	2.35 kA					
				B	33.68 MVA	0.15 kA	92.54	0.36 kA					
				C	33.10 MVA	0.14 kA	99.55	0.35 kA					
Lne 400 MARIKA	BB 400 ISI			A	283.62 MVA	1.23 kA	95.36	3.03 kA					
				B	33.68 MVA	0.15 kA	-87.46	0.36 kA					
				C	33.10 MVA	0.14 kA	-80.45	0.35 kA					
Lne 400 MARIKA	BB 400 ISI			A	283.62 MVA	1.23 kA	95.36	3.03 kA					
				B	33.68 MVA	0.15 kA	-87.46	0.36 kA					
				C	33.10 MVA	0.14 kA	-80.45	0.35 kA					
TR MARIAKANI 40	BB 220 MAR			A	220.21 MVA	0.95 kA	96.27	2.35 kA					
				B	33.68 MVA	0.15 kA	92.54	0.36 kA					
				C	33.10 MVA	0.14 kA	99.55	0.35 kA					
Shnt MARIAKANI				A	0.00 MVA	0.00 kA	0.00	0.00 kA					
				B	0.00 MVA	0.00 kA	0.00	0.00 kA					
				C	0.00 MVA	0.00 kA	0.00	0.00 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 74					
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 400 NBEAST (A				400.00	0.00	0.00	1.10	1299.43	MVA	5.63	kA	-83.72	14.18	kA	5.63	1299.43	0.00
					236.78	-114.79		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.93
					251.97	113.53		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.98
TR NBEAST 400/2				BB 220 NBE			A	462.64	MVA	2.00	kA	97.21	5.05	kA			
						B	11.17	MVA	0.05	kA	166.99	0.12	kA				
						C	4.97	MVA	0.02	kA	127.23	0.05	kA				
TR NBEAST 400/2				BB 220 NBE			A	462.64	MVA	2.00	kA	97.21	5.05	kA			
						B	11.17	MVA	0.05	kA	166.99	0.12	kA				
						C	4.97	MVA	0.02	kA	127.23	0.05	kA				
Lne 400 LAMU CP				BB 400 LAM			A	187.28	MVA	0.81	kA	94.00	2.04	kA			
						B	11.17	MVA	0.05	kA	-13.01	0.12	kA				
						C	4.97	MVA	0.02	kA	-52.77	0.05	kA				
Lne 400 LAMU CP				BB 400 LAM			A	187.28	MVA	0.81	kA	94.00	2.04	kA			
						B	11.17	MVA	0.05	kA	-13.01	0.12	kA				
						C	4.97	MVA	0.02	kA	-52.77	0.05	kA				
BB 400 SUSWA A				400.00	0.00	0.00	1.10	4839.62	MVA	20.96	kA	-85.00	52.38	kA	20.96	4839.62	0.00
					247.82	-117.09		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.98
					247.41	117.29		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97
Lne 400 ISINYA				BB 400 ISI			A	399.06	MVA	1.73	kA	95.25	4.32	kA			
						B	71.70	MVA	0.31	kA	94.55	0.78	kA				
						C	70.25	MVA	0.30	kA	98.52	0.76	kA				
Lne 400 ISINYA				BB 400 ISI			A	399.06	MVA	1.73	kA	95.25	4.32	kA			
						B	71.70	MVA	0.31	kA	94.55	0.78	kA				
						C	70.25	MVA	0.30	kA	98.52	0.76	kA				
Lne 400 SUSWA -				BB 400 LOI			A	7.58	MVA	0.03	kA	90.58	0.08	kA			
						B	7.58	MVA	0.03	kA	90.58	0.08	kA				
						C	7.58	MVA	0.03	kA	90.58	0.08	kA				
TR SUSWA 400/22				BB 220 SUS			A	347.34	MVA	1.50	kA	91.41	3.76	kA			
						B	13.94	MVA	0.06	kA	87.05	0.15	kA				
						C	11.92	MVA	0.05	kA	78.17	0.13	kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 75				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR SUSWA 400/22	BB 220 SUS					347.34 MVA	1.50 kA	91.41	3.76 kA			
						13.94 MVA	0.06 kA	87.05	0.15 kA			
						11.92 MVA	0.05 kA	78.17	0.13 kA			
Lne 400 SUSWA -	BB 400 LOI					7.58 MVA	0.03 kA	90.58	0.08 kA			
						7.58 MVA	0.03 kA	90.58	0.08 kA			
						7.58 MVA	0.03 kA	90.58	0.08 kA			
Ethiopia						3333.33 MVA	14.43 kA	-84.29	36.08 kA			
						186.22 MVA	0.81 kA	93.11	2.02 kA			
						178.17 MVA	0.77 kA	95.18	1.93 kA			
BB 400 TORORO	A	400.00	0.00	0.00	1.10	678.74 MVA	2.94 kA	-87.77	7.83 kA	2.94	678.74	0.00
			252.89	-118.92		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
			250.82	119.24		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
Lne 400 LESSOS	BB 400 LES					133.32 MVA	0.58 kA	94.00	1.54 kA			
						3.82 MVA	0.02 kA	84.47	0.04 kA			
						3.63 MVA	0.02 kA	86.89	0.04 kA			
Lne 400 LESSOS	BB 400 LES					133.32 MVA	0.58 kA	94.00	1.54 kA			
						3.82 MVA	0.02 kA	84.47	0.04 kA			
						3.63 MVA	0.02 kA	86.89	0.04 kA			
TR TORORO 400/2	BB 220 TOR					206.16 MVA	0.89 kA	91.08	2.38 kA			
						3.82 MVA	0.02 kA	-95.53	0.04 kA			
						3.63 MVA	0.02 kA	-93.11	0.04 kA			
TR TORORO 400/2	BB 220 TOR					206.16 MVA	0.89 kA	91.08	2.38 kA			
						3.82 MVA	0.02 kA	-95.53	0.04 kA			
						3.63 MVA	0.02 kA	-93.11	0.04 kA			

	20-26-90740 KENYA MASTERPLAN MTP(U)/LTP Study Case MTP/LTP 12/1/2021 1:00:00 AM	DIgSILENT PowerFactory 2016 SP1	Project: 260740
			Date: 6/16/2016

Fault Locations with Feeders Short-Circuit Calculation / Method : IEC 60909				Single Phase to Ground / Min. Short-Circuit Currents			
Asynchronous Motors Always Considered		Grid Identification Automatic		Short-Circuit Duration Break Time		0.08 s	
		Conductor Temperature User Defined		Fault Clearing Time (Ith)		1.00 s	
		No		c-Voltage Factor User Defined		No	

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 1			
	rtd.V. [kV]	Voltage [kV]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
WPP-S/S MERU (HV)											
BB 132 MERU WF A	132.00	0.00	0.00 1.00	204.45 MVA	2.68 kA	-73.50	5.53 kA	2.68	204.45	0.00	
B		85.64	-130.61	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.12	
C		87.30	129.74	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.14	
Lne 132 MERU WF BB 132 ISI											
A				66.30 MVA	0.87 kA	108.02	1.79 kA				
B				12.62 MVA	0.17 kA	110.00	0.34 kA				
C				12.58 MVA	0.17 kA	110.55	0.34 kA				
Lne 132 MERU WF BB 132 ISI											
A				66.30 MVA	0.87 kA	108.02	1.79 kA				
B				12.62 MVA	0.17 kA	110.00	0.34 kA				
C				12.58 MVA	0.17 kA	110.55	0.34 kA				
TR MERU-WPP 132 BB 33 MERU											
A				35.99 MVA	0.47 kA	103.69	0.97 kA				
B				12.62 MVA	0.17 kA	-70.00	0.34 kA				
C				12.58 MVA	0.17 kA	-69.45	0.34 kA				
TR MERU-WPP 132 BB 33 MERU											
A				35.99 MVA	0.47 kA	103.69	0.97 kA				
B				12.62 MVA	0.17 kA	-70.00	0.34 kA				
C				12.58 MVA	0.17 kA	-69.45	0.34 kA				
BB 132 1RABTRF A	132.00	0.00	0.00 1.00	843.74 MVA	11.07 kA	-79.70	25.54 kA	11.07	843.74	0.00	
B		69.57	-106.65	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.89	
C		73.73	106.86	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93	

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 2				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR RABAI 220/13	BB 220 RAB					A 144.07 MVA B 69.57 MVA C 75.40 MVA	1.89 kA 0.91 kA 0.99 kA	67.27 -40.14 -32.71	4.36 kA 2.11 kA 2.28 kA			
TR 1RABTRF 132/	BB 11 1RAB					A 0.46 MVA B 0.46 MVA C 0.46 MVA	0.01 kA 0.01 kA 0.01 kA	84.59 84.59 84.59	0.01 kA 0.01 kA 0.01 kA			
zpu_1126_1726_1	BB 132 RAB					A 726.78 MVA B 69.31 MVA C 75.19 MVA	9.54 kA 0.91 kA 0.99 kA	106.52 140.17 147.61	22.00 kA 2.10 kA 2.28 kA			
BB 132 AEOLOUS	A 132.00	0.00	0.00	1.00		371.33 MVA	4.87 kA	-79.37	10.92 kA	4.87	371.33	0.00
	B	73.82	-113.77			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C	72.24	114.81			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 132 NAIVASH	BB 132 NAI					A 271.40 MVA B 19.43 MVA C 17.55 MVA	3.56 kA 0.25 kA 0.23 kA	103.98 -91.25 -83.24	7.98 kA 0.57 kA 0.52 kA			
TR AEOLOUS 132/	BB 11 AEOL					A 101.64 MVA B 19.43 MVA C 17.55 MVA	1.33 kA 0.25 kA 0.23 kA	91.66 88.75 96.76	2.99 kA 0.57 kA 0.52 kA			
BB 132 AWENDO (	A 132.00	0.00	0.00	1.00		168.00 MVA	2.20 kA	-67.25	4.10 kA	2.20	168.00	0.00
	B	73.87	-116.26			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C	73.99	116.45			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 KISII	BB 132 KIS					A 90.10 MVA B 1.02 MVA C 1.09 MVA	1.18 kA 0.01 kA 0.01 kA	114.82 -44.33 -24.48	2.20 kA 0.02 kA 0.03 kA			
Lne 132 AWENDO	BB 132 NDH					A 77.29 MVA B 0.73 MVA C 1.04 MVA	1.01 kA 0.01 kA 0.01 kA	110.56 -174.87 -161.65	1.88 kA 0.02 kA 0.03 kA			
TR AWENDO 132/3	BB 33 AWEN					A 0.78 MVA B 0.78 MVA C 0.78 MVA	0.01 kA 0.01 kA 0.01 kA	90.00 90.00 90.00	0.02 kA 0.02 kA 0.02 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 3			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 BAMBURI	A	132.00	0.00	0.00	1.00			450.22 MVA	5.91 kA	-72.46	11.83 kA	5.91	450.22	0.00	
	B							0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93	
	C							0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95	
Lne 132 MTWAPA		BB 132 MTW						4.71 MVA	0.06 kA	89.60	0.12 kA				
	B							4.71 MVA	0.06 kA	89.60	0.12 kA				
	C							4.71 MVA	0.06 kA	89.60	0.12 kA				
Lne 132 RABAI		BB 132 RAB						220.34 MVA	2.89 kA	107.97	5.79 kA				
	B							5.05 MVA	0.07 kA	-91.39	0.13 kA				
	C							5.05 MVA	0.07 kA	-91.39	0.13 kA				
Lne 132 RABAI		BB 132 RAB						220.34 MVA	2.89 kA	107.97	5.79 kA				
	B							5.05 MVA	0.07 kA	-91.39	0.13 kA				
	C							5.05 MVA	0.07 kA	-91.39	0.13 kA				
TR BAMBURI 132/		BB 33 BAMB						2.70 MVA	0.04 kA	87.75	0.07 kA				
	B							2.70 MVA	0.04 kA	87.75	0.07 kA				
	C							2.70 MVA	0.04 kA	87.75	0.07 kA				
TR BAMBURI 132/		BB 33 BAMB						2.70 MVA	0.04 kA	87.75	0.07 kA				
	B							2.70 MVA	0.04 kA	87.75	0.07 kA				
	C							2.70 MVA	0.04 kA	87.75	0.07 kA				
BB 132 BOMET (P	A	132.00	0.00	0.00	1.00			238.70 MVA	3.13 kA	-66.72	5.86 kA	3.13	238.70	0.00	
	B							0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97	
	C							0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00	
Lne 132 BOMET		BB 132 SOT						113.95 MVA	1.50 kA	114.19	2.80 kA				
	B							6.01 MVA	0.08 kA	94.62	0.15 kA				
	C							5.95 MVA	0.08 kA	94.74	0.15 kA				
Lne 132 BOMET		BB 132 NAR						59.51 MVA	0.78 kA	116.95	1.46 kA				
	B							3.32 MVA	0.04 kA	-81.93	0.08 kA				
	C							3.30 MVA	0.04 kA	-81.83	0.08 kA				
Lne 132 BOMET		BB 132 NAR						64.74 MVA	0.85 kA	108.67	1.59 kA				
	B							3.62 MVA	0.05 kA	-90.20	0.09 kA				
	C							3.59 MVA	0.05 kA	-90.10	0.09 kA				

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 4			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
TR BOMET 132/33	BB 33 BOME				A	0.92 MVA	0.01 kA	88.17	0.02 kA				
					B	0.92 MVA	0.01 kA	88.17	0.02 kA				
					C	0.92 MVA	0.01 kA	88.17	0.02 kA				
BB 132 CHEMOSIT A	132.00	0.00	0.00	1.00	259.16 MVA	3.40 kA	-66.93	6.27 kA	3.40	259.16	0.00		
B		73.70	-115.90		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97		
C		73.59	116.19		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96		
Lne 132 MUHORON	BB 132 MUH				A	149.29 MVA	1.96 kA	115.11	3.61 kA				
					B	3.22 MVA	0.04 kA	-94.27	0.08 kA				
					C	3.16 MVA	0.04 kA	-92.91	0.08 kA				
Lne 132 CHEMOSI	BB 132 SOT				A	104.62 MVA	1.37 kA	111.40	2.53 kA				
					B	2.64 MVA	0.03 kA	-84.27	0.06 kA				
					C	2.69 MVA	0.04 kA	-86.07	0.07 kA				
TR CHEMOSIT 132	BB 33 CHEM				A	2.92 MVA	0.04 kA	90.23	0.07 kA				
					B	2.92 MVA	0.04 kA	90.23	0.07 kA				
					C	2.92 MVA	0.04 kA	90.23	0.07 kA				
TR CHEMOSIT 132	BB 33 CHEM				A	2.92 MVA	0.04 kA	90.23	0.07 kA				
					B	2.92 MVA	0.04 kA	90.23	0.07 kA				
					C	2.92 MVA	0.04 kA	90.23	0.07 kA				
Shn CHEMO 33 (M					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
					B	0.00 MVA	0.00 kA	0.00	0.00 kA				
					C	0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 CHOGORIA A	132.00	0.00	0.00	1.00	171.05 MVA	2.24 kA	-72.69	4.46 kA	2.24	171.05	0.00		
B		75.41	-118.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99		
C		75.66	118.77		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99		
Lne 132 CHOGORI	BB 132 ISH				A	170.51 MVA	2.24 kA	107.37	4.45 kA				
					B	0.57 MVA	0.01 kA	-90.16	0.01 kA				
					C	0.57 MVA	0.01 kA	-90.16	0.01 kA				
TR CHOGORIA 132	BB 33 CHOG				A	0.57 MVA	0.01 kA	89.84	0.01 kA				
					B	0.57 MVA	0.01 kA	89.84	0.01 kA				
					C	0.57 MVA	0.01 kA	89.84	0.01 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 5					
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]		Ib [kA]	Sb [MVA]	EFF [-]
Ld CHOGORIA (13							A	0.00	MVA	0.00	kA	0.00	0.00	kA			
							B	0.00	MVA	0.00	kA	0.00	0.00	kA			
							C	0.00	MVA	0.00	kA	0.00	0.00	kA			
BB 132 DANDORA	A	132.00	0.00	0.00	1.00			1409.46	MVA	18.49	kA	-82.77	45.36	kA	18.49	1409.46	0.00
	B		69.55	-107.52				0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.91
	C		69.29	108.06				0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.91
Lne 132 JUJA -	BB 132 JUJ					A		240.88	MVA	3.16	kA	106.66	7.75	kA			
						B		23.79	MVA	0.31	kA	-71.91	0.77	kA			
						C		25.94	MVA	0.34	kA	-66.04	0.83	kA			
Lne 132 JUJA -	BB 132 JUJ					A		240.88	MVA	3.16	kA	106.66	7.75	kA			
						B		23.79	MVA	0.31	kA	-71.91	0.77	kA			
						C		25.94	MVA	0.34	kA	-66.04	0.83	kA			
TR DANDORA 132/	BB 11 1DAN					A		0.47	MVA	0.01	kA	90.61	0.02	kA			
						B		0.47	MVA	0.01	kA	90.61	0.02	kA			
						C		0.47	MVA	0.01	kA	90.61	0.02	kA			
TR DANDORA 132/	BB 11 1DAN					A		0.47	MVA	0.01	kA	90.61	0.02	kA			
						B		0.47	MVA	0.01	kA	90.61	0.02	kA			
						C		0.47	MVA	0.01	kA	90.61	0.02	kA			
TR DANDORA 220/	BB 220 DAN					A		468.30	MVA	6.14	kA	92.40	15.07	kA			
						B		23.35	MVA	0.31	kA	108.44	0.75	kA			
						C		25.51	MVA	0.33	kA	114.38	0.82	kA			
TR DANDORA 220/	BB 220 DAN					A		468.30	MVA	6.14	kA	92.40	15.07	kA			
						B		23.35	MVA	0.31	kA	108.44	0.75	kA			
						C		25.51	MVA	0.33	kA	114.38	0.82	kA			
BB 132 DOMES (P	A	132.00	0.00	0.00	1.00			575.57	MVA	7.55	kA	-81.52	17.81	kA	7.55	575.57	0.00
	B		71.88	-110.71				0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.94
	C		70.98	111.40				0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.92
Lne 132 DOMES	BB 132 OLK					A		485.21	MVA	6.37	kA	99.87	15.02	kA			
						B		11.52	MVA	0.15	kA	-92.57	0.36	kA			
						C		9.98	MVA	0.13	kA	-82.21	0.31	kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 6				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR DOMES 132/11	BB 11 DOME											
					A	45.63 MVA	0.60 kA	91.06	1.41 kA			
					B	5.76 MVA	0.08 kA	87.43	0.18 kA			
					C	4.99 MVA	0.07 kA	97.79	0.15 kA			
TR DOMES 132/11	BB 11 DOME				A	45.63 MVA	0.60 kA	91.06	1.41 kA			
					B	5.76 MVA	0.08 kA	87.43	0.18 kA			
					C	4.99 MVA	0.07 kA	97.79	0.15 kA			
BB 132 ELDORET	A	132.00	0.00	0.00	1.00	296.13 MVA	3.89 kA	-68.52	7.37 kA	3.89	296.13	0.00
	B		73.48	-114.95		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		72.66	115.52		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 ELDORET	BB 132 LES				A	229.21 MVA	3.01 kA	114.74	5.70 kA			
					B	9.70 MVA	0.13 kA	-79.56	0.24 kA			
					C	9.59 MVA	0.13 kA	-80.27	0.24 kA			
Lne 132 ELDORET	BB 132 KIT				A	60.06 MVA	0.79 kA	101.90	1.49 kA			
					B	1.86 MVA	0.02 kA	150.01	0.05 kA			
					C	1.70 MVA	0.02 kA	150.28	0.04 kA			
TR ELDORET 132/	BB 33 ELD3				A	4.31 MVA	0.06 kA	90.96	0.11 kA			
					B	4.31 MVA	0.06 kA	90.96	0.11 kA			
					C	4.31 MVA	0.06 kA	90.96	0.11 kA			
TR ELDORET 132/	BB 33 ELD3				A	4.31 MVA	0.06 kA	90.96	0.11 kA			
					B	4.31 MVA	0.06 kA	90.96	0.11 kA			
					C	4.31 MVA	0.06 kA	90.96	0.11 kA			
BB 132 GALU (PS	A	132.00	0.00	0.00	1.00	213.35 MVA	2.80 kA	-67.97	5.33 kA	2.80	213.35	0.00
	B		74.09	-115.07		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		73.88	115.55		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 RABAI	BB 132 RAB				A	182.23 MVA	2.39 kA	115.88	4.55 kA			
					B	8.31 MVA	0.11 kA	-95.77	0.21 kA			
					C	7.77 MVA	0.10 kA	-84.55	0.19 kA			
Lne 132 GALU -	BB 132 LUN				A	0.45 MVA	0.01 kA	90.63	0.01 kA			
					B	0.45 MVA	0.01 kA	90.63	0.01 kA			
					C	0.45 MVA	0.01 kA	90.63	0.01 kA			

Grid: 1 KENYA			System Stage: 1 KENYA								Annex: LF.001 / 7	
		rtd.V. [kV]	Voltage [kV] [deg]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA] [deg]		ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR GALU 132/11	BB 11 KWAL				A	31.89 MVA	0.42 kA	90.80	0.80 kA			
					B	6.38 MVA	0.08 kA	82.33	0.16 kA			
					C	5.84 MVA	0.08 kA	97.11	0.15 kA			
TR GALU 132/33	BB 33 GALU				A	0.74 MVA	0.01 kA	90.41	0.02 kA			
					B	0.74 MVA	0.01 kA	90.41	0.02 kA			
					C	0.74 MVA	0.01 kA	90.41	0.02 kA			
TR GALU 132/33	BB 33 GALU				A	0.74 MVA	0.01 kA	90.41	0.02 kA			
					B	0.74 MVA	0.01 kA	90.41	0.02 kA			
					C	0.74 MVA	0.01 kA	90.41	0.02 kA			
BB 132 GARISSA	A	132.00	0.00	0.00	1.00	148.00 MVA	1.94 kA	-75.46	4.11 kA	1.94	148.00	0.00
	B		75.65	-117.86		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
	C		74.62	118.39		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 WAJIR	BB 132 WAJ				A	0.74 MVA	0.01 kA	92.40	0.02 kA			
					B	0.74 MVA	0.01 kA	92.40	0.02 kA			
					C	0.74 MVA	0.01 kA	92.40	0.02 kA			
Lne 132 MWINGI	BB 132 MWI				A	46.25 MVA	0.61 kA	115.34	1.29 kA			
					B	0.58 MVA	0.01 kA	-109.10	0.02 kA			
					C	0.63 MVA	0.01 kA	-113.48	0.02 kA			
TR GARISSA 132/	BB 33 GARI				A	0.81 MVA	0.01 kA	91.00	0.02 kA			
					B	0.81 MVA	0.01 kA	91.00	0.02 kA			
					C	0.81 MVA	0.01 kA	91.00	0.02 kA			
TR GARISSA 220/	BB 220 GAR				A	101.40 MVA	1.33 kA	99.83	2.82 kA			
					B	1.03 MVA	0.01 kA	-76.71	0.03 kA			
					C	1.01 MVA	0.01 kA	-72.90	0.03 kA			
Shnt GARISSA 13					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 GATUNDU	A	132.00	0.00	0.00	1.00	266.96 MVA	3.50 kA	-69.17	6.77 kA	3.50	266.96	0.00
	B		72.27	-114.99		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		73.01	115.17		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 8						
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MANGU	BB 132 MAN					A 266.26 MVA B 0.76 MVA C 0.76 MVA	3.49 kA 0.01 kA 0.01 kA	110.89 -90.53 -90.53	6.75 kA 0.02 kA 0.02 kA			
TR GATUNDU 132/	BB 33 GATU					A 0.76 MVA B 0.76 MVA C 0.76 MVA	0.01 kA 0.01 kA 0.01 kA	89.47 89.47 89.47	0.02 kA 0.02 kA 0.02 kA			
BB 132 GITARU (A	132.00	0.00	0.00	1.00		925.56 MVA	12.14 kA	-80.45	27.93 kA	12.14	925.56	0.00
B		72.50	-110.56			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
C		72.62	110.81			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 GITARU	BB 132 KAM					A 356.69 MVA B 12.09 MVA C 9.73 MVA	4.68 kA 0.16 kA 0.13 kA	102.36 -118.22 -67.43	10.76 kA 0.36 kA 0.29 kA			
Lne 132 GITARU	BB 132 KAM					A 358.66 MVA B 12.16 MVA C 9.79 MVA	4.71 kA 0.16 kA 0.13 kA	101.76 -118.82 -68.03	10.82 kA 0.37 kA 0.30 kA			
TR GITARU 132/1	BB 15 GITA					A 106.61 MVA B 12.13 MVA C 9.76 MVA	1.40 kA 0.16 kA 0.13 kA	91.13 61.48 112.27	3.22 kA 0.37 kA 0.29 kA			
TR GITARU 132/1	BB 15 GITA					A 106.61 MVA B 12.13 MVA C 9.76 MVA	1.40 kA 0.16 kA 0.13 kA	91.13 61.48 112.27	3.22 kA 0.37 kA 0.29 kA			
BB 132 GITHAMBO A	132.00	0.00	0.00	1.00		177.45 MVA	2.33 kA	-66.97	4.34 kA	2.33	177.45	0.00
B		73.37	-116.65			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		74.03	116.68			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 MANGU	BB 132 MAN					A 176.68 MVA B 0.84 MVA C 0.84 MVA	2.32 kA 0.01 kA 0.01 kA	113.14 -90.49 -90.49	4.32 kA 0.02 kA 0.02 kA			
TR GITHAMBO 132	BB 33 GITH					A 0.84 MVA B 0.84 MVA C 0.84 MVA	0.01 kA 0.01 kA 0.01 kA	89.51 89.51 89.51	0.02 kA 0.02 kA 0.02 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 9			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 HOMABAY	A	132.00	0.00	0.00	1.00	170.41 MVA	2.24 kA	-68.29	4.24 kA	2.24	170.41	0.00			
	B		73.63	-116.07		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97			
	C		74.10	116.16		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97			
Lne 132 SONDU	BB 132 SON				A	98.56 MVA	1.29 kA	109.53	2.45 kA						
					B	1.13 MVA	0.01 kA	138.02	0.03 kA						
					C	1.24 MVA	0.02 kA	158.87	0.03 kA						
Lne 132 HOMABAY	BB 132 NDH				A	72.02 MVA	0.95 kA	114.71	1.79 kA						
					B	1.13 MVA	0.01 kA	-41.98	0.03 kA						
					C	1.24 MVA	0.02 kA	-21.13	0.03 kA						
BB 132 ISHIARA	A	132.00	0.00	0.00	1.00	361.40 MVA	4.74 kA	-79.40	10.59 kA	4.74	361.40	0.00			
	B		74.98	-117.51		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98			
	C		75.02	117.67		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98			
Lne 132 KAMBURU	BB 132 KAM				A	300.41 MVA	3.94 kA	99.96	8.80 kA						
					B	4.39 MVA	0.06 kA	109.52	0.13 kA						
					C	4.40 MVA	0.06 kA	116.94	0.13 kA						
Lne 132 CHOGORI	BB 132 CHO				A	0.54 MVA	0.01 kA	90.18	0.02 kA						
					B	0.54 MVA	0.01 kA	90.18	0.02 kA						
					C	0.54 MVA	0.01 kA	90.18	0.02 kA						
Lne 132 KYENI	BB 132 KYE				A	0.82 MVA	0.01 kA	90.25	0.02 kA						
					B	0.82 MVA	0.01 kA	90.25	0.02 kA						
					C	0.82 MVA	0.01 kA	90.25	0.02 kA						
Lne 132 ISHIARA	BB 132 MER				A	59.79 MVA	0.78 kA	104.03	1.75 kA						
					B	5.69 MVA	0.07 kA	-75.01	0.17 kA						
					C	5.64 MVA	0.07 kA	-69.27	0.17 kA						
BB 132 ISINYA (	A	132.00	0.00	0.00	1.00	706.95 MVA	9.28 kA	-82.52	22.67 kA	9.28	706.95	0.00			
	B		69.49	-104.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91			
	C		67.61	105.41		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.88			
Lne 132 KONZA	BB 132 KON				A	92.23 MVA	1.21 kA	113.38	2.96 kA						
					B	24.26 MVA	0.32 kA	-69.63	0.78 kA						
					C	24.32 MVA	0.32 kA	-69.74	0.78 kA						

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 10				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 KAJIADO	BB 132 KAJ					A 47.37 MVA B 11.71 MVA C 11.74 MVA	0.62 kA 0.15 kA 0.15 kA	117.27 -64.27 -64.39	1.52 kA 0.38 kA 0.38 kA			
TR ISINYA 220/1	BB 220 ISI					A 575.16 MVA B 35.93 MVA C 36.03 MVA	7.55 kA 0.47 kA 0.47 kA	93.36 112.12 112.01	18.45 kA 1.15 kA 1.16 kA			
BB 132 ISIOLO (	A	132.00	0.00	0.00	1.00	237.17 MVA	3.11 kA	-74.41	6.39 kA	3.11	237.17	0.00
	B		81.60	-125.70		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.07
	C		81.38	125.89		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.07
Lne 132 MERU WF	WPP-S/S ME					A 36.72 MVA B 13.98 MVA C 13.92 MVA	0.48 kA 0.18 kA 0.18 kA	103.05 -73.40 -72.78	0.99 kA 0.38 kA 0.38 kA			
Lne 132 MERU WF	WPP-S/S ME					A 36.72 MVA B 13.98 MVA C 13.92 MVA	0.48 kA 0.18 kA 0.18 kA	103.05 -73.40 -72.78	0.99 kA 0.38 kA 0.38 kA			
Lne 132 NANYUKI	BB 132 NAN					A 84.83 MVA B 11.58 MVA C 11.52 MVA	1.11 kA 0.15 kA 0.15 kA	111.08 113.21 113.72	2.29 kA 0.31 kA 0.31 kA			
Lne 132 MERU -	BB 132 MER					A 78.32 MVA B 15.34 MVA C 15.28 MVA	1.03 kA 0.20 kA 0.20 kA	102.25 102.90 103.66	2.11 kA 0.41 kA 0.41 kA			
TR ISIOLO 132/3	BB 33 ISIO					A 1.21 MVA B 1.21 MVA C 1.21 MVA	0.02 kA 0.02 kA 0.02 kA	90.20 90.20 90.20	0.03 kA 0.03 kA 0.03 kA			
BB 132 JUJA RD	A	132.00	0.00	0.00	1.00	1369.01 MVA	17.96 kA	-81.99	43.47 kA	17.96	1369.01	0.00
	B		69.68	-108.31		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
	C		69.69	108.80		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 ULU -	BB 132 ULU					A 82.04 MVA B 14.79 MVA C 14.64 MVA	1.08 kA 0.19 kA 0.19 kA	112.92 -68.09 -71.33	2.60 kA 0.47 kA 0.46 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 11				
	rtd.V. [kV]	Voltage [kV]	c- [deg] Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MANGU	BB 132 MAN		A	68.11 MVA	0.89 kA	105.91	2.16 kA			
			B	4.69 MVA	0.06 kA	-83.88	0.15 kA			
			C	6.63 MVA	0.09 kA	-56.22	0.21 kA			
Lne 132 JUJA -	BB 132 THI		A	30.29 MVA	0.40 kA	95.06	0.96 kA			
			B	4.12 MVA	0.05 kA	116.51	0.13 kA			
			C	3.45 MVA	0.05 kA	83.54	0.11 kA			
Lne 132 JUJA -	BB 132 DAN		A	433.68 MVA	5.69 kA	92.87	13.77 kA			
			B	18.81 MVA	0.25 kA	110.47	0.60 kA			
			C	21.11 MVA	0.28 kA	117.51	0.67 kA			
Lne 132 JUJA -	BB 132 DAN		A	433.68 MVA	5.69 kA	92.87	13.77 kA			
			B	18.81 MVA	0.25 kA	110.47	0.60 kA			
			C	21.11 MVA	0.28 kA	117.51	0.67 kA			
Lne 132 JUJA -	BB 132 RUA		A	91.48 MVA	1.20 kA	112.84	2.90 kA			
			B	13.53 MVA	0.18 kA	-66.63	0.43 kA			
			C	13.64 MVA	0.18 kA	-69.61	0.43 kA			
Lne 132 JUJA -	BB 132 RUA		A	91.48 MVA	1.20 kA	112.84	2.90 kA			
			B	13.53 MVA	0.18 kA	-66.63	0.43 kA			
			C	13.64 MVA	0.18 kA	-69.61	0.43 kA			
TR JUJA 132/66	BB 66 JUJA		A	35.20 MVA	0.46 kA	98.77	1.12 kA			
			B	1.32 MVA	0.02 kA	109.62	0.04 kA			
			C	1.22 MVA	0.02 kA	78.30	0.04 kA			
TR JUJA 132/66	BB 66 JUJA		A	8.79 MVA	0.12 kA	98.77	0.28 kA			
			B	0.33 MVA	0.00 kA	109.42	0.01 kA			
			C	0.31 MVA	0.00 kA	78.69	0.01 kA			
TR JUJA 132/66	BB 66 JUJA		A	17.63 MVA	0.23 kA	98.77	0.56 kA			
			B	0.64 MVA	0.01 kA	109.96	0.02 kA			
			C	0.59 MVA	0.01 kA	77.65	0.02 kA			
TR JUJA 132/66	BB 66 JUJA		A	8.79 MVA	0.12 kA	98.77	0.28 kA			
			B	0.33 MVA	0.00 kA	109.42	0.01 kA			
			C	0.31 MVA	0.00 kA	78.69	0.01 kA			
TR JUJA 132/66	BB 66 JUJA		A	36.51 MVA	0.48 kA	98.77	1.16 kA			
			B	0.60 MVA	0.01 kA	125.08	0.02 kA			
			C	0.59 MVA	0.01 kA	48.69	0.02 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 12	
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR JUJA 132/66	BB 66 JUJA			A	8.78 MVA	0.12 kA	98.76	0.28 kA			
				B	0.33 MVA	0.00 kA	109.45	0.01 kA			
				C	0.31 MVA	0.00 kA	78.49	0.01 kA			
TR JUJA 132/66	BB 66 JUJA			A	35.59 MVA	0.47 kA	98.77	1.13 kA			
				B	1.09 MVA	0.01 kA	112.26	0.03 kA			
				C	1.00 MVA	0.01 kA	72.99	0.03 kA			
BB 132 KABARNET A	132.00	0.00	0.00	1.00	213.69 MVA	2.80 kA	-77.21	6.02 kA	2.80	213.69	0.00
B		75.46	-118.33		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		74.92	118.66		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 NYAHURU	BB 132 RUM			A	56.18 MVA	0.74 kA	104.47	1.58 kA			
				B	2.18 MVA	0.03 kA	-82.79	0.06 kA			
				C	2.14 MVA	0.03 kA	-82.37	0.06 kA			
Lne 132 LESSOS	BB 132 LES			A	156.77 MVA	2.06 kA	102.25	4.41 kA			
				B	1.39 MVA	0.02 kA	101.01	0.04 kA			
				C	1.35 MVA	0.02 kA	101.79	0.04 kA			
TR KABARNET 132	BB 33 KABA			A	0.79 MVA	0.01 kA	90.54	0.02 kA			
				B	0.79 MVA	0.01 kA	90.54	0.02 kA			
				C	0.79 MVA	0.01 kA	90.54	0.02 kA			
BB 132 KAJIADO A	132.00	0.00	0.00	1.00	497.68 MVA	6.53 kA	-75.40	14.10 kA	6.53	497.68	0.00
B		69.72	-110.82		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
C		71.56	110.41		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 132 KONZA	BB 132 KON			A	88.48 MVA	1.16 kA	111.09	2.51 kA			
				B	8.28 MVA	0.11 kA	-58.67	0.23 kA			
				C	8.30 MVA	0.11 kA	-58.81	0.24 kA			
Lne 132 KAJIADO	BB 132 ISI			A	408.82 MVA	5.36 kA	103.24	11.59 kA			
				B	7.38 MVA	0.10 kA	126.06	0.21 kA			
				C	7.40 MVA	0.10 kA	125.89	0.21 kA			
TR KAJIADO 132/	BB 33 KAJI			A	1.10 MVA	0.01 kA	87.81	0.03 kA			
				B	1.10 MVA	0.01 kA	87.81	0.03 kA			
				C	1.10 MVA	0.01 kA	87.81	0.03 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 13				
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KAMBTRF	A	132.00	0.00	0.00	1.00	1102.43	MVA	14.47	kA	-83.59	35.05	kA	14.47	1102.43	0.00	
	B		72.25	-109.05		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.93	
	C		71.57	109.70		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.92	
TR KAMBURU 220/		BB 220 KAM				326.89	MVA	4.29	kA	96.74	10.39	kA				
					A	8.23	MVA	0.11	kA	-146.21	0.26	kA				
					C	2.58	MVA	0.03	kA	-66.14	0.08	kA				
TR KAMBURU 220/		BB 220 KAM				326.89	MVA	4.29	kA	96.74	10.39	kA				
					A	8.23	MVA	0.11	kA	-146.21	0.26	kA				
					C	2.58	MVA	0.03	kA	-66.14	0.08	kA				
zpu_1103_1723_1		BB 132 KAM				224.33	MVA	2.94	kA	95.93	7.13	kA				
					A	8.23	MVA	0.11	kA	33.79	0.26	kA				
					C	2.58	MVA	0.03	kA	113.86	0.08	kA				
zpu_1103_1723_2		BB 132 KAM				224.33	MVA	2.94	kA	95.93	7.13	kA				
					A	8.23	MVA	0.11	kA	33.79	0.26	kA				
					C	2.58	MVA	0.03	kA	113.86	0.08	kA				
BB 132 KAMBURU	A	132.00	0.00	0.00	1.00	1112.76	MVA	14.60	kA	-83.35	35.24	kA	14.60	1112.76	0.00	
	B		72.11	-109.03		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.93	
	C		71.59	109.60		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.92	
Lne 132 KAMBURU		BB 132 KIG				27.35	MVA	0.36	kA	104.91	0.87	kA				
					B	9.15	MVA	0.12	kA	-80.67	0.29	kA				
					C	9.05	MVA	0.12	kA	-72.56	0.29	kA				
Lne 132 GITARU		BB 132 GIT				97.89	MVA	1.28	kA	93.49	3.10	kA				
					A	5.96	MVA	0.08	kA	52.04	0.19	kA				
					C	5.89	MVA	0.08	kA	150.51	0.19	kA				
Lne 132 GITARU		BB 132 GIT				98.43	MVA	1.29	kA	92.89	3.12	kA				
					A	5.99	MVA	0.08	kA	51.44	0.19	kA				
					C	5.93	MVA	0.08	kA	149.91	0.19	kA				
Lne 132 KAMBURU		BB 132 MAS				65.35	MVA	0.86	kA	102.68	2.07	kA				
					A	4.83	MVA	0.06	kA	41.75	0.15	kA				
					C	5.02	MVA	0.07	kA	32.94	0.16	kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 14				
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 132 KAMBURU	BB 132 ISH			A	40.22 MVA	0.53 kA	99.98	1.27 kA				
				B	9.02 MVA	0.12 kA	-80.01	0.29 kA				
				C	8.95 MVA	0.12 kA	-67.62	0.28 kA				
TR KAMBURU 132/	BB 11 KAMB			A	36.94 MVA	0.48 kA	91.25	1.17 kA				
				B	3.69 MVA	0.05 kA	85.22	0.12 kA				
				C	3.28 MVA	0.04 kA	93.04	0.10 kA				
TR KAMBURU 132/	BB 11 KAMB			A	36.94 MVA	0.48 kA	91.25	1.17 kA				
				B	3.69 MVA	0.05 kA	85.22	0.12 kA				
				C	3.28 MVA	0.04 kA	93.04	0.10 kA				
TR KAMBURU 132/	BB 11 KAMB			A	36.94 MVA	0.48 kA	91.25	1.17 kA				
				B	3.69 MVA	0.05 kA	85.22	0.12 kA				
				C	3.28 MVA	0.04 kA	93.04	0.10 kA				
TR KAMBURU 132/	BB 33 KAMB			A	0.18 MVA	0.00 kA	90.87	0.01 kA				
				B	0.18 MVA	0.00 kA	90.87	0.01 kA				
				C	0.18 MVA	0.00 kA	90.87	0.01 kA				
zpu_1103_1723_1	BB 132 KAM			A	337.08 MVA	4.42 kA	97.44	10.67 kA				
				B	8.04 MVA	0.11 kA	-158.53	0.25 kA				
				C	0.88 MVA	0.01 kA	-75.34	0.03 kA				
zpu_1103_1723_2	BB 132 KAM			A	337.08 MVA	4.42 kA	97.44	10.67 kA				
				B	8.04 MVA	0.11 kA	-158.53	0.25 kA				
				C	0.88 MVA	0.01 kA	-75.34	0.03 kA				
BB 132 KIBOKO (	A	132.00	0.00	0.00	1.00	157.87 MVA	2.07 kA	-65.09	3.74 kA	2.07	157.87	0.00
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
Lne 132 SULTAN	BB 132 SUL			A	112.63 MVA	1.48 kA	114.98	2.67 kA				
				B	1.87 MVA	0.02 kA	103.85	0.04 kA				
				C	1.93 MVA	0.03 kA	102.11	0.05 kA				
Lne 132 KIBOKO	BB 132 MTI			A	45.24 MVA	0.59 kA	114.75	1.07 kA				
				B	1.87 MVA	0.02 kA	-76.15	0.04 kA				
				C	1.93 MVA	0.03 kA	-77.89	0.05 kA				
Ld KIBOKO (132				A	0.00 MVA	0.00 kA	0.00	0.00 kA				
				B	0.00 MVA	0.00 kA	0.00	0.00 kA				
				C	0.00 MVA	0.00 kA	0.00	0.00 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 15				
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KIGANJO	A	132.00	0.00	0.00	1.00	273.15	MVA	3.58	kA	-70.47	7.19	kA	3.58	273.15	0.00	
	B		76.80	-123.22		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	1.01	
	C		80.36	121.77		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	1.05	
Lne 132 KAMBURU	BB 132 KAM				A	89.85	MVA	1.18	kA	103.31	2.37	kA				
					B	21.55	MVA	0.28	kA	-86.84	0.57	kA				
					C	21.66	MVA	0.28	kA	-87.42	0.57	kA				
Lne 132 KIGANJO	BB 132 NAN				A	84.32	MVA	1.11	kA	110.60	2.22	kA				
					B	4.77	MVA	0.06	kA	65.54	0.13	kA				
					C	5.20	MVA	0.07	kA	63.58	0.14	kA				
Lne 132 KIGANJO	BB 132 KUT				A	96.47	MVA	1.27	kA	115.25	2.54	kA				
					B	13.78	MVA	0.18	kA	104.06	0.36	kA				
					C	13.62	MVA	0.18	kA	104.76	0.36	kA				
TR KIGANJO 132/	BB 33 KIGA				A	1.91	MVA	0.03	kA	87.24	0.05	kA				
					B	1.91	MVA	0.03	kA	87.24	0.05	kA				
					C	1.91	MVA	0.03	kA	87.24	0.05	kA				
TR KIGANJO 132/	BB 33 KIGA				A	1.91	MVA	0.03	kA	87.24	0.05	kA				
					B	1.91	MVA	0.03	kA	87.24	0.05	kA				
					C	1.91	MVA	0.03	kA	87.24	0.05	kA				
BB 132 KILIFI (	A	132.00	0.00	0.00	1.00	161.96	MVA	2.13	kA	-64.01	3.74	kA	2.13	161.96	0.00	
	B		74.05	-116.13		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97	
	C		74.17	116.50		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97	
Lne 132 MTWAPA	BB 132 MTW				A	158.05	MVA	2.07	kA	116.68	3.65	kA				
					B	4.37	MVA	0.06	kA	-89.91	0.10	kA				
					C	4.37	MVA	0.06	kA	-89.91	0.10	kA				
TR KILIFI 132/3	BB 33 KILI				A	2.18	MVA	0.03	kA	90.09	0.05	kA				
					B	2.18	MVA	0.03	kA	90.09	0.05	kA				
					C	2.18	MVA	0.03	kA	90.09	0.05	kA				
TR KILIFI 132/3	BB 33 KILI				A	2.18	MVA	0.03	kA	90.09	0.05	kA				
					B	2.18	MVA	0.03	kA	90.09	0.05	kA				
					C	2.18	MVA	0.03	kA	90.09	0.05	kA				

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 16			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Shn KILIFI 132k					A	0.00 MVA	0.00 kA	0.00		0.00 kA			
					B	0.00 MVA	0.00 kA	0.00		0.00 kA			
					C	0.00 MVA	0.00 kA	0.00		0.00 kA			
BB 132 KILIMAMB	A	132.00	0.00	0.00	1.00	287.96 MVA	3.78 kA	-67.70		7.11 kA	3.78	287.96	0.00
	B		73.31	-117.10		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.96
	C		74.58	116.75		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.98
Lne 132 THIKA -		BB 132 THI				A	287.96 MVA	3.78 kA	112.30	7.11 kA			
						B	0.00 MVA	0.00 kA	0.00	0.00 kA			
						C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Ld KILIMAMBOGO						A	0.00 MVA	0.00 kA	0.00	0.00 kA			
						B	0.00 MVA	0.00 kA	0.00	0.00 kA			
						C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KINDARUM	A	132.00	0.00	0.00	1.00	263.46 MVA	3.46 kA	-74.71		7.36 kA	3.46	263.46	0.00
	B		74.94	-112.09		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.97
	C		71.53	113.09		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.92
Lne 132 KINDARU		BB 132 MAN				A	86.47 MVA	1.13 kA	114.55	2.41 kA			
						B	9.17 MVA	0.12 kA	-96.09	0.26 kA			
						C	8.34 MVA	0.11 kA	-70.67	0.23 kA			
Lne 132 KINDARU		BB 132 MWI				A	73.96 MVA	0.97 kA	113.36	2.07 kA			
						B	8.46 MVA	0.11 kA	-88.99	0.24 kA			
						C	8.05 MVA	0.11 kA	-68.58	0.22 kA			
TR KINDARUMA 13		BB 11 1KIN				A	36.35 MVA	0.48 kA	92.25	1.02 kA			
						B	6.00 MVA	0.08 kA	87.51	0.17 kA			
						C	5.59 MVA	0.07 kA	109.99	0.16 kA			
TR KINDARUMA 13		BB 11 1KIN				A	36.35 MVA	0.48 kA	92.25	1.02 kA			
						B	6.00 MVA	0.08 kA	87.51	0.17 kA			
						C	5.59 MVA	0.07 kA	109.99	0.16 kA			
TR KINDARUMA 13		BB 11 1KIN				A	34.97 MVA	0.46 kA	92.24	0.98 kA			
						B	5.59 MVA	0.07 kA	86.91	0.16 kA			
						C	5.20 MVA	0.07 kA	111.13	0.15 kA			

Grid: 1 KENYA		System Stage: 1 KENYA							Annex: LF.001 / 17			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KIPEVU (	A	132.00	0.00	0.00	1.00	711.19 MVA	9.33 kA	-82.17	22.16 kA	9.33	711.19	0.00
	B		72.35	-107.99		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
	C		72.12	108.64		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 KIPEVU	BB 132 KIP				A	222.58 MVA	2.92 kA	93.26	6.93 kA			
					B	9.15 MVA	0.12 kA	-49.10	0.29 kA			
					C	11.64 MVA	0.15 kA	-125.11	0.36 kA			
Lne 132 KIPEVU	BB 132 RAB				A	119.74 MVA	1.57 kA	107.96	3.73 kA			
					B	6.92 MVA	0.09 kA	-103.64	0.22 kA			
					C	5.68 MVA	0.07 kA	-64.47	0.18 kA			
Lne 132 KIPEVU	BB 132 RAB				A	119.74 MVA	1.57 kA	107.96	3.73 kA			
					B	6.92 MVA	0.09 kA	-103.64	0.22 kA			
					C	5.68 MVA	0.07 kA	-64.47	0.18 kA			
Lne 132 KIPEVU	BB 132 RAB				A	128.35 MVA	1.68 kA	93.16	4.00 kA			
					B	7.42 MVA	0.10 kA	-118.45	0.23 kA			
					C	6.09 MVA	0.08 kA	-79.27	0.19 kA			
TR KIPEVU 132/1	BB 11 1KIP				A	0.59 MVA	0.01 kA	90.60	0.02 kA			
					B	0.59 MVA	0.01 kA	90.60	0.02 kA			
					C	0.59 MVA	0.01 kA	90.60	0.02 kA			
TR KIPEVU 132/1	BB 11 2KIP				A	0.66 MVA	0.01 kA	90.60	0.02 kA			
					B	0.66 MVA	0.01 kA	90.60	0.02 kA			
					C	0.66 MVA	0.01 kA	90.60	0.02 kA			
TR KIPEVU 132/1	BB 11 3KIP				A	0.66 MVA	0.01 kA	90.60	0.02 kA			
					B	0.66 MVA	0.01 kA	90.60	0.02 kA			
					C	0.66 MVA	0.01 kA	90.60	0.02 kA			
TR KIPEVU 132/1	BB 11 KIPE				A	60.28 MVA	0.79 kA	91.56	1.88 kA			
					B	10.53 MVA	0.14 kA	87.63	0.33 kA			
					C	9.97 MVA	0.13 kA	87.93	0.31 kA			
TR KIPEVU 132/1	BB 11 KIPE				A	60.28 MVA	0.79 kA	91.56	1.88 kA			
					B	10.53 MVA	0.14 kA	87.63	0.33 kA			
					C	9.97 MVA	0.13 kA	87.93	0.31 kA			
TR KIPEVU 132/3	BB 33 1KIP				A	1.31 MVA	0.02 kA	90.60	0.04 kA			
					B	1.31 MVA	0.02 kA	90.60	0.04 kA			
					C	1.31 MVA	0.02 kA	90.60	0.04 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 18			
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
TR KIPEVU 132/3	BB 33 1KIP			A	1.31 MVA	0.02 kA	90.60	0.04 kA					
				B	1.31 MVA	0.02 kA	90.60	0.04 kA					
				C	1.31 MVA	0.02 kA	90.60	0.04 kA					
TR KIPEVU 132/3	BB 33 1KIP			A	1.31 MVA	0.02 kA	90.60	0.04 kA					
				B	1.31 MVA	0.02 kA	90.60	0.04 kA					
				C	1.31 MVA	0.02 kA	90.60	0.04 kA					
BB 132 KIPEVU D	132.00	0.00	0.00	1.00	697.66 MVA	9.15 kA	-81.98	21.70 kA	9.15	697.66	0.00		
					A	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92	
					B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92	
C	72.41	-108.31	108.87		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92		
Lne 132 KIPEVU	BB 132 KIP			A	446.90 MVA	5.86 kA	100.99	13.90 kA					
				B	8.72 MVA	0.11 kA	138.56	0.27 kA					
				C	10.51 MVA	0.14 kA	52.41	0.33 kA					
Lne 132 KIPEVU	BB 132 RAB			A	142.50 MVA	1.87 kA	93.74	4.43 kA					
				B	7.07 MVA	0.09 kA	-122.46	0.22 kA					
				C	5.70 MVA	0.07 kA	-72.55	0.18 kA					
TR KIPEVU 132/1	BB 11 1KIP			A	40.90 MVA	0.54 kA	91.52	1.27 kA					
				B	4.39 MVA	0.06 kA	-1.63	0.14 kA					
				C	3.82 MVA	0.05 kA	-157.75	0.12 kA					
TR KIPEVU 132/1	BB 11 2KIP			A	69.08 MVA	0.91 kA	91.46	2.15 kA					
				B	5.96 MVA	0.08 kA	3.08	0.19 kA					
				C	4.81 MVA	0.06 kA	-162.53	0.15 kA					
BB 132 KISII (P	132.00	0.00	0.00	1.00	199.16 MVA	2.61 kA	-68.07	4.87 kA	2.61	199.16	0.00		
					A	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97	
					B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96	
C	74.01	-115.61	116.16		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96		
Lne 132 KISII	BB 132 SOT			A	134.77 MVA	1.77 kA	113.11	3.29 kA					
				B	7.19 MVA	0.09 kA	-82.78	0.18 kA					
				C	6.99 MVA	0.09 kA	-80.78	0.17 kA					
Lne 132 KISII	BB 132 AWE			A	57.18 MVA	0.75 kA	111.94	1.40 kA					
				B	0.99 MVA	0.01 kA	-141.49	0.02 kA					
				C	1.30 MVA	0.02 kA	-139.42	0.03 kA					

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 19			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR KISII 132/33	BB 33 KISI										
				A	3.87 MVA	0.05 kA	90.98	0.09 kA			
				B	3.87 MVA	0.05 kA	90.98	0.09 kA			
				C	3.87 MVA	0.05 kA	90.98	0.09 kA			
TR KISII 132/33	BB 33 KISI										
				A	3.87 MVA	0.05 kA	90.98	0.09 kA			
				B	3.87 MVA	0.05 kA	90.98	0.09 kA			
				C	3.87 MVA	0.05 kA	90.98	0.09 kA			
Shn KISUMU 132k											
				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KISUMU (A	132.00	0.00	0.00	1.00	389.26 MVA	5.11 kA	-78.20	11.60 kA	5.11	389.26	0.00
B		71.72	-110.90		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		70.74	111.57		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 MUHORON	BB 132 MUH										
				A	90.94 MVA	1.19 kA	118.01	2.71 kA			
				B	11.83 MVA	0.16 kA	-64.12	0.35 kA			
				C	11.61 MVA	0.15 kA	-61.78	0.35 kA			
Lne 132 KISUMU	BB 132 SON										
				A	87.78 MVA	1.15 kA	102.31	2.61 kA			
				B	0.79 MVA	0.01 kA	-99.04	0.02 kA			
				C	2.70 MVA	0.04 kA	-136.67	0.08 kA			
TR KISUMU 132/3	BB 33 KISU										
				A	6.20 MVA	0.08 kA	91.35	0.18 kA			
				B	6.20 MVA	0.08 kA	91.35	0.18 kA			
				C	6.20 MVA	0.08 kA	91.35	0.18 kA			
TR KISUMU 132/3	BB 33 KISU										
				A	6.20 MVA	0.08 kA	91.35	0.18 kA			
				B	6.20 MVA	0.08 kA	91.35	0.18 kA			
				C	6.20 MVA	0.08 kA	91.35	0.18 kA			
TR KISUMU 220/1	BB 220 KIS										
				A	101.69 MVA	1.33 kA	95.04	3.03 kA			
				B	2.42 MVA	0.03 kA	-168.47	0.07 kA			
				C	1.62 MVA	0.02 kA	-174.54	0.05 kA			
TR KISUMU 220/1	BB 220 KIS										
				A	101.69 MVA	1.33 kA	95.04	3.03 kA			
				B	2.42 MVA	0.03 kA	-168.47	0.07 kA			
				C	1.62 MVA	0.02 kA	-174.54	0.05 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 20				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 KITALE (	A	132.00	0.00	0.00	1.00	199.50 MVA	2.62 kA	-73.19	5.43 kA	2.62	199.50	0.00
	B		73.64	-114.59		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		72.14	115.40		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 132 ELDORET		BB 132 ELD				103.92 MVA	1.36 kA	115.87	2.83 kA			
					A	6.16 MVA	0.08 kA	-71.77	0.17 kA			
					B	5.98 MVA	0.08 kA	-72.08	0.16 kA			
TR KITALE 132/3		BB 33 KITA				0.71 MVA	0.01 kA	91.67	0.02 kA			
					A	0.71 MVA	0.01 kA	91.67	0.02 kA			
					B	0.71 MVA	0.01 kA	91.67	0.02 kA			
TR KITALE 220/1		BB 220 KIT				97.55 MVA	1.28 kA	97.27	2.66 kA			
					A	5.49 MVA	0.07 kA	110.33	0.15 kA			
					B	5.31 MVA	0.07 kA	110.06	0.14 kA			
BB 132 KITUI (P	A	132.00	0.00	0.00	1.00	180.33 MVA	2.37 kA	-68.25	4.47 kA	2.37	180.33	0.00
	B		74.72	-116.89		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
	C		74.67	117.06		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 SULTAN		BB 132 WOT				62.22 MVA	0.82 kA	114.09	1.54 kA			
					A	2.69 MVA	0.04 kA	-82.94	0.07 kA			
					B	2.50 MVA	0.03 kA	-64.85	0.06 kA			
Lne 132 MWINGI		BB 132 MWI				117.48 MVA	1.54 kA	110.64	2.91 kA			
					A	1.95 MVA	0.03 kA	99.72	0.05 kA			
					B	1.85 MVA	0.02 kA	125.03	0.05 kA			
TR KITUI 132/33		BB 33 KITU				0.75 MVA	0.01 kA	90.13	0.02 kA			
					A	0.75 MVA	0.01 kA	90.13	0.02 kA			
					B	0.75 MVA	0.01 kA	90.13	0.02 kA			
BB 132 KOKOTONI	A	132.00	0.00	0.00	1.00	492.19 MVA	6.46 kA	-73.43	13.23 kA	6.46	492.19	0.00
	B		71.43	-113.03		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
	C		74.86	112.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 KOKOTON		BB 132 RAB				461.16 MVA	6.05 kA	106.37	12.39 kA			
					A	3.20 MVA	0.04 kA	103.34	0.09 kA			
					B	2.91 MVA	0.04 kA	111.20	0.08 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 21				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 KOKOTON	BB 132 MAR					A 31.08 MVA	0.41 kA	109.46	0.84 kA			
						B 3.20 MVA	0.04 kA	-76.66	0.09 kA			
						C 2.91 MVA	0.04 kA	-68.80	0.08 kA			
Ld KOKOTONI (13						A 0.00 MVA	0.00 kA	0.00	0.00 kA			
						B 0.00 MVA	0.00 kA	0.00	0.00 kA			
						C 0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KONZA (P A	132.00	0.00	0.00	1.00		486.90 MVA	6.39 kA	-71.86	12.91 kA	6.39	486.90	0.00
B		71.51	-114.56			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		73.56	114.00			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 ULU -	BB 132 ULU					A 149.69 MVA	1.96 kA	114.18	3.97 kA			
						B 11.79 MVA	0.15 kA	-60.50	0.31 kA			
						C 11.80 MVA	0.15 kA	-59.17	0.31 kA			
Lne 132 SULTAN	BB 132 SUL					A 60.10 MVA	0.79 kA	113.57	1.59 kA			
						B 5.36 MVA	0.07 kA	-58.37	0.14 kA			
						C 5.43 MVA	0.07 kA	-62.50	0.14 kA			
Lne 132 KONZA	BB 132 KAJ					A 93.29 MVA	1.22 kA	106.65	2.47 kA			
						B 5.20 MVA	0.07 kA	127.10	0.14 kA			
						C 5.22 MVA	0.07 kA	126.65	0.14 kA			
Lne 132 KONZA	BB 132 ISI					A 183.75 MVA	2.41 kA	102.44	4.87 kA			
						B 10.10 MVA	0.13 kA	123.34	0.27 kA			
						C 10.14 MVA	0.13 kA	122.89	0.27 kA			
Lne 132 KONZA	BB 132 MAC					A 2.25 MVA	0.03 kA	88.31	0.06 kA			
						B 2.25 MVA	0.03 kA	88.31	0.06 kA			
						C 2.25 MVA	0.03 kA	88.31	0.06 kA			
Ld KONZA (132kV						A 0.00 MVA	0.00 kA	0.00	0.00 kA			
						B 0.00 MVA	0.00 kA	0.00	0.00 kA			
						C 0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 KUTUS (P A	132.00	0.00	0.00	1.00		269.20 MVA	3.53 kA	-68.09	6.59 kA	3.53	269.20	0.00
B		75.18	-118.39			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		75.69	118.47			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 22					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MASINGA	BB 132 MAS			A	163.92 MVA	2.15 kA	112.80	4.01 kA			
				B	4.51 MVA	0.06 kA	126.45	0.11 kA			
				C	4.41 MVA	0.06 kA	129.72	0.11 kA			
Lne 132 KIGANJO	BB 132 KIG			A	100.43 MVA	1.32 kA	111.60	2.46 kA			
				B	9.24 MVA	0.12 kA	-73.33	0.23 kA			
				C	9.05 MVA	0.12 kA	-72.07	0.22 kA			
TR KUTUS 132/33	BB 33 KUTU			A	7.02 MVA	0.09 kA	91.41	0.17 kA			
				B	4.60 MVA	0.06 kA	88.49	0.11 kA			
				C	4.61 MVA	0.06 kA	88.25	0.11 kA			
TR KUTUS 132/33	BB 33 KUTU			A	1.75 MVA	0.02 kA	-83.54	0.04 kA			
				B	0.63 MVA	0.01 kA	98.27	0.02 kA			
				C	0.62 MVA	0.01 kA	100.19	0.02 kA			
BB 132 KYENI (P A	132.00	0.00	0.00	1.00	184.14 MVA	2.42 kA	-71.05	4.69 kA	2.42	184.14	0.00
B		75.31	-118.62		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		75.61	118.65		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
Lne 132 KYENI	BB 132 ISH			A	183.33 MVA	2.41 kA	109.04	4.67 kA			
				B	0.86 MVA	0.01 kA	-90.19	0.02 kA			
				C	0.86 MVA	0.01 kA	-90.19	0.02 kA			
TR KYENI 132/33	BB 33 KYEN			A	0.86 MVA	0.01 kA	89.81	0.02 kA			
				B	0.86 MVA	0.01 kA	89.81	0.02 kA			
				C	0.86 MVA	0.01 kA	89.81	0.02 kA			
BB 132 LANET (P A	132.00	0.00	0.00	1.00	532.40 MVA	6.99 kA	-71.27	13.99 kA	6.99	532.40	0.00
B		72.85	-113.66		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
C		72.81	114.24		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 LANET	BB 132 NAI			A	110.00 MVA	1.44 kA	114.62	2.89 kA			
				B	7.83 MVA	0.10 kA	-79.55	0.21 kA			
				C	7.14 MVA	0.09 kA	-72.39	0.19 kA			
Lne 132 LANET	BB 132 NAI			A	110.00 MVA	1.44 kA	114.62	2.89 kA			
				B	7.83 MVA	0.10 kA	-79.55	0.21 kA			
				C	7.14 MVA	0.09 kA	-72.39	0.19 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 23					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LANET	BB 132 NAK			A	156.09 MVA	2.05 kA	104.73	4.10 kA			
				B	6.72 MVA	0.09 kA	102.15	0.18 kA			
				C	6.06 MVA	0.08 kA	110.80	0.16 kA			
Lne 132 LANET	BB 132 NAK			A	156.09 MVA	2.05 kA	104.73	4.10 kA			
				B	6.72 MVA	0.09 kA	102.15	0.18 kA			
				C	6.06 MVA	0.08 kA	110.80	0.16 kA			
TR LANET 132/33	BB 33 LANE			A	0.76 MVA	0.01 kA	90.32	0.02 kA			
				B	0.76 MVA	0.01 kA	90.32	0.02 kA			
				C	0.76 MVA	0.01 kA	90.32	0.02 kA			
TR LANET 132/33	BB 33 LANE			A	0.76 MVA	0.01 kA	90.32	0.02 kA			
				B	0.76 MVA	0.01 kA	90.32	0.02 kA			
				C	0.76 MVA	0.01 kA	90.32	0.02 kA			
TR LANET 132/33	BB 33 LANE			A	0.76 MVA	0.01 kA	90.32	0.02 kA			
				B	0.76 MVA	0.01 kA	90.32	0.02 kA			
				C	0.76 MVA	0.01 kA	90.32	0.02 kA			
BB 132 LESSOS (	A 132.00	0.00	0.00	1.00	692.07 MVA	9.08 kA	-77.22	19.57 kA	9.08	692.07	0.00
	B	72.74	-111.56		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C	70.45	112.74		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 ELDORET	BB 132 ELD			A	40.69 MVA	0.53 kA	101.65	1.15 kA			
				B	3.38 MVA	0.04 kA	126.00	0.10 kA			
				C	3.14 MVA	0.04 kA	122.21	0.09 kA			
Lne 132 MUHORON	BB 132 MUH			A	64.19 MVA	0.84 kA	114.23	1.81 kA			
				B	6.48 MVA	0.08 kA	-83.50	0.18 kA			
				C	6.59 MVA	0.09 kA	-84.31	0.19 kA			
Lne 132 MUSAGA	BB 132 MUS			A	21.87 MVA	0.29 kA	99.05	0.62 kA			
				B	2.54 MVA	0.03 kA	105.95	0.07 kA			
				C	2.62 MVA	0.03 kA	134.28	0.07 kA			
Lne 132 MUSAGA	BB 132 MUS			A	21.87 MVA	0.29 kA	99.05	0.62 kA			
				B	2.54 MVA	0.03 kA	105.95	0.07 kA			
				C	2.62 MVA	0.03 kA	134.28	0.07 kA			
Lne 132 LESSOS	BB 132 KAB			A	43.95 MVA	0.58 kA	103.49	1.24 kA			
				B	6.28 MVA	0.08 kA	-84.34	0.18 kA			
				C	6.04 MVA	0.08 kA	-82.30	0.17 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 24				
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
Lne 132 LESS0S				BB 132 NAK			A	65.89 MVA	0.86 kA	113.60	1.86 kA					
							B	6.26 MVA	0.08 kA	-82.66					0.18 kA	
							C	6.36 MVA	0.08 kA	-83.26					0.18 kA	
Lne 132 LESS0S				BB 132 MAK			A	66.06 MVA	0.87 kA	113.55	1.87 kA					
							B	6.09 MVA	0.08 kA	-82.62					0.17 kA	
							C	6.18 MVA	0.08 kA	-83.24					0.17 kA	
Lne 132 LESS0S				BB 132 LES			A	184.51 MVA	2.42 kA	97.53	5.22 kA					
							B	6.74 MVA	0.09 kA	87.28					0.19 kA	
							C	7.49 MVA	0.10 kA	80.07					0.21 kA	
Lne 132 LESS0S				BB 132 LES			A	184.51 MVA	2.42 kA	97.53	5.22 kA					
							B	6.74 MVA	0.09 kA	87.28					0.19 kA	
							C	7.49 MVA	0.10 kA	80.07					0.21 kA	
TR LESS0S 132/3				BB 33 LESS			A	3.84 MVA	0.05 kA	92.83	0.11 kA					
							B	3.84 MVA	0.05 kA	92.83					0.11 kA	
							C	3.84 MVA	0.05 kA	92.83					0.11 kA	
BB 132 LESSTRF				A	132.00	0.00	0.00	1.00	692.13 MVA	9.08 kA	-77.23	19.57 kA	9.08	692.13	0.00	
									B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
									C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 LESS0S				BB 132 LES			A	163.05 MVA	2.14 kA	108.69	4.61 kA					
							B	6.76 MVA	0.09 kA	-92.66					0.19 kA	
							C	7.50 MVA	0.10 kA	-99.87					0.21 kA	
Lne 132 LESS0S				BB 132 LES			A	163.05 MVA	2.14 kA	108.69	4.61 kA					
							B	6.76 MVA	0.09 kA	-92.66					0.19 kA	
							C	7.50 MVA	0.10 kA	-99.87					0.21 kA	
TR LESS0S 220/1				BB 220 LES			A	92.03 MVA	1.21 kA	97.56	2.60 kA					
							B	3.08 MVA	0.04 kA	86.81					0.09 kA	
							C	3.46 MVA	0.05 kA	79.04					0.10 kA	
TR LESS0S 220/1				BB 220 LES			A	92.03 MVA	1.21 kA	97.56	2.60 kA					
							B	3.08 MVA	0.04 kA	86.81					0.09 kA	
							C	3.46 MVA	0.05 kA	79.04					0.10 kA	
TR LESS0S 220/1				BB 220 LES			A	92.03 MVA	1.21 kA	97.56	2.60 kA					
							B	3.08 MVA	0.04 kA	86.81					0.09 kA	
							C	3.46 MVA	0.05 kA	79.04					0.10 kA	

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 25				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR LESSOS 220/1	BB 220 LES					92.03 MVA	1.21 kA	97.56	2.60 kA			
						3.08 MVA	0.04 kA	86.81	0.09 kA			
						3.46 MVA	0.05 kA	79.04	0.10 kA			
TR LESSTRF 132/	BB 11 LESS					0.60 MVA	0.01 kA	92.84	0.02 kA			
						0.60 MVA	0.01 kA	92.84	0.02 kA			
						0.60 MVA	0.01 kA	92.84	0.02 kA			
TR LESSTRF 132/	BB 11 LESS					0.60 MVA	0.01 kA	92.84	0.02 kA			
						0.60 MVA	0.01 kA	92.84	0.02 kA			
						0.60 MVA	0.01 kA	92.84	0.02 kA			
BB 132 LUNGA LU A	132.00	0.00	0.00	1.00		103.86 MVA	1.36 kA	-65.22	2.47 kA	1.36	103.86	0.00
B		74.95	-117.47			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
C		74.93	117.71			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 GALU -	BB 132 GAL					103.41 MVA	1.36 kA	114.90	2.46 kA			
						0.50 MVA	0.01 kA	-89.87	0.01 kA			
						0.50 MVA	0.01 kA	-89.87	0.01 kA			
TR LUNGA 132/33	BB 33 LUNG					0.50 MVA	0.01 kA	90.13	0.01 kA			
						0.50 MVA	0.01 kA	90.13	0.01 kA			
						0.50 MVA	0.01 kA	90.13	0.01 kA			
BB 132 MACHAKOS A	132.00	0.00	0.00	1.00		271.58 MVA	3.56 kA	-67.81	6.71 kA	3.56	271.58	0.00
B		73.24	-116.83			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
C		74.55	116.42			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
Lne 132 KONZA	BB 132 KON					269.27 MVA	3.53 kA	112.40	6.65 kA			
						2.53 MVA	0.03 kA	-91.22	0.06 kA			
						2.53 MVA	0.03 kA	-91.22	0.06 kA			
TR MACHAKOS 132	BB 33 MACH					2.53 MVA	0.03 kA	88.78	0.06 kA			
						2.53 MVA	0.03 kA	88.78	0.06 kA			
						2.53 MVA	0.03 kA	88.78	0.06 kA			
BB 132 MAKUTANO A	132.00	0.00	0.00	1.00		290.42 MVA	3.81 kA	-66.10	6.98 kA	3.81	290.42	0.00
B		73.98	-117.28			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		74.89	117.20			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 26					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LESSOS	BB 132 LES			A	140.70 MVA	1.85 kA	113.94	3.38 kA			
				B	1.06 MVA	0.01 kA	-86.61	0.03 kA			
				C	0.83 MVA	0.01 kA	-70.85	0.02 kA			
Lne 132 NAKURU	BB 132 NAK			A	148.98 MVA	1.95 kA	113.99	3.58 kA			
				B	0.26 MVA	0.00 kA	106.04	0.01 kA			
				C	0.28 MVA	0.00 kA	-175.07	0.01 kA			
TR MAKUTANO 132	BB 33 MAKU			A	0.81 MVA	0.01 kA	89.29	0.02 kA			
				B	0.81 MVA	0.01 kA	89.29	0.02 kA			
				C	0.81 MVA	0.01 kA	89.29	0.02 kA			
BB 132 MANGU (P A	132.00	0.00	0.00	1.00	473.95 MVA	6.22 kA	-74.36	13.05 kA	6.22	473.95	0.00
B		70.73	-110.56		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		70.07	111.63		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 KINDARU	BB 132 KIN			A	66.08 MVA	0.87 kA	110.23	1.82 kA			
				B	6.97 MVA	0.09 kA	-65.80	0.19 kA			
				C	6.96 MVA	0.09 kA	-87.60	0.19 kA			
Lne 132 MANGU	BB 132 JUJ			A	195.84 MVA	2.57 kA	113.53	5.39 kA			
				B	28.20 MVA	0.37 kA	-69.67	0.78 kA			
				C	26.40 MVA	0.35 kA	-73.00	0.73 kA			
Lne 132 MANGU	BB 132 GAT			A	0.62 MVA	0.01 kA	91.35	0.02 kA			
				B	0.62 MVA	0.01 kA	91.35	0.02 kA			
				C	0.62 MVA	0.01 kA	91.35	0.02 kA			
Lne 132 MANGU	BB 132 GIT			A	0.64 MVA	0.01 kA	91.49	0.02 kA			
				B	0.64 MVA	0.01 kA	91.49	0.02 kA			
				C	0.64 MVA	0.01 kA	91.49	0.02 kA			
TR MANGU 132/66	BB 66 MANG			A	107.62 MVA	1.41 kA	97.13	2.96 kA			
				B	16.98 MVA	0.22 kA	111.81	0.47 kA			
				C	15.97 MVA	0.21 kA	104.45	0.44 kA			
TR MANGU 132/66	BB 66 MANG			A	107.63 MVA	1.41 kA	97.13	2.96 kA			
				B	16.99 MVA	0.22 kA	111.82	0.47 kA			
				C	15.98 MVA	0.21 kA	104.46	0.44 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 27					
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 MANYANI	A	132.00	0.00	0.00	1.00	140.64 MVA	1.85 kA	-66.21		3.45 kA	1.85	140.64	0.00
	B		76.09	-122.41		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	1.00
	C		79.58	121.02		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	1.04
Lne 132 MANYANI	BB 132 MTI				A	50.27 MVA	0.66 kA	116.23		1.23 kA			
					B	2.73 MVA	0.04 kA	93.48		0.07 kA			
					C	2.90 MVA	0.04 kA	90.59		0.07 kA			
Lne 132 MANYANI	BB 132 VOI				A	90.44 MVA	1.19 kA	112.44		2.22 kA			
					B	2.73 MVA	0.04 kA	-86.52		0.07 kA			
					C	2.90 MVA	0.04 kA	-89.41		0.07 kA			
Ld MANYANI (132					A	0.00 MVA	0.00 kA	0.00		0.00 kA			
					B	0.00 MVA	0.00 kA	0.00		0.00 kA			
					C	0.00 MVA	0.00 kA	0.00		0.00 kA			
BB 132 MARIAKAN	A	132.00	0.00	0.00	1.00	363.01 MVA	4.76 kA	-69.52		9.20 kA	4.76	363.01	0.00
	B		72.18	-115.48		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94
	C		75.82	114.89		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.98
Lne 132 SAMBURU	BB 132 SAM				A	39.40 MVA	0.52 kA	109.46		1.00 kA			
					B	4.01 MVA	0.05 kA	-78.64		0.10 kA			
					C	3.75 MVA	0.05 kA	-74.62		0.10 kA			
Lne 132 KOKOTON	BB 132 KOK				A	323.62 MVA	4.25 kA	110.61		8.20 kA			
					B	4.01 MVA	0.05 kA	101.36		0.10 kA			
					C	3.75 MVA	0.05 kA	105.38		0.10 kA			
Ld MARIAKANI (1					A	0.00 MVA	0.00 kA	0.00		0.00 kA			
					B	0.00 MVA	0.00 kA	0.00		0.00 kA			
					C	0.00 MVA	0.00 kA	0.00		0.00 kA			
BB 132 MASINGA	A	132.00	0.00	0.00	1.00	524.11 MVA	6.88 kA	-79.61		15.43 kA	6.88	524.11	0.00
	B		73.90	-114.06		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.96
	C		72.99	114.78		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.95
Lne 132 KAMBURU	BB 132 KAM				A	410.54 MVA	5.39 kA	98.97		12.09 kA			
					B	10.82 MVA	0.14 kA	-115.87		0.32 kA			
					C	9.67 MVA	0.13 kA	-114.83		0.28 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 28			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 MASINGA	BB 132 KUT			A	59.11 MVA	0.78 kA	114.30	1.74 kA			
				B	3.56 MVA	0.05 kA	-58.21	0.10 kA			
				C	3.43 MVA	0.05 kA	-48.15	0.10 kA			
TR MASINGA 132/	BB 11 MASI			A	28.23 MVA	0.37 kA	96.31	0.83 kA			
				B	6.54 MVA	0.09 kA	77.44	0.19 kA			
				C	5.73 MVA	0.08 kA	81.12	0.17 kA			
TR MASINGA 132/	BB 11 MASI			A	28.23 MVA	0.37 kA	96.31	0.83 kA			
				B	6.54 MVA	0.09 kA	77.44	0.19 kA			
				C	5.73 MVA	0.08 kA	81.12	0.17 kA			
BB 132 MAUA (PS A	132.00	0.00	0.00	1.00	113.54 MVA	1.49 kA	-69.39	2.81 kA	1.49	113.54	0.00
B		77.78	-120.71		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02
C		76.43	121.37		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
Lne 132 MERU -	BB 132 MER			A	112.96 MVA	1.48 kA	110.71	2.79 kA			
				B	0.61 MVA	0.01 kA	-88.84	0.02 kA			
				C	0.61 MVA	0.01 kA	-88.84	0.02 kA			
TR MAUA 132/33	BB 33 MAUA			A	0.61 MVA	0.01 kA	91.16	0.02 kA			
				B	0.61 MVA	0.01 kA	91.16	0.02 kA			
				C	0.61 MVA	0.01 kA	91.16	0.02 kA			
BB 132 MAUNGU (A	132.00	0.00	0.00	1.00	174.19 MVA	2.29 kA	-67.39	4.38 kA	2.29	174.19	0.00
B		75.39	-122.11		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
C		79.89	120.40		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04
Lne 132 SAMBURU	BB 132 SAM			A	91.83 MVA	1.20 kA	114.70	2.31 kA			
				B	8.33 MVA	0.11 kA	99.93	0.21 kA			
				C	8.21 MVA	0.11 kA	100.66	0.21 kA			
Lne 132 VOI -	BB 132 VOI			A	82.49 MVA	1.08 kA	110.29	2.08 kA			
				B	8.33 MVA	0.11 kA	-80.07	0.21 kA			
				C	8.21 MVA	0.11 kA	-79.34	0.21 kA			
Ld MAUNGU (132				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 29			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 MERU (PS A	B	132.00	0.00	0.00	1.00	210.86 MVA	2.77 kA	-75.30	5.73 kA	2.77	210.86	0.00	
	C		78.96	-121.92		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04	
			77.50	122.67		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02	
Lne 132 ISHIARA		BB 132 ISH			A	93.89 MVA	1.23 kA	100.46	2.55 kA				
						B	7.38 MVA	0.10 kA	110.97	0.20 kA			
						C	7.37 MVA	0.10 kA	112.71	0.20 kA			
Lne 132 MERU -		BB 132 ISI			A	112.82 MVA	1.48 kA	108.79	3.07 kA				
						B	12.04 MVA	0.16 kA	-76.81	0.33 kA			
						C	11.99 MVA	0.16 kA	-75.77	0.33 kA			
Lne 132 MERU -		BB 132 MAU			A	0.64 MVA	0.01 kA	91.42	0.02 kA				
						B	0.64 MVA	0.01 kA	91.42	0.02 kA			
						C	0.64 MVA	0.01 kA	91.42	0.02 kA			
TR MERU 132/33		BB 33 MERU			A	4.19 MVA	0.06 kA	91.23	0.11 kA				
						B	4.19 MVA	0.06 kA	91.23	0.11 kA			
						C	4.19 MVA	0.06 kA	91.23	0.11 kA			
Shn MERU 132kV					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
						B	0.00 MVA	0.00 kA	0.00	0.00 kA			
						C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 MTITO AN A	B	132.00	0.00	0.00	1.00	129.62 MVA	1.70 kA	-65.21	3.10 kA	1.70	129.62	0.00	
	C		75.92	-121.23		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00	
			78.13	120.40		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02	
Lne 132 MANYANI		BB 132 MAN			A	67.47 MVA	0.89 kA	113.66	1.61 kA				
						B	2.18 MVA	0.03 kA	-83.30	0.05 kA			
						C	2.29 MVA	0.03 kA	-85.95	0.05 kA			
Lne 132 KIBOKO		BB 132 KIB			A	62.17 MVA	0.82 kA	116.02	1.49 kA				
						B	2.18 MVA	0.03 kA	96.70	0.05 kA			
						C	2.29 MVA	0.03 kA	94.05	0.05 kA			
Ld MTITO (132 k					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
						B	0.00 MVA	0.00 kA	0.00	0.00 kA			
						C	0.00 MVA	0.00 kA	0.00	0.00 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 30				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 MTWAPA (	A	132.00	0.00	0.00	1.00	238.26 MVA	3.13 kA	-66.14	5.68 kA	3.13	238.26	0.00
	B		73.21	-115.44		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		74.47	115.55		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 MTWAPA		BB 132 KIL			A	4.12 MVA	0.05 kA	89.95	0.10 kA			
					B	4.12 MVA	0.05 kA	89.95	0.10 kA			
					C	4.12 MVA	0.05 kA	89.95	0.10 kA			
Lne 132 MTWAPA		BB 132 BAM			A	233.23 MVA	3.06 kA	114.41	5.56 kA			
					B	5.52 MVA	0.07 kA	-90.28	0.13 kA			
					C	5.52 MVA	0.07 kA	-90.28	0.13 kA			
TR MTWAPA 132/3		BB 33 MTWA			A	0.70 MVA	0.01 kA	89.03	0.02 kA			
					B	0.70 MVA	0.01 kA	89.03	0.02 kA			
					C	0.70 MVA	0.01 kA	89.03	0.02 kA			
TR MTWAPA 132/3		BB 33 MTWA			A	0.70 MVA	0.01 kA	89.03	0.02 kA			
					B	0.70 MVA	0.01 kA	89.03	0.02 kA			
					C	0.70 MVA	0.01 kA	89.03	0.02 kA			
BB 132 MUHORONI	A	132.00	0.00	0.00	1.00	337.63 MVA	4.43 kA	-68.38	8.38 kA	4.43	337.63	0.00
	B		72.94	-115.34		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		73.60	115.41		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 MUHORON		BB 132 KIS			A	116.67 MVA	1.53 kA	108.08	2.90 kA			
					B	3.18 MVA	0.04 kA	164.30	0.08 kA			
					C	3.25 MVA	0.04 kA	169.32	0.08 kA			
Lne 132 MUHORON		BB 132 CHE			A	78.56 MVA	1.03 kA	111.25	1.95 kA			
					B	1.00 MVA	0.01 kA	70.82	0.02 kA			
					C	0.94 MVA	0.01 kA	74.21	0.02 kA			
Lne 132 MUHORON		BB 132 LES			A	139.06 MVA	1.82 kA	115.46	3.45 kA			
					B	6.56 MVA	0.09 kA	-65.74	0.16 kA			
					C	6.38 MVA	0.08 kA	-62.97	0.16 kA			
TR MUHORONI 132		BB 33 MUHO			A	2.09 MVA	0.03 kA	89.49	0.05 kA			
					B	2.09 MVA	0.03 kA	89.49	0.05 kA			
					C	2.09 MVA	0.03 kA	89.49	0.05 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 31			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR MUHORONI 132	BB 33 MUHO										
				A	2.09 MVA	0.03 kA	89.49	0.05 kA			
				B	2.09 MVA	0.03 kA	89.49	0.05 kA			
				C	2.09 MVA	0.03 kA	89.49	0.05 kA			
BB 132 MUMIAS (A	132.00	0.00	0.00	1.00	204.10 MVA	2.68 kA	-69.27	5.25 kA	2.68	204.10	0.00
B		74.96	-113.86		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
C		71.80	115.01		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 MUSAGA	BB 132 MUS										
				A	153.15 MVA	2.01 kA	117.26	3.94 kA			
				B	10.86 MVA	0.14 kA	-91.43	0.28 kA			
				C	9.96 MVA	0.13 kA	-75.32	0.26 kA			
Lne 132 MUMIAS	BB 132 RAN										
				A	2.05 MVA	0.03 kA	93.52	0.05 kA			
				B	2.05 MVA	0.03 kA	93.52	0.05 kA			
				C	2.05 MVA	0.03 kA	93.52	0.05 kA			
TR MUMIAS 132/1	BB 11 MUMI										
				A	52.74 MVA	0.69 kA	92.14	1.36 kA			
				B	8.82 MVA	0.12 kA	87.42	0.23 kA			
				C	7.96 MVA	0.10 kA	107.54	0.20 kA			
BB 132 MUSAGA (A	132.00	0.00	0.00	1.00	282.46 MVA	3.71 kA	-68.57	7.09 kA	3.71	282.46	0.00
B		73.98	-114.58		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		72.68	115.22		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 WEBUYE	BB 132 WEB										
				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Lne 132 MUSAGA	BB 132 LES										
				A	116.35 MVA	1.53 kA	115.04	2.92 kA			
				B	5.97 MVA	0.08 kA	-88.06	0.15 kA			
				C	5.54 MVA	0.07 kA	-74.87	0.14 kA			
Lne 132 MUSAGA	BB 132 LES										
				A	116.35 MVA	1.53 kA	115.04	2.92 kA			
				B	5.97 MVA	0.08 kA	-88.06	0.15 kA			
				C	5.54 MVA	0.07 kA	-74.87	0.14 kA			
Lne 132 MUSAGA	BB 132 MUM										
				A	48.72 MVA	0.64 kA	95.46	1.22 kA			
				B	8.34 MVA	0.11 kA	92.17	0.21 kA			
				C	7.64 MVA	0.10 kA	111.56	0.19 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 32			
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR MUSAGA 132/3	BB 33 MUSA										
				A	1.42 MVA	0.02 kA	91.41	0.04 kA			
				B	1.42 MVA	0.02 kA	91.41	0.04 kA			
				C	1.42 MVA	0.02 kA	91.41	0.04 kA			
TR MUSAGA 132/3	BB 33 MUSA										
				A	2.18 MVA	0.03 kA	91.41	0.05 kA			
				B	2.18 MVA	0.03 kA	91.41	0.05 kA			
				C	2.18 MVA	0.03 kA	91.41	0.05 kA			
Shn MUSAGA 132k											
				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 MWINGI (A	132.00	0.00	0.00	1.00	219.90 MVA	2.89 kA	-70.57	5.68 kA	2.89	219.90	0.00
B		74.54	-115.33		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
C		73.77	115.75		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 132 KINDARU	BB 132 KIN										
				A	126.82 MVA	1.66 kA	107.22	3.27 kA			
				B	4.92 MVA	0.06 kA	97.16	0.13 kA			
				C	4.74 MVA	0.06 kA	120.26	0.12 kA			
Lne 132 MWINGI	BB 132 GAR										
				A	38.81 MVA	0.51 kA	110.54	1.00 kA			
				B	2.49 MVA	0.03 kA	-84.04	0.06 kA			
				C	2.41 MVA	0.03 kA	-66.23	0.06 kA			
Lne 132 MWINGI	BB 132 KIT										
				A	53.81 MVA	0.71 kA	114.13	1.39 kA			
				B	3.21 MVA	0.04 kA	-83.45	0.08 kA			
				C	3.03 MVA	0.04 kA	-61.89	0.08 kA			
TR MWINGI 132/3	BB 33 MWIN										
				A	0.79 MVA	0.01 kA	90.83	0.02 kA			
				B	0.79 MVA	0.01 kA	90.83	0.02 kA			
				C	0.79 MVA	0.01 kA	90.83	0.02 kA			
BB 132 NAIVASHA A	132.00	0.00	0.00	1.00	771.88 MVA	10.13 kA	-74.69	21.65 kA	10.13	771.88	0.00
B		72.33	-113.46		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
C		72.76	113.78		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 132 OLKARIA	BB 132 OLK										
				A	297.31 MVA	3.90 kA	97.17	8.34 kA			
				B	11.37 MVA	0.15 kA	112.32	0.32 kA			
				C	11.54 MVA	0.15 kA	114.83	0.32 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 33					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LANET	BB 132 LAN			A	79.85 MVA	1.05 kA	111.86	2.24 kA			
				B	2.72 MVA	0.04 kA	-88.14	0.08 kA			
				C	3.00 MVA	0.04 kA	-86.50	0.08 kA			
Lne 132 LANET	BB 132 LAN			A	79.85 MVA	1.05 kA	111.86	2.24 kA			
				B	2.72 MVA	0.04 kA	-88.14	0.08 kA			
				C	3.00 MVA	0.04 kA	-86.50	0.08 kA			
Lne 132 NAIVASH	BB 132 RUA			A	119.70 MVA	1.57 kA	115.34	3.36 kA			
				B	9.51 MVA	0.12 kA	-79.40	0.27 kA			
				C	8.73 MVA	0.11 kA	-71.25	0.24 kA			
Lne 132 NAIVASH	BB 132 RUA			A	119.70 MVA	1.57 kA	115.34	3.36 kA			
				B	9.51 MVA	0.12 kA	-79.40	0.27 kA			
				C	8.73 MVA	0.11 kA	-71.25	0.24 kA			
Lne 132 NAIVASH	BB 132 AEO			A	80.38 MVA	1.05 kA	93.45	2.25 kA			
				B	8.99 MVA	0.12 kA	86.01	0.25 kA			
				C	7.48 MVA	0.10 kA	98.86	0.21 kA			
TR NAIVASHA 132	BB 33 NAIV			A	2.33 MVA	0.03 kA	89.77	0.07 kA			
				B	2.33 MVA	0.03 kA	89.77	0.07 kA			
				C	2.33 MVA	0.03 kA	89.77	0.07 kA			
TR NAIVASHA 132	BB 33 NAIV			A	2.33 MVA	0.03 kA	89.77	0.07 kA			
				B	2.33 MVA	0.03 kA	89.77	0.07 kA			
				C	2.33 MVA	0.03 kA	89.77	0.07 kA			
BB 132 NAKURU W A	132.00	0.00	0.00	1.00	557.54 MVA	7.32 kA	-72.98	15.07 kA	7.32	557.54	0.00
B		72.91	-112.50		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
C		71.93	113.45		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 132 MENENGA	BB 132MENE			A	105.23 MVA	1.38 kA	95.44	2.84 kA			
				B	12.90 MVA	0.17 kA	99.95	0.35 kA			
				C	11.57 MVA	0.15 kA	110.09	0.31 kA			
Lne 132 MENENGA	BB 132MENE			A	105.23 MVA	1.38 kA	95.44	2.84 kA			
				B	12.90 MVA	0.17 kA	99.95	0.35 kA			
				C	11.57 MVA	0.15 kA	110.09	0.31 kA			
Lne 132 LESSOS	BB 132 LES			A	73.87 MVA	0.97 kA	113.40	2.00 kA			
				B	6.61 MVA	0.09 kA	-82.98	0.18 kA			
				C	5.98 MVA	0.08 kA	-74.18	0.16 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 34				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 LANET	BB 132 LAN					100.96 MVA	1.32 kA	114.73	2.73 kA			
					A	8.58 MVA	0.11 kA	-80.05	0.23 kA			
					B	7.81 MVA	0.10 kA	-72.04	0.21 kA			
					C							
Lne 132 LANET	BB 132 LAN					100.96 MVA	1.32 kA	114.73	2.73 kA			
					A	8.58 MVA	0.11 kA	-80.05	0.23 kA			
					B	7.81 MVA	0.10 kA	-72.04	0.21 kA			
					C							
Lne 132 NAKURU	BB 132 MAK					74.09 MVA	0.97 kA	113.34	2.00 kA			
					A	6.38 MVA	0.08 kA	-82.88	0.17 kA			
					B	5.75 MVA	0.08 kA	-73.72	0.16 kA			
					C							
TR NAKURU 132/3	BB 33 NAKU					2.20 MVA	0.03 kA	91.39	0.06 kA			
					A	2.20 MVA	0.03 kA	91.39	0.06 kA			
					B	2.20 MVA	0.03 kA	91.39	0.06 kA			
					C							
TR NAKURU 132/3	BB 33 NAKU					2.20 MVA	0.03 kA	91.39	0.06 kA			
					A	2.20 MVA	0.03 kA	91.39	0.06 kA			
					B	2.20 MVA	0.03 kA	91.39	0.06 kA			
					C							
BB 132 NANYUKI	A	132.00	0.00	0.00	1.00	240.05 MVA	3.15 kA	-71.26	6.19 kA	3.15	240.05	0.00
	B		77.96	-121.70		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02
	C		77.72	121.95		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.02
Lne 132 NANYUKI	BB 132 RUM					53.16 MVA	0.70 kA	101.90	1.37 kA			
					A	3.34 MVA	0.04 kA	103.13	0.09 kA			
					B	3.39 MVA	0.04 kA	100.82	0.09 kA			
					C							
Lne 132 KIGANJO	BB 132 KIG					100.95 MVA	1.32 kA	114.55	2.60 kA			
					A	2.27 MVA	0.03 kA	-160.93	0.06 kA			
					B	2.54 MVA	0.03 kA	-158.00	0.07 kA			
					C							
Lne 132 NANYUKI	BB 132 ISI					84.30 MVA	1.11 kA	106.68	2.17 kA			
					A	6.00 MVA	0.08 kA	-60.85	0.15 kA			
					B	5.93 MVA	0.08 kA	-59.56	0.15 kA			
					C							
TR NANYUKI 132/	BB 33 NANY					2.73 MVA	0.04 kA	90.27	0.07 kA			
					A	2.73 MVA	0.04 kA	90.27	0.07 kA			
					B	2.73 MVA	0.04 kA	90.27	0.07 kA			
					C							

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 35				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 NAROK (P	A	132.00	0.00	0.00	1.00	305.56 MVA	4.01 kA	-69.24	8.15 kA	4.01	305.56	0.00
	B		73.62	-121.66		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		79.91	119.16		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.05
Lne 132 OLKARIA		BB 132 OLK				103.78 MVA	1.36 kA	101.73	2.77 kA			
					A	24.21 MVA	0.32 kA	-86.22	0.65 kA			
					B	24.24 MVA	0.32 kA	-86.44	0.65 kA			
Lne 132 OLKARIA		BB 132 OLK				123.00 MVA	1.61 kA	116.22	3.28 kA			
					A	16.02 MVA	0.21 kA	99.22	0.43 kA			
					B	15.98 MVA	0.21 kA	99.47	0.43 kA			
Lne 132 BOMET		BB 132 BOM				38.40 MVA	0.50 kA	118.62	1.02 kA			
					A	3.61 MVA	0.05 kA	87.50	0.10 kA			
					B	3.66 MVA	0.05 kA	86.45	0.10 kA			
Lne 132 BOMET		BB 132 BOM				41.78 MVA	0.55 kA	110.35	1.11 kA			
					A	3.92 MVA	0.05 kA	79.23	0.10 kA			
					B	3.98 MVA	0.05 kA	78.18	0.11 kA			
TR NAROK 132/33		BB 33 NARO				0.89 MVA	0.01 kA	84.76	0.02 kA			
					A	0.89 MVA	0.01 kA	84.76	0.02 kA			
					B	0.89 MVA	0.01 kA	84.76	0.02 kA			
BB 132 NDHIWA (	A	132.00	0.00	0.00	1.00	167.14 MVA	2.19 kA	-67.67	4.11 kA	2.19	167.14	0.00
	B		73.78	-116.24		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		74.11	116.37		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 AWENDO		BB 132 AWE				80.48 MVA	1.06 kA	114.69	1.98 kA			
					A	0.85 MVA	0.01 kA	-23.33	0.02 kA			
					B	1.06 MVA	0.01 kA	-2.89	0.03 kA			
Lne 132 HOMABAY		BB 132 HOM				86.78 MVA	1.14 kA	110.14	2.13 kA			
					A	0.85 MVA	0.01 kA	156.67	0.02 kA			
					B	1.06 MVA	0.01 kA	177.11	0.03 kA			
BB 132 NYAHURUR	A	132.00	0.00	0.00	1.00	134.01 MVA	1.76 kA	-76.22	3.71 kA	1.76	134.01	0.00
	B		76.26	-119.73		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
	C		76.01	119.90		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 36			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]			
Lne 132 NYAHURU	BB 132 RUM				A	133.14 MVA	1.75 kA	103.87	3.69 kA						
						0.90 MVA	0.01 kA	-89.75	0.02 kA						
						0.90 MVA	0.01 kA	-89.75	0.02 kA						
TR NYAHURURU 13	BB 33 NYAH				A	0.90 MVA	0.01 kA	90.25	0.02 kA						
						0.90 MVA	0.01 kA	90.25	0.02 kA						
						0.90 MVA	0.01 kA	90.25	0.02 kA						
BB 132 OLKARIA	A	132.00	0.00	0.00	1.00	845.94 MVA	11.10 kA	-82.17	26.66 kA	11.10	845.94	0.00			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.90			
Lne 132 OLKARIA	BB 132 NAR				A	28.44 MVA	0.37 kA	105.39	0.90 kA						
						9.87 MVA	0.13 kA	-80.54	0.31 kA						
						9.79 MVA	0.13 kA	-77.52	0.31 kA						
Lne 132 OLKARIA	BB 132 OLK				A	81.01 MVA	1.06 kA	92.14	2.55 kA						
						0.97 MVA	0.01 kA	126.45	0.03 kA						
						2.18 MVA	0.03 kA	-159.58	0.07 kA						
Lne 132 OLKARIA	BB 132 OLK				A	645.46 MVA	8.47 kA	97.71	20.34 kA						
						12.82 MVA	0.17 kA	123.59	0.40 kA						
						13.56 MVA	0.18 kA	77.66	0.43 kA						
Lne 132 OLKARIA	BB 132 NAR				A	29.81 MVA	0.39 kA	121.65	0.94 kA						
						2.49 MVA	0.03 kA	-49.21	0.08 kA						
						2.55 MVA	0.03 kA	-39.26	0.08 kA						
TR OLKARIA 132/	BB 11 OLKA				A	64.73 MVA	0.85 kA	92.14	2.04 kA						
						4.42 MVA	0.06 kA	2.06	0.14 kA						
						5.11 MVA	0.07 kA	-165.20	0.16 kA						
BB 132 OLKARIA	A	132.00	0.00	0.00	1.00	706.67 MVA	9.27 kA	-81.74	22.05 kA	9.27	706.67	0.00			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93			
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91			
Lne 132 OLKARIA	BB 132 OLK				A	621.89 MVA	8.16 kA	99.16	19.40 kA						
						6.04 MVA	0.08 kA	-89.84	0.19 kA						
						4.77 MVA	0.06 kA	-69.52	0.15 kA						

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 37				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 DOMES	BB 132 DOM											
						A 85.41 MVA	1.12 kA	91.66	2.66 kA			
						B 6.04 MVA	0.08 kA	90.16	0.19 kA			
						C 4.77 MVA	0.06 kA	110.48	0.15 kA			
BB 132 OLKARIA	A 132.00	0.00	0.00	1.00		875.49 MVA	11.49 kA	-82.34	27.67 kA	11.49	875.49	0.00
	B	70.66	-106.18			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
	C	68.79	107.10			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.89
Lne 132 OLKARIA	BB 132 OLK											
						A 195.98 MVA	2.57 kA	98.30	6.19 kA			
						B 15.46 MVA	0.20 kA	-63.33	0.49 kA			
						C 16.61 MVA	0.22 kA	-100.38	0.53 kA			
Lne 132 OLKARIA	BB 132 NAI											
						A 253.78 MVA	3.33 kA	106.38	8.02 kA			
						B 51.38 MVA	0.67 kA	-78.98	1.62 kA			
						C 50.78 MVA	0.67 kA	-75.39	1.60 kA			
TR OLKARIA 220/	BB 220 OLK											
						A 430.59 MVA	5.65 kA	92.25	13.61 kA			
						B 66.40 MVA	0.87 kA	104.62	2.10 kA			
						C 66.21 MVA	0.87 kA	98.52	2.09 kA			
BB 132 RABAI (P	A 132.00	0.00	0.00	1.00		795.05 MVA	10.43 kA	-83.39	25.30 kA	10.43	795.05	0.00
	B	71.84	-107.35			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
	C	71.77	108.07			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 RABAI -	BB 132 VOI											
						A 15.82 MVA	0.21 kA	109.37	0.50 kA			
						B 5.96 MVA	0.08 kA	-79.35	0.19 kA			
						C 5.75 MVA	0.08 kA	-69.25	0.18 kA			
Lne 132 KIPEVU	BB 132 KIP											
						A 51.32 MVA	0.67 kA	101.26	1.63 kA			
						B 3.86 MVA	0.05 kA	71.93	0.12 kA			
						C 3.30 MVA	0.04 kA	140.57	0.10 kA			
Lne 132 KIPEVU	BB 132 KIP											
						A 51.32 MVA	0.67 kA	101.26	1.63 kA			
						B 3.86 MVA	0.05 kA	71.93	0.12 kA			
						C 3.30 MVA	0.04 kA	140.57	0.10 kA			
Lne 132 KIPEVU	BB 132 KIP											
						A 55.01 MVA	0.72 kA	86.46	1.75 kA			
						B 4.13 MVA	0.05 kA	57.12	0.13 kA			
						C 3.54 MVA	0.05 kA	125.77	0.11 kA			

Grid: 1 KENYA		System Stage: 1 KENYA					Annex: LF.001 / 38			
	rtd.V. [kV]	Voltage [kV]	c- [deg] Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 KIPEVU	BB 132 KIP		A	57.66 MVA	0.76 kA	86.70	1.83 kA			
			B	3.88 MVA	0.05 kA	49.39	0.12 kA			
			C	3.44 MVA	0.05 kA	137.66	0.11 kA			
Lne 132 KOKOTON	BB 132 KOK		A	15.48 MVA	0.20 kA	121.87	0.49 kA			
			B	1.86 MVA	0.02 kA	-57.54	0.06 kA			
			C	1.90 MVA	0.02 kA	-31.74	0.06 kA			
Lne 132 RABAI	BB 132 BAM		A	3.79 MVA	0.05 kA	92.54	0.12 kA			
			B	3.79 MVA	0.05 kA	92.54	0.12 kA			
			C	3.79 MVA	0.05 kA	92.54	0.12 kA			
Lne 132 RABAI	BB 132 BAM		A	3.79 MVA	0.05 kA	92.54	0.12 kA			
			B	3.79 MVA	0.05 kA	92.54	0.12 kA			
			C	3.79 MVA	0.05 kA	92.54	0.12 kA			
Lne 132 RABAI	BB 132 GAL		A	27.01 MVA	0.35 kA	94.83	0.86 kA			
			B	0.78 MVA	0.01 kA	106.78	0.02 kA			
			C	0.83 MVA	0.01 kA	163.02	0.03 kA			
TR RABAI 132/11	BB 11 RABA		A	50.18 MVA	0.66 kA	91.47	1.60 kA			
			B	2.08 MVA	0.03 kA	49.33	0.07 kA			
			C	0.74 MVA	0.01 kA	131.83	0.02 kA			
TR RABAI 132/11	BB 11 RABA		A	66.68 MVA	0.87 kA	91.47	2.12 kA			
			B	3.25 MVA	0.04 kA	64.19	0.10 kA			
			C	1.85 MVA	0.02 kA	98.73	0.06 kA			
TR RABAI 132/33	BB 33 RABA		A	2.42 MVA	0.03 kA	90.46	0.08 kA			
			B	2.42 MVA	0.03 kA	90.46	0.08 kA			
			C	2.42 MVA	0.03 kA	90.46	0.08 kA			
TR RABAI 132/33	BB 33 RABA		A	2.42 MVA	0.03 kA	90.46	0.08 kA			
			B	2.42 MVA	0.03 kA	90.46	0.08 kA			
			C	2.42 MVA	0.03 kA	90.46	0.08 kA			
zpu_1126_1726_1	BB 132 1RA		A	198.79 MVA	2.61 kA	98.58	6.33 kA			
			B	13.03 MVA	0.17 kA	-116.64	0.41 kA			
			C	9.50 MVA	0.12 kA	-65.92	0.30 kA			
zpu_1126_1727_2	BB 132 RAB		A	198.07 MVA	2.60 kA	98.54	6.30 kA			
			B	13.55 MVA	0.18 kA	-114.40	0.43 kA			
			C	10.23 MVA	0.13 kA	-66.23	0.33 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 39			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 RABAITRF	A	132.00	0.00	0.00	1.00	843.87 MVA	11.07 kA	-79.69	25.55 kA	11.07	843.87	0.00			
	B		69.54	-106.64		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.89			
	C		73.74	106.85		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93			
TR RABAI 220/13		BB 220 RAB				144.01 MVA	1.89 kA	67.16	4.36 kA						
					A	69.91 MVA	0.92 kA	-40.12	2.12 kA						
					B	75.74 MVA	0.99 kA	-32.71	2.29 kA						
zpu_1126_1727_2		BB 132 RAB				727.59 MVA	9.55 kA	106.53	22.03 kA						
					A	69.91 MVA	0.92 kA	139.88	2.12 kA						
					B	75.74 MVA	0.99 kA	147.29	2.29 kA						
BB 132 RANGALA	A	132.00	0.00	0.00	1.00	136.23 MVA	1.79 kA	-72.28	3.61 kA	1.79	136.23	0.00			
	B		75.38	-115.40		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98			
	C		72.56	116.42		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95			
Lne 132 MUMIAS		BB 132 MUM				134.09 MVA	1.76 kA	107.96	3.55 kA						
					A	2.22 MVA	0.03 kA	-87.24	0.06 kA						
					B	2.22 MVA	0.03 kA	-87.24	0.06 kA						
TR RANGALA 132/		BB 33 RANG				2.22 MVA	0.03 kA	92.76	0.06 kA						
					A	2.22 MVA	0.03 kA	92.76	0.06 kA						
					B	2.22 MVA	0.03 kA	92.76	0.06 kA						
BB 132 RUARAKA	A	132.00	0.00	0.00	1.00	1082.19 MVA	14.20 kA	-76.10	30.93 kA	14.20	1082.19	0.00			
	B		69.82	-111.80		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92			
	C		72.25	111.43		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95			
Lne 132 RUARAKA		BB 132 RUA				539.00 MVA	7.07 kA	103.97	15.41 kA						
					A	2.19 MVA	0.03 kA	-92.51	0.06 kA						
					B	2.19 MVA	0.03 kA	-92.51	0.06 kA						
Lne 132 RUARAKA		BB 132 RUA				539.00 MVA	7.07 kA	103.97	15.41 kA						
					A	2.19 MVA	0.03 kA	-92.51	0.06 kA						
					B	2.19 MVA	0.03 kA	-92.51	0.06 kA						
TR RUARAKA 132/		BB 66 RUAR				2.19 MVA	0.03 kA	87.49	0.06 kA						
					A	2.19 MVA	0.03 kA	87.49	0.06 kA						
					B	2.19 MVA	0.03 kA	87.49	0.06 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 40			
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR RUARAKA 132/				BB 66 RUAR				A	2.19 MVA	0.03 kA	87.49	0.06 kA			
								B	2.19 MVA	0.03 kA	87.49	0.06 kA			
								C	2.19 MVA	0.03 kA	87.49	0.06 kA			
BB 132 RUARAKA	A	132.00	0.00	0.00	1.00		1157.12 MVA	15.18 kA	-77.38		33.81 kA	15.18	1157.12	0.00	
	B		69.69	-111.11			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.92	
	C		71.80	110.88			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94	
Lne 132 JUJA -		BB 132 JUJ				A	482.20 MVA	6.33 kA	100.71		14.09 kA				
						B	9.38 MVA	0.12 kA	122.85		0.27 kA				
						C	9.46 MVA	0.12 kA	118.54		0.28 kA				
Lne 132 JUJA -		BB 132 JUJ				A	482.20 MVA	6.33 kA	100.71		14.09 kA				
						B	9.38 MVA	0.12 kA	122.85		0.27 kA				
						C	9.46 MVA	0.12 kA	118.54		0.28 kA				
Lne 132 NAIVASH		BB 132 NAI				A	96.03 MVA	1.26 kA	112.59		2.81 kA				
						B	11.18 MVA	0.15 kA	-63.38		0.33 kA				
						C	11.33 MVA	0.15 kA	-66.93		0.33 kA				
Lne 132 NAIVASH		BB 132 NAI				A	96.03 MVA	1.26 kA	112.59		2.81 kA				
						B	11.18 MVA	0.15 kA	-63.38		0.33 kA				
						C	11.33 MVA	0.15 kA	-66.93		0.33 kA				
Lne 132 RUARAKA		BB 132 RUA				A	2.12 MVA	0.03 kA	87.84		0.06 kA				
						B	2.12 MVA	0.03 kA	87.84		0.06 kA				
						C	2.12 MVA	0.03 kA	87.84		0.06 kA				
Lne 132 RUARAKA		BB 132 RUA				A	2.12 MVA	0.03 kA	87.84		0.06 kA				
						B	2.12 MVA	0.03 kA	87.84		0.06 kA				
						C	2.12 MVA	0.03 kA	87.84		0.06 kA				
BB 132 RUMURUTI	A	132.00	0.00	0.00	1.00		166.80 MVA	2.19 kA	-75.78		4.59 kA	2.19	166.80	0.00	
	B		76.34	-119.83			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	1.00	
	C		76.11	120.00			0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	1.00	
Lne 132 NANYUKI		BB 132 NAN				A	89.41 MVA	1.17 kA	106.16		2.46 kA				
						B	2.46 MVA	0.03 kA	-82.40		0.07 kA				
						C	2.47 MVA	0.03 kA	-83.44		0.07 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 41				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 NYAHURU	BB 132 KAB					76.62 MVA	1.01 kA	102.12	2.11 kA			
						1.57 MVA	0.02 kA	101.76	0.04 kA			
						1.58 MVA	0.02 kA	100.13	0.04 kA			
Lne 132 NYAHURU	BB 132 NYA					0.90 MVA	0.01 kA	90.28	0.02 kA			
						0.90 MVA	0.01 kA	90.28	0.02 kA			
						0.90 MVA	0.01 kA	90.28	0.02 kA			
Shnt RUMURUTI 1						0.00 MVA	0.00 kA	0.00	0.00 kA			
						0.00 MVA	0.00 kA	0.00	0.00 kA			
						0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 SAMBURU	A	132.00	0.00	0.00	1.00	204.39 MVA	2.68 kA	-66.98	5.03 kA	2.68	204.39	0.00
	B		74.24	-119.29		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		77.52	118.34		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.01
Lne 132 SAMBURU	BB 132 MAU					59.48 MVA	0.78 kA	110.94	1.46 kA			
						6.01 MVA	0.08 kA	-78.99	0.15 kA			
						5.87 MVA	0.08 kA	-77.71	0.14 kA			
Lne 132 SAMBURU	BB 132 MAR					144.96 MVA	1.90 kA	113.87	3.56 kA			
						6.01 MVA	0.08 kA	101.01	0.15 kA			
						5.87 MVA	0.08 kA	102.29	0.14 kA			
Ld SAMBURU (132						0.00 MVA	0.00 kA	0.00	0.00 kA			
						0.00 MVA	0.00 kA	0.00	0.00 kA			
						0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 132 SANGORO	A	132.00	0.00	0.00	1.00	265.29 MVA	3.48 kA	-76.45	7.60 kA	3.48	265.29	0.00
	B		72.84	-111.15		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		71.09	112.10		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
Lne 132 SONDU	BB 132 SON					233.45 MVA	3.06 kA	105.25	6.69 kA			
						6.07 MVA	0.08 kA	-84.28	0.17 kA			
						5.58 MVA	0.07 kA	-85.84	0.16 kA			
TR SANGORO 132/	BB 11 SANG					32.70 MVA	0.43 kA	91.26	0.94 kA			
						6.07 MVA	0.08 kA	95.72	0.17 kA			
						5.58 MVA	0.07 kA	94.16	0.16 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 42				
		rtd.V. [kV]	Voltage [kV]	c- [deg] Factor		Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 SONDU (P	A	132.00	0.00	0.00	1.00	289.74 MVA	3.80 kA	-77.83	8.49 kA	3.80	289.74	0.00
	B		72.90	-110.56		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		70.68	111.60		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 KISUMU		BB 132 KIS			A	130.26 MVA	1.71 kA	107.47	3.82 kA			
					B	12.49 MVA	0.16 kA	-93.33	0.37 kA			
					C	11.30 MVA	0.15 kA	-79.52	0.33 kA			
Lne 132 SONDU		BB 132 SAN			A	31.97 MVA	0.42 kA	91.93	0.94 kA			
					B	5.40 MVA	0.07 kA	99.84	0.16 kA			
					C	4.89 MVA	0.06 kA	97.85	0.14 kA			
Lne 132 SONDU		BB 132 HOM			A	43.42 MVA	0.57 kA	114.76	1.27 kA			
					B	4.84 MVA	0.06 kA	-77.56	0.14 kA			
					C	4.56 MVA	0.06 kA	-65.48	0.13 kA			
TR SONDU 132/11		BB 11 SOND			A	43.82 MVA	0.57 kA	91.80	1.28 kA			
					B	5.94 MVA	0.08 kA	87.08	0.17 kA			
					C	5.46 MVA	0.07 kA	107.49	0.16 kA			
TR SONDU 132/11		BB 11 SOND			A	43.82 MVA	0.57 kA	91.80	1.28 kA			
					B	5.94 MVA	0.08 kA	87.08	0.17 kA			
					C	5.46 MVA	0.07 kA	107.49	0.16 kA			
BB 132 SOTIK (P	A	132.00	0.00	0.00	1.00	255.49 MVA	3.35 kA	-67.46	6.24 kA	3.35	255.49	0.00
	B		73.88	-116.46		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		74.09	116.63		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 CHEMOSI		BB 132 CHE			A	109.09 MVA	1.43 kA	113.04	2.66 kA			
					B	1.12 MVA	0.01 kA	94.76	0.03 kA			
					C	1.19 MVA	0.02 kA	89.78	0.03 kA			
Lne 132 BOMET		BB 132 BOM			A	93.97 MVA	1.23 kA	114.35	2.30 kA			
					B	7.38 MVA	0.10 kA	-82.07	0.18 kA			
					C	7.25 MVA	0.10 kA	-81.03	0.18 kA			
Lne 132 KISII		BB 132 KIS			A	52.62 MVA	0.69 kA	108.25	1.29 kA			
					B	6.26 MVA	0.08 kA	98.50	0.15 kA			
					C	6.07 MVA	0.08 kA	100.76	0.15 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 43			
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
BB 132 SULTAN H	A	132.00	0.00	0.00	1.00			227.40 MVA	2.98 kA	-66.30	5.48 kA	2.98	227.40	0.00	
	B		74.57	-118.56				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98	
	C		75.82	118.18				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99	
Lne 132 SULTAN		BB 132 WOT					A	52.87 MVA	0.69 kA	112.04	1.27 kA				
							B	0.91 MVA	0.01 kA	75.35	0.02 kA				
							C	0.68 MVA	0.01 kA	97.69	0.02 kA				
Lne 132 SULTAN		BB 132 KIB					A	38.60 MVA	0.51 kA	114.90	0.93 kA				
							B	2.15 MVA	0.03 kA	-71.19	0.05 kA				
							C	2.20 MVA	0.03 kA	-71.90	0.05 kA				
Lne 132 SULTAN		BB 132 KON					A	135.71 MVA	1.78 kA	114.05	3.27 kA				
							B	1.28 MVA	0.02 kA	136.52	0.03 kA				
							C	1.29 MVA	0.02 kA	117.63	0.03 kA				
TR SULTAN 132/3		BB 33 SULT					A	0.27 MVA	0.00 kA	88.93	0.01 kA				
							B	0.27 MVA	0.00 kA	88.93	0.01 kA				
							C	0.27 MVA	0.00 kA	88.93	0.01 kA				
BB 132 TAVETA (	A	132.00	0.00	0.00	1.00			69.11 MVA	0.91 kA	-64.82	1.65 kA	0.91	69.11	0.00	
	B		76.29	-121.80				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00	
	C		78.58	120.88				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.03	
Lne 132 VOI -		BB 132 VOI					A	69.11 MVA	0.91 kA	115.18	1.65 kA				
							B	0.00 MVA	0.00 kA	0.00	0.00 kA				
							C	0.00 MVA	0.00 kA	0.00	0.00 kA				
Ld TAVETA (132							A	0.00 MVA	0.00 kA	0.00	0.00 kA				
							B	0.00 MVA	0.00 kA	0.00	0.00 kA				
							C	0.00 MVA	0.00 kA	0.00	0.00 kA				
BB 132 THIKA (P	A	132.00	0.00	0.00	1.00			482.91 MVA	6.34 kA	-71.28	12.64 kA	6.34	482.91	0.00	
	B		71.88	-114.79				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95	
	C		73.17	114.58				0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96	
Lne 132 THIKA -		BB 132 KIL					A	0.00 MVA	0.00 kA	0.00	0.00 kA				
							B	0.00 MVA	0.00 kA	0.00	0.00 kA				
							C	0.00 MVA	0.00 kA	0.00	0.00 kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 44				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 132 JUJA -	BB 132 JUJ					A 402.84 MVA B 17.09 MVA C 16.75 MVA	5.29 kA 0.22 kA 0.22 kA	110.52 -71.54 -74.89	10.54 kA 0.45 kA 0.44 kA			
TR THIKA 132/66	BB 66 THIK					A 81.27 MVA B 17.09 MVA C 16.75 MVA	1.07 kA 0.22 kA 0.22 kA	99.74 108.46 105.11	2.13 kA 0.45 kA 0.44 kA			
BB 132 ULU (PSS A	132.00	0.00	0.00	1.00		470.27 MVA	6.17 kA	-71.18	12.32 kA	6.17	470.27	0.00
B		71.74	-115.05			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		73.85	114.45			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 132 ULU -	BB 132 JUJ					A 155.95 MVA B 10.76 MVA C 10.76 MVA	2.05 kA 0.14 kA 0.14 kA	114.11 -59.87 -58.46	4.08 kA 0.28 kA 0.28 kA			
Lne 132 ULU -	BB 132 KON					A 315.31 MVA B 10.76 MVA C 10.76 MVA	4.14 kA 0.14 kA 0.14 kA	106.21 120.13 121.54	8.26 kA 0.28 kA 0.28 kA			
Ld ULU (132 kV)						A 0.00 MVA B 0.00 MVA C 0.00 MVA	0.00 kA 0.00 kA 0.00 kA	0.00 0.00 0.00	0.00 kA 0.00 kA 0.00 kA			
BB 132 VOI (PSS A	132.00	0.00	0.00	1.00		178.57 MVA	2.34 kA	-68.57	4.69 kA	2.34	178.57	0.00
B		76.16	-124.65			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
C		82.55	121.90			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.08
Lne 132 RABAI -	BB 132 RAB					A 64.30 MVA B 14.59 MVA C 14.70 MVA	0.84 kA 0.19 kA 0.19 kA	104.25 -83.93 -84.53	1.69 kA 0.38 kA 0.39 kA			
Lne 132 MANYANI	BB 132 MAN					A 42.05 MVA B 3.95 MVA C 4.21 MVA	0.55 kA 0.05 kA 0.06 kA	116.32 89.42 86.39	1.10 kA 0.10 kA 0.11 kA			
Lne 132 VOI -	BB 132 MAU					A 73.01 MVA B 10.68 MVA C 10.57 MVA	0.96 kA 0.14 kA 0.14 kA	114.94 98.52 99.07	1.92 kA 0.28 kA 0.28 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 45					
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]			
Lne 132 VOI -	BB 132 TAV				A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA						
Shn VOI 132kV (					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA						
Ld VOI (132 kV)					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 132 WAJIR (P	A	132.00	0.00	0.00	1.00	31.46 MVA	0.41 kA	-68.97	0.77 kA	0.41	31.46	0.00			
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	0.00	0.99
						0.00 MVA	0.00 kA	0.00	0.00 kA						
B	75.76	-118.16			A	30.72 MVA	0.40 kA	111.53	0.76 kA						
						0.79 MVA	0.01 kA	-88.83	0.02 kA				0.02	kA	
						0.79 MVA	0.01 kA	-88.83	0.02 kA						0.02
C	74.49	118.72			A	0.79 MVA	0.01 kA	91.17	0.02 kA						
						0.79 MVA	0.01 kA	91.17	0.02 kA				0.02	kA	
						0.79 MVA	0.01 kA	91.17	0.02 kA						0.02
Lne 132 WAJIR	BB 132 GAR				A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00
TR WAJIR 132/33	BB 33 WAJI				A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00
Ld WAJIR (PSS/E					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00
BB 132 WEBUYE (	A	132.00	0.00	0.00	1.00	197.57 MVA	2.59 kA	-65.52	4.75 kA	2.59	197.57	0.00			
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	0.00	0.97
						0.00 MVA	0.00 kA	0.00	0.00 kA						
B	74.31	-116.31			A	197.57 MVA	2.59 kA	114.48	4.75 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00
C	73.93	116.61			A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00
Lne 132 WEBUYE	BB 132 MUS				A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00
Ld WEBUYE (PSS/					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
						0.00 MVA	0.00 kA	0.00	0.00 kA				0.00	kA	
						0.00 MVA	0.00 kA	0.00	0.00 kA						0.00

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 46				
		rtd.V. [kV]	Voltage [kV]	c- [deg] Factor		Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 132 WOTE (PS A	A	132.00	0.00	0.00	1.00	174.31 MVA	2.29 kA	-66.19	4.19 kA	2.29	174.31	0.00
	B		74.98	-118.48		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
	C		75.60	118.34		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
Lne 132 SULTAN		BB 132 KIT				65.16 MVA	0.86 kA	111.39	1.56 kA			
					A	1.17 MVA	0.02 kA	89.58	0.03 kA			
					B	1.01 MVA	0.01 kA	112.84	0.02 kA			
Lne 132 SULTAN		BB 132 SUL				109.00 MVA	1.43 kA	115.31	2.62 kA			
					A	1.44 MVA	0.02 kA	-90.44	0.03 kA			
					B	1.26 MVA	0.02 kA	-71.98	0.03 kA			
TR WOTE 132/33		BB 33 WOTE				0.27 MVA	0.00 kA	89.49	0.01 kA			
					A	0.27 MVA	0.00 kA	89.49	0.01 kA			
					B	0.27 MVA	0.00 kA	89.49	0.01 kA			
BB 132MENENGAI	A	132.00	0.00	0.00	1.00	519.78 MVA	6.82 kA	-75.49	14.68 kA	6.82	519.78	0.00
	B		73.48	-110.86		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		70.45	112.46		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
Lne 132 MENENGA		BB 132 NAK				144.76 MVA	1.90 kA	114.72	4.09 kA			
					A	16.44 MVA	0.22 kA	-84.05	0.46 kA			
					B	14.85 MVA	0.19 kA	-75.00	0.42 kA			
Lne 132 MENENGA		BB 132 NAK				144.76 MVA	1.90 kA	114.72	4.09 kA			
					A	16.44 MVA	0.22 kA	-84.05	0.46 kA			
					B	14.85 MVA	0.19 kA	-75.00	0.42 kA			
TR MENENGAI 132		BB 11 MENE				240.40 MVA	3.15 kA	92.18	6.79 kA			
					A	32.88 MVA	0.43 kA	95.95	0.93 kA			
					B	29.69 MVA	0.39 kA	105.00	0.84 kA			
BB 220 0RTUM (P A	A	220.00	0.00	0.00	1.00	235.72 MVA	1.86 kA	-77.54	4.05 kA	1.86	235.72	0.00
	B		122.75	-115.66		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C		122.12	116.22		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 KAINUK		BB 220 KAI				157.61 MVA	1.24 kA	99.23	2.71 kA			
					A	3.54 MVA	0.03 kA	-74.31	0.06 kA			
					B	3.86 MVA	0.03 kA	-73.82	0.07 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 47				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 0RTUM	BB 220 KIT											
					A	78.87 MVA	0.62 kA	108.93	1.35 kA			
					B	3.54 MVA	0.03 kA	105.69	0.06 kA			
					C	3.86 MVA	0.03 kA	106.18	0.07 kA			
Ld 0RTUM (220 k					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 ATHI RIV A	220.00	0.00	0.00	1.00		2098.52 MVA	16.52 kA	-81.98	38.94 kA	16.52	2098.52	0.00
B		119.53	-112.13			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		120.41	112.44			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 EMBAKAS	BB 220 EMB				A	547.70 MVA	4.31 kA	99.82	10.16 kA			
					B	14.18 MVA	0.11 kA	-88.37	0.26 kA			
					C	14.02 MVA	0.11 kA	-82.89	0.26 kA			
Lne 220 EMBAKAS	BB 220 EMB				A	547.70 MVA	4.31 kA	99.82	10.16 kA			
					B	14.18 MVA	0.11 kA	-88.37	0.26 kA			
					C	14.02 MVA	0.11 kA	-82.89	0.26 kA			
Lne 220 ISINYA	BB 220 ISI				A	426.28 MVA	3.36 kA	96.28	7.91 kA			
					B	3.49 MVA	0.03 kA	134.98	0.06 kA			
					C	3.34 MVA	0.03 kA	105.56	0.06 kA			
Lne 220 ISINYA	BB 220 ISI				A	426.28 MVA	3.36 kA	96.28	7.91 kA			
					B	3.49 MVA	0.03 kA	134.98	0.06 kA			
					C	3.34 MVA	0.03 kA	105.56	0.06 kA			
TR ATHI 220/BB	BB 66 ATHI				A	75.87 MVA	0.60 kA	94.79	1.41 kA			
					B	11.88 MVA	0.09 kA	79.99	0.22 kA			
					C	10.73 MVA	0.08 kA	94.50	0.20 kA			
TR ATHI 220/BB	BB 66 ATHI				A	75.87 MVA	0.60 kA	94.79	1.41 kA			
					B	11.88 MVA	0.09 kA	79.99	0.22 kA			
					C	10.73 MVA	0.08 kA	94.50	0.20 kA			
BB 220 DANDORA A	220.00	0.00	0.00	1.00		2568.26 MVA	20.22 kA	-82.89	48.53 kA	20.22	2568.26	0.00
B		118.70	-111.07			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
C		119.86	111.43			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93

Grid: 1 KENYA		System Stage: 1 KENYA						Annex: LF.001 / 48		
	rtd.V. [kV]	Voltage [kV]	c- [deg] Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 DANDORA	BB 220 NBE		A	133.13 MVA	1.05 kA	95.65	2.52 kA			
			B	4.30 MVA	0.03 kA	-83.50	0.08 kA			
			C	7.04 MVA	0.06 kA	-136.13	0.13 kA			
Lne 220 DANDORA	BB 220 NBE		A	133.13 MVA	1.05 kA	95.65	2.52 kA			
			B	4.30 MVA	0.03 kA	-83.50	0.08 kA			
			C	7.04 MVA	0.06 kA	-136.13	0.13 kA			
Lne 220 KAMBURU	BB 220 KAM		A	141.18 MVA	1.11 kA	97.33	2.67 kA			
			B	4.70 MVA	0.04 kA	-49.49	0.09 kA			
			C	4.72 MVA	0.04 kA	-106.85	0.09 kA			
Lne 220 KAMBURU	BB 220 KAM		A	138.58 MVA	1.09 kA	97.33	2.62 kA			
			B	4.61 MVA	0.04 kA	-49.50	0.09 kA			
			C	4.64 MVA	0.04 kA	-106.85	0.09 kA			
Lne 220 KIAMBER	BB 220 KIA		A	104.22 MVA	0.82 kA	97.34	1.97 kA			
			B	3.34 MVA	0.03 kA	-54.47	0.06 kA			
			C	3.47 MVA	0.03 kA	-101.89	0.07 kA			
Lne 220 DANDORA	BB 220 KOM		A	5.26 MVA	0.04 kA	89.47	0.10 kA			
			B	5.26 MVA	0.04 kA	89.47	0.10 kA			
			C	5.26 MVA	0.04 kA	89.47	0.10 kA			
Lne 220 DANDORA	BB 220 KOM		A	5.26 MVA	0.04 kA	89.47	0.10 kA			
			B	5.26 MVA	0.04 kA	89.47	0.10 kA			
			C	5.26 MVA	0.04 kA	89.47	0.10 kA			
Lne 220 DANDORA	BB 220 EMB		A	221.10 MVA	1.74 kA	96.69	4.18 kA			
			B	9.30 MVA	0.07 kA	89.04	0.18 kA			
			C	9.26 MVA	0.07 kA	93.78	0.18 kA			
Lne 220 DANDORA	BB 220 EMB		A	221.10 MVA	1.74 kA	96.69	4.18 kA			
			B	9.30 MVA	0.07 kA	89.04	0.18 kA			
			C	9.26 MVA	0.07 kA	93.78	0.18 kA			
Lne 220 DANDORA	BB 220 THI		A	357.38 MVA	2.81 kA	97.88	6.75 kA			
			B	28.64 MVA	0.23 kA	-89.72	0.54 kA			
			C	27.82 MVA	0.22 kA	-73.07	0.53 kA			
Lne 220 DANDORA	BB 220 THI		A	357.38 MVA	2.81 kA	97.88	6.75 kA			
			B	28.64 MVA	0.23 kA	-89.72	0.54 kA			
			C	27.82 MVA	0.22 kA	-73.07	0.53 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 49			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 ISINYA	BB 220 ISI				A	216.71 MVA	1.71 kA	95.09	4.10 kA				
					B	4.04 MVA	0.03 kA	100.72	0.08 kA				
					C	4.50 MVA	0.04 kA	91.28	0.09 kA				
Lne 220 ISINYA	BB 220 ISI				A	216.71 MVA	1.71 kA	95.09	4.10 kA				
					B	4.04 MVA	0.03 kA	100.72	0.08 kA				
					C	4.50 MVA	0.04 kA	91.28	0.09 kA				
TR DANDORA 220/	BB 132 DAN				A	159.03 MVA	1.25 kA	99.92	3.01 kA				
					B	19.72 MVA	0.16 kA	101.93	0.37 kA				
					C	18.69 MVA	0.15 kA	91.99	0.35 kA				
TR DANDORA 220/	BB 132 DAN				A	159.03 MVA	1.25 kA	99.92	3.01 kA				
					B	19.72 MVA	0.16 kA	101.93	0.37 kA				
					C	18.69 MVA	0.15 kA	91.99	0.35 kA				
BB 220 EMBAKASI A	220.00	0.00	0.00	1.00		2152.90 MVA	16.95 kA	-81.74	39.79 kA	16.95	2152.90	0.00	
					B		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
					C		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 DANDORA	BB 220 DAN				A	666.56 MVA	5.25 kA	99.90	12.32 kA				
					B	15.57 MVA	0.12 kA	-89.62	0.29 kA				
					C	15.43 MVA	0.12 kA	-85.40	0.29 kA				
Lne 220 DANDORA	BB 220 DAN				A	666.56 MVA	5.25 kA	99.90	12.32 kA				
					B	15.57 MVA	0.12 kA	-89.62	0.29 kA				
					C	15.43 MVA	0.12 kA	-85.40	0.29 kA				
Lne 220 EMBAKAS	BB 220 ATH				A	406.05 MVA	3.20 kA	95.67	7.51 kA				
					B	11.00 MVA	0.09 kA	90.77	0.20 kA				
					C	10.89 MVA	0.09 kA	96.77	0.20 kA				
Lne 220 EMBAKAS	BB 220 ATH				A	406.05 MVA	3.20 kA	95.67	7.51 kA				
					B	11.00 MVA	0.09 kA	90.77	0.20 kA				
					C	10.89 MVA	0.09 kA	96.77	0.20 kA				
TR EMBAKASI 220	BB 66 EMBA				A	3.05 MVA	0.02 kA	89.45	0.06 kA				
					B	3.05 MVA	0.02 kA	89.45	0.06 kA				
					C	3.05 MVA	0.02 kA	89.45	0.06 kA				
TR EMBAKASI 220	BB 66 EMBA				A	3.05 MVA	0.02 kA	89.45	0.06 kA				
					B	3.05 MVA	0.02 kA	89.45	0.06 kA				
					C	3.05 MVA	0.02 kA	89.45	0.06 kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 50			
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]			
TR EMBAKASI 220		BB 66 EMBA			A	3.05 MVA	0.02 kA	89.45	0.06 kA						
					B	3.05 MVA	0.02 kA	89.45	0.06 kA						
					C	3.05 MVA	0.02 kA	89.45	0.06 kA						
Shnt EMBAKASI 2					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
					B	0.00 MVA	0.00 kA	0.00	0.00 kA						
					C	0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 220 GARISSA		A	220.00	0.00	0.00	1.00	149.83 MVA	1.18 kA	-75.49	2.50 kA	1.18	149.83	0.00		
		B		125.41	-117.20		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99		
		C		123.56	117.75		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97		
Lne 220 GARISSA		BB 220 HOL			A	100.93 MVA	0.79 kA	100.47	1.68 kA						
					B	2.99 MVA	0.02 kA	-101.75	0.05 kA						
					C	2.95 MVA	0.02 kA	-100.68	0.05 kA						
TR GARISSA 220/		BB 132 GAR			A	49.67 MVA	0.39 kA	112.76	0.83 kA						
					B	2.99 MVA	0.02 kA	78.25	0.05 kA						
					C	2.95 MVA	0.02 kA	79.32	0.05 kA						
Shnt GARISA 220					A	0.00 MVA	0.00 kA	0.00	0.00 kA						
					B	0.00 MVA	0.00 kA	0.00	0.00 kA						
					C	0.00 MVA	0.00 kA	0.00	0.00 kA						
BB 220 GARSEN (		A	220.00	0.00	0.00	1.00	413.60 MVA	3.26 kA	-76.26	6.91 kA	3.26	413.60	0.00		
		B		122.92	-115.97		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96		
		C		124.66	115.92		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97		
Lne 220 MALINDI		BB 220 MAL			A	140.27 MVA	1.10 kA	104.77	2.34 kA						
					B	4.46 MVA	0.04 kA	-81.38	0.07 kA						
					C	4.32 MVA	0.03 kA	-63.09	0.07 kA						
Lne 220 GARSEN		BB 220 LAM			A	237.14 MVA	1.87 kA	102.41	3.96 kA						
					B	3.66 MVA	0.03 kA	120.32	0.06 kA						
					C	4.18 MVA	0.03 kA	145.30	0.07 kA						
Lne 220 GARSEN		BB 220 HOL			A	35.72 MVA	0.28 kA	108.81	0.60 kA						
					B	1.28 MVA	0.01 kA	24.48	0.02 kA						
					C	1.65 MVA	0.01 kA	26.76	0.03 kA						

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 51			
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
TR GARSEN 220/3		BB 33 GARS			A	0.72 MVA	0.01 kA	89.14		0.01 kA					
					B	0.72 MVA	0.01 kA	89.14		0.01 kA					
					C	0.72 MVA	0.01 kA	89.14		0.01 kA					
Shnt GARSEN 220					A	0.00 MVA	0.00 kA	0.00		0.00 kA					
					B	0.00 MVA	0.00 kA	0.00		0.00 kA					
					C	0.00 MVA	0.00 kA	0.00		0.00 kA					
BB 220 GITARU (A		220.00	0.00	0.00	1.00	1008.99 MVA	7.94 kA	-81.60		18.45 kA	7.94	1008.99	0.00		
B			122.92	-112.82		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.96		
C			121.40	113.42		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94		
Lne 220 KAMBURU		BB 220 KAM			A	896.14 MVA	7.06 kA	99.27		16.38 kA					
					B	16.63 MVA	0.13 kA	-111.32		0.30 kA					
					C	14.27 MVA	0.11 kA	-65.92		0.26 kA					
TR GITARU 220/1		BB 15 GITA			A	113.77 MVA	0.90 kA	91.53		2.08 kA					
					B	16.63 MVA	0.13 kA	68.68		0.30 kA					
					C	14.27 MVA	0.11 kA	114.08		0.26 kA					
BB 220 HOLA (PS A		220.00	0.00	0.00	1.00	220.62 MVA	1.74 kA	-77.07		3.74 kA	1.74	220.62	0.00		
B			125.05	-117.43		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.98		
C			124.59	117.68		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.98		
Lne 220 GARSEN		BB 220 GAR			A	180.21 MVA	1.42 kA	101.29		3.06 kA					
					B	2.18 MVA	0.02 kA	-110.99		0.04 kA					
					C	2.25 MVA	0.02 kA	-112.02		0.04 kA					
Lne 220 GARISSA		BB 220 GAR			A	40.59 MVA	0.32 kA	110.32		0.69 kA					
					B	1.96 MVA	0.02 kA	66.49		0.03 kA					
					C	2.03 MVA	0.02 kA	65.44		0.03 kA					
TR HOLA 220/33		BB 33 HOLA			A	0.24 MVA	0.00 kA	90.33		0.00 kA					
					B	0.24 MVA	0.00 kA	90.33		0.00 kA					
					C	0.24 MVA	0.00 kA	90.33		0.00 kA					
BB 220 ISINYA (A		220.00	0.00	0.00	1.00	2295.01 MVA	18.07 kA	-83.20		43.61 kA	18.07	2295.01	0.00		
B			118.78	-110.73		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.93		
C			118.96	111.17		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.93		

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 52		
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 ISINYA	BB 220 DAN			A	307.40 MVA	2.42 kA	98.33	5.84 kA				
				B	20.65 MVA	0.16 kA	-85.23	0.39 kA				
				C	20.93 MVA	0.16 kA	-85.21	0.40 kA				
Lne 220 ISINYA	BB 220 DAN			A	307.40 MVA	2.42 kA	98.33	5.84 kA				
				B	20.65 MVA	0.16 kA	-85.23	0.39 kA				
				C	20.93 MVA	0.16 kA	-85.21	0.40 kA				
Lne 220 ISINYA	BB 220 KIP			A	119.31 MVA	0.94 kA	92.60	2.27 kA				
				B	10.20 MVA	0.08 kA	70.39	0.19 kA				
				C	7.87 MVA	0.06 kA	112.12	0.15 kA				
Lne 220 ISINYA	BB 220 ATH			A	296.67 MVA	2.34 kA	99.28	5.64 kA				
				B	14.58 MVA	0.11 kA	-78.56	0.28 kA				
				C	15.01 MVA	0.12 kA	-83.20	0.29 kA				
Lne 220 ISINYA	BB 220 ATH			A	296.67 MVA	2.34 kA	99.28	5.64 kA				
				B	14.58 MVA	0.11 kA	-78.56	0.28 kA				
				C	15.01 MVA	0.12 kA	-83.20	0.29 kA				
TR ISINYA 400/2	BB 400 ISI			A	450.68 MVA	3.55 kA	93.78	8.56 kA				
				B	29.73 MVA	0.23 kA	102.92	0.56 kA				
				C	31.18 MVA	0.25 kA	94.48	0.59 kA				
TR ISINYA 400/2	BB 400 ISI			A	450.68 MVA	3.55 kA	93.78	8.56 kA				
				B	29.73 MVA	0.23 kA	102.92	0.56 kA				
				C	31.18 MVA	0.25 kA	94.48	0.59 kA				
TR ISINYA 220/1	BB 132 ISI			A	70.01 MVA	0.55 kA	108.47	1.33 kA				
				B	2.29 MVA	0.02 kA	73.45	0.04 kA				
				C	2.20 MVA	0.02 kA	69.05	0.04 kA				
BB 220 KAINUK (A	220.00	0.00	0.00	1.00	310.58 MVA	2.45 kA	-79.76	5.52 kA	2.45	310.58	0.00	
					B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
					C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 TURKWEL	BB 220 TUR			A	247.35 MVA	1.95 kA	98.46	4.39 kA				
				B	2.34 MVA	0.02 kA	-76.74	0.04 kA				
				C	2.82 MVA	0.02 kA	-75.94	0.05 kA				
Lne 220 KAINUK	BB 220 0RT			A	62.48 MVA	0.49 kA	107.47	1.11 kA				
				B	1.04 MVA	0.01 kA	118.96	0.02 kA				
				C	1.51 MVA	0.01 kA	115.49	0.03 kA				

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 53						
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR KAINUK 220/6	BB 66 KAIN					A 1.37 MVA	0.01 kA	91.50	0.02 kA			
						B 1.37 MVA	0.01 kA	91.50	0.02 kA			
						C 1.37 MVA	0.01 kA	91.50	0.02 kA			
BB 220 KAMBURU	A	220.00	0.00	0.00	1.00	1259.09 MVA	9.91 kA	-82.16	23.24 kA	9.91	1259.09	0.00
	B		122.15	-111.42		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		120.18	112.14		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 220 KAMBURU	BB 220 KIA					A 288.45 MVA	2.27 kA	100.06	5.32 kA			
						B 8.97 MVA	0.07 kA	-111.32	0.17 kA			
						C 7.86 MVA	0.06 kA	-77.49	0.14 kA			
Lne 220 KAMBURU	BB 220 GIT					A 108.82 MVA	0.86 kA	91.98	2.01 kA			
						B 11.82 MVA	0.09 kA	63.52	0.22 kA			
						C 10.20 MVA	0.08 kA	126.74	0.19 kA			
Lne 220 KAMBURU	BB 220 DAN					A 242.64 MVA	1.91 kA	100.20	4.48 kA			
						B 26.56 MVA	0.21 kA	-96.12	0.49 kA			
						C 25.00 MVA	0.20 kA	-78.10	0.46 kA			
Lne 220 KAMBURU	BB 220 DAN					A 238.17 MVA	1.88 kA	100.20	4.40 kA			
						B 26.07 MVA	0.21 kA	-96.12	0.48 kA			
						C 24.54 MVA	0.19 kA	-78.10	0.45 kA			
TR KAMBURU 220/	BB 132 KAM					A 191.36 MVA	1.51 kA	94.88	3.53 kA			
						B 25.12 MVA	0.20 kA	85.88	0.46 kA			
						C 24.16 MVA	0.19 kA	96.91	0.45 kA			
TR KAMBURU 220/	BB 132 KAM					A 191.36 MVA	1.51 kA	94.88	3.53 kA			
						B 25.12 MVA	0.20 kA	85.88	0.46 kA			
						C 24.16 MVA	0.19 kA	96.91	0.45 kA			
BB 220 KIAMBERE	A	220.00	0.00	0.00	1.00	939.47 MVA	7.40 kA	-80.41	16.78 kA	7.40	939.47	0.00
	B		122.32	-113.00		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		120.82	113.66		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
Lne 220 KAMBURU	BB 220 KAM					A 484.75 MVA	3.82 kA	101.79	8.66 kA			
						B 19.18 MVA	0.15 kA	-91.79	0.34 kA			
						C 19.07 MVA	0.15 kA	-92.77	0.34 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 54			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 KIAMBER	BB 220 DAN			A	192.15 MVA	1.51 kA	100.36	3.43 kA			
				B	17.17 MVA	0.14 kA	-93.34	0.31 kA			
				C	16.17 MVA	0.13 kA	-81.24	0.29 kA			
Lne 220 KIAMBER	BB 220 RAB			A	71.98 MVA	0.57 kA	105.42	1.29 kA			
				B	6.84 MVA	0.05 kA	-86.50	0.12 kA			
				C	6.57 MVA	0.05 kA	-77.43	0.12 kA			
TR KIAMBERE 220	BB 11 KIAM			A	93.58 MVA	0.74 kA	91.17	1.67 kA			
				B	23.12 MVA	0.18 kA	88.69	0.41 kA			
				C	22.37 MVA	0.18 kA	93.64	0.40 kA			
TR KIAMBERE 220	BB 11 KIAM			A	99.86 MVA	0.79 kA	91.09	1.78 kA			
				B	20.03 MVA	0.16 kA	88.12	0.36 kA			
				C	19.19 MVA	0.15 kA	94.65	0.34 kA			
Shnt KIAMBERE 2				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 KIPETO (	A 220.00	0.00	0.00	1.00	919.81 MVA	7.24 kA	-81.16	16.69 kA	7.24	919.81	0.00
	B	122.78	-114.84		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C	122.13	115.27		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 ISINYA	BB 220 ISI			A	780.02 MVA	6.14 kA	100.20	14.15 kA			
				B	30.30 MVA	0.24 kA	-98.18	0.55 kA			
				C	27.53 MVA	0.22 kA	-83.89	0.50 kA			
TR KIPETO 220/1	BB 11 KIPE			A	70.62 MVA	0.56 kA	91.32	1.28 kA			
				B	15.15 MVA	0.12 kA	81.82	0.27 kA			
				C	13.76 MVA	0.11 kA	96.11	0.25 kA			
TR KIPETO 220/1	BB 11 KIPE			A	70.62 MVA	0.56 kA	91.32	1.28 kA			
				B	15.15 MVA	0.12 kA	81.82	0.27 kA			
				C	13.76 MVA	0.11 kA	96.11	0.25 kA			
BB 220 KISUMU (	A 220.00	0.00	0.00	1.00	496.77 MVA	3.91 kA	-79.92	8.94 kA	3.91	496.77	0.00
	B	120.73	-113.61		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C	120.51	113.92		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 55				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]		Ib [kA]	Sb [MVA]	EFF [-]	
Lne 220 LESSOS	BB 220 LES				A	166.53	MVA	1.31	kA	98.54	3.00	kA				
						12.93	MVA	0.10	kA	-83.04	0.23	kA				
						12.80	MVA	0.10	kA	-79.97	0.23	kA				
Lne 220 LESSOS	BB 220 LES			A	166.53	MVA	1.31	kA	98.54	3.00	kA					
					12.93	MVA	0.10	kA	-83.04	0.23	kA					
					12.80	MVA	0.10	kA	-79.97	0.23	kA					
TR KISUMU 220/1	BB 132 KIS			A	82.04	MVA	0.65	kA	103.20	1.48	kA					
					12.93	MVA	0.10	kA	96.96	0.23	kA					
					12.80	MVA	0.10	kA	100.03	0.23	kA					
TR KISUMU 220/1	BB 132 KIS			A	82.04	MVA	0.65	kA	103.20	1.48	kA					
					12.93	MVA	0.10	kA	96.96	0.23	kA					
					12.80	MVA	0.10	kA	100.03	0.23	kA					
BB 220 KITALE (	A	220.00	0.00	0.00	1.00	215.05	MVA	1.69	kA	-75.73	3.60	kA	1.69	215.05	0.00	
Lne 220 0RTUM	BB 220 0RT				A	120.78	MVA	0.95	kA	99.40	2.02	kA				
TR KITALE 220/1	BB 132 KIT				A	95.26	MVA	0.75	kA	110.46	1.60	kA				
Shn KITALE 220k					A	0.00	MVA	0.00	kA	0.00	0.00	kA				
BB 220 KOMOROCK	A	220.00	0.00	0.00	1.00	2489.95	MVA	19.60	kA	-82.91	47.07	kA	19.60	2489.95	0.00	
Lne 220 DANDORA	BB 220 DAN				A	1239.69	MVA	9.76	kA	97.12	23.44	kA				

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 56			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 DANDORA	BB 220 DAN			A	1239.69 MVA	9.76 kA	97.12	23.44 kA			
				B	5.33 MVA	0.04 kA	-90.50	0.10 kA			
				C	5.33 MVA	0.04 kA	-90.50	0.10 kA			
TR KOMOROCK 220	BB 66 KOMO			A	5.33 MVA	0.04 kA	89.50	0.10 kA			
				B	5.33 MVA	0.04 kA	89.50	0.10 kA			
				C	5.33 MVA	0.04 kA	89.50	0.10 kA			
TR KOMOROCK 220	BB 66 KOMO			A	5.33 MVA	0.04 kA	89.50	0.10 kA			
				B	5.33 MVA	0.04 kA	89.50	0.10 kA			
				C	5.33 MVA	0.04 kA	89.50	0.10 kA			
BB 220 LAMU (PS A	220.00	0.00	0.00	1.00	868.29 MVA	6.84 kA	-85.61	17.37 kA	6.84	868.29	0.00
B		120.18	-105.29		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.91
C		118.21	105.77		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.90
TR LAMU 400/220	BB 400 LAM			A	379.11 MVA	2.98 kA	92.67	7.59 kA			
				B	12.45 MVA	0.10 kA	96.10	0.25 kA			
				C	12.32 MVA	0.10 kA	112.79	0.25 kA			
TR LAMU 400/220	BB 400 LAM			A	379.11 MVA	2.98 kA	92.67	7.59 kA			
				B	12.45 MVA	0.10 kA	96.10	0.25 kA			
				C	12.32 MVA	0.10 kA	112.79	0.25 kA			
Lne 220 GARSEN	BB 220 GAR			A	112.31 MVA	0.88 kA	106.08	2.25 kA			
				B	25.32 MVA	0.20 kA	-83.97	0.51 kA			
				C	25.04 MVA	0.20 kA	-67.55	0.50 kA			
TR LAMU 220/33	BB 33 LAMU			A	0.42 MVA	0.00 kA	91.94	0.01 kA			
				B	0.42 MVA	0.00 kA	91.94	0.01 kA			
				C	0.42 MVA	0.00 kA	91.94	0.01 kA			
Ld LAMU (220kV)				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt LAMU 220kV				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 57			
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 220 LAMU CPP A				220.00	0.00	0.00	1.00	1678.19 MVA	13.21 kA	-87.60		34.29 kA	13.21	1678.19	0.00
					134.20	-108.83		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.97
					134.36	109.92		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.95
TR LAMU CPP 400				BB 400 LAM			A	192.88 MVA	1.52 kA	97.37		3.94 kA			
							B	23.59 MVA	0.19 kA	170.31		0.48 kA			
							C	21.34 MVA	0.17 kA	33.72		0.44 kA			
TR LAMU CPP 400				BB 400 LAM			A	192.88 MVA	1.52 kA	97.37		3.94 kA			
							B	23.59 MVA	0.19 kA	170.31		0.48 kA			
							C	21.34 MVA	0.17 kA	33.72		0.44 kA			
Sym LAMU CPP G1							A	1294.32 MVA	10.19 kA	-89.08		26.45 kA			
							B	47.17 MVA	0.37 kA	170.31		0.96 kA			
							C	42.68 MVA	0.34 kA	33.72		0.87 kA			
BB 220 LESSOS (A				220.00	0.00	0.00	1.00	875.51 MVA	6.89 kA	-80.77		16.09 kA	6.89	875.51	0.00
					120.76	-113.66		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.95
					120.56	114.09		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94
TR LESSOS 400/2				BB 400 LES			A	91.46 MVA	0.72 kA	91.34		1.68 kA			
							B	10.28 MVA	0.08 kA	-89.64		0.19 kA			
							C	9.74 MVA	0.08 kA	-86.92		0.18 kA			
TR LESSOS 400/2				BB 400 LES			A	91.46 MVA	0.72 kA	91.34		1.68 kA			
							B	10.28 MVA	0.08 kA	-89.64		0.19 kA			
							C	9.74 MVA	0.08 kA	-86.92		0.18 kA			
Lne 220 TURKWEL				BB 220 TUR			A	62.14 MVA	0.49 kA	97.58		1.14 kA			
							B	1.42 MVA	0.01 kA	-81.82		0.03 kA			
							C	2.09 MVA	0.02 kA	-74.28		0.04 kA			
Lne 220 OLKARIA				BB 220 OLK			A	135.67 MVA	1.07 kA	98.33		2.49 kA			
							B	12.68 MVA	0.10 kA	-86.27		0.23 kA			
							C	12.21 MVA	0.10 kA	-81.84		0.22 kA			
Lne 220 OLKARIA				BB 220 OLK			A	135.67 MVA	1.07 kA	98.33		2.49 kA			
							B	12.68 MVA	0.10 kA	-86.27		0.23 kA			
							C	12.21 MVA	0.10 kA	-81.84		0.22 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 58					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 LESSOS	BB 220 KIS			A	47.82 MVA	0.38 kA	98.08	0.88 kA			
				B	6.87 MVA	0.05 kA	92.09	0.13 kA			
				C	6.69 MVA	0.05 kA	97.74	0.12 kA			
Lne 220 LESSOS	BB 220 KIS			A	47.82 MVA	0.38 kA	98.08	0.88 kA			
				B	6.87 MVA	0.05 kA	92.09	0.13 kA			
				C	6.69 MVA	0.05 kA	97.74	0.12 kA			
TR LESSOS 220/1	BB 132 LES			A	66.84 MVA	0.53 kA	106.35	1.23 kA			
				B	8.39 MVA	0.07 kA	92.53	0.15 kA			
				C	8.14 MVA	0.06 kA	95.78	0.15 kA			
TR LESSOS 220/1	BB 132 LES			A	66.84 MVA	0.53 kA	106.35	1.23 kA			
				B	8.39 MVA	0.07 kA	92.53	0.15 kA			
				C	8.14 MVA	0.06 kA	95.78	0.15 kA			
TR LESSOS 220/1	BB 132 LES			A	66.84 MVA	0.53 kA	106.35	1.23 kA			
				B	8.39 MVA	0.07 kA	92.53	0.15 kA			
				C	8.14 MVA	0.06 kA	95.78	0.15 kA			
TR LESSOS 220/1	BB 132 LES			A	66.84 MVA	0.53 kA	106.35	1.23 kA			
				B	8.39 MVA	0.07 kA	92.53	0.15 kA			
				C	8.14 MVA	0.06 kA	95.78	0.15 kA			
BB 220 LOYANGAL A	220.00	0.00	0.00	1.00	387.65 MVA	3.05 kA	-85.64	7.73 kA	3.05	387.65	0.00
B		124.61	-117.56		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
C		123.84	117.77		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
TR LOIYANGALANI	BB 400 LOI			A	187.84 MVA	1.48 kA	94.49	3.75 kA			
				B	6.00 MVA	0.05 kA	-89.56	0.12 kA			
				C	6.00 MVA	0.05 kA	-89.56	0.12 kA			
TR LOIYANGALANI	BB 400 LOI			A	187.84 MVA	1.48 kA	94.49	3.75 kA			
				B	6.00 MVA	0.05 kA	-89.56	0.12 kA			
				C	6.00 MVA	0.05 kA	-89.56	0.12 kA			
TR LOYANGALANI	BB 33 LOYA			A	4.00 MVA	0.03 kA	90.44	0.08 kA			
				B	4.00 MVA	0.03 kA	90.44	0.08 kA			
				C	4.00 MVA	0.03 kA	90.44	0.08 kA			
TR LOYANGALANI	BB 33 LOYA			A	4.00 MVA	0.03 kA	90.44	0.08 kA			
				B	4.00 MVA	0.03 kA	90.44	0.08 kA			
				C	4.00 MVA	0.03 kA	90.44	0.08 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 59				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR LOYANGALANI	BB 33 LOYA					A 4.00 MVA	0.03 kA	90.44	0.08 kA			
						B 4.00 MVA	0.03 kA	90.44	0.08 kA			
						C 4.00 MVA	0.03 kA	90.44	0.08 kA			
Shnt LOIYANGALA						A 0.00 MVA	0.00 kA	0.00	0.00 kA			
						B 0.00 MVA	0.00 kA	0.00	0.00 kA			
						C 0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 MALINDI	A 220.00	0.00	0.00	1.00		401.38 MVA	3.16 kA	-76.16	6.69 kA	3.16	401.38	0.00
	B	123.12	-116.44			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C	124.75	116.37			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
Lne 220 RABAI	BB 220 RAB					A 254.40 MVA	2.00 kA	103.39	4.24 kA			
						B 1.19 MVA	0.01 kA	126.55	0.02 kA			
						C 1.16 MVA	0.01 kA	126.51	0.02 kA			
Lne 220 MALINDI	BB 220 GAR					A 145.59 MVA	1.15 kA	104.79	2.43 kA			
						B 2.51 MVA	0.02 kA	-74.16	0.04 kA			
						C 2.49 MVA	0.02 kA	-74.39	0.04 kA			
TR MALINDI 220/	BB 33 MALI					A 0.73 MVA	0.01 kA	89.21	0.01 kA			
						B 0.73 MVA	0.01 kA	89.21	0.01 kA			
						C 0.73 MVA	0.01 kA	89.21	0.01 kA			
TR MALINDI 220/	BB 33 MALI					A 0.73 MVA	0.01 kA	89.21	0.01 kA			
						B 0.73 MVA	0.01 kA	89.21	0.01 kA			
						C 0.73 MVA	0.01 kA	89.21	0.01 kA			
Shnt MALINDI 22						A 0.00 MVA	0.00 kA	0.00	0.00 kA			
						B 0.00 MVA	0.00 kA	0.00	0.00 kA			
						C 0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 MARIAKAN	A 220.00	0.00	0.00	1.00		820.25 MVA	6.46 kA	-82.40	15.42 kA	6.46	820.25	0.00
	B	119.61	-110.34			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
	C	119.73	110.75			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
TR MARIAKANI 40	BB 400 MAR					A 185.29 MVA	1.46 kA	95.07	3.48 kA			
						B 6.72 MVA	0.05 kA	-111.70	0.13 kA			
						C 5.45 MVA	0.04 kA	-64.68	0.10 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 60				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 RABAI	BB 220 RAB					A 225.16 MVA B 6.72 MVA C 5.45 MVA	1.77 kA 0.05 kA 0.04 kA	99.68 68.30 115.32	4.23 kA 0.13 kA 0.10 kA			
Lne 220 RABAI	BB 220 RAB					A 225.16 MVA B 6.72 MVA C 5.45 MVA	1.77 kA 0.05 kA 0.04 kA	99.68 68.30 115.32	4.23 kA 0.13 kA 0.10 kA			
TR MARIAKANI 40	BB 400 MAR					A 185.29 MVA B 6.72 MVA C 5.45 MVA	1.46 kA 0.05 kA 0.04 kA	95.07 -111.70 -64.68	3.48 kA 0.13 kA 0.10 kA			
BB 220 MATASIA	A 220.00	0.00	0.00	1.00		1095.24 MVA	8.62 kA	-81.37	20.02 kA	8.62	1095.24	0.00
	B	122.28	-116.08			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C	122.74	116.26			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 MATASIA	BB 220 NGO					A 541.45 MVA B 6.24 MVA C 6.24 MVA	4.26 kA 0.05 kA 0.05 kA	98.73 -90.13 -90.13	9.90 kA 0.11 kA 0.11 kA			
Lne 220 MATASIA	BB 220 NGO					A 541.45 MVA B 6.24 MVA C 6.24 MVA	4.26 kA 0.05 kA 0.05 kA	98.73 -90.13 -90.13	9.90 kA 0.11 kA 0.11 kA			
TR MATASIA 220/	BB 66 MATA					A 6.24 MVA B 6.24 MVA C 6.24 MVA	0.05 kA 0.05 kA 0.05 kA	89.87 89.87 89.87	0.11 kA 0.11 kA 0.11 kA			
TR MATASIA 220/	BB 66 MATA					A 6.24 MVA B 6.24 MVA C 6.24 MVA	0.05 kA 0.05 kA 0.05 kA	89.87 89.87 89.87	0.11 kA 0.11 kA 0.11 kA			
BB 220 NBEAST (	A 220.00	0.00	0.00	1.00		1628.44 MVA	12.82 kA	-79.57	30.15 kA	12.82	1628.44	0.00
	B	123.96	-121.57			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
	C	133.56	119.46			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.04
Lne 220 DANDORA	BB 220 DAN					A 651.69 MVA B 40.71 MVA C 39.14 MVA	5.13 kA 0.32 kA 0.31 kA	102.26 -101.40 -94.34	12.06 kA 0.75 kA 0.72 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 61				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 DANDORA	BB 220 DAN					651.69 MVA	5.13 kA	102.26	12.06 kA			
						40.71 MVA	0.32 kA	-101.40	0.75 kA			
						39.14 MVA	0.31 kA	-94.34	0.72 kA			
TR NBEAST 400/2	BB 400 NBE					164.18 MVA	1.29 kA	93.14	3.04 kA			
						40.71 MVA	0.32 kA	78.60	0.75 kA			
						39.14 MVA	0.31 kA	85.66	0.72 kA			
TR NBEAST 400/2	BB 400 NBE					164.18 MVA	1.29 kA	93.14	3.04 kA			
						40.71 MVA	0.32 kA	78.60	0.75 kA			
						39.14 MVA	0.31 kA	85.66	0.72 kA			
BB 220 NBNORTH	A	220.00	0.00	0.00	1.00	2155.21 MVA	16.97 kA	-82.68	40.54 kA	16.97	2155.21	0.00
	B		120.03	-113.97		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		121.50	114.17		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 SUSWA	BB 220 SUS					592.53 MVA	4.66 kA	95.53	11.15 kA			
						5.64 MVA	0.04 kA	-119.13	0.11 kA			
						5.23 MVA	0.04 kA	-51.66	0.10 kA			
Lne 220 SUSWA	BB 220 SUS					592.53 MVA	4.66 kA	95.53	11.15 kA			
						5.64 MVA	0.04 kA	-119.13	0.11 kA			
						5.23 MVA	0.04 kA	-51.66	0.10 kA			
Lne 220 NBNORTH	BB 220 THI					481.64 MVA	3.79 kA	99.60	9.06 kA			
						2.83 MVA	0.02 kA	17.62	0.05 kA			
						3.29 MVA	0.03 kA	179.50	0.06 kA			
Lne 220 NBNORTH	BB 220 THI					481.64 MVA	3.79 kA	99.60	9.06 kA			
						2.83 MVA	0.02 kA	17.62	0.05 kA			
						3.29 MVA	0.03 kA	179.50	0.06 kA			
TR NBNORTH 220/	BB 66 NBNO					1.79 MVA	0.01 kA	-88.94	0.03 kA			
						0.53 MVA	0.00 kA	91.80	0.01 kA			
						0.52 MVA	0.00 kA	92.76	0.01 kA			
TR NBNORTH 220/	BB 66 NBNO					1.79 MVA	0.01 kA	-88.94	0.03 kA			
						0.53 MVA	0.00 kA	91.80	0.01 kA			
						0.52 MVA	0.00 kA	92.76	0.01 kA			
TR NBNORTH 220/	BB 66 NBNO					11.87 MVA	0.09 kA	89.86	0.22 kA			
						7.08 MVA	0.06 kA	88.94	0.13 kA			
						7.11 MVA	0.06 kA	88.80	0.13 kA			

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 62						
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 220 NGONG (P	A	220.00	0.00	0.00	1.00	1390.75 MVA	10.95 kA	-82.16	25.83 kA	10.95	1390.75	0.00
	B		121.42	-115.26		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
	C		121.96	115.50		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.96
Lne 220 MATASIA		BB 220 MAT				A	5.98 MVA	0.05 kA	89.96	0.11 kA		
						B	5.98 MVA	0.05 kA	89.96	0.11 kA		
						C	5.98 MVA	0.05 kA	89.96	0.11 kA		
Lne 220 MATASIA		BB 220 MAT				A	5.98 MVA	0.05 kA	89.96	0.11 kA		
						B	5.98 MVA	0.05 kA	89.96	0.11 kA		
						C	5.98 MVA	0.05 kA	89.96	0.11 kA		
Lne 220 SUSWA		BB 220 SUS				A	675.14 MVA	5.32 kA	98.05	12.54 kA		
						B	14.17 MVA	0.11 kA	-90.82	0.26 kA		
						C	14.03 MVA	0.11 kA	-88.88	0.26 kA		
Lne 220 SUSWA		BB 220 SUS				A	675.14 MVA	5.32 kA	98.05	12.54 kA		
						B	14.17 MVA	0.11 kA	-90.82	0.26 kA		
						C	14.03 MVA	0.11 kA	-88.88	0.26 kA		
TR NGONG 220/66		BB 66 NGON				A	14.42 MVA	0.11 kA	91.08	0.27 kA		
						B	8.19 MVA	0.06 kA	88.62	0.15 kA		
						C	8.06 MVA	0.06 kA	91.99	0.15 kA		
TR NGONG 220/66		BB 66 NGON				A	14.42 MVA	0.11 kA	91.08	0.27 kA		
						B	8.19 MVA	0.06 kA	88.62	0.15 kA		
						C	8.06 MVA	0.06 kA	91.99	0.15 kA		
BB 220 OLKARIA	A	220.00	0.00	0.00	1.00	2131.57 MVA	16.78 kA	-84.57	41.30 kA	16.78	2131.57	0.00
	B		118.20	-111.76		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
	C		117.94	112.57		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 220 OLKARIA		BB 220 OLK				A	495.74 MVA	3.90 kA	96.39	9.61 kA		
						B	7.93 MVA	0.06 kA	-128.18	0.15 kA		
						C	10.45 MVA	0.08 kA	-31.56	0.20 kA		
Lne 220 OLKARIA		BB 220 OLK				A	495.74 MVA	3.90 kA	96.39	9.61 kA		
						B	7.93 MVA	0.06 kA	-128.18	0.15 kA		
						C	10.45 MVA	0.08 kA	-31.56	0.20 kA		

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 63				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 SUSWA	BB 220 SUS					A 351.63 MVA B 27.92 MVA C 26.58 MVA	2.77 kA 0.22 kA 0.21 kA	95.42 -82.19 -94.69	6.81 kA 0.54 kA 0.52 kA			
Lne 220 SUSWA	BB 220 SUS					A 351.63 MVA B 27.92 MVA C 26.58 MVA	2.77 kA 0.22 kA 0.21 kA	95.42 -82.19 -94.69	6.81 kA 0.54 kA 0.52 kA			
TR OLKARIA 220/	BB 11 OLKA					A 75.18 MVA B 10.58 MVA C 9.07 MVA	0.59 kA 0.08 kA 0.07 kA	91.49 78.25 97.17	1.46 kA 0.20 kA 0.18 kA			
TR OLKARIA 220/	BB 11 OLKA					A 75.18 MVA B 10.58 MVA C 9.07 MVA	0.59 kA 0.08 kA 0.07 kA	91.49 78.25 97.17	1.46 kA 0.20 kA 0.18 kA			
TR OLKARIA 220/	BB 11 OLKA					A 75.18 MVA B 10.58 MVA C 9.07 MVA	0.59 kA 0.08 kA 0.07 kA	91.49 78.25 97.17	1.46 kA 0.20 kA 0.18 kA			
TR OLKARIA 220/	BB 132 OLK					A 211.97 MVA B 36.96 MVA C 38.26 MVA	1.67 kA 0.29 kA 0.30 kA	95.11 96.61 105.24	4.11 kA 0.72 kA 0.74 kA			
BB 220 OLKARIA	A 220.00	0.00	0.00	0.00	1.00	2133.28 MVA	16.80 kA	-84.49	41.24 kA	16.80	2133.28	0.00
	B	118.05	-111.83			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
	C	117.80	112.67			0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
Lne 220 OLKARIA	BB 220 SUS					A 349.43 MVA B 27.19 MVA C 25.88 MVA	2.75 kA 0.21 kA 0.20 kA	97.33 -78.06 -95.95	6.75 kA 0.53 kA 0.50 kA			
Lne 220 OLKARIA	BB 220 SUS					A 349.43 MVA B 27.19 MVA C 25.88 MVA	2.75 kA 0.21 kA 0.20 kA	97.33 -78.06 -95.95	6.75 kA 0.53 kA 0.50 kA			
Lne 220 OLKARIA	BB 220 OLK					A 490.29 MVA B 5.45 MVA C 9.54 MVA	3.86 kA 0.04 kA 0.08 kA	94.85 26.69 168.94	9.48 kA 0.11 kA 0.18 kA			
Lne 220 OLKARIA	BB 220 OLK					A 490.29 MVA B 5.45 MVA C 9.54 MVA	3.86 kA 0.04 kA 0.08 kA	94.85 26.69 168.94	9.48 kA 0.11 kA 0.18 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 64				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 OLKARIA	BB 220 LES											
					A	95.40 MVA	0.75 kA	97.91	1.84 kA			
					B	8.76 MVA	0.07 kA	-78.16	0.17 kA			
					C	8.37 MVA	0.07 kA	-91.40	0.16 kA			
Lne 220 OLKARIA	BB 220 LES											
					A	95.40 MVA	0.75 kA	97.91	1.84 kA			
					B	8.76 MVA	0.07 kA	-78.16	0.17 kA			
					C	8.37 MVA	0.07 kA	-91.40	0.16 kA			
Lne 220 OLKARIA	BB 220 OLK											
					A	135.85 MVA	1.07 kA	91.54	2.63 kA			
					B	51.80 MVA	0.41 kA	122.24	1.00 kA			
					C	51.62 MVA	0.41 kA	59.40	1.00 kA			
TR OLKARIA 220/	BB 11 OLKN											
					A	43.94 MVA	0.35 kA	91.32	0.85 kA			
					B	7.47 MVA	0.06 kA	81.95	0.14 kA			
					C	6.90 MVA	0.05 kA	95.08	0.13 kA			
TR OLKARIA 220/	BB 11 OLKN											
					A	43.94 MVA	0.35 kA	91.32	0.85 kA			
					B	7.47 MVA	0.06 kA	81.95	0.14 kA			
					C	6.90 MVA	0.05 kA	95.08	0.13 kA			
TR OLKARIA 220/	BB 11 OLKN											
					A	40.53 MVA	0.32 kA	91.32	0.78 kA			
					B	6.92 MVA	0.05 kA	82.00	0.13 kA			
					C	6.40 MVA	0.05 kA	95.05	0.12 kA			
BB 220 OLKARIA	A	220.00	0.00	0.00	1.00	1587.53 MVA	12.50 kA	-83.15	29.80 kA	12.50	1587.53	0.00
	B		118.23	-113.24		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
	C		118.10	114.06		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
TR OLKARIA 220/	BB 11 OLKA											
					A	72.57 MVA	0.57 kA	90.98	1.36 kA			
					B	29.98 MVA	0.24 kA	116.23	0.56 kA			
					C	30.21 MVA	0.24 kA	63.61	0.57 kA			
Lne 220 OLKARIA	BB 220 OLK											
					A	1443.22 MVA	11.36 kA	97.44	27.09 kA			
					B	59.97 MVA	0.47 kA	-63.77	1.13 kA			
					C	60.41 MVA	0.48 kA	-116.39	1.13 kA			
TR OLKARIA 220/	BB 11 OLKA											
					A	72.57 MVA	0.57 kA	90.98	1.36 kA			
					B	29.98 MVA	0.24 kA	116.23	0.56 kA			
					C	30.21 MVA	0.24 kA	63.61	0.57 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 65			
				rtd.V. [kV]	Voltage [kV]	c- Factor		Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 220 OLKARIA A				220.00	0.00	0.00	1.00	1560.90 MVA	12.29 kA	-84.14		29.98 kA	12.29	1560.90	0.00
					120.74	-113.31		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.95
					120.05	113.99		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.94
TR OLKARIA 220/				BB 11 OLKA			A	105.43 MVA	0.83 kA	91.49		2.02 kA			
							B	20.38 MVA	0.16 kA	84.82		0.39 kA			
							C	18.68 MVA	0.15 kA	92.76		0.36 kA			
Lne 220 SUSWA				BB 220 SUS			A	604.72 MVA	4.76 kA	97.21		11.61 kA			
							B	36.41 MVA	0.29 kA	-94.03		0.70 kA			
							C	33.83 MVA	0.27 kA	-86.79		0.65 kA			
Lne 220 SUSWA				BB 220 SUS			A	604.72 MVA	4.76 kA	97.21		11.61 kA			
							B	36.41 MVA	0.29 kA	-94.03		0.70 kA			
							C	33.83 MVA	0.27 kA	-86.79		0.65 kA			
TR OLKARIA 220/				BB 11 OLKA			A	123.76 MVA	0.97 kA	91.75		2.38 kA			
							B	26.32 MVA	0.21 kA	84.93		0.51 kA			
							C	24.44 MVA	0.19 kA	91.71		0.47 kA			
TR OLKARIA 220/				BB 11 OLKA			A	123.79 MVA	0.97 kA	90.45		2.38 kA			
							B	26.14 MVA	0.21 kA	87.90		0.50 kA			
							C	24.56 MVA	0.19 kA	95.06		0.47 kA			
BB 220 RABAI (P A				220.00	0.00	0.00	1.00	858.85 MVA	6.76 kA	-82.40		16.09 kA	6.76	858.85	0.00
					119.75	-109.11		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.93
					118.99	109.68		0.00 MVA	0.00 kA	0.00		0.00 kA	0.00	0.00	0.92
TR RABAI 220/13				BB 132 1RA			A	179.50 MVA	1.41 kA	94.89		3.36 kA			
							B	26.31 MVA	0.21 kA	87.37		0.49 kA			
							C	24.87 MVA	0.20 kA	105.47		0.47 kA			
TR RABAI 220/13				BB 132 RAB			A	179.69 MVA	1.41 kA	94.95		3.37 kA			
							B	26.47 MVA	0.21 kA	87.81		0.50 kA			
							C	25.09 MVA	0.20 kA	105.79		0.47 kA			
Lne 220 KIAMBER				BB 220 KIA			A	73.03 MVA	0.57 kA	105.90		1.37 kA			
							B	12.85 MVA	0.10 kA	-81.30		0.24 kA			
							C	12.48 MVA	0.10 kA	-70.20		0.23 kA			

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 66							
				rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]					
Lne 220 RABAI				BB 220 MAR				A	163.36 MVA	1.29 kA	96.38	3.06 kA							
								B	12.75 MVA	0.10 kA	-104.34	0.24 kA							
								C	11.19 MVA	0.09 kA	-77.53	0.21 kA							
Lne 220 RABAI				BB 220 MAR				A	163.36 MVA	1.29 kA	96.38	3.06 kA							
								B	12.75 MVA	0.10 kA	-104.34	0.24 kA							
								C	11.19 MVA	0.09 kA	-77.53	0.21 kA							
Lne 220 RABAI				BB 220 MAL				A	102.01 MVA	0.80 kA	105.06	1.91 kA							
								B	15.48 MVA	0.12 kA	-82.02	0.29 kA							
								C	15.17 MVA	0.12 kA	-73.15	0.28 kA							
Shnt RABAI 220k								A	0.00 MVA	0.00 kA	0.00	0.00 kA							
								B	0.00 MVA	0.00 kA	0.00	0.00 kA							
								C	0.00 MVA	0.00 kA	0.00	0.00 kA							
BB 220 SUSWA (P A				220.00				0.00	0.00	0.00	1.00	2542.05 MVA	20.01 kA	-85.19	50.17 kA	20.01	2542.05	0.00	
								B	118.93	-112.38		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94
								C	119.24	112.99		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94
TR SUSWA 400/22				BB 400 SUS				A	384.33 MVA	3.03 kA	91.10	7.59 kA							
								B	48.95 MVA	0.39 kA	-86.87	0.97 kA							
								C	45.48 MVA	0.36 kA	-89.28	0.90 kA							
TR SUSWA 400/22				BB 400 SUS				A	384.33 MVA	3.03 kA	91.10	7.59 kA							
								B	48.95 MVA	0.39 kA	-86.87	0.97 kA							
								C	45.48 MVA	0.36 kA	-89.28	0.90 kA							
Lne 220 OLKARIA				BB 220 OLK				A	182.00 MVA	1.43 kA	95.64	3.59 kA							
								B	17.27 MVA	0.14 kA	108.23	0.34 kA							
								C	16.11 MVA	0.13 kA	81.97	0.32 kA							
Lne 220 OLKARIA				BB 220 OLK				A	182.00 MVA	1.43 kA	95.64	3.59 kA							
								B	17.27 MVA	0.14 kA	108.23	0.34 kA							
								C	16.11 MVA	0.13 kA	81.97	0.32 kA							
Lne 220 SUSWA				BB 220 OLK				A	182.36 MVA	1.44 kA	93.55	3.60 kA							
								B	17.69 MVA	0.14 kA	103.59	0.35 kA							
								C	16.50 MVA	0.13 kA	83.64	0.33 kA							
Lne 220 SUSWA				BB 220 OLK				A	182.36 MVA	1.44 kA	93.55	3.60 kA							
								B	17.69 MVA	0.14 kA	103.59	0.35 kA							
								C	16.50 MVA	0.13 kA	83.64	0.33 kA							

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 67					
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 SUSWA	BB 220 NBN			A	356.36 MVA	2.81 kA	100.27	7.03 kA			
				B	17.16 MVA	0.14 kA	-73.48	0.34 kA			
				C	16.57 MVA	0.13 kA	-95.97	0.33 kA			
Lne 220 SUSWA	BB 220 NBN			A	356.36 MVA	2.81 kA	100.27	7.03 kA			
				B	17.16 MVA	0.14 kA	-73.48	0.34 kA			
				C	16.57 MVA	0.13 kA	-95.97	0.33 kA			
Lne 220 SUSWA	BB 220 OLK			A	150.55 MVA	1.19 kA	92.31	2.97 kA			
				B	20.23 MVA	0.16 kA	84.49	0.40 kA			
				C	18.31 MVA	0.14 kA	97.81	0.36 kA			
Lne 220 SUSWA	BB 220 OLK			A	150.55 MVA	1.19 kA	92.31	2.97 kA			
				B	20.23 MVA	0.16 kA	84.49	0.40 kA			
				C	18.31 MVA	0.14 kA	97.81	0.36 kA			
Lne 220 SUSWA	BB 220 NGO			A	18.09 MVA	0.14 kA	91.33	0.36 kA			
				B	11.59 MVA	0.09 kA	89.69	0.23 kA			
				C	11.48 MVA	0.09 kA	92.19	0.23 kA			
Lne 220 SUSWA	BB 220 NGO			A	18.09 MVA	0.14 kA	91.33	0.36 kA			
				B	11.59 MVA	0.09 kA	89.69	0.23 kA			
				C	11.48 MVA	0.09 kA	92.19	0.23 kA			
Shnt SUSWA (PSS				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt SUSWA 220k				A	0.00 MVA	0.00 kA	0.00	0.00 kA			
				B	0.00 MVA	0.00 kA	0.00	0.00 kA			
				C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 220 THIKA RD A	220.00	0.00	0.00	1.00	2232.17 MVA	17.57 kA	-81.96	41.44 kA	17.57	2232.17	0.00
B		119.56	-113.13		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
C		121.32	113.30		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 DANDORA	BB 220 DAN			A	675.83 MVA	5.32 kA	98.97	12.55 kA			
				B	10.65 MVA	0.08 kA	88.50	0.20 kA			
				C	11.11 MVA	0.09 kA	124.62	0.21 kA			
Lne 220 DANDORA	BB 220 DAN			A	675.83 MVA	5.32 kA	98.97	12.55 kA			
				B	10.65 MVA	0.08 kA	88.50	0.20 kA			
				C	11.11 MVA	0.09 kA	124.62	0.21 kA			

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 68													
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]												
Lne 220 NBNORTH	BB 220 NBN			A	431.74 MVA	3.40 kA	96.77	8.01 kA															
				B	19.47 MVA	0.15 kA	-91.22	0.36 kA															
				C	19.00 MVA	0.15 kA	-71.03	0.35 kA															
Lne 220 NBNORTH	BB 220 NBN			A	431.74 MVA	3.40 kA	96.77	8.01 kA															
				B	19.47 MVA	0.15 kA	-91.22	0.36 kA															
				C	19.00 MVA	0.15 kA	-71.03	0.35 kA															
TR THIKA 220/66	BB 66 THIK			A	8.82 MVA	0.07 kA	89.11	0.16 kA															
				B	8.82 MVA	0.07 kA	89.11	0.16 kA															
				C	8.82 MVA	0.07 kA	89.11	0.16 kA															
TR THIKA 220/66	BB 66 THIK			A	8.82 MVA	0.07 kA	89.11	0.16 kA															
				B	8.82 MVA	0.07 kA	89.11	0.16 kA															
				C	8.82 MVA	0.07 kA	89.11	0.16 kA															
BB 220 TORORO (	A	220.00	0.00	0.00	1.00		2820.67 MVA	22.21 kA	-84.43	54.97 kA	22.21	2820.67	0.00										
														B	126.95	-119.87	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
														C	126.82	119.91	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00
TR TORORO 400/2	BB 400 TOR			A	77.07 MVA	0.61 kA	93.19	1.50 kA															
				B	3.03 MVA	0.02 kA	79.24	0.06 kA															
				C	2.91 MVA	0.02 kA	81.11	0.06 kA															
TR TORORO 400/2	BB 400 TOR			A	77.07 MVA	0.61 kA	93.19	1.50 kA															
				B	3.03 MVA	0.02 kA	79.24	0.06 kA															
				C	2.91 MVA	0.02 kA	81.11	0.06 kA															
External Grid (				A	2666.67 MVA	20.99 kA	-84.29	51.97 kA															
				B	6.06 MVA	0.05 kA	79.24	0.12 kA															
				C	5.81 MVA	0.05 kA	81.11	0.11 kA															
BB 220 TURKWEL	A	220.00	0.00	0.00	1.00		312.31 MVA	2.46 kA	-79.73	5.55 kA	2.46	312.31	0.00										
														B	122.80	-114.76	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.97
														C	120.88	115.87	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.95
Lne 220 TURKWEL	BB 220 KAI			A	63.59 MVA	0.50 kA	107.07	1.13 kA															
				B	2.30 MVA	0.02 kA	103.15	0.04 kA															
				C	2.78 MVA	0.02 kA	104.00	0.05 kA															

Grid: 1 KENYA		System Stage: 1 KENYA				Annex: LF.001 / 69					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
Lne 220 TURKWEL	BB 220 LES			A	131.26 MVA	1.03 kA	104.96	2.33 kA			
				B	9.68 MVA	0.08 kA	-84.70	0.17 kA			
				C	8.53 MVA	0.07 kA	-85.37	0.15 kA			
TR TURKWEL 220/	BB 11 TURK			A	59.87 MVA	0.47 kA	91.49	1.06 kA			
				B	3.70 MVA	0.03 kA	92.87	0.07 kA			
				C	2.90 MVA	0.02 kA	90.15	0.05 kA			
TR TURKWEL 220/	BB 11 TURK			A	59.87 MVA	0.47 kA	91.49	1.06 kA			
				B	3.70 MVA	0.03 kA	92.87	0.07 kA			
				C	2.90 MVA	0.02 kA	90.15	0.05 kA			
BB 33 MERU WPP- A	33.00	0.00	0.00	1.00	204.15 MVA	10.72 kA	-73.28	21.56 kA	10.72	204.15	0.00
B		22.25	-131.63		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.17
C		22.07	132.05		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.16
CB MERU WPP S/S	BB 33 MERU			A	108.79 MVA	5.71 kA	106.92	11.49 kA			
				B	3.42 MVA	0.18 kA	-70.47	0.36 kA			
				C	3.42 MVA	0.18 kA	-70.24	0.36 kA			
TR MERU-WPP 132	WPP-S/S ME			A	59.86 MVA	3.14 kA	104.66	6.32 kA			
				B	21.55 MVA	1.13 kA	109.16	2.28 kA			
				C	21.53 MVA	1.13 kA	109.40	2.27 kA			
Lne 33UGC F1	BB 33 MERU			A	11.86 MVA	0.62 kA	109.57	1.25 kA			
				B	6.04 MVA	0.32 kA	-70.91	0.64 kA			
				C	6.04 MVA	0.32 kA	-70.67	0.64 kA			
Lne 33UGC F2	.			A	11.86 MVA	0.62 kA	109.57	1.25 kA			
				B	6.04 MVA	0.32 kA	-70.91	0.64 kA			
				C	6.04 MVA	0.32 kA	-70.67	0.64 kA			
Lne 33UGC F3	BB 33 MERU			A	11.86 MVA	0.62 kA	109.57	1.25 kA			
				B	6.04 MVA	0.32 kA	-70.91	0.64 kA			
				C	6.04 MVA	0.32 kA	-70.67	0.64 kA			
BB 33 MERU WPP- A	33.00	0.00	0.00	1.00	204.15 MVA	10.72 kA	-73.28	21.56 kA	10.72	204.15	0.00
B		22.25	-131.63		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.17
C		22.07	132.05		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.16

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 70					
	rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]				
CB MERU WPP S/S	BB 33 MERU			A	95.36 MVA	5.01 kA	106.49	10.07 kA							
				B	3.42 MVA	0.18 kA	109.53	0.36 kA							
				C	3.42 MVA	0.18 kA	109.76	0.36 kA							
TR MERU-WPP 132	WPP-S/S ME			A	59.86 MVA	3.14 kA	104.66	6.32 kA							
				B	21.55 MVA	1.13 kA	109.16	2.28 kA							
				C	21.53 MVA	1.13 kA	109.40	2.27 kA							
Lne 33UGC F4	BB 33 MERU			A	11.86 MVA	0.62 kA	109.57	1.25 kA							
				B	6.04 MVA	0.32 kA	-70.91	0.64 kA							
				C	6.04 MVA	0.32 kA	-70.67	0.64 kA							
Lne 33UGC F5	BB 33 MERU			A	11.86 MVA	0.62 kA	109.57	1.25 kA							
				B	6.04 MVA	0.32 kA	-70.91	0.64 kA							
				C	6.04 MVA	0.32 kA	-70.67	0.64 kA							
Lne 33UGC F6	BB 33 MERU			A	11.86 MVA	0.62 kA	109.57	1.25 kA							
				B	6.04 MVA	0.32 kA	-70.91	0.64 kA							
				C	6.04 MVA	0.32 kA	-70.67	0.64 kA							
Lne 33UGC F7	BB 33 MERU			A	13.45 MVA	0.71 kA	109.97	1.42 kA							
				B	6.84 MVA	0.36 kA	-70.47	0.72 kA							
				C	6.83 MVA	0.36 kA	-70.24	0.72 kA							
BB 400 ISINYA (A	400.00	0.00	0.00	1.00	2520.53 MVA	10.91 kA	-84.06	26.81 kA	10.91	2520.53	0.00				
					B	0.00 MVA	0.00 kA	0.00				0.00 kA	0.00	0.00	0.94
					C	0.00 MVA	0.00 kA	0.00				0.00 kA	0.00	0.00	0.94
Lne 400 ISINYA	BB 400 SUS			A	731.22 MVA	3.17 kA	95.97	7.78 kA							
				B	87.18 MVA	0.38 kA	-84.48	0.93 kA							
				C	85.82 MVA	0.37 kA	-80.78	0.91 kA							
Lne 400 ISINYA	BB 400 SUS			A	731.22 MVA	3.17 kA	95.97	7.78 kA							
				B	87.18 MVA	0.38 kA	-84.48	0.93 kA							
				C	85.82 MVA	0.37 kA	-80.78	0.91 kA							
Lne 400 MARIKA	BB 400 MAR			A	103.89 MVA	0.45 kA	96.27	1.11 kA							
				B	7.43 MVA	0.03 kA	82.71	0.08 kA							
				C	6.91 MVA	0.03 kA	107.28	0.07 kA							
Lne 400 MARIKA	BB 400 MAR			A	103.89 MVA	0.45 kA	96.27	1.11 kA							
				B	7.43 MVA	0.03 kA	82.71	0.08 kA							
				C	6.91 MVA	0.03 kA	107.28	0.07 kA							

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 71				
		rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR ISINYA 400/2	BB 220 ISI				A	425.16 MVA	1.84 kA	95.80	4.52 kA			
					B	79.95 MVA	0.35 kA	96.70	0.85 kA			
					C	78.99 MVA	0.34 kA	98.52	0.84 kA			
TR ISINYA 400/2	BB 220 ISI				A	425.16 MVA	1.84 kA	95.80	4.52 kA			
					B	79.95 MVA	0.35 kA	96.70	0.85 kA			
					C	78.99 MVA	0.34 kA	98.52	0.84 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
Shnt ISINYA 400					A	0.00 MVA	0.00 kA	0.00	0.00 kA			
					B	0.00 MVA	0.00 kA	0.00	0.00 kA			
					C	0.00 MVA	0.00 kA	0.00	0.00 kA			
BB 400 LAMU CPP	A	400.00	0.00	0.00	1.00	1265.07 MVA	5.48 kA	-86.14	13.96 kA	5.48	1265.07	0.00
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.93
						0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.92
TR LAMU 400/220	BB 220 LAM				A	59.90 MVA	0.26 kA	103.30	0.66 kA			
					B	1.44 MVA	0.01 kA	-162.48	0.02 kA			
					C	4.36 MVA	0.02 kA	17.22	0.05 kA			
TR LAMU 400/220	BB 220 LAM				A	59.90 MVA	0.26 kA	103.30	0.66 kA			
					B	1.44 MVA	0.01 kA	-162.48	0.02 kA			
					C	4.36 MVA	0.02 kA	17.22	0.05 kA			

Grid: 1 KENYA				System Stage: 1 KENYA				Annex: LF.001 / 72				
		rtd.V. [kV]	Voltage [kV]	[deg]	c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
TR LAMU CPP 400	BB 220 LAM					415.32 MVA	1.80 kA	91.32	4.58 kA			
						29.57 MVA	0.13 kA	66.92	0.33 kA			
						25.86 MVA	0.11 kA	119.01	0.29 kA			
TR LAMU CPP 400	BB 220 LAM					415.32 MVA	1.80 kA	91.32	4.58 kA			
						29.57 MVA	0.13 kA	66.92	0.33 kA			
						25.86 MVA	0.11 kA	119.01	0.29 kA			
Lne 400 LAMU CP	BB 400 NBE					158.77 MVA	0.69 kA	96.98	1.75 kA			
						28.65 MVA	0.12 kA	-110.90	0.32 kA			
						25.34 MVA	0.11 kA	-70.70	0.28 kA			
Lne 400 LAMU CP	BB 400 NBE					158.77 MVA	0.69 kA	96.98	1.75 kA			
						28.65 MVA	0.12 kA	-110.90	0.32 kA			
						25.34 MVA	0.11 kA	-70.70	0.28 kA			
BB 400 LESSOS	A	400.00	0.00	0.00	1.00	582.58 MVA	2.52 kA	-86.86	6.57 kA	2.52	582.58	0.00
	B		229.38	-118.50		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
	C		227.01	118.91		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98
TR LESSOS 400/2	BB 220 LES					132.98 MVA	0.58 kA	94.54	1.50 kA			
						4.13 MVA	0.02 kA	82.84	0.05 kA			
						3.92 MVA	0.02 kA	85.37	0.04 kA			
Lne 400 LESSOS	BB 400 TOR					158.39 MVA	0.69 kA	91.97	1.79 kA			
						4.13 MVA	0.02 kA	-97.16	0.05 kA			
						3.92 MVA	0.02 kA	-94.63	0.04 kA			
Lne 400 LESSOS	BB 400 TOR					158.39 MVA	0.69 kA	91.97	1.79 kA			
						4.13 MVA	0.02 kA	-97.16	0.05 kA			
						3.92 MVA	0.02 kA	-94.63	0.04 kA			
TR LESSOS 400/2	BB 220 LES					132.98 MVA	0.58 kA	94.54	1.50 kA			
						4.13 MVA	0.02 kA	82.84	0.05 kA			
						3.92 MVA	0.02 kA	85.37	0.04 kA			
BB 400 LOIYANGA	A	400.00	0.00	0.00	1.00	581.85 MVA	2.52 kA	-83.53	6.10 kA	2.52	581.85	0.00
	B		227.60	-118.13		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99
	C		226.48	118.31		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.98

Grid: 1 KENYA		System Stage: 1 KENYA								Annex: LF.001 / 73			
	rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]	Ik" [kA/kA]	[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
TR LOIYANGALANI	BB 220 LOY			A	7.74 MVA	0.03 kA	90.35	0.08 kA					
				B	7.74 MVA	0.03 kA	90.35	0.08 kA					
				C	7.74 MVA	0.03 kA	90.35	0.08 kA					
TR LOIYANGALANI	BB 220 LOY			A	7.74 MVA	0.03 kA	90.35	0.08 kA					
				B	7.74 MVA	0.03 kA	90.35	0.08 kA					
				C	7.74 MVA	0.03 kA	90.35	0.08 kA					
Lne 400 SUSWA -	BB 400 SUS			A	283.23 MVA	1.23 kA	96.63	2.97 kA					
				B	7.74 MVA	0.03 kA	-89.65	0.08 kA					
				C	7.74 MVA	0.03 kA	-89.65	0.08 kA					
Lne 400 SUSWA -	BB 400 SUS			A	283.23 MVA	1.23 kA	96.63	2.97 kA					
				B	7.74 MVA	0.03 kA	-89.65	0.08 kA					
				C	7.74 MVA	0.03 kA	-89.65	0.08 kA					
BB 400 MARIAKAN	A	400.00	0.00	0.00	1.00	868.12 MVA	3.76 kA	-83.09	9.06 kA	3.76	868.12	0.00	
						B	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
						C	0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.94
TR MARIAKANI 40	BB 220 MAR			A	180.75 MVA	0.78 kA	97.51	1.89 kA					
				B	28.50 MVA	0.12 kA	92.79	0.30 kA					
				C	28.05 MVA	0.12 kA	100.01	0.29 kA					
Lne 400 MARIKA	BB 400 ISI			A	253.33 MVA	1.10 kA	96.49	2.64 kA					
				B	28.50 MVA	0.12 kA	-87.21	0.30 kA					
				C	28.05 MVA	0.12 kA	-79.99	0.29 kA					
Lne 400 MARIKA	BB 400 ISI			A	253.33 MVA	1.10 kA	96.49	2.64 kA					
				B	28.50 MVA	0.12 kA	-87.21	0.30 kA					
				C	28.05 MVA	0.12 kA	-79.99	0.29 kA					
TR MARIAKANI 40	BB 220 MAR			A	180.75 MVA	0.78 kA	97.51	1.89 kA					
				B	28.50 MVA	0.12 kA	92.79	0.30 kA					
				C	28.05 MVA	0.12 kA	100.01	0.29 kA					
Shnt MARIAKANI				A	0.00 MVA	0.00 kA	0.00	0.00 kA					
				B	0.00 MVA	0.00 kA	0.00	0.00 kA					
				C	0.00 MVA	0.00 kA	0.00	0.00 kA					

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 74				
				rtd.V. [kV]	Voltage [kV]	c- [deg]	Factor	Sk" [MVA/MVA]		Ik" [kA/kA]		[deg]	ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]
BB 400 NBEAST (	A	400.00	0.00	0.00	1.00	1151.45	MVA	4.99	kA	-82.60	12.36	kA	4.99	1151.45	0.00	
	B		213.83	-114.93		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.92	
	C		230.71	113.35		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.99	
TR NBEAST 400/2		BB 220 NBE				406.59	MVA	1.76	kA	98.49	4.37	kA				
					A	11.15	MVA	0.05	kA	170.59	0.12	kA				
					B	5.17	MVA	0.02	kA	140.28	0.06	kA				
TR NBEAST 400/2		BB 220 NBE				406.59	MVA	1.76	kA	98.49	4.37	kA				
					A	11.15	MVA	0.05	kA	170.59	0.12	kA				
					B	5.17	MVA	0.02	kA	140.28	0.06	kA				
Lne 400 LAMU CP		BB 400 LAM				169.39	MVA	0.73	kA	94.78	1.82	kA				
					A	11.15	MVA	0.05	kA	-9.41	0.12	kA				
					B	5.17	MVA	0.02	kA	-39.72	0.06	kA				
Lne 400 LAMU CP		BB 400 LAM				169.39	MVA	0.73	kA	94.78	1.82	kA				
					A	11.15	MVA	0.05	kA	-9.41	0.12	kA				
					B	5.17	MVA	0.02	kA	-39.72	0.06	kA				
BB 400 SUSWA	A	400.00	0.00	0.00	1.00	3946.71	MVA	17.09	kA	-84.82	42.58	kA	17.09	3946.71	0.00	
	B		224.69	-116.76		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97	
	C		224.56	116.96		0.00	MVA	0.00	kA	0.00	0.00	kA	0.00	0.00	0.97	
Lne 400 ISINYA		BB 400 ISI				339.31	MVA	1.47	kA	96.25	3.66	kA				
					A	62.69	MVA	0.27	kA	95.61	0.68	kA				
					B	61.39	MVA	0.27	kA	100.08	0.66	kA				
Lne 400 ISINYA		BB 400 ISI				339.31	MVA	1.47	kA	96.25	3.66	kA				
					A	62.69	MVA	0.27	kA	95.61	0.68	kA				
					B	61.39	MVA	0.27	kA	100.08	0.66	kA				
Lne 400 SUSWA -		BB 400 LOI				6.80	MVA	0.03	kA	90.61	0.07	kA				
					A	6.80	MVA	0.03	kA	90.61	0.07	kA				
					B	6.80	MVA	0.03	kA	90.61	0.07	kA				
TR SUSWA 400/22		BB 220 SUS				294.61	MVA	1.28	kA	91.64	3.18	kA				
					A	13.34	MVA	0.06	kA	83.38	0.14	kA				
					B	11.35	MVA	0.05	kA	79.46	0.12	kA				

Grid: 1 KENYA				System Stage: 1 KENYA								Annex: LF.001 / 75			
		rtd.V. [kV]	Voltage [kV]		c- Factor	Sk" [MVA/MVA]	Ik" [kA/kA]			ip [kA/kA]	Ib [kA]	Sb [MVA]	EFF [-]		
TR SUSWA 400/22		BB 220 SUS				A	294.61 MVA	1.28 kA	91.64	3.18 kA					
						B	13.34 MVA	0.06 kA	83.38	0.14 kA					
						C	11.35 MVA	0.05 kA	79.46	0.12 kA					
Lne 400 SUSWA -		BB 400 LOI				A	6.80 MVA	0.03 kA	90.61	0.07 kA					
						B	6.80 MVA	0.03 kA	90.61	0.07 kA					
						C	6.80 MVA	0.03 kA	90.61	0.07 kA					
Ethiopia						A	2666.67 MVA	11.55 kA	-84.29	28.77 kA					
						B	165.16 MVA	0.72 kA	93.24	1.78 kA					
						C	157.79 MVA	0.68 kA	96.36	1.70 kA					
BB 400 TORORO	A	400.00	0.00	0.00	1.00	606.12 MVA	2.62 kA	-87.42	6.94 kA	2.62	606.12	0.00			
	B		229.80	-118.84		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	1.00			
	C		227.81	119.17		0.00 MVA	0.00 kA	0.00	0.00 kA	0.00	0.00	0.99			
Lne 400 LESSOS		BB 400 LES				A	118.88 MVA	0.51 kA	94.79	1.36 kA					
						B	3.68 MVA	0.02 kA	83.94	0.04 kA					
						C	3.50 MVA	0.02 kA	86.53	0.04 kA					
Lne 400 LESSOS		BB 400 LES				A	118.88 MVA	0.51 kA	94.79	1.36 kA					
						B	3.68 MVA	0.02 kA	83.94	0.04 kA					
						C	3.50 MVA	0.02 kA	86.53	0.04 kA					
TR TORORO 400/2		BB 220 TOR				A	184.32 MVA	0.80 kA	91.16	2.11 kA					
						B	3.68 MVA	0.02 kA	-96.06	0.04 kA					
						C	3.50 MVA	0.02 kA	-93.47	0.04 kA					
TR TORORO 400/2		BB 220 TOR				A	184.32 MVA	0.80 kA	91.16	2.11 kA					
						B	3.68 MVA	0.02 kA	-96.06	0.04 kA					
						C	3.50 MVA	0.02 kA	-93.47	0.04 kA					



Annex 8.I Small signal stability MTP

SMALL SIGNAL STABILITY MTP Upd. 2020

Name	Real part 1/s	Imaginary part rad/s	Magnitude 1/s	Angle deg	Damped Frequency Hz	Period s	Damping 1/s	Damping Ratio	Damping Time Const. s	Ratio A1/A2
Mode 00693	0	0	0	0	0	0	0	0	0	0
Mode 00694	0	0	0	0	0	0	0	0	0	0
Mode 00695	0	0	0	0	0	0	0	0	0	0
Mode 00696	0	0	0	0	0	0	0	0	0	0
Mode 00697	0	0	0	0	0	0	0	0	0	0
Mode 00190	-0.352065811	9.999288918	10.00548496	92.01649896	1.591436259	0.628363213	0.352065811	0.035187281	2.840378046	1.247604364
Mode 00191	-0.352065811	-9.999288918	10.00548496	-92.01649896	1.591436259	0.628363213	0.352065811	0.035187281	2.840378046	1.247604364
Mode 00120	-1.164856454	23.65548767	23.68415056	92.81911294	3.764887794	0.265612166	1.164856454	0.049182953	0.858474876	1.362607366
Mode 00121	-1.164856454	-23.65548767	23.68415056	-92.81911294	3.764887794	0.265612166	1.164856454	0.049182953	0.858474876	1.362607366
Mode 00176	-0.963331661	13.58793937	13.62204479	94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00177	-0.963331661	-13.58793937	13.62204479	-94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00180	-0.963331661	13.58793937	13.62204479	94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00181	-0.963331661	-13.58793937	13.62204479	-94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00178	-0.963331661	13.58793937	13.62204479	94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00179	-0.963331661	-13.58793937	13.62204479	-94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00172	-0.963331661	13.58793937	13.62204479	94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00173	-0.963331661	-13.58793937	13.62204479	-94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00174	-0.963331661	13.58793937	13.62204479	94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00175	-0.963331661	-13.58793937	13.62204479	-94.05526109	2.162587718	0.462408989	0.963331661	0.07071858	1.038064086	1.5611976
Mode 00162	-0.963333581	13.58793982	13.62204537	94.05526902	2.162587788	0.462408974	0.963333581	0.070718718	1.038062017	1.561198964
Mode 00163	-0.963333581	-13.58793982	13.62204537	-94.05526902	2.162587788	0.462408974	0.963333581	0.070718718	1.038062017	1.561198964
Mode 00160	-0.963439547	13.58796532	13.62207551	94.05570685	2.162591401	0.462408201	0.963439547	0.07072634	1.037947844	1.561274302
Mode 00161	-0.963439547	-13.58796532	13.62207551	-94.05570685	2.162591401	0.462408201	0.963439547	0.07072634	1.037947844	1.561274302
Mode 00290	-0.557335885	6.844620508	6.867274073	94.65514457	1.089355188	0.91797424	0.557335885	0.081158241	1.79425016	1.667991128
Mode 00291	-0.557335885	-6.844620508	6.867274073	-94.65514457	1.089355188	0.91797424	0.557335885	0.081158241	1.79425016	1.667991128
Mode 00286	-0.651202401	7.32194173	7.350843167	95.08242719	1.165323219	0.858131018	0.651202401	0.088588804	1.535620873	1.748602643
Mode 00287	-0.651202401	-7.32194173	7.350843167	-95.08242719	1.165323219	0.858131018	0.651202401	0.088588804	1.535620873	1.748602643
Mode 00282	-0.694965001	7.742446315	7.773573907	95.12914593	1.232248603	0.811524556	0.694965001	0.089409664	1.438921383	1.757656106
Mode 00283	-0.694965001	-7.742446315	7.773573907	-95.12914593	1.232248603	0.811524556	0.694965001	0.089409664	1.438921383	1.757656106
Mode 00244	-0.980835055	9.720176134	9.769537424	95.76204885	1.547014079	0.646406528	0.980835055	0.100397287	1.019539417	1.88517034
Mode 00245	-0.980835055	-9.720176134	9.769537424	-95.76204885	1.547014079	0.646406528	0.980835055	0.100397287	1.019539417	1.88517034
Mode 00270	-0.880545962	8.595521232	8.640506145	95.84911396	1.368019693	0.730983629	0.880545962	0.101909072	1.135659061	1.903446331
Mode 00271	-0.880545962	-8.595521232	8.640506145	-95.84911396	1.368019693	0.730983629	0.880545962	0.101909072	1.135659061	1.903446331
Mode 00278	-0.849849691	8.237604377	8.281326606	95.89020061	1.311055456	0.762744242	0.849849691	0.10262241	1.176678666	1.912130295
Mode 00279	-0.849849691	-8.237604377	8.281326606	-95.89020061	1.311055456	0.762744242	0.849849691	0.10262241	1.176678666	1.912130295
Mode 00240	-1.044514867	9.723286996	9.779229075	96.13143139	1.547509189	0.646199717	1.044514867	0.106809531	0.957382257	1.963964651
Mode 00241	-1.044514867	-9.723286996	9.779229075	-96.13143139	1.547509189	0.646199717	1.044514867	0.106809531	0.957382257	1.963964651
Mode 00258	-0.998916908	9.140815512	9.195234811	96.23658874	1.454805973	0.687376887	0.998916908	0.108634192	1.001084266	1.987012777
Mode 00259	-0.998916908	-9.140815512	9.195234811	-96.23658874	1.454805973	0.687376887	0.998916908	0.108634192	1.001084266	1.987012777
Mode 00280	-0.917023875	8.149066921	8.200501477	96.4205492	1.296964282	0.771031256	0.917023875	0.111825341	1.090484149	2.028008081
Mode 00281	-0.917023875	-8.149066921	8.200501477	-96.4205492	1.296964282	0.771031256	0.917023875	0.111825341	1.090484149	2.028008081
Mode 00262	-1.024661814	9.012045251	9.070109781	96.48662476	1.434311549	0.697198597	1.024661814	0.112971269	0.975931753	2.042945787
Mode 00263	-1.024661814	-9.012045251	9.070109781	-96.48662476	1.434311549	0.697198597	1.024661814	0.112971269	0.975931753	2.042945787
Mode 00284	-0.885616804	7.774853792	7.825130581	96.49842939	1.237406413	0.808141925	0.885616804	0.113175978	1.129156534	2.045626436
Mode 00285	-0.885616804	-7.774853792	7.825130581	-96.49842939	1.237406413	0.808141925	0.885616804	0.113175978	1.129156534	2.045626436
Mode 00288	-0.926402131	8.04983993	8.102971295	96.56490671	1.281171816	0.780535434	0.926402131	0.114328695	1.07944484	2.060790588
Mode 00289	-0.926402131	-8.04983993	8.102971295	-96.56490671	1.281171816	0.780535434	0.926402131	0.114328695	1.07944484	2.060790588
Mode 00232	-1.157036514	9.944424941	10.01150942	96.63653956	1.582704386	0.631829929	1.157036514	0.115570636	0.86427696	2.077621207
Mode 00233	-1.157036514	-9.944424941	10.01150942	-96.63653956	1.582704386	0.631829929	1.157036514	0.115570636	0.86427696	2.077621207
Mode 00260	-1.075958859	9.188907109	9.251686404	96.67853622	1.462459988	0.683779391	1.075958859	0.116298674	0.929403566	2.086980935
Mode 00261	-1.075958859	-9.188907109	9.251686404	-96.67853622	1.462459988	0.683779391	1.075958859	0.116298674	0.929403566	2.086980935
Mode 00242	-1.207249529	9.739153078	9.813692175	97.06624593	1.550034354	0.645146991	1.207249529	0.123016853	0.82832917	2.178972426
Mode 00243	-1.207249529	-9.739153078	9.813692175	-97.06624593	1.550034354	0.645146991	1.207249529	0.123016853	0.82832917	2.178972426
Mode 00264	-1.125952066	8.980583831	9.050892442	97.14624214	1.429304309	0.699641073	1.125952066	0.124402325	0.888137276	2.198471423
Mode 00265	-1.125952066	-8.980583831	9.050892442	-97.14624214	1.429304309	0.699641073	1.125952066	0.124402325	0.888137276	2.198471423
Mode 00248	-1.196373329	9.537478325	9.612221488	97.14979027	1.51793682	0.658788947	1.196373329	0.12446377	0.83585949	2.199340464
Mode 00249	-1.196373329	-9.537478325	9.612221488	-97.14979027	1.51793682	0.658788947	1.196373329	0.12446377	0.83585949	2.199340464
Mode 00238	-1.238544211	9.858514991	9.936010748	97.16066315	1.569031392	0.637335878	1.238544211	0.12465206	0.807399519	2.202005778
Mode 00239	-1.238544211	-9.858514991	9.936010748	-97.16066315	1.569031392	0.637335878	1.238544211	0.12465206	0.807399519	2.202005778
Mode 00276	-1.084270744	8.457639594	8.526858187	97.30547945	1.346075148	0.742900574	1.084270744	0.127159467	0.922278873	2.237821717
Mode 00277	-1.084270744	-8.457639594	8.526858187	-97.30547945	1.346075148	0.742900574	1.084270744	0.127159467	0.922278873	2.237821717
Mode 00234	-1.280215797	9.954713918	10.03669675	97.3282412	1.584341927	0.631176884	1.280215797	0.1275535	0.78111831	2.243512273
Mode 00235	-1.280215797	-9.954713918	10.03669675	-97.3282412	1.584341927	0.631176884	1.280215797	0.1275535	0.78111831	2.243512273
Mode 00274	-1.108529104	8.488673047	8.560748033	97.4401078	1.351014276	0.740184629	1.108529104	0.129489748	0.902096298	2.271672179
Mode 00275	-1.108529104	-8.488673047	8.560748033	-97.4401078	1.351014276	0.740184629	1.108529104	0.129489748	0.902096298	2.271672179
Mode 00266	-1.199828105	9.112659334	9.191308264	97.50076478	1.450324778	0.689500735	1.199828105	0.130539426	0.834352722	2.287094787
Mode 00267	-1.199828105	-9.112659334	9.191308264	-97.50076478	1.450324778	0.689500735	1.199828105	0.130539426	0.834352722	2.287094787
Mode 00186	-1.41633162	10.60200482	10.69619098	97.60914394	1.687361473	0.592641242	1.41633162	0.132414578	0.706049336	2.314923243
Mode 00187	-1.41633162	-10.60200482	10.69619098	-97.60914394	1.687361473	0.592641242	1.41633162	0.132414578	0.706049336	2.314923243
Mode 00254	-1.243167366	9.302513636	9.385213106	97.61178208	1.480541028	0.675428766	1.243167366	0.132460217	0.80439692	2.315605017
Mode 00255	-1.243167366	-9.302513636	9.385213106	-97.61178208	1.480541028	0.675428766	1.243167366	0.132460217	0.80439692	2.315605017
Mode 00252	-1.276939971	9.520256352	9.605511787	97.63941599	1.515195858	0.659980685	1.276939971			

SMALL SIGNAL STABILITY MTP Upd. 2020

Name	Real part	Imaginary part	Magnitude	Angle	Damped Frequency	Period	Damping	Damping Ratio	Damping Time Const.	Ratio A1/A2
	1/s	rad/s		deg	Hz	s	1/s		s	
Mode 00231	-6.047130649	-8.987224439	10.83226626	-123.9349746	1.430361194	0.699124112	6.047130649	0.558251663	0.165367686	68.55901084
Mode 00196	-6.174631534	9.175500147	11.05965088	123.9384904	1.460326204	0.684778509	6.174631534	0.558302572	0.161952984	68.59742339
Mode 00197	-6.174631534	-9.175500147	11.05965088	123.9384904	1.460326204	0.684778509	6.174631534	0.558302572	0.161952984	68.59742339
Mode 00204	-6.001986041	8.910464468	10.74337998	123.9637531	1.418144465	0.705146778	6.001986041	0.558668319	0.166611517	68.8741631
Mode 00205	-6.001986041	-8.910464468	10.74337998	123.9637531	1.418144465	0.705146778	6.001986041	0.558668319	0.166611517	68.8741631
Mode 00206	-6.040525919	8.959981475	10.80598082	123.9865583	1.426025342	0.70124981	6.040525919	0.558998394	0.165548499	69.12508246
Mode 00207	-6.040525919	-8.959981475	10.80598082	123.9865583	1.426025342	0.70124981	6.040525919	0.558998394	0.165548499	69.12508246
Mode 00194	-6.238406985	9.176986571	11.09661229	124.2074023	1.460562775	0.684667593	6.238406985	0.562190227	0.160297333	71.61002623
Mode 00195	-6.238406985	-9.176986571	11.09661229	124.2074023	1.460562775	0.684667593	6.238406985	0.562190227	0.160297333	71.61002623
Mode 00202	-6.15939111	9.027175259	10.92831149	124.3063653	1.436719565	0.696030057	6.15939111	0.563617821	0.16235371	72.75672512
Mode 00203	-6.15939111	-9.027175259	10.92831149	124.3063653	1.436719565	0.696030057	6.15939111	0.563617821	0.16235371	72.75672512
Mode 00214	-6.114994427	8.955018789	10.84368565	124.3274763	1.425235506	0.701638428	6.114994427	0.563922141	0.163532447	73.00406159
Mode 00215	-6.114994427	-8.955018789	10.84368565	124.3274763	1.425235506	0.701638428	6.114994427	0.563922141	0.163532447	73.00406159
Mode 00208	-6.153866012	8.974484823	10.8817136	124.4387877	1.42833621	0.700116545	6.153866012	0.565525453	0.162498948	74.32426002
Mode 00209	-6.153866012	-8.974484823	10.8817136	124.4387877	1.42833621	0.700116545	6.153866012	0.565525453	0.162498948	74.32426002
Mode 00198	-6.262145562	9.095649208	11.04288466	124.5465184	1.447617532	0.690790197	6.262145562	0.567051558	0.159689677	75.6281649
Mode 00199	-6.262145562	-9.095649208	11.04288466	124.5465184	1.447617532	0.690790197	6.262145562	0.567051558	0.159689677	75.6281649
Mode 00192	-6.333465589	9.177830243	11.15102538	124.6089054	1.460697705	0.684604655	6.333465589	0.567971677	0.157891415	76.39526431
Mode 00193	-6.333465589	-9.177830243	11.15102538	124.6089054	1.460697705	0.684604655	6.333465589	0.567971677	0.157891415	76.39526431
Mode 00482	-0.362890591	0.379680925	0.461817522	124.6980884	0.060429428	16.54822875	0.262890591	0.569252093	77.50741679	
Mode 00483	-0.262890591	-0.379680925	0.461817522	124.6980884	0.060429428	16.54822875	0.262890591	0.569252093	77.50741679	
Mode 00218	-6.057929663	8.726980097	10.62349723	124.7668754	1.388942021	0.719972458	6.057929663	0.570238739	0.165072897	78.37793975
Mode 00219	-6.057929663	-8.726980097	10.62349723	124.7668754	1.388942021	0.719972458	6.057929663	0.570238739	0.165072897	78.37793975
Mode 00220	-6.14137675	8.830806682	10.75642175	124.8164842	1.405475129	0.711503163	6.14137675	0.570949791	0.162829939	79.01273035
Mode 00221	-6.14137675	-8.830806682	10.75642175	124.8164842	1.405475129	0.711503163	6.14137675	0.570949791	0.162829939	79.01273035
Mode 00226	-5.783299204	8.13348883	10.12722303	124.8245014	1.323132842	0.755782011	5.783299204	0.571064663	0.172911683	79.11587133
Mode 00227	-5.783299204	-8.13348883	10.12722303	124.8245014	1.323132842	0.755782011	5.783299204	0.571064663	0.172911683	79.11587133
Mode 00222	-6.142234402	8.808769472	10.73878313	124.8875363	1.401959204	0.713287517	6.142234402	0.57196745	0.162807203	79.9322811
Mode 00223	-6.142234402	-8.808769472	10.73878313	124.8875363	1.401959204	0.713287517	6.142234402	0.57196745	0.162807203	79.9322811
Mode 00228	-6.11626981	8.767355115	10.68995966	124.9003312	1.395367904	0.716656874	6.11626981	0.572150614	0.163498422	80.09911244
Mode 00229	-6.11626981	-8.767355115	10.68995966	124.9003312	1.395367904	0.716656874	6.11626981	0.572150614	0.163498422	80.09911244
Mode 00224	-6.118818342	8.748351194	10.67584126	124.9699158	1.392343336	0.718213657	6.118818342	0.573146246	0.163430248	81.01375056
Mode 00225	-6.118818342	-8.748351194	10.67584126	124.9699158	1.392343336	0.718213657	6.118818342	0.573146246	0.163430248	81.01375056
Mode 00210	-6.229409612	8.878636814	10.84600091	125.054183	1.413078937	0.707674549	6.229409612	0.574350829	0.160528856	82.13749743
Mode 00211	-6.229409612	-8.878636814	10.84600091	125.054183	1.413078937	0.707674549	6.229409612	0.574350829	0.160528856	82.13749743
Mode 00216	-6.059905135	8.601985819	10.52222199	125.1640329	1.369048564	0.730434279	6.059905135	0.575919244	0.16501786	83.62941446
Mode 00217	-6.059905135	-8.601985819	10.52222199	125.1640329	1.369048564	0.730434279	6.059905135	0.575919244	0.16501786	83.62941446
Mode 00212	-6.237735498	8.821637164	10.80419485	125.2639395	1.404007161	0.71224708	6.237735498	0.577343854	0.160314589	85.01340006
Mode 00213	-6.237735498	-8.821637164	10.80419485	125.2639395	1.404007161	0.71224708	6.237735498	0.577343854	0.160314589	85.01340006
Mode 00478	-0.338320052	0.467056478	0.576716751	125.918312	0.074334347	13.45273131	0.338320052	0.58663122	2.955781058	94.75823484
Mode 00479	-0.338320052	-0.467056478	0.576716751	125.918312	0.074334347	13.45273131	0.338320052	0.58663122	2.955781058	94.75823484
Mode 00200	-6.095750509	8.292887052	10.29223736	126.3180329	1.31983967	0.757659578	6.095750509	0.592266802	0.164048709	101.3422863
Mode 00201	-6.095750509	-8.292887052	10.29223736	126.3180329	1.31983967	0.757659578	6.095750509	0.592266802	0.164048709	101.3422863
Mode 00466	-0.44461753	0.531123189	0.692659072	129.9336086	0.084530881	11.8299962	0.44461753	0.641899526	2.249124096	192.4475577
Mode 00467	-0.44461753	-0.531123189	0.692659072	129.9336086	0.084530881	11.8299962	0.44461753	0.641899526	2.249124096	192.4475577
Mode 00470	-0.458451453	0.529551382	0.700430154	130.8839031	0.08428072	11.86510983	0.458451453	0.654528436	2.181256036	230.3446918
Mode 00471	-0.458451453	-0.529551382	0.700430154	130.8839031	0.08428072	11.86510983	0.458451453	0.654528436	2.181256036	230.3446918
Mode 00472	-0.457526768	0.522930511	0.694828801	131.1836024	0.083226976	12.01533506	0.457526768	0.658474098	2.185664467	244.0412875
Mode 00473	-0.457526768	-0.522930511	0.694828801	131.1836024	0.083226976	12.01533506	0.457526768	0.658474098	2.185664467	244.0412875
Mode 00455	-0.549496906	0.626994305	0.833707807	131.231278	0.099789243	10.02112022	0.549496906	0.659100108	1.819846462	246.3059732
Mode 00456	-0.549496906	-0.626994305	0.833707807	131.231278	0.099789243	10.02112022	0.549496906	0.659100108	1.819846462	246.3059732
Mode 00480	-0.462913559	0.522512356	0.698074584	131.5389533	0.083160424	12.02495067	0.462913559	0.663129083	2.160230525	261.5205085
Mode 00481	-0.462913559	-0.522512356	0.698074584	131.5389533	0.083160424	12.02495067	0.462913559	0.663129083	2.160230525	261.5205085
Mode 00463	-0.532538567	0.592873947	0.796929635	131.9312086	0.094358819	10.5978435	0.532538567	0.668237877	1.877798269	282.5231212
Mode 00464	-0.532538567	-0.592873947	0.796929635	131.9312086	0.094358819	10.5978435	0.532538567	0.668237877	1.877798269	282.5231212
Mode 00468	-0.479829031	0.521433692	0.708610608	132.6206035	0.08298875	12.04982609	0.479829031	0.677140626	2.084075652	324.360767
Mode 00469	-0.479829031	-0.521433692	0.708610608	132.6206035	0.08298875	12.04982609	0.479829031	0.677140626	2.084075652	324.360767
Mode 00457	-0.589844361	0.60518161	0.845080559	134.2646926	0.096317645	10.38231367	0.589844361	0.697974121	1.695362483	456.6645845
Mode 00458	-0.589844361	-0.60518161	0.845080559	134.2646926	0.096317645	10.38231367	0.589844361	0.697974121	1.695362483	456.6645845
Mode 00476	-0.458144793	0.465838304	0.653377362	134.5229399	0.074140469	13.48791041	0.458144793	0.701194777	2.182716064	482.7099368
Mode 00477	-0.458144793	-0.465838304	0.653377362	134.5229399	0.074140469	13.48791041	0.458144793	0.701194777	2.182716064	482.7099368
Mode 00437	-0.807222557	0.772467456	1.117277967	136.2604735	0.122941584	8.133944306	0.807222557	0.722490356	1.238815729	710.4533714
Mode 00438	-0.807222557	-0.772467456	1.117277967	136.2604735	0.122941584	8.133944306	0.807222557	0.722490356	1.238815729	710.4533714
Mode 00474	-0.502481395	0.470594209	0.688437696	136.8768815	0.074897395	13.3515993	0.502481395	0.729886521	1.990123437	819.6932902
Mode 00475	-0.502481395	-0.470594209	0.688437696	136.8768815	0.074897395	13.3515993	0.502481395	0.729886521	1.990123437	819.6932902
Mode 00453	-0.699635927	0.632700819	0.938850961	137.6304566	0.100697463	9.930736798	0.699635927	0.738813674	1.441678495	980.748276
Mode 00454	-0.699635927	-0.632700819	0.938850961	137.6304566	0.100697463	9.930736798	0.699635927	0.738813674	1.441678495	980.748276
Mode 00439	-0.78805026	0.714506151	1.063739748	137.8021623	0.113717186	8.793745584	0.78805026	0.740829946	1.268954597	1022.40553
Mode 00440	-0.78805026	-0.714506151	1.063739748	137.8021623	0.113717186	8.793745584	0.78805026	0.740829946</		

SMALL SIGNAL STABILITY MTP Upd. 2020										
Name	Real part 1/s	Imaginary part rad/s	Magnitude 1/s	Angle deg	Damped Frequency Hz	Period s	Damping 1/s	Damping Ratio	Damping Time Const. s	Ratio A1/A2
Mode 00395	-1.906993873	-0.101944951	1.909716839	-176.9399688	0.016225043	61.63311933	1.906993873	0.998574152	0.524385534	#INF
Mode 00521	-0.336437725	0.005988458	0.336491017	178.9802655	0.000953093	1049.215805	0.336437725	0.999841625	2.972318278	#INF
Mode 00522	-0.336437725	-0.005988458	0.336491017	-178.9802655	0.000953093	1049.215805	0.336437725	0.999841625	2.972318278	#INF
Mode 00302	-14.19142967	0.208529778	14.19296167	179.1581527	0.033188545	30.13087797	14.19142967	0.99989206	0.070465064	#INF
Mode 00303	-14.19142967	-0.208529778	14.19296167	-179.1581527	0.033188545	30.13087797	14.19142967	0.99989206	0.070465064	#INF
Mode 00525	-0.254286869	0.002569836	0.254299855	179.4209858	0.000409002	2444.975665	0.254286869	0.999948938	3.932566405	#INF
Mode 00526	-0.254286869	-0.002569836	0.254299855	-179.4209858	0.000409002	2444.975665	0.254286869	0.999948938	3.932566405	#INF
Mode 00535	-0.224620936	0.000669273	0.224621933	179.8292839	0.000106518	9388.074785	0.224620936	0.999995561	4.451944763	#INF
Mode 00536	-0.224620936	-0.000669273	0.224621933	-179.8292839	0.000106518	9388.074785	0.224620936	0.999995561	4.451944763	#INF
Mode 00308	-14.35053495	0.04106417	14.3505937	179.8360481	0.006535566	153.0089457	14.35053495	0.999995906	0.069683813	#INF
Mode 00309	-14.35053495	-0.04106417	14.3505937	-179.8360481	0.006535566	153.0089457	14.35053495	0.999995906	0.069683813	#INF
Mode 00321	-15.7359506	0.005780712	15.73595166	179.978952	0.000920029	1086.922388	15.7359506	0.999999933	0.063548751	#INF
Mode 00322	-15.7359506	-0.005780712	15.73595166	-179.978952	0.000920029	1086.922388	15.7359506	0.999999933	0.063548751	#INF
Mode 00492	-0.752295997	0.000158398	0.752296014	179.9879362	2.52098E-05	39667.1387	0.752295997	0.999999978	1.329264018	#INF
Mode 00493	-0.752295997	-0.000158398	0.752296014	-179.9879362	2.52098E-05	39667.1387	0.752295997	0.999999978	1.329264018	#INF
Mode 00093	-66.67500426	0.000565328	66.67500426	179.9995142	8.99748E-05	11114.22049	66.67500426	1	0.014998124	#INF
Mode 00094	-66.67500426	-0.000565328	66.67500426	-179.9995142	8.99748E-05	11114.22049	66.67500426	1	0.014998124	#INF
Mode 00001	-0.142857143	0	0.142857143	180	0	0	0.142857143	1	7	0
Mode 00002	-0.142857143	0	0.142857143	180	0	0	0.142857143	1	7	0
Mode 00003	-0.142857143	0	0.142857143	180	0	0	0.142857143	1	7	0
Mode 00004	-0.142857143	0	0.142857143	180	0	0	0.142857143	1	7	0
Mode 00005	-100	0	100	180	0	0	100	1	0.01	0
Mode 00006	-100	0	100	180	0	0	100	1	0.01	0
Mode 00007	-100	0	100	180	0	0	100	1	0.01	0
Mode 00008	-100	0	100	180	0	0	100	1	0.01	0
Mode 00009	-100	0	100	180	0	0	100	1	0.01	0
Mode 00010	-1	0	1	180	0	0	1	1	1	0
Mode 00011	-10	0	10	180	0	0	10	1	0.1	0
Mode 00012	-1	0	1	180	0	0	1	1	1	0
Mode 00013	-10	0	10	180	0	0	10	1	0.1	0
Mode 00014	-1	0	1	180	0	0	1	1	1	0
Mode 00015	-10	0	10	180	0	0	10	1	0.1	0
Mode 00016	-100	0	100	180	0	0	100	1	0.01	0
Mode 00017	-1	0	1	180	0	0	1	1	1	0
Mode 00018	-10	0	10	180	0	0	10	1	0.1	0
Mode 00019	-100	0	100	180	0	0	100	1	0.01	0
Mode 00021	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00022	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00023	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00024	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00025	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00026	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00027	-100000000	0	100000000	180	0	0	100000000	1	0.00000001	0
Mode 00028	-500.1310605	0	500.1310605	180	0	0	500.1310605	1	0.01999476	0
Mode 00029	-500.1312333	0	500.1312333	180	0	0	500.1312333	1	0.01999475	0
Mode 00030	-500.1311684	0	500.1311684	180	0	0	500.1311684	1	0.01999475	0
Mode 00043	-114.1387186	0	114.1387186	180	0	0	114.1387186	1	0.008761269	0
Mode 00046	-99.34251861	0	99.34251861	180	0	0	99.34251861	1	0.010066183	0
Mode 00047	-98.97823221	0	98.97823221	180	0	0	98.97823221	1	0.010103232	0
Mode 00048	-99.83341286	0	99.83341286	180	0	0	99.83341286	1	0.010016687	0
Mode 00049	-99.86156497	0	99.86156497	180	0	0	99.86156497	1	0.010013863	0
Mode 00050	-99.89925709	0	99.89925709	180	0	0	99.89925709	1	0.010010084	0
Mode 00051	-100.0925965	0	100.0925965	180	0	0	100.0925965	1	0.009990749	0
Mode 00052	-100.0829475	0	100.0829475	180	0	0	100.0829475	1	0.009991712	0
Mode 00053	-99.99815631	0	99.99815631	180	0	0	99.99815631	1	0.010000184	0
Mode 00054	-99.99064307	0	99.99064307	180	0	0	99.99064307	1	0.010000936	0
Mode 00055	-100	0	100	180	0	0	100	1	0.01	0
Mode 00056	-100.0000404	0	100.0000404	180	0	0	100.0000404	1	0.009999996	0
Mode 00057	-87.80417432	0	87.80417432	180	0	0	87.80417432	1	0.01138898	0
Mode 00060	-77.91779547	0	77.91779547	180	0	0	77.91779547	1	0.012834039	0
Mode 00061	-77.93421375	0	77.93421375	180	0	0	77.93421375	1	0.012831335	0
Mode 00062	-87.71966306	1.32E-10	87.71966306	180	2.1E-11	0	87.71966306	1	0.011399953	0
Mode 00063	-87.71966306	-1.32E-10	87.71966306	-180	2.1E-11	0	87.71966306	1	0.011399953	0
Mode 00064	-87.71966306	0	87.71966306	180	0	0	87.71966306	1	0.011399953	0
Mode 00065	-87.71966306	0	87.71966306	180	0	0	87.71966306	1	0.011399953	0
Mode 00066	-87.71966306	0	87.71966306	180	0	0	87.71966306	1	0.011399953	0
Mode 00067	-76.47828281	0	76.47828281	180	0	0	76.47828281	1	0.013075607	0
Mode 00068	-76.60468742	0	76.60468742	180	0	0	76.60468742	1	0.013054031	0
Mode 00069	-76.60468742	0	76.60468742	180	0	0	76.60468742	1	0.013054031	0
Mode 00070	-76.60468742	0	76.60468742	180	0	0	76.60468742	1	0.013054031	0
Mode 00071	-76.60468742	0	76.60468742	180	0	0	76.60468742	1	0.013054031	0
Mode 00072	-76.60468742	0	76.60468742	180	0	0	76.60468742	1	0.013054031	0
Mode 00073	-68.19562013	0	68.19562013	180	0	0	68.19562013	1	0.014663698	0
Mode 00074	-63.77768212	0	63.77768212	180	0	0	63.77768212	1	0.015679466	0
Mode 00075	-60.75923163	0	60.75923163	180	0	0	60.75923163	1	0.016458404	0
Mode 00076	-58.68612863	0	58.68612863	180	0	0	58.68612863	1	0.017039802	0
Mode 00077	-57.65203026	0	57.65203026	180	0	0	57.65203026	1	0.017345443	0
Mode 00078	-55.6731423	0	55.6731423	180	0	0	55.6731423	1	0.017961982	0
Mode 00079	-55.33892476	0	55.33892476	180	0	0	55.33892476	1	0.018070463	0
Mode 00080	-54.48938382	0	54.48938382	180	0	0	54.48938382	1	0.018352199	0
Mode 00081	-66.69856742	0	66.69856742	180	0	0	66.69856742	1	0.014992826	0
Mode 00082	-66.68276776	0	66.68276776	180	0	0	66.68276776	1	0.014996378	0
Mode 00083	-66.64703909	0	66.64703909	180	0	0	66.64703909	1	0.015004418	0
Mode 00084	-66.64763603	0	66.64763603	180	0	0	66.64763603	1	0.015004283	0
Mode 00085	-66.64888619	0	66.64888619	180	0	0	66.64888619	1	0.015004002	0
Mode 00086	-66.65538025	0	66.65538025	180	0	0	66.65538025	1	0.01500254	0
Mode 00087	-66.65590383	0	66.65590383	180	0	0	66.65590383	1	0.015002422	0
Mode 00088	-66.66097273	0	66.66097273	180	0	0	66.66097273	1	0.015001281	0
Mode 00089	-66.65809761	0	66.65809761	180	0	0	66.65809761	1	0.015001928	0
Mode 00090	-66.66697278	0	66.66697278	180	0	0	66.66697278	1	0.014999931	0
Mode 00091	-66.66996845	0	66.66996845	180	0	0	66.66996845	1	0.014999257	0
Mode 00092	-66.67284606	0	66.67284606	180	0	0	66.67284606	1	0.01499861	0
Mode 00095	-66.67519384	0	66.67519384	180	0	0	66.67519384	1	0.014998082	0
Mode 00096	-66.67459286	0	66.67459286	180	0	0	66.67459286	1	0.014998217	0
Mode 00097	-66.67414473	0	66.67414473	180	0	0	66.67414473	1	0.014998318	0
Mode 00098	-66.67380346	0	66.67380346	180	0	0	66.67380346	1	0.014998394	0
Mode 00099	-66.67393994	0	66.67393994	180	0	0	66.67393994	1	0.014998364	0
Mode 00100	-66.64845813	0	66.64845813	180	0	0	66.64845813	1	0.015004098	0
Mode 00101	-53.16621614	0	53.16621614	180	0	0	53.16621614	1	0.018808937	0
Mode 00102	-51.44349738	0	51.44349738	180	0	0	51.44349738	1	0.0194	

SMALL SIGNAL STABILITY MTP Upd. 2020										
Name	Real part 1/s	Imaginary part rad/s	Magnitude 1/s	Angle deg	Damped Frequency Hz	Period s	Damping 1/s	Damping Ratio	Damping Time Const. s	Ratio A1/A2
Mode 00113	-37.56121118	0	37.56121118	180	0	0	37.56121118	1	0.02662321	0
Mode 00114	-52.49881954	0	52.49881954	180	0	0	52.49881954	1	0.019048047	0
Mode 00115	-52.49881954	0	52.49881954	180	0	0	52.49881954	1	0.019048047	0
Mode 00116	-52.49881954	0	52.49881954	180	0	0	52.49881954	1	0.019048047	0
Mode 00117	-52.49881954	1E-12	52.49881954	180	0	0	52.49881954	1	0.019048047	0
Mode 00118	-52.49881954	-1E-12	52.49881954	-180	0	0	52.49881954	1	0.019048047	0
Mode 00119	-35.05198242	0	35.05198242	180	0	0	35.05198242	1	0.028529057	0
Mode 00122	-34.26175607	0	34.26175607	180	0	0	34.26175607	1	0.029187062	0
Mode 00123	-32.97353517	0	32.97353517	180	0	0	32.97353517	1	0.030327352	0
Mode 00124	-32.14686851	0	32.14686851	180	0	0	32.14686851	1	0.031107229	0
Mode 00125	-32.3562825	0	32.3562825	180	0	0	32.3562825	1	0.030905899	0
Mode 00126	-29.42027394	0	29.42027394	180	0	0	29.42027394	1	0.033990166	0
Mode 00127	-29.1047029	0	29.1047029	180	0	0	29.1047029	1	0.034358708	0
Mode 00128	-27.0091906	0	27.0091906	180	0	0	27.0091906	1	0.037024434	0
Mode 00129	-26.31675666	0	26.31675666	180	0	0	26.31675666	1	0.037998603	0
Mode 00130	-26.05809755	0	26.05809755	180	0	0	26.05809755	1	0.038375787	0
Mode 00131	-25.98640014	0	25.98640014	180	0	0	25.98640014	1	0.038481667	0
Mode 00132	-25.70437719	0	25.70437719	180	0	0	25.70437719	1	0.03890388	0
Mode 00133	-25.31870143	0	25.31870143	180	0	0	25.31870143	1	0.039496496	0
Mode 00134	-25.23976956	0	25.23976956	180	0	0	25.23976956	1	0.039620013	0
Mode 00135	-24.47095335	0	24.47095335	180	0	0	24.47095335	1	0.040864775	0
Mode 00136	-23.94453019	0	23.94453019	180	0	0	23.94453019	1	0.041763192	0
Mode 00137	-23.12545234	0	23.12545234	180	0	0	23.12545234	1	0.043242397	0
Mode 00142	-22.04350368	0	22.04350368	180	0	0	22.04350368	1	0.045364839	0
Mode 00143	-21.3814241	0	21.3814241	180	0	0	21.3814241	1	0.046769569	0
Mode 00144	-21.51608916	0	21.51608916	180	0	0	21.51608916	1	0.046476848	0
Mode 00145	-21.98560246	0	21.98560246	180	0	0	21.98560246	1	0.045484312	0
Mode 00146	-21.95450665	0	21.95450665	180	0	0	21.95450665	1	0.045548735	0
Mode 00147	-21.95292607	0	21.95292607	180	0	0	21.95292607	1	0.045552014	0
Mode 00148	-21.95111099	0	21.95111099	180	0	0	21.95111099	1	0.045555781	0
Mode 00149	-21.94279073	0	21.94279073	180	0	0	21.94279073	1	0.045573055	0
Mode 00150	-21.93801822	0	21.93801822	180	0	0	21.93801822	1	0.045582969	0
Mode 00151	-21.92674676	0	21.92674676	180	0	0	21.92674676	1	0.045606401	0
Mode 00152	-21.92513154	0	21.92513154	180	0	0	21.92513154	1	0.045609761	0
Mode 00153	-21.89931869	0	21.89931869	180	0	0	21.89931869	1	0.045663521	0
Mode 00154	-21.90030661	0	21.90030661	180	0	0	21.90030661	1	0.045661461	0
Mode 00155	-21.90880594	0	21.90880594	180	0	0	21.90880594	1	0.045643747	0
Mode 00156	-21.58973177	0	21.58973177	180	0	0	21.58973177	1	0.046318315	0
Mode 00157	-20.60932088	0	20.60932088	180	0	0	20.60932088	1	0.048521735	0
Mode 00170	-19.16059381	0	19.16059381	180	0	0	19.16059381	1	0.052190449	0
Mode 00171	-18.95896475	0	18.95896475	180	0	0	18.95896475	1	0.052745496	0
Mode 00294	-17.64632088	0	17.64632088	180	0	0	17.64632088	1	0.056669036	0
Mode 00295	-17.49905349	0	17.49905349	180	0	0	17.49905349	1	0.057145948	0
Mode 00296	-12.37253784	0	12.37253784	180	0	0	12.37253784	1	0.080824162	0
Mode 00297	-12.7732792	0	12.7732792	180	0	0	12.7732792	1	0.078288133	0
Mode 00298	-12.92313571	0	12.92313571	180	0	0	12.92313571	1	0.0773806	0
Mode 00299	-13.16790051	0	13.16790051	180	0	0	13.16790051	1	0.075942251	0
Mode 00300	-13.38866033	0	13.38866033	180	0	0	13.38866033	1	0.074690072	0
Mode 00301	-13.67469188	0	13.67469188	180	0	0	13.67469188	1	0.07312779	0
Mode 00304	-13.80600788	0	13.80600788	180	0	0	13.80600788	1	0.072432234	0
Mode 00305	-13.84759063	0	13.84759063	180	0	0	13.84759063	1	0.072214729	0
Mode 00306	-13.92265856	0	13.92265856	180	0	0	13.92265856	1	0.071825363	0
Mode 00307	-14.03573849	0	14.03573849	180	0	0	14.03573849	1	0.071246696	0
Mode 00310	-14.86891426	0	14.86891426	180	0	0	14.86891426	1	0.067254406	0
Mode 00311	-14.92817868	0	14.92817868	180	0	0	14.92817868	1	0.066987408	0
Mode 00312	-15.06389994	0	15.06389994	180	0	0	15.06389994	1	0.066383872	0
Mode 00313	-17.22257473	0	17.22257473	180	0	0	17.22257473	1	0.058063328	0
Mode 00314	-13.56211735	0	13.56211735	180	0	0	13.56211735	1	0.073734799	0
Mode 00315	-15.31324662	0	15.31324662	180	0	0	15.31324662	1	0.065302938	0
Mode 00316	-15.31095092	0	15.31095092	180	0	0	15.31095092	1	0.06531273	0
Mode 00317	-15.41493312	0	15.41493312	180	0	0	15.41493312	1	0.06487216	0
Mode 00318	-15.49799297	0	15.49799297	180	0	0	15.49799297	1	0.064524484	0
Mode 00319	-14.16805716	0	14.16805716	180	0	0	14.16805716	1	0.070581308	0
Mode 00320	-14.77988921	0	14.77988921	180	0	0	14.77988921	1	0.067655906	0
Mode 00323	-15.91555732	0	15.91555732	180	0	0	15.91555732	1	0.062831604	0
Mode 00324	-17.00991868	0	17.00991868	180	0	0	17.00991868	1	0.058789229	0
Mode 00325	-10.13781711	0	10.13781711	180	0	0	10.13781711	1	0.098640564	0
Mode 00326	-16.13559537	0	16.2559537	180	0	0	16.2559537	1	0.061517279	0
Mode 00327	-16.25992307	0	16.25992307	180	0	0	16.25992307	1	0.061500906	0
Mode 00328	-16.22559786	0	16.22559786	180	0	0	16.22559786	1	0.061631011	0
Mode 00329	-16.84097048	0	16.84097048	180	0	0	16.84097048	1	0.059379001	0
Mode 00330	-16.5642142	0	16.5642142	180	0	0	16.5642142	1	0.06037111	0
Mode 00331	-16.67982375	0	16.67982375	180	0	0	16.67982375	1	0.059952672	0
Mode 00332	-16.65663216	0	16.65663216	180	0	0	16.65663216	1	0.060026146	0
Mode 00333	-16.66485115	0	16.66485115	180	0	0	16.66485115	1	0.060006537	0
Mode 00334	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00335	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00336	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00337	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00338	-16.6648757	0	16.6648757	180	0	0	16.6648757	1	0.060006448	0
Mode 00339	-16.6648757	0	16.6648757	180	0	0	16.6648757	1	0.060006448	0
Mode 00340	-16.6648757	0	16.6648757	180	0	0	16.6648757	1	0.060006448	0
Mode 00341	-16.6648757	0	16.6648757	180	0	0	16.6648757	1	0.060006448	0
Mode 00342	-16.6648757	0	16.6648757	180	0	0	16.6648757	1	0.060006448	0
Mode 00343	-8.974767694	0	8.974767694	180	0	0	8.974767694	1	0.111423497	0
Mode 00344	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00345	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00346	-16.66666667	0	16.66666667	180	0	0	16.66666667	1	0.06	0
Mode 00347	-8.635312506	0	8.635312506	180	0	0	8.635312506	1	0.115803568	0
Mode 00348	-6.050209843	0	6.050209843	180	0	0	6.050209843	1	0.165283523	0
Mode 00349	-7.816937324	0	7.816937324	180	0	0	7.816937324	1	0.12792734	0
Mode 00350	-4.771170349	0	4.771170349	180	0	0	4.771170349	1	0.209592181	0
Mode 00351	-7.977875405	0	7.977875405	180	0	0	7.977875405	1	0.125346656	0
Mode 00352	-8.280652676	0	8.280652676	180	0	0	8.280652676	1	0.120763428	0
Mode 00353	-8.078412309	0	8.078412309	180	0	0	8.078412309	1	0.1237867	0
Mode 00354	-8.063867735	0	8.063867735	180	0	0	8.063867735	1	0.124009971	0
Mode 00355	-8.331497871	0	8.331497871	180	0	0	8.331497871	1	0.120026436	0
Mode 00356	-4.602817869	0	4.602817869	180	0	0	4.602817869	1	0.217258216	0
Mode 00357	-8.331412997	0	8.331412997	180	0	0	8.331412997	1	0.120027659	0
Mode 00358	-8.331412997	2E-12	8.331412997	180	0	0	8.331412997	1	0.120027659	0
Mode 00359	-8.331412997	-2E-12	8.331412997	-180	0	0	8.331412997	1	0.120027659	0
Mode 00360	-8.331412997	1E-12	8.331412997	180	0	0	8.331412997	1	0.120	

SMALL SIGNAL STABILITY MTP Upd. 2020											
Name	Real part	Imaginary part	Magnitude	Angle	Damped Frequency	Period	Damping	Damping Ratio	Damping Time Const.	Ratio A1/A2	
	1/s	rad/s	1/s	deg	Hz	s	1/s		s		
Mode 00369	-2.974063569	0	2.974063569	180	0	0	2.974063569	1	0.336240291		0
Mode 00370	-2.831044607	0	2.831044607	180	0	0	2.831044607	1	0.353226508		0
Mode 00371	-2.771500526	0	2.771500526	180	0	0	2.771500526	1	0.360815374		0
Mode 00372	-2.758480893	0	2.758480893	180	0	0	2.758480893	1	0.362518371		0
Mode 00373	-2.707385059	0	2.707385059	180	0	0	2.707385059	1	0.369360094		0
Mode 00374	-2.694969988	0	2.694969988	180	0	0	2.694969988	1	0.371061646		0
Mode 00375	-2.690904351	0	2.690904351	180	0	0	2.690904351	1	0.371622276		0
Mode 00376	-2.681633915	0	2.681633915	180	0	0	2.681633915	1	0.372906978		0
Mode 00377	-2.634995096	0	2.634995096	180	0	0	2.634995096	1	0.379507348		0
Mode 00378	-2.697100522	0	2.697100522	180	0	0	2.697100522	1	0.370768532		0
Mode 00379	-2.597040046	0	2.597040046	180	0	0	2.597040046	1	0.385053747		0
Mode 00380	-2.592729267	0	2.592729267	180	0	0	2.592729267	1	0.385693953		0
Mode 00381	-2.549184912	0	2.549184912	180	0	0	2.549184912	1	0.392282253		0
Mode 00382	-2.539105471	0	2.539105471	180	0	0	2.539105471	1	0.393839489		0
Mode 00383	-2.473637115	0	2.473637115	180	0	0	2.473637115	1	0.404263016		0
Mode 00384	-2.442008168	0	2.442008168	180	0	0	2.442008168	1	0.40949904		0
Mode 00385	-2.398224731	0	2.398224731	180	0	0	2.398224731	1	0.416975101		0
Mode 00386	-2.326063768	0	2.326063768	180	0	0	2.326063768	1	0.429910828		0
Mode 00387	-2.292465389	0	2.292465389	180	0	0	2.292465389	1	0.436211602		0
Mode 00388	-2.268908317	0	2.268908317	180	0	0	2.268908317	1	0.440740594		0
Mode 00389	-2.237103212	0	2.237103212	180	0	0	2.237103212	1	0.447006644		0
Mode 00390	-2.19712439	0	2.19712439	180	0	0	2.19712439	1	0.455140366		0
Mode 00391	-2.168331229	0	2.168331229	180	0	0	2.168331229	1	0.461184152		0
Mode 00392	-2.147079595	0	2.147079595	180	0	0	2.147079595	1	0.465748919		0
Mode 00393	-2.113404158	0	2.113404158	180	0	0	2.113404158	1	0.473170262		0
Mode 00396	-2.098692714	0	2.098692714	180	0	0	2.098692714	1	0.476487098		0
Mode 00401	-1.895746196	0	1.895746196	180	0	0	1.895746196	1	0.527496773		0
Mode 00402	-1.747549566	0	1.747549566	180	0	0	1.747549566	1	0.572229835		0
Mode 00405	-1.652089056	0	1.652089056	180	0	0	1.652089056	1	0.605294246		0
Mode 00406	-2.088160419	0	2.088160419	180	0	0	2.088160419	1	0.47889041		0
Mode 00407	-1.607253058	0	1.607253058	180	0	0	1.607253058	1	0.62217956		0
Mode 00408	-1.954676612	0	1.954676612	180	0	0	1.954676612	1	0.511593577		0
Mode 00409	-1.568024015	0	1.568024015	180	0	0	1.568024015	1	0.637745335		0
Mode 00410	-1.969511854	0	1.969511854	180	0	0	1.969511854	1	0.507740026		0
Mode 00411	-2.088600516	0	2.088600516	180	0	0	2.088600516	1	0.478789502		0
Mode 00412	-1.998213221	0	1.998213221	180	0	0	1.998213221	1	0.500447094		0
Mode 00413	-1.980092843	0	1.980092843	180	0	0	1.980092843	1	0.505026824		0
Mode 00414	-1.982585521	0	1.982585521	180	0	0	1.982585521	1	0.504391861		0
Mode 00415	-1.994017075	0	1.994017075	180	0	0	1.994017075	1	0.501500219		0
Mode 00416	-1.986036275	0	1.986036275	180	0	0	1.986036275	1	0.503515476		0
Mode 00417	-1.992487918	0	1.992487918	180	0	0	1.992487918	1	0.501885101		0
Mode 00418	-2.088610361	0	2.088610361	180	0	0	2.088610361	1	0.478787245		0
Mode 00419	-2.088610361	0	2.088610361	-180	0	0	2.088610361	1	0.478787245		0
Mode 00420	-2.088610361	0	2.088610361	180	0	0	2.088610361	1	0.478787245		0
Mode 00421	-2.088610361	0	2.088610361	-180	0	0	2.088610361	1	0.478787245		0
Mode 00422	-2.088610361	0	2.088610361	180	0	0	2.088610361	1	0.478787245		0
Mode 00423	-1.99136355	0	1.99136355	180	0	0	1.99136355	1	0.502168476		0
Mode 00424	-1.991188636	0	1.991188636	180	0	0	1.991188636	1	0.502212589		0
Mode 00425	-1.990733504	0	1.990733504	180	0	0	1.990733504	1	0.502327407		0
Mode 00426	-1.990887158	0	1.990887158	180	0	0	1.990887158	1	0.502288639		0
Mode 00427	-1.52373164	0	1.52373164	180	0	0	1.52373164	1	0.656283543		0
Mode 00430	-1.990943679	0	1.990943679	180	0	0	1.990943679	1	0.502274379		0
Mode 00431	-1.469378774	0	1.469378774	180	0	0	1.469378774	1	0.680559715		0
Mode 00432	-1.987840245	0	1.987840245	180	0	0	1.987840245	1	0.503058534		0
Mode 00435	-1.396785912	0	1.396785912	180	0	0	1.396785912	1	0.715929328		0
Mode 00436	-1.987879636	0	1.987879636	180	0	0	1.987879636	1	0.503048566		0
Mode 00441	-1.987879652	0	1.987879652	180	0	0	1.987879652	1	0.503048562		0
Mode 00442	-1.987879652	0	1.987879652	180	0	0	1.987879652	1	0.503048562		0
Mode 00443	-1.987879652	0	1.987879652	180	0	0	1.987879652	1	0.503048562		0
Mode 00444	-1.987879652	0	1.987879652	-180	0	0	1.987879652	1	0.503048562		0
Mode 00445	-1.987879652	0	1.987879652	180	0	0	1.987879652	1	0.503048562		0
Mode 00446	-1.258351031	0	1.258351031	180	0	0	1.258351031	1	0.79469081		0
Mode 00465	-1.052247878	0	1.052247878	180	0	0	1.052247878	1	0.950346416		0
Mode 00486	-0.859122147	0	0.859122147	180	0	0	0.859122147	1	1.16397884		0
Mode 00489	-0.790150988	0	0.790150988	180	0	0	0.790150988	1	1.265580903		0
Mode 00490	-0.794750747	0	0.794750747	180	0	0	0.794750747	1	1.258255613		0
Mode 00491	-0.779510973	0	0.779510973	180	0	0	0.779510973	1	1.282855578		0
Mode 00494	-0.744276951	0	0.744276951	180	0	0	0.744276951	1	1.343585877		0
Mode 00495	-0.724226473	0	0.724226473	180	0	0	0.724226473	1	1.380783549		0
Mode 00496	-0.768383961	0	0.768383961	180	0	0	0.768383961	1	1.301432684		0
Mode 00497	-0.707180026	0	0.707180026	180	0	0	0.707180026	1	1.414067088		0
Mode 00498	-0.668736404	0	0.668736404	180	0	0	0.668736404	1	1.495357503		0
Mode 00499	-0.617442229	0	0.617442229	180	0	0	0.617442229	1	1.619584722		0
Mode 00500	-0.97371143	0	0.97371143	180	0	0	0.97371143	1	1.026998318		0
Mode 00501	-0.600899201	0	0.600899201	180	0	0	0.600899201	1	1.664172625		0
Mode 00502	-0.644215557	0	0.644215557	180	0	0	0.644215557	1	1.552275461		0
Mode 00503	-0.500933706	0	0.500933706	180	0	0	0.500933706	1	1.996272138		0
Mode 00504	-0.973611989	0	0.973611989	180	0	0	0.973611989	1	1.027103211		0
Mode 00505	-0.973611989	0	0.973611989	180	0	0	0.973611989	1	1.027103211		0
Mode 00506	-0.973611989	0	0.973611989	180	0	0	0.973611989	1	1.027103211		0
Mode 00507	-0.973611989	0	0.973611989	180	0	0	0.973611989	1	1.027103211		0
Mode 00508	-0.973611989	0	0.973611989	180	0	0	0.973611989	1	1.027103211		0
Mode 00509	-0.973611989	0	0.973611989	180	0	0	0.973611989	1	1.027103211		0
Mode 00512	-0.398574362	0	0.398574362	180	0	0	0.398574362	1	2.50894211		0
Mode 00513	-0.396545418	0	0.396545418	180	0	0	0.396545418	1	2.521779236		0
Mode 00516	-0.282527296	0	0.282527296	180	0	0	0.282527296	1	3.539481009		0
Mode 00517	-0.286631855	0	0.286631855	180	0	0	0.286631855	1	3.488795762		0
Mode 00518	-0.261935769	0	0.261935769	180	0	0	0.261935769	1	3.817729841		0
Mode 00519	-0.297757503	0	0.297757503	180	0	0	0.297757503	1	3.358437627		0
Mode 00520	-0.305826545	0	0.305826545	180	0	0	0.305826545	1	3.269827349		0
Mode 00523	-0.338765771	0	0.338765771	180	0	0	0.338765771	1	2.95189209		0
Mode 00524	-0.336474291	0	0.336474291	180	0	0	0.336474291	1	2.97199527		0
Mode 00527	-0.319899837	0	0.319899837	180	0	0	0.319899837	1	3.125978457		0
Mode 00528	-0.330434305	0	0.330434305	180	0	0	0.330434305	1	3.026320165		0
Mode 00529	-0.331530368	0	0.331530368	180	0	0	0.331530368	1	3.016314938		0
Mode 00530	-0.328422321	0	0.328422321	180	0	0	0.328422321	1	3.044860034		0
Mode 00531	-0.326929529	0	0.326929529	180	0	0	0.326929529	1	3.058763165		0
Mode 00532	-0.325953197	0	0.325953197	180	0						

SMALL SIGNAL STABILITY MTP Upd. 2020

Name	Real part 1/s	Imaginary part rad/s	Magnitude 1/s	Angle deg	Damped Frequency Hz	Period s	Damping 1/s	Damping Ratio	Damping Time Const. s	Ratio A1/A2
Mode 00547	-0.135803094	0	0.135803094	180	0	0	0.135803094	1	7.363602482	0
Mode 00548	-0.059898971	0	0.059898971	180	0	0	0.059898971	1	16.69477769	0
Mode 00549	-0.109494467	0	0.109494467	180	0	0	0.109494467	1	9.132881574	0
Mode 00550	-0.139707587	0	0.139707587	180	0	0	0.139707587	1	7.157807401	0
Mode 00551	-0.109526211	0	0.109526211	180	0	0	0.109526211	1	9.13023457	0
Mode 00552	-0.067704089	0	0.067704089	180	0	0	0.067704089	1	14.7701566	0
Mode 00553	-0.14232266	0	0.14232266	180	0	0	0.14232266	1	7.026288036	0
Mode 00554	-0.142006451	0	0.142006451	180	0	0	0.142006451	1	7.041933596	0
Mode 00555	-0.142060829	0	0.142060829	180	0	0	0.142060829	1	7.039238107	0
Mode 00556	-0.142205133	0	0.142205133	180	0	0	0.142205133	1	7.032094968	0
Mode 00557	-0.14218304	0	0.14218304	180	0	0	0.14218304	1	7.033187639	0
Mode 00558	-0.142108189	0	0.142108189	180	0	0	0.142108189	1	7.036892139	0
Mode 00559	-0.142127786	0	0.142127786	180	0	0	0.142127786	1	7.035921877	0
Mode 00560	-0.142145662	0	0.142145662	180	0	0	0.142145662	1	7.035037047	0
Mode 00561	-0.142145781	0	0.142145781	180	0	0	0.142145781	1	7.035031182	0
Mode 00562	-0.032667537	0	0.032667537	180	0	0	0.032667537	1	30.61142887	0
Mode 00563	-0.024280734	0	0.024280734	180	0	0	0.024280734	1	41.18491666	0
Mode 00564	-0.0254353	0	0.0254353	180	0	0	0.0254353	1	39.31543957	0
Mode 00565	-0.025411992	0	0.025411992	180	0	0	0.025411992	1	39.35149986	0
Mode 00566	-0.015132847	0	0.015132847	180	0	0	0.015132847	1	66.08141738	0
Mode 00567	-0.015143306	0	0.015143306	180	0	0	0.015143306	1	66.03577666	0
Mode 00568	-0.01514499	0	0.01514499	180	0	0	0.01514499	1	66.02843795	0
Mode 00569	-0.015152115	0	0.015152115	180	0	0	0.015152115	1	65.99738572	0
Mode 00570	-0.015146725	0	0.015146725	180	0	0	0.015146725	1	66.02087286	0
Mode 00571	-0.015147306	0	0.015147306	180	0	0	0.015147306	1	66.01833942	0
Mode 00572	-0.015148334	0	0.015148334	180	0	0	0.015148334	1	66.01386171	0
Mode 00573	-0.015149597	0	0.015149597	180	0	0	0.015149597	1	66.00835695	0
Mode 00574	-0.015150898	0	0.015150898	180	0	0	0.015150898	1	66.00268933	0
Mode 00575	-0.015150858	0	0.015150858	180	0	0	0.015150858	1	66.00286168	0
Mode 00576	-0.01515073	0	0.01515073	180	0	0	0.01515073	1	66.00341934	0
Mode 00577	-0.010103766	0	0.010103766	180	0	0	0.010103766	1	98.9729987	0
Mode 00578	-0.025411557	0	0.025411557	180	0	0	0.025411557	1	39.35217305	0
Mode 00579	-0.025411557	0	0.025411557	180	0	0	0.025411557	1	39.35217305	0
Mode 00580	-0.025411557	0	0.025411557	180	0	0	0.025411557	1	39.35217305	0
Mode 00581	-0.025411557	0	0.025411557	180	0	0	0.025411557	1	39.35217305	0
Mode 00582	-0.025411557	0	0.025411557	180	0	0	0.025411557	1	39.35217305	0
Mode 00583	-0.010103777	0	0.010103777	180	0	0	0.010103777	1	98.97289381	0
Mode 00584	-0.010103777	0	0.010103777	180	0	0	0.010103777	1	98.97289381	0
Mode 00585	-0.010103777	0	0.010103777	-180	0	0	0.010103777	1	98.97289381	0
Mode 00586	-0.010103777	0	0.010103777	180	0	0	0.010103777	1	98.97289381	0
Mode 00587	-0.010103777	0	0.010103777	180	0	0	0.010103777	1	98.97289381	0
Mode 00588	-0.010103777	0	0.010103777	180	0	0	0.010103777	1	98.97289381	0
Mode 00596	-1	0	1	180	0	0	1	1	1	0
Mode 00597	-1	0	1	180	0	0	1	1	1	0
Mode 00598	-1	0	1	180	0	0	1	1	1	0
Mode 00599	-1	0	1	180	0	0	1	1	1	0
Mode 00604	-1	0	1	180	0	0	1	1	1	0
Mode 00605	-1	0	1	180	0	0	1	1	1	0
Mode 00606	-100	0	100	180	0	0	100	1	0.01	0
Mode 00608	-2	0	2	180	0	0	2	1	0.5	0
Mode 00610	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00614	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00615	-100	0	100	180	0	0	100	1	0.01	0
Mode 00617	-2	0	2	180	0	0	2	1	0.5	0
Mode 00619	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00623	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00624	-100	0	100	180	0	0	100	1	0.01	0
Mode 00626	-2	0	2	180	0	0	2	1	0.5	0
Mode 00628	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00632	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00633	-100	0	100	180	0	0	100	1	0.01	0
Mode 00635	-2	0	2	180	0	0	2	1	0.5	0
Mode 00637	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00641	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00642	-100	0	100	180	0	0	100	1	0.01	0
Mode 00644	-2	0	2	180	0	0	2	1	0.5	0
Mode 00646	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00650	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00651	-100	0	100	180	0	0	100	1	0.01	0
Mode 00653	-2	0	2	180	0	0	2	1	0.5	0
Mode 00655	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00659	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00660	-100	0	100	180	0	0	100	1	0.01	0
Mode 00662	-2	0	2	180	0	0	2	1	0.5	0
Mode 00664	-0.033333333	0	0.033333333	180	0	0	0.033333333	1	30	0
Mode 00668	-0.2	0	0.2	180	0	0	0.2	1	5	0
Mode 00669	-1	0	1	180	0	0	1	1	1	0

Annex 8.J HVDC benchmark model

HVDC LCC Modelling

DlgSILENT *PowerFactory**

Abstract

This paper discusses the modelling of High-Voltage Direct Current (HVDC) Transmission Systems, in particular line-commutated (LCC) technology, for the purpose of load flow and time-domain simulation.

1 Content

This document presents a model of a HVDC system. A few simulations are performed and the results are discussed. The simulations show the steady-state effect of tap changing commutation transformers, as well as the transient response to faults in the AC network on both sides of the HVDC system.

2 Model for steady-state operation

The model is based on the IEEE benchmark model [1]. It has been constructed in DlgSILENT *PowerFactory* version 15.0 and is contained in the file "HVDC.Example.pfd". The single line diagram of the system as implemented in *PowerFactory* is shown in Figure 1.

The system has twelve-pulse thyristor converters on both the rectifier and inverter side. The 500 kV DC line has a length of 500 km and is rated at 2 kA. If the study case "0_BaseCase" is activated and a load flow

calculation performed, the user may observe that approximately 1000 MW flows through the DC link. The rectifiers set the DC current to 2 kA and the inverters set the DC voltage to 99%. The converter models include commutation transformers, which provide the 30 degree phase shift in AC voltage between the upper and lower converters. The transformers include tap changers, which, initially, have fixed positions of 1.01 on the rectifier side and 0.989 on the inverter side. The resulting voltage ratio leads to a firing angle of $\alpha = 15.2^\circ$ on the rectifier side and $\gamma = 14.6^\circ$ on the inverters side. The overlap angle on the inverter side is 23.6° . The model also includes harmonic filters. In the load-flow calculation these harmonic filters can be seen to compensate the reactive power consumption of the converters.

The study case "1_TapControl" can be activated to demonstrate the effect of automatic tap changers (installed in the commutation transformers) on the steady-state operation. The settings of the tap changers can be seen under the load flow tab of the converters' dialogue windows. The tap positions on the rectifier side are set so that the firing angle is $\alpha = 15^\circ$. The tap positions on the inverter side are set so as to lead to an extinction angle of $\gamma = 20^\circ$. For the purpose of testing the tap changers the initial tap positions have been set to 0.95 on all converters.

3 Model for time-domain simulation

The converter model used for the EMT-simulation reproduces the transients due to the six thyristor switches and their snubber

*DlgSILENT GmbH, Heinrich-Hertz-Str. 9, 72810 Gomaringen, Germany, www.digsilent.de



circuits. Either a built-in firing controller or a user-defined firing controller can be used. The built-in firing controller represents EPC (equidistant firing control). The firing angle is measured relative to an internal synchronising angle "phiref", which varies at the rate of the frequency signal that is connected to the converter model. The frequency is measured by a phase-locked loop (PLL). The model requires the commutation reactance to be entered correctly so that the internal angle "phiref" can be initialised correctly.

When either the study case "2..." or "3..." is activated then the variations "HVDC_Control" and "Lower_SCR" are activated. The former links dynamic controllers to the converter models and the latter modifies the short-circuit levels of the external AC grid elements.

The graphic "HVDC Controls" provides an overview of the controls. It shows how the converter models are linked with the dynamic controller models, phase-measurement devices and voltage & current measurement devices.

The graphic "Rect Controller" shows the dynamic model of the rectifier controller. Under normal conditions, this controller regulates the DC current to the reference "Id_ref", which is calculated from the load flow solution. In the event of a severe drop in the DC voltage the current reference is reduced through the VDCOL (voltage-dependent current-order limiter).

The graphic "Inv Controller" shows the dynamic model of the inverter controller. Under normal conditions the controller regulates the extinction angle γ to gamma_min, which is obtained from the load flow solution. In the event of a severe reduction in DC voltage the controller can switch to current-control mode. In this case the inverter regulates the DC current (to the initial current less the margin, Im).

4 Fault at the inverter side

The study case "2.Fault.InverterSide" is used to study the response of the HVDC system to a three-phase short circuit in the

AC system on the inverter side using a time-domain simulation (EMT).

After running the EMT simulation the simulation plots appear in the graphics named "\$...". The inverter phase currents in the graphic "AC Waveforms" display thyristor commutation failures (see Figure 2). The graphic "\$Rec_Ctrl" shows that the VDCOL is activated during the fault due to the reduction in the DC voltage. The rectifier controller reduces the DC current and alleviates the commutation problems on the inverter side.

5 Fault at the rectifier side

The study case "3.Fault.Rectifier Side" is used to study the response of the HVDC system to a three-phase short circuit in the AC system on the rectifier side. The response is studied using a time-domain simulation (EMT).

After running the EMT simulation the plots appear in the graphics named "\$...". The firing angle on the rectifier side reduces to the minimum value of 5 degrees, but the rectifier controller is unable to regulate the current to its set-point. The inverter controller switches to current control mode (see Figure 3). The inverter controller has a reference current equal to 90% (the initial 100% less a 10% margin). The inverter controller prevents the HVDC system from running down. When the fault clears the rectifier controller takes over current control again. After some time the inverter controller switches back to extinction-angle control.

References

- [1] M. Szechtman, T. Wess, and C.V. Thio. A benchmark model for HVDC system studies. In *International Conference on AC and DC Power Transmission*, pages 374–378. IET, 1991.

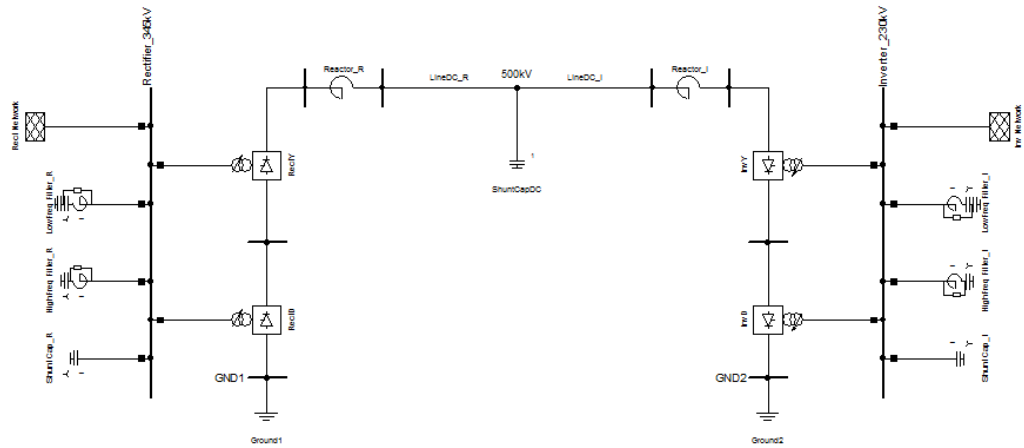


Figure 1: Single line diagram for the HVDC system as modelled in *PowerFactory*

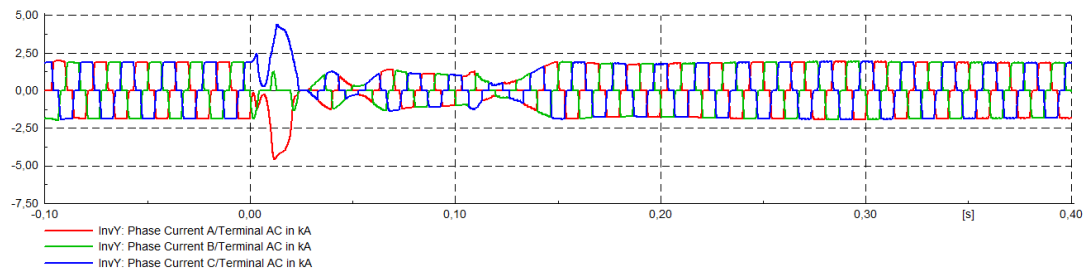


Figure 2: Commutation failure

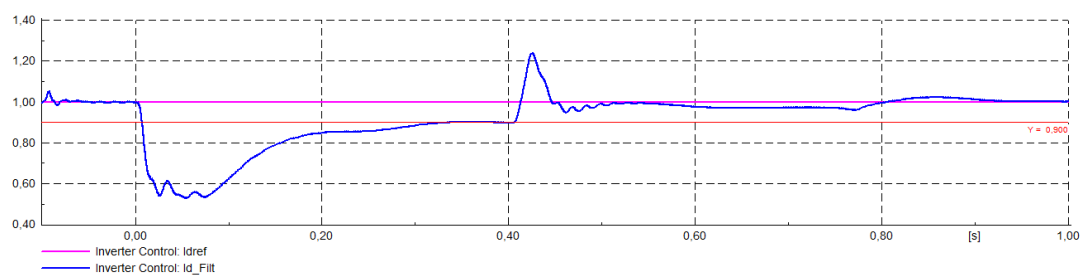


Figure 3: Current control at the inverter

ANNEX 9 INVESTMENT PLANNING – ANNEXES

Annex 9.A Power plants and transmission lines considered in investment plan

Annex Table 107: Overview of power plants considered in investment plan (incl. plants with construction start in MTP period)

#	Power plant name	Technology	Project status	Construction/rehabilitation start	period	COD / system integration	Year of rehabilitation	Capacity [MW]	CAPEX construction [MUSD]	Cost rehabilitation [MUSD]	Upfront investment [MUSD]
1	Olkaria 1 - Unit 1-3	GEO	rehabilitation	2017	3	1981	2020	44	175.1	48.4	-
2	Olkaria 1 - Unit 4-5	GEO	exists	2006	8	2014		140	471.1	na	-
3	Olkaria 2	GEO	rehabilitation	2025	3	2003	2028	101	312.6	82.3	-
4	Olkaria 3 - Unit 1-6 (OrPower4)	GEO	rehabilitation	2022	3	2000	2025	48	209.5	56.6	-
5	Olkaria 3 - Unit 7-9 (OrPower4)	GEO	exists	2004	10	2014		62	266.2	na	-
6	Olkaria 4	GEO	exists	2004	10	2014		140	471.1	na	-
7	KenGen Olkaria Wellheads I & Eburru	GEO	exists	2007	8	2015		54.8	134.0	na	-
8	Orpower Wellhead 4	GEO	exists	2007	8	2015		24	90.6	na	-
9	KenGen Olkaria Wellheads II	GEO	committed/candidate	2008	8	2016		20	48.9	na	36.7
10	Olkaria 1 - Unit 6	GEO	committed/candidate	2010	9	2019		70	252.0	na	45.4
11	Olkaria 5	GEO	committed/candidate	2008	11	2019		140	471.1	na	150.8
12	Olkaria 6	GEO	committed/candidate	2010	11	2021		140	471.1	na	47.1
13	Olkaria 7	GEO	committed/candidate	2016	11	2027		140	471.1	na	-
14	Olkaria Topping	GEO	rehabilitation	2023	3	2026		60	168.0	168.0	-
15	Olkaria 8	GEO	committed/candidate	2020	11	2031		140	471.1	na	-
16	Menengai 1 Phase I - Stage 1	GEO	committed/candidate	2009	10	2019		103	351.9	na	102.1
17	Menengai 2 Phase I - Stage 2	GEO	committed/candidate	2019	9	2028		60	222.1	na	-
18	Menengai 2 Phase I - Stage 3	GEO	committed/candidate	2020	10	2030		100	343.9	na	-
19	Menengai 2 Phase I - Stage 4	GEO	committed/candidate	2020	11	2031		200	670.0	na	-
20	Tana	HPP	rehabilitation	2007	3	1955	2010	20	68.6	16.1	-
21	Masinga	HPP	rehabilitation	2018	3	1981	2021	40	137.2	19.9	-
22	Kamburu	HPP	rehabilitation	2012	3	1975	2015	90	308.8	59.4	-
23	Gitaru	HPP	rehabilitation	2015	3	1978	2018	216	741.1	105.6	-
24	Kindaruma	HPP	rehabilitation	2005	3	1968	2008	70	241.9	46.6	-
25	Kiambere	HPP	rehabilitation	2025	3	1988	2028	164	562.6	108.3	-
26	Turkwel	HPP	rehabilitation	2028	3	1991	2031	105	360.2	69.3	-
27	Sondo	HPP	exists	1999	9	2008		60	205.8	na	-
28	Sang'oro	HPP	exists	2003	9	2012		20	68.6	na	-
29	High Grand Falls	HPP	committed/candidate	2019	9	2028		495	1,835.3	na	-
30	Karura	HPP	committed/candidate	2016	9	2025		89	328.5	na	-
31	High Grand Falls Stage 2	HPP	committed/candidate	2020	9	2029		198	62.7	na	-

#	Power plant name	Technology	Project status	Construction/rehabilitation start	period	COD / system integration	Year of rehabilitation	Capacity [MW]	CAPEX construction [MUSD]	Cost rehabilitation [MUSD]	Upfront investment [MUSD]
32	Embakasi GT	GT	exists	1995	2	1997		27	33.5	na	-
33	Embakasi GT	GT	exists	1997	2	1999		27	33.5	na	-
34	Iberafrika 1	MSD	exists	1996	1	1997		56	89.8	na	-
35	Iberafrika 2	MSD	exists	2003	1	2004		52.5	84.2	na	-
36	Kipevu 1	MSD	exists	1998	1	1999		59	94.6	na	-
37	Kipevu 3	MSD	exists	2010	1	2011		115	163.4	na	-
38	Tsavo	MSD	exists	2000	1	2001		74	114.2	na	-
39	Rabai Diesel (CC-ICE)	MSD	exists	2008	1	2009		90	155.3	na	-
40	Thika (CC-ICE)	MSD	exists	2013	1	2014		87	150.1	na	-
41	Athi River Gulf	MSD	exists	2013	1	2014		80	128.3	na	-
42	Triumph (Kitengela)	MSD	exists	2014	1	2015		77	133.1	na	-
43	Aggreko	MSD	exists	2007	1	2008		30	-	na	-
44	HVDC Ethiopia	HVDC	committed/candidate	2016	3	2019		400	507.5	na	-
45	Lamu Unit 1	Coal	committed/candidate	2015	6	2021		327	810.7	na	-
46	Lamu Unit 2	Coal	committed/candidate	2016	6	2022		327	810.7	na	-
47	Lamu Unit 3	Coal	committed/candidate	2017	6	2023		327	810.7	na	-
48	Ngong 1, Phase I	Wind	exists	2006	2	2008		5.1	10.7	na	-
49	Ngong 1, Phase II, Ngong 2	Wind	exists	2013	2	2015		20.4	41.4	na	-
50	Aeolus Kinangop	Wind	committed/candidate	2017	2	2019		60	120.6	na	-
51	Ngong 1 - Phase III	Wind	committed/candidate	2017	2	2019		10	20.2	na	-
52	Kipeto - Phase I	Wind	committed/candidate	2016	2	2018		50	100.5	na	-
53	Lake Turkana - Phase I, Stage 1	Wind	committed/candidate	2014	3	2017		100	201.0	na	30.1
54	Meru Phase I	Wind	committed/candidate	2018	2	2020		80	160.8	na	-
55	Kipeto - Phase II	Wind	committed/candidate	2017	2	2019		50	100.0	na	-
56	Lake Turkana - Phase I, Stage 2	Wind	committed/candidate	2015	3	2018		100	200.0	na	-
57	Lake Turkana - Phase I, Stage 3	Wind	committed/candidate	2016	3	2019		100	199.0	na	-
58	Generic Wind 1	Wind	committed/candidate	2020	2	2022		25	49.0	na	-
59	PV grid	PV	committed/candidate	2018	1	2019		50	80.9	na	-
60	Generic PV 1	PV	committed/candidate	2019	1	2020		5	7.8	na	-
61	SHPP FIT 2017	SHPP	committed/candidate	2013	4	2017		17	51.0	na	20.4
62	SHPP FIT 2018	SHPP	committed/candidate	2014	4	2018		7	21.0	na	2.1
63	SHPP FIT 2019	SHPP	committed/candidate	2015	4	2019		11	33.0	na	-
64	Generic SHPP 1	SHPP	committed/candidate	2019	4	2023		35.75	107.3	na	-
65	Boijoule	Biomass	committed/candidate	2013	3	2016		2	6.0	na	4.8
66	Kwale	Biomass	committed/candidate	2014	3	2017		10	30.0	na	4.5
67	Cummins	Biomass	committed/candidate	2014	3	2017		10	30.0	na	4.5
68	Generic Biomass 1	Biomass	committed/candidate	2017	3	2020		11	33.0	na	-
69	Generic Biomass 2	Biomass	committed/candidate	2018	3	2021		11	33.0	na	-
70	Generic Biomass 3	Biomass	committed/candidate	2019	3	2022		11	33.0	na	-

Annex Table 108: Overview of transmission projects considered in investment plan

#	OHL name	Start	End	Power system area	Type	# of circuits	Vol-tage [kV]	Length [km]	Construction period [years]	Specific Costs T/L [MUSD/km]	Total costs T/L [MUSD]	COD	No of Substations	Substation location(s)	Type	Specific costs (p [mUSD/km]	Total costs \$S [mUSD]
1	Isinya-Mariakani	Isinya	Mariakani	Coast		2x	400	429	5	0.48	207.98	2016	2.0	Isinya-Mariakani		18.2	36.4
2	Rabai-Voi	Rabai	Voi	Coast		1x	132	125	2	0.15	18.18	2018	1.0	Rabai	132	6	6
3	Mtwapa-Bamburi	Mtwapa	Bamburi	Coast		1x	132	24.3	1	0.15	3.53	2019	2.0	Mtwapa-Bamburi		6	12
4	Mtwapa-Kilifi	Mtwapa	Kilifi	Coast		1x	132	24.3	1	0.15	3.53	2019	1.0	Kilifi		6	6
5	Galun-Lunga	Galun	Lunga	Coast		1x	132	60	1	0.15	8.73	2019	1.0	Lunga		6	6
6	Garsen-Hola	Garsen	Hola	Coast		1x	220	96	1	0.19	18.62	2019	1.0	Hola		10.95	10.95
7	Garissa-Hola	Garissa	Hola	Coast		1x	220	144	2	0.19	27.92	2019	1.0	Garissa		10.95	10.95
8	Lamu-Nbeast	Lamu	Nbeast	Coast		2x	400	520	6	0.48	252.10	2020	2.0	Lamu-Nbeast		18.2	36.4
9	Voi-Taveta	Voi	Taveta	Coast		1x	132	107	2	0.15	15.56	2020	1.0	Taveta		6	6
10	Wajir-Garissa	Wajir	Garissa	Coast		1x	132	330	4	0.15	48.00	2020	2.0	Wajir-Garissa		6	12
11	Generic 132kV 1 link load centers			Generic 132kV 1		1x	132	200	2	0.15	29.09	2019	2.0	Generic 132kV 1 link load centers	132	6	12
12	Generic 132kV 2 link load centers			Generic 132kV 2		1x	132	200	2	0.15	29.09	2020	2.0	Generic 132kV 2 link load centers	132	6	12
13	Kindaruma-Mwingi	Kindaruma	Mwingi	Mt Kenya		1x	132	32	1	0.15	4.65	2016	1.0	Mwingi		6	6
14	Mwingi-Garissa	Mwingi	Garissa	Mt Kenya		1x	132	192	2	0.15	27.92	2016	-	-		-	-
15	Kieni-Ishara	Kieni	Ishara	Mt Kenya		1x	132	33	1	0.15	4.80	2016	2.0	Kieni-Ishara		6	12
16	Nanyuki-Isiolo	Nanyuki	Isiolo	Mt Kenya		1x	132	64	1	0.15	9.31	2016	1.0	Isiolo		6	6
17	Isiolo-Meru WF	Isiolo	Meru WF	Mt Kenya		2x	132	20	1	0.18	3.64	2017	1.0	Meru WF		6	6
18	Mwingi-Kitui	Mwingi	Kitui	Mt Kenya		1x	132	30	1	0.15	4.36	2017	1.0	Kitui		6	6
19	Kitui-Sultan Hamud	Kitui	Sultan Hamud	Mt Kenya		1x	132	86	1	0.15	12.51	2017	-	-		-	-
20	Wote-Sultan Hamud	Wote	Sultan Hamud	Mt Kenya		1x	132	41	1	0.15	5.96	2017	1.0	Wote		6	6
21	Kamburu-Kiganjo/via Kutus	Kamburu	Kiganjo/via Kutus	Mt Kenya		1x	132	90	1	0.15	13.09	2018	2.0	Kiganjo/via Kutus	132	6	12
22	Meru-Maua	Meru	Maua	Mt Kenya		1x	132	50	1	0.15	7.27	2019	1.0	Maua		6	6
23	Chogoria-Ishara	Chogoria	Ishara	Mt Kenya		1x	132	40	1	0.15	5.82	2019	1.0	Chogoria		6	6
24	No OHL/Nanyuki substation	Nanyuki substation		Mt Kenya								2019	1.0	Nanyuki	132	6	6
25	Ulu-Konza	Ulu	Konza	Nairobi		1x	132	20.5	1	0.15	2.98	2016	1.0	Konza		6	6
26	Sultan Hamud-Konza	Sultan Hamud	Konza	Nairobi		1x	132	60	1	0.15	8.73	2016	-	-		-	-
27	Isinya-Athi River	Isinya	Athi River	Nairobi		2x	220	7.5	1	0.24	1.82	2016	1.0	Athi River		10.95	10.95
28	Dandora-Komorock	Dandora	Komorock	Nairobi		2x	220	3	1	0.24	0.73	2016	1.0	Komorock		10.95	10.95
29	Konza-Machakos	Konza	Machakos	Nairobi		1x	132	20	1	0.15	2.91	2016	1.0	Machakos		6	6
30	Konza-Kajiado	Konza	Kajiado	Nairobi		1x	132	55	1	0.15	8.00	2016	-	-		-	-
31	Kajiado-Namanga	Kajiado	Namanga	Nairobi		1x	132	90	1	0.15	13.09	2016	1.0	Namanga		6	6
32	Kajiado-Isinya	Kajiado	Isinya	Nairobi		1x	132	10	1	0.15	1.45	2017	2.0	Kajiado-Isinya		6	12
33	Konza-Isinya	Konza	Isinya	Nairobi		1x	132	35	1	0.15	5.09	2017	-	-		-	-
34	Isinya-Dandora	Isinya	Dandora	Nairobi		2x	220	34	1	0.24	8.24	2017	-	-		-	-
35	Isinya-Kipeto	Isinya	Kipeto	Nairobi		1x	220	30	1	0.19	5.82	2017	1.0	Kipeto		10.95	10.95
36	Suswa-Isinya	Suswa	Isinya	Nairobi		2x	400	100	1	0.48	48.48	2017	1.0	Suswa-Isinya		18.2	18.2
37	Isinya-Arusha	Isinya	Arusha	Nairobi		2x	400	100	1	0.48	48.48	2017	-	Arusha		-	-
38	Dandora-Nbeast	Dandora	Nbeast	Nairobi		2x	220	15	1	0.24	3.64	2018	1.0	Dandora	220	10.95	10.95
39	Matasia-Ngong	Matasia	Ngong	Nairobi		2x	220	25	1	0.24	6.06	2018	1.0	Matasia		10.95	10.95
40	Suswa-Loiyangalani	Suswa	Loiyangalani	Western		2x	400	430	5	0.48	208.46	2017	2.0	Suswa-Loiyangalani		18.2	36.4
41	Olkaria I-Narok	Olkaria I	Narok	Western		1x	132	68	1	0.15	9.89	2016	1.0	Narok		6	6
42	Olkaria II-Lessos	Olkaria II	Lessos	Western		2x	220	203	3	0.24	49.21	2017	1.0	Lessos		10.95	10.95
43	Kabarnet-Rumuruti	Kabarnet	Rumuruti	Western		1x	132	90	1	0.15	13.09	2018	1.0	Kabarnet		6	6
44	Olkaria I-Narok	Olkaria I	Narok	Western		1x	132	68	1	0.15	9.89	2018	-	-		-	-
45	No OHL/Nakuru substation	Nakuru substation		Western								2019	1.0	Nakuru substation	132	6	6
46	Eldoret-Kitale	Eldoret	Kitale	Western		1x	132	60	1	0.15	8.73	2016	1.0	Kitale		6	6
47	Lessos-Kabarnet	Lessos	Kabarnet	Western		1x	132	65	1	0.15	9.45	2016	-	-		-	-
48	Turkwel-Kainuk	Turkwel	Kainuk	Western		1x	220	10	1	0.19	1.94	2016	1.0	Kainuk		10.95	10.95
49	Kainuk-Ortum	Kainuk	Ortum	Western		1x	220	80	1	0.19	15.51	2016	1.0	Kainuk-Ortum		10.95	10.95
50	Ortum-Kitale	Ortum	Kitale	Western		1x	220	65	1	0.19	12.60	2016	2.0	Ortum-Kitale		10.95	21.9
51	Lessos-Kisumu	Lessos	Kisumu	Western		2x	220	103	2	0.24	24.97	2017	1.0	Kisumu		10.95	10.95
52	No OHL/Eldoret substation	Eldoret substation		Western								2019	1.0	Eldoret substation	132	3.3	3.3
53	Lessos-Tororo	Lessos	Tororo	Western		2x	400	127	2	0.48	61.57	2016	1.0	Lessos		18.2	18.2
54	Kisii-Awendo	Kisii	Awendo	Western		1x	132	44	1	0.15	6.40	2016	1.0	Awendo		6	6
55	Bomet-Sotik	Bomet	Sotik	Western		1x	132	33	1	0.15	4.80	2016	1.0	Bomet		6	6
56	Sondu-Homa Bay	Sondu	Homa Bay	Western		1x	132	70	1	0.15	10.18	2018	1.0	Homa Bay		6	6
57	Homa Bay-Ndhiwa	Homa Bay	Ndhiwa	Western		1x	132	15	1	0.15	2.18	2018	1.0	Ndhiwa		6	6
58	Awendo-Ndhiwa	Awendo	Ndhiwa	Western		1x	132	15	1	0.15	2.18	2018	-	-		-	-
59	Awendo-Isabania	Awendo	Isabania	Western		1x	132	50	1	0.15	7.27	2018	1.0	Isabania		6	6
60	Bomet-Narok	Bomet	Narok	Western		2x	132	88	1	0.18	16.00	2018	-	-		-	-
61	No OHL/Lessos substation	Lessos substation		Western								2019	1.0	Lessos substation	132	6	6
62	No OHL/Muhoroni substation	Muhoroni substation		Western								2019	1.0	Muhoroni substation	132	6	6
63	No OHL/Kisumu Kisii substations	Kisumu Kisii substation		Western								2019	2.0	Kisumu substation	132	3.3	6.6
64	Menengai-Nakuru West	Menengai	Nakuru West	Western		2x	132	15	1	0.18	2.73	2016	1.0	Menengai		6	6
65	Suswa-Ngong	Suswa	Ngong	Western		2x	220	50	1	0.24	12.12	2016	1.0	Ngong		10.95	10.95
66	Rumuruti-Nanyuki	Rumuruti	Nanyuki	Western		1x	132	79	1	0.15	11.49	2017	1.0	Rumuruti		6	6
67	Naivasha-Aeolus	Naivasha	Aeolus	Western		1x	132	30	1	0.15	4.36	2017	1.0	Aeolus		6	6
68	Rumuruti-Maralal	Rumuruti	Maralal	Western		1x	132	148	2	0.15	21.53	2018	1.0	Maralal		6	6
69	Nyahururu-Rumuti	Nyahururu	Rumuti	Western		1x	132	20	1	0.15	2.91	2018	1.0	Nyahururu		6	6
70	No OHL/Chemosit substation	Chemosit substation		Western								2019	1.0	Chemosit substation	132	6	6
71	No OHL/Musaga substation	Musaga substation		Western								2019	1.0	Musaga substation	132	6	6
72	No OHL/Rangala substation	Rangala substation		Western								2019	1.0	Rangala substation	132	6	6

Annex 9.B Investment plan results – details

Annex Table 109: Investment plan – supported funding scenario, 3% inflation

		LTP	MTP	Share MTP / LTP	Discount Factor	1.00	0.89	0.80	0.71	0.64	0.57
		2015-2035	2015-2020			1	2	3	4	5	6
Cost Item		Total	Total			2015	2016	2017	2018	2019	2020
Generation	Expansion	27,021,882	7,074,300	26%		499,517	845,132	1,586,993	1,818,636	1,226,636	1,097,386
	Rehabilitation	929,120	202,650	22%		16,844	75,791	35,337	40,290	28,798	5,591
	Total	27,951,002	7,276,950	26%		516,362	920,923	1,622,330	1,858,925	1,255,434	1,102,977
Transmission	T/L	3,156,991	1,282,641	41%		376,869	344,730	219,229	185,768	119,557	36,489
	S/S	1,521,683	583,985	38%		180,809	114,952	113,025	111,832	48,313	15,053
	Total	4,678,674	1,866,626	40%		557,678	459,682	332,254	297,600	167,870	51,543
Distribution		8,183,039	1,256,471	15%		114,931	150,058	275,512	259,280	211,711	244,978
OVERALL INVESTMENT		40,812,714	10,400,046	25%		1,188,970	1,530,662	2,230,096	2,415,805	1,635,015	1,399,498
Present Value (PV)		15,365,017 kUSD	7,886,168 kUSD	51%		1,188,970	1,366,663	1,777,819	1,719,522	1,039,082	794,112
@ Discount Factor		12%	12%								
Extreme Investment	MAX	3,045,996	2030	2,415,805	2018						
	MIN	817,773	2035	1,188,970	2015						

Annex Table 110: Investment plan – commercial funding scenario, 3% inflation

		LTP	MTP	Share MTP / LTP	Discount Factor	1.00	0.89	0.80	0.71	0.64	0.57
		2015-2035	2015-2020			1	2	3	4	5	6
Cost Item		Total	Total			2015	2016	2017	2018	2019	2020
Generation	Expansion	28,343,064	7,372,650	26%		516,620	875,682	1,639,002	1,895,095	1,281,002	1,165,249
	Rehabilitation	960,200	209,429	22%		17,145	77,432	37,548	41,149	30,139	6,016
	Total	29,303,264	7,582,079	26%		533,764	953,114	1,676,550	1,936,244	1,311,141	1,171,266
Transmission	T/L	3,249,292	1,330,640	41%		390,801	356,288	226,064	193,233	126,814	37,439
	S/S	1,562,400	600,120	38%		185,891	118,185	115,755	115,007	49,838	15,445
	Total	4,811,692	1,930,760	40%		576,692	474,473	341,819	308,240	176,652	52,884
Distribution		8,328,953	1,278,875	15%		116,981	152,734	280,425	263,903	215,486	249,347
OVERALL INVESTMENT		42,443,909	10,791,714	25%		1,227,437	1,580,321	2,298,794	2,508,387	1,703,279	1,473,497
Present Value (PV)		15,972,012 kUSD	8,175,008 kUSD	51%		1,227,437	1,411,001	1,832,585	1,785,420	1,082,465	836,102
@ Discount Factor		12%	12%								
Extreme Investment	MAX	3,172,282	2030	2,508,387	2018						
	MIN	833,014	2035	1,227,437	2015						

* * *