Energy & Petroleum Regulatory Authority

ENERGY & PETROLEUM STATISTICS REPORT 2019

FOREWORD

This Energy Statistics Report 2018 is the first in a series of annual reports on statistics and data for the energy, oil and gas sectors in Kenya. The Report provides a summary of data, key developments and emerging issues in electricity, renewable energy and Petroleum and Gas.

The Energy and Petroleum Regulatory Authority (EPRA) is an independent energy and petroleum regulator established under the Energy Act, 2019 and is responsible for economic and technical regulation of the electricity, renewable energy and petroleum sub-sectors. Among the key mandates of the Authority pursuant to section 10 (jj) of the Energy Act, 2019 is to collect and maintain energy data.

Kenya's Energy Sector has experienced tremendous growth and development since independence with paradigm shifts occurring over time in the regulations and structures of utilities in both the electricity and petroleum sub-sectors. The country has emerged as a leader in promotion of renewable energy in Africa and beyond. The guiding policies and regulatory frameworks that have led to a revamped and highly effective energy sector include the Sessional Paper No. 4 of 2004, Vision 2030, the Energy Act 2006, (superseded by the Energy Act, 2019) and the Petroleum Act, 2019. These statutes have not only guided investments in the sector, but also enhanced sector regulation, efficiency, energy security and sustainable development.

The Authority will be publishing subsequent energy statistics reports on a yearly basis to provide industry data on the sector and to inform decision-making. Energy information is key in informing investment, policy and regulatory decision on changes in infrastructure, regulations and the performance and state of competition within the sector. It provides insights into available investment opportunities within the sector and aids in the appreciation of major milestones that have taken place.

The year 2018 witnessed development and commissioning of new infrastructure in the Energy Sector. The key highlights within the Electricity sub-sector was the completion and commissioning of the largest private sector-led wind farm in Africa, the Lake Turkana Wind Power with an additional installed capacity of 310MW to the national grid and the Garissa 54.5MW Solar Power Plant by the Rural Electrification and Renewable Energy Corporation (REREC). This has not only increased the share of renewable energy generation but also improved the Independent Power Producers (IPPs), rising from 30% to 38% in terms of installed electricity capacity. In the Petroleum sub-sector, commissioning of the 20-inch Mombasa Nairobi Pipeline, dubbed "Line 5", and additional storage tanks at the Kenya Pipeline Company (KPC) took place. This is not only bound to increase the Pipeline capacity, as Road transportation stood at 80:20, but also reduce the cost of demurrage and subsequently, the cost of petroleum retail prices. The upstream sector has also experienced new development with more exploration, drilling initiatives and preparations on the Early Oil Pilot Scheme (EOPS).

With regard to electricity access, the rate of connectivity stands at 74.7% making the country one of the global leaders in increasing electrification. Only Vietnam and Myanmar have achieved such performance before. The peak demand increased to 1,859 MW in November 2018 against an installed capacity of 2,712 MW. This progress is attributed to major initiatives in the last mile connectivity programme and energy investment programmes in line with Vision 2030.

It is my hope this report will provide critical information and statistics in the energy and gas sectors in the country to enhance the quality of decision-making. I am convinced that the Report will be a key guide to investors and the public on major developments and emerging issues in the energy sector in Kenya for the prosperity and wealth of the nation and her people.

Mr. Pavel Robert Oimeke, EBS
Director General

Table of Contents

List of Tables

List of Figures

ABBREVIATIONS AND ACRONYMS

AGO	Automotive Gas Oil
AGOL	Africa Gas and Oil Limited
CAK	Competition Authority of Kenya
CBR	Central Bank Rates
CMA	Capital Markets Authority
EAC	East African Community
EOPS	Early Oil Piloting Scheme
EPRA	Energy and Petroleum Regulatory Authority
ERC	Energy Regulatory Commission
FCC	Fuel Cost Charge
FERFA	Foreign Exchange Rate Fluctuation Adjustment
GDP	Gross Domestic Product
GHG	Green House Gases
GWh	Gigawatt-hour
HHI	Herfidahl Hirschman Index
IPP	Independent Power Producer
KETRACO	Kenya Electricity Transmission Company
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
KOT	Kipevu Oil Terminal
KPA	Kenya Ports Authority
KPC	Kenya Pipeline Company
KRA	Kenya Revenue Authority
LPG	Liquefied Petroleum Gas
LTWP	Lake Turkana Wind Power
MWh	Megawatt-hour
NOCK	National Oil Corporation of Kenya
NSC	Network Service Contract
PPA	Power Purchase Agreement
PPPs	Public Private Partnerships
REREC	Rural Electrification and Renewable Energy Corporation
SOT	Shimanzi Oil Terminal

1.
INTRODUCTION AND BACKGROUND

1. The Energy and Petroleum Regulatory Authority (EPRA) is established under the Energy Act, 2019 as a single sector regulatory agency responsible for economic and technical regulation of the electricity, renewable energy and petroleum sub-sectors. The core mandates of the Authority include; tariff setting and review, licensing, enforcement, dispute resolution and approval of Power Purchase Agreements (PPAs) and Network Service Contracts. The Authority is also mandated to oversee regulation of the upstream petroleum and gas sectors.

2. One of the Authority's key objectives and functions as provided with regard to Section 10(ii) and 10(jj) of the Energy Act, 2019 is to monitor, ensure implementation and observance of the principles of fair competition in the energy sector in coordination with statutory authorities and provide such information and statistics to the Cabinet Secretary as may be required from time to time. The Authority is also charged with collection and maintenance of energy data.

3. In the financial year 2018/19, the Authority committed to commence preparation of the Energy Statistics Report, 2018 for publication after undergoing Board approval. The Director General in the middle of the year approved a comprehensive data template that will enable accurate recording of data and presentation in line with international best practices. The template has been beneficial in the preparation of this report. With transition from ERC to EPRA, the Energy Statistics Report will be updated to capture more information on upstream petroleum and energy emission-related statistics.

4. The key statistics captured in this report include energy supply, energy demand, energy balance, energy prices, competition and market shares, energy trading, energy indicators and emissions from the energy sector.

5. Data on the electricity sub-sector include: the monthly pass-through costs, energy generation, generation costs, tariff evolution, generation expansion and peak demand trends. In the petroleum sub-sector, the data captured includes monthly pump prices, infrastructure expansion and the upstream licensing of business operators.

6. The Energy Statistics Report for the year 2018 therefore provides key data to inform policy makers, the public, investors, academia and consumers on key trends in energy consumption, supply, and new emerging issues. The report captures key statistics in electricity, petroleum and renewable energy subsectors and emerging issues on greenhouse gases including the Grid Emission Factor. These statistics will enable the Authority to continue to develop and implement facilitative frameworks in line with achieving the nation's Big Four (4) Agenda and subsequently, Vision 2030.

7. Energy is regarded as a major enabler in the development of the Kenyan economy. For the country to experience economic growth and better quality life for its citizens, access to adequate and reliable energy supply is imperative.

8. Kenya's energy sources consist of imported fossil fuels and renewable energy sources which include biomass, hydro, geothermal, solar and wind.

9. The overall goal of the energy sector is to provide the affordable, sustainable and reliable supply of energy that will stimulate high and sustained economic growth leading to higher incomes, increased employment and reduced poverty levels.

10. Kenya is endowed with renewable energy resources including wind, solar and geothermal. With full exploitation of these resources, Kenya can achieve full transition to renewable energy utilisation.

11. The discovery and exploitation of oil and gas in the country will add impetus to the country's

economic growth, speed up reduction of inflation, strengthen the local currency and thus increase the country's purchasing power for imports.

1.1 The Kenyan Economy

12. The report captures statistics in the energy sector for the year 2018. Provisional estimates of Gross Domestic Product (GDP) indicate that the economy expanded by 5.7% during the year compared to 4.8 % in the year 2017.

13. Devolution has become the biggest gain from the Constitution of Kenya, 2010, which ushered in a new political and economic governance system. It is transformative and has promoted greater investments at the grassroots and strengthened accountability and public service delivery at local levels.

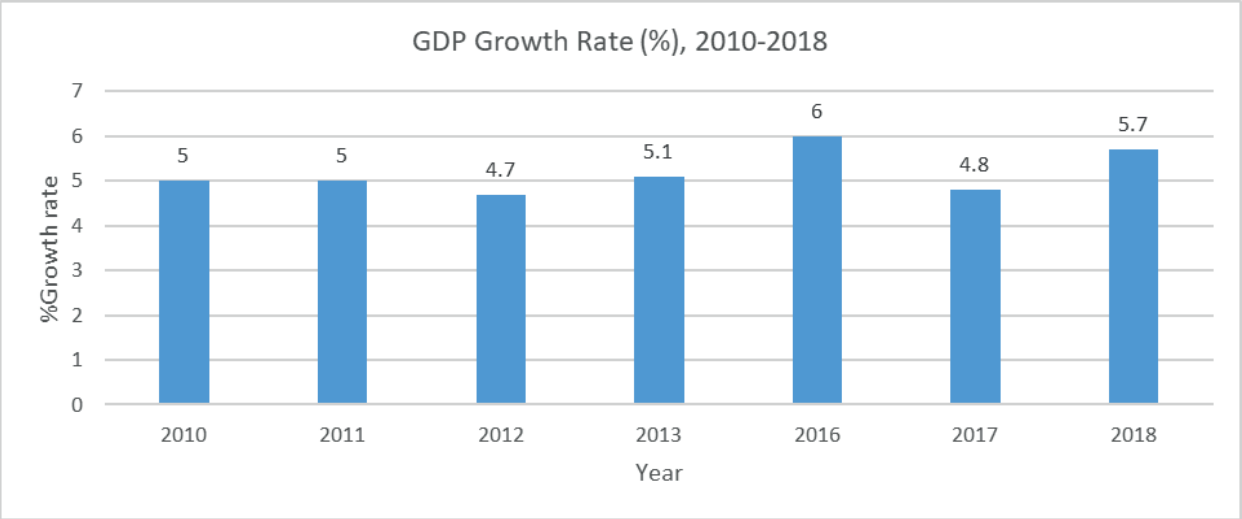
14. While economic activity faltered following the 2008 global economic recession, growth resumed in the last ten years reaching 5.7% in 2018 placing Kenya as one of the fastest growing economies in sub-Saharan Africa. The economy has been boosted by a stable macroeconomic environment, low oil prices, a rebound in tourism, strong remittance inflows and a government-led infrastructure development initiative.

15. Generally, key macroeconomic indicators were largely favorable to growth during the period under review. Interest rates declined after the Central Bank Rate (CBR) was reviewed downwards from 10% to 9% in 2018. In the money market, the Kenya Shilling recorded mixed performance against its major trading currencies. The current account balance as a percentage of GDP, narrowed from 6.7% in 2017 to 5.8% in 2018. There was a significant decrease in inflation that averaged at 4.35% during the year 2018 as compared to an average of 8.0% experienced during the year 2017. The slowdown in inflation was mainly influenced by lower food prices during the period under review.

16. Performance across the various sectors of the economy varied widely. From the supply side, growth was mainly driven by a recovery in activities of agriculture as well as improved output in wholesale and retail trade, manufacturing and real estate sectors. On the other hand, the finance and insurance, transportation and storage, construction, electricity supply, mining and quarrying sectors recorded a marked slowdown in growth. Growth of activities in information and communication was robust while it slowed down significantly in the hospitality industry, but remained relatively strong.

17. According to the World Bank, looking ahead, near-term gross domestic product (GDP) growth is expected to rise to 5.8% in 2019 underpinned by recovery in agriculture, better business sentiment, and easing of political uncertainty. Medium-term GDP growth should rebound to 5.8% in 2019 and 6.0% in 2020 respectively dependent on growth in private sector credit, continued strong remittance flows, prudent management of public debt and expenditure and reduction in global oil prices. In the long-term, adoption of prudent macroeconomic policies will safeguard Kenya's robust economic performance. This includes implementation of fiscal and monetary prudence and lowering deficit down to 4.3% by FY19/20 as per the Medium-Term Fiscal Framework. The fiscal consolidation needs to avoid compromising public investments in critical infrastructure key to unlocking the economy's productive capacity.

Figure 1: GDP Growth Rates, 2010-2018



Source: KNBS, Various Publications

2.
THE ELECTRICITY SUB-SECTOR

18. The electricity sub-sector in Kenya has witnessed various reforms that have led to efficiency and revamped competition in the sector. Electricity generation is completely unbundled with increased private sector participation while electricity transmission is undertaken by both Kenya Power and the Kenya Electricity Transmission Company (KETRACO). The distribution segment is mainly carried out by the Kenya Power. However, a number of mini-grids have been licensed to supply to customers in marginalised areas and selected gated communities.

2.1 Installed Electricity Capacity in Kenya

19. The installed electricity capacity in Kenya has increased from 1,723MW in 2013 to 2,712MW by end of December 2018 while the total effective capacity was 2,642.9MW. The effective interconnected capacity was 2,247MW. It is notable that the proportion of geothermal power capacity has increased to 28.8% of the total effective capacity compared to 14.8% in 2013. This has significantly reduced dependence on generation from hydropower plants and displaced thermal power generation that has considerable fuel energy costs and associated effects on the economy. Table 1 below provides a profile of installed and effective capacity in Kenya from 2013 to 2018.

Table 1: Installed and Effective Capacity (MW)

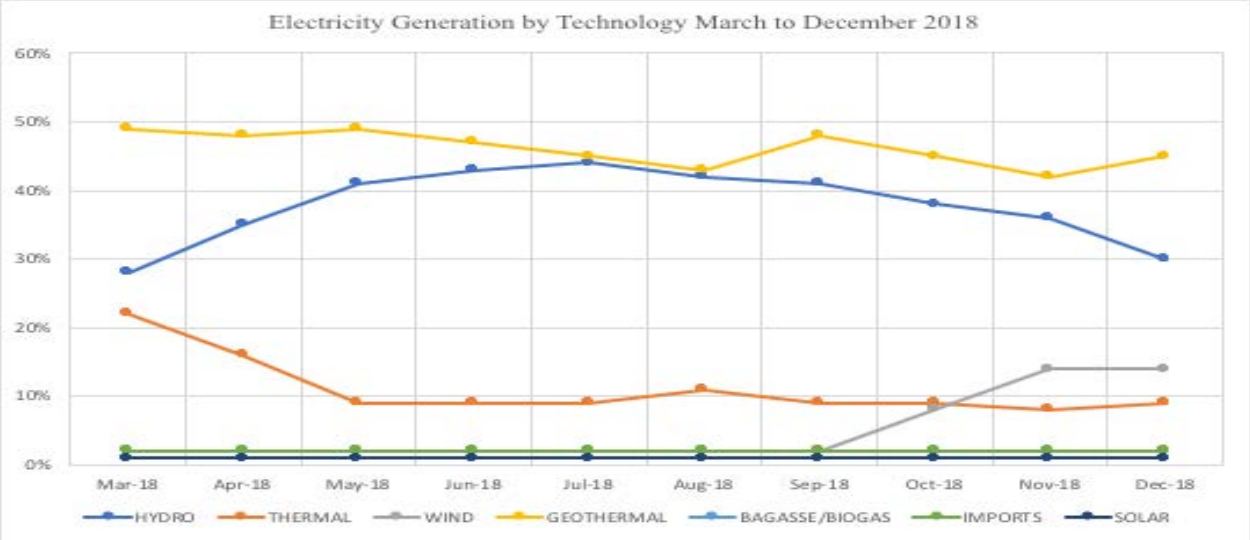
	Installed Capacity							Effective Installed Capacity						
Year	Hydro	Thermal Oil	Geo - thermal	Wind	Co - gene- ration	Solar	Total	Hydro	Thermal Oil	Geo thermal - al	Wind	Co - gene - ration	Solar	Total
2013	812.3	714.4	241.8	26.3	26		1820.8	766.6	693.2	236.5	5.3	21.5		1,723.1
2014	818.3	751.3	573.4	26.3	26.0	-	2195.3	797.5	712.6	558.0	5.3	21.5		2,094.9
2015	820.4	833.6	627.0	26.1	26.0	0.6	2333.7	799.5	799.2	619.0	26.1	21.5	0.2	2,263.3
2016	818.7	801.6	652.0	26.1	28.0	0.6	2327.0	797.5	762.9	644.0	26.0	23.5	0.2	2,254.1
2017	826.2	806.9	652.0	26.1	28.0	0.7	2339.9	805.0	765.8	644.0	25.5	23.5	0.6	2,264.4
2018	826.2	807.7	663	336.1	28	50.7	2711.7	805.0	768.2	655.0	335.5	23.5	50.6	2,637.8

Source: EPRA, Kenya Power, Various Publications.

2.2 Power Generation

20. This sub-section of the report provides an analysis of statistics on electric power generation in 2018. The contribution from hydropower generation declined from 44.0% in July 2018 to 29.8% in December 2018. Thermal power generation decreased from 26.3% in January to 9.6% in December of the same year. This is due to the acceleration of renewable energy adoption especially geothermal, wind and solar to substitute the costly thermal plants and therefore reduce the cost of electricity. Geothermal power generation keeps on fluctuating but still remains the highest contributor. Wind power generation significantly increased from 0.3% in January to 14% in December 2018. This is mainly attributed to the injection of additional wind power from Lake Turkana Wind Power Plant from September 2018. Figure 2 below provides an analysis of the electricity generation mix by technology.

Figure 2: Generation Trend by Technology (March-December, 2018)

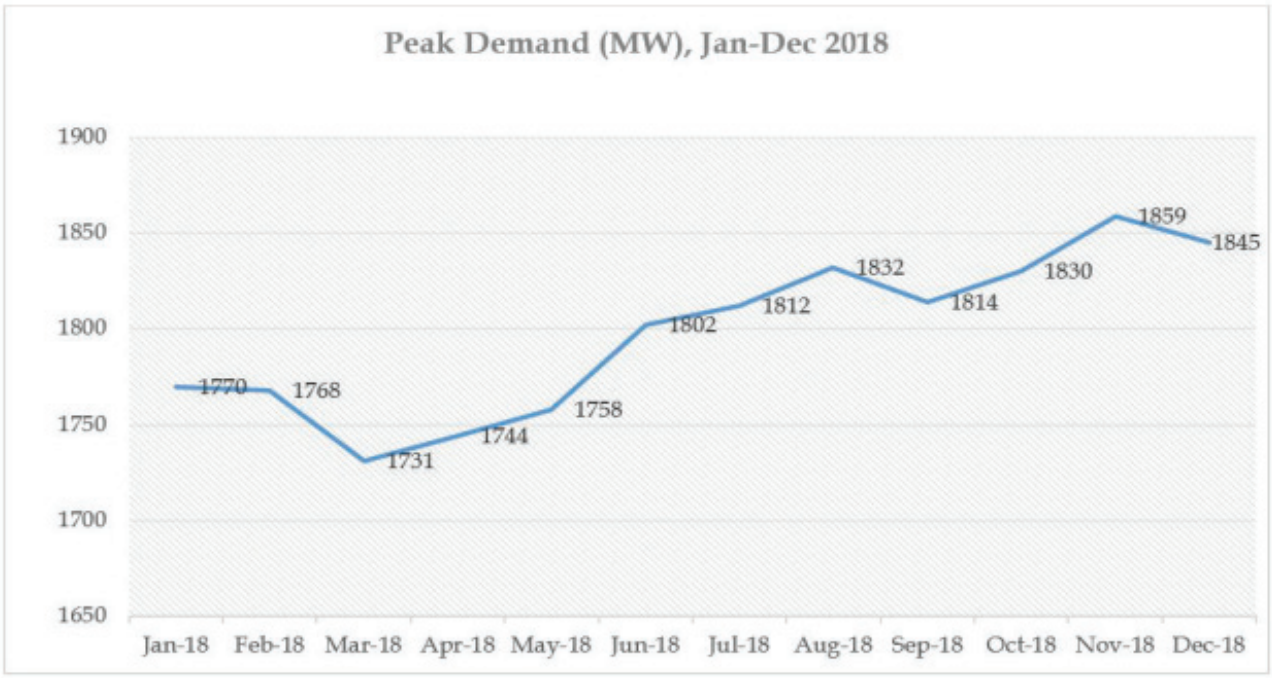


Source: Own Computation based on EPRA and KPLC Data

2.3 Analysis of Electricity Peak Demand

21. Analysis of electricity demand shows that it has been increasing over time. The peak demand was recorded at 1,770MW in January 2018 against a total installed capacity of 2,642.9 MW as shown in Figure 3. Despite a general election in 2017 and a repeat of the presidential vote, electricity consumption was resilient and recorded another peak of 1,859MW in November 2018. The increase in peak demand is attributed to confidence in the Kenyan economy and initiatives to increase connectivity through the Last Mile Connectivity Programme.

Figure 3: Peak Demand MW (Jan-Dec 2018)

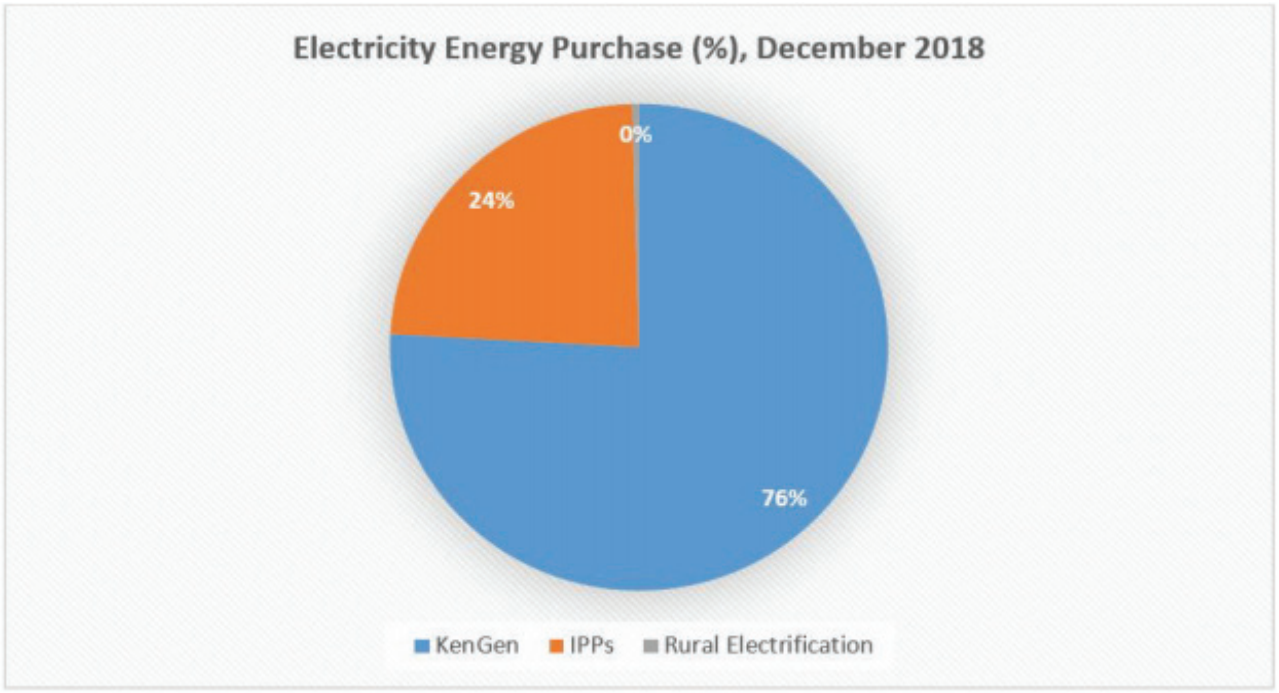


Source: EPRA, 2019

2.4 Competition Analysis and Market Share Data

22. This sub-section of the report provides data on market share and competition analysis. The structure and share of power generation in 2017/18 remains in favor of KenGen with a 76% share compared to the share of IPPs at 24%.

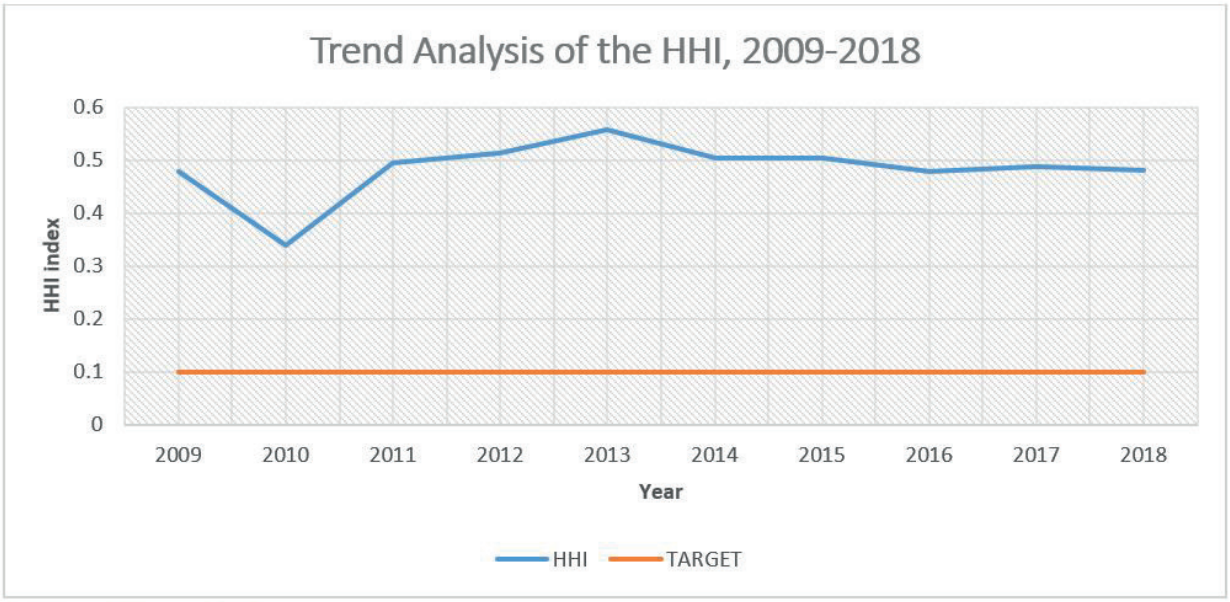
Figure 4: Share of Electricity Power Purchase (%), 2017/18



Source: EPRA, 2019

23. The Herfindahl-Hirschman Index (HHI) is a commonly accepted measure of market concentration. It is calculated by squaring the market share of each firm competing in a market and then summing up the resulting numbers. It can range from close to zero to 10,000. During the 2018 period, the HHI index in the electricity sub sector was 0.482, which is lower compared to 0.559 that was recorded in 2013. This indicates that concentration of activities within the industry declined because of increased competition. Lake Turkana Wind Power has increased competition in the power sector as the generation segment had previously been dominated by KenGen despite the high number of IPPs participating in power generation.

Figure 5: HHI Trend 2009-2018



Source: EPRA

2.5 Evolution of Electricity Tariffs

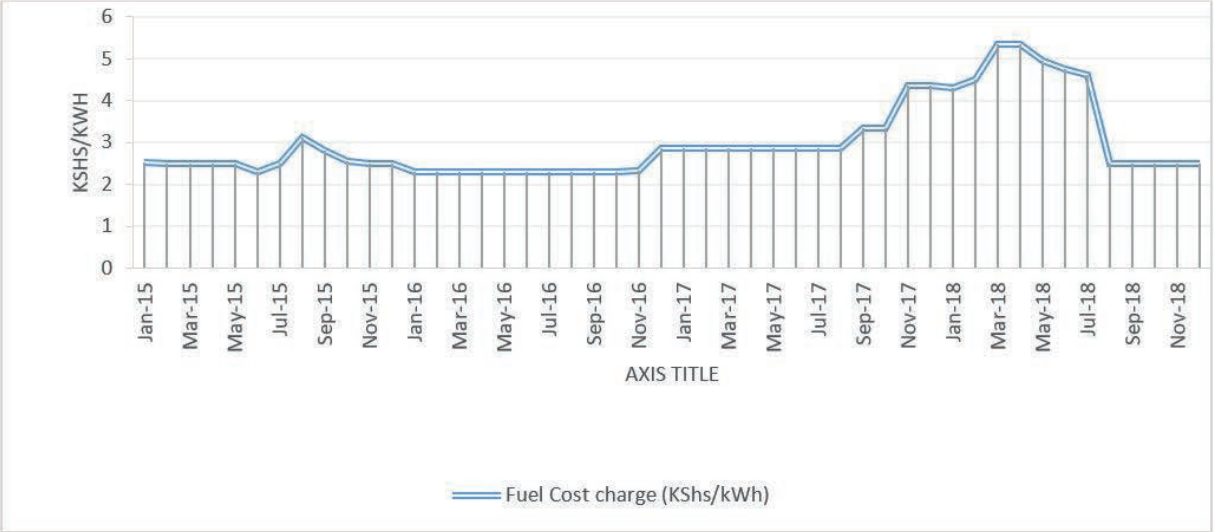
24. The evolution of electricity retail tariffs has had mixed performance. The electricity tariff mainly comprises the non-fuel tariffs, value added tax (VAT), levies and pass-through costs: Fuel Cost Charge (FCC), Foreign Exchange Rates Fluctuations Adjustments (FERFA), Water Resource Management Authority (WARMA) levy and Inflation Adjustments and taxes.

25. The monthly fuel cost pass through charges are managed by EPRA as approved in the electricity retail tariffs. The FCC rate is computed monthly, but the applicable charge is set at an agreed level to mitigate against any sharp increases in electricity prices. In this regard, when the computed FCC is above the set cost, the charge to customers is maintained at the set cost and any amount not recovered by the generating company is recovered in subsequent months during periods of improved hydrology when the FCC falls below the set cost.

2.5.1 The Fuel Energy Charge

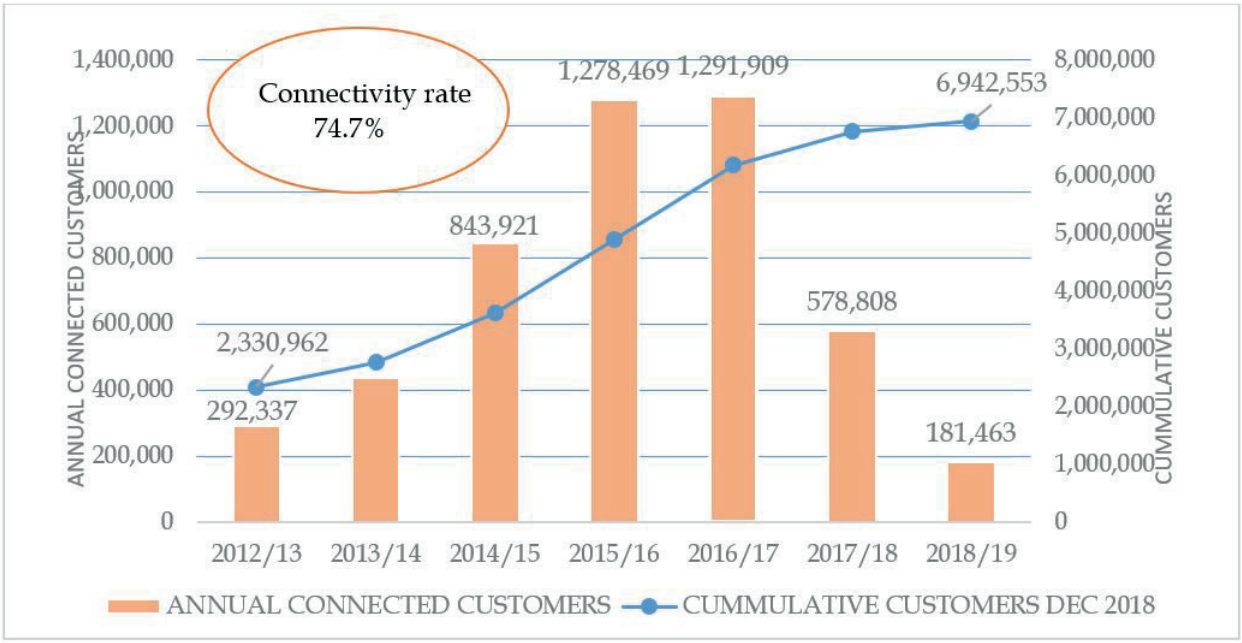
26. Despite variations in crude oil prices, dam levels and fluctuations in foreign exchange rates, the FCC remained fairly stable between January 2015 and November 2018 as shown in figure 6. The approved FCC increased to 3.35 Ksh/kWh applied in September 2017 and October 2017. Thereafter, the FCC increased to 4.35 Ksh/kWh in November 2017. In the month of January 2018, the FCC reduced to 4.30 Ksh/kWh and then increased to 4.51 Ksh/kWh in February 2018 due to low hydrology. FCC increased to 5.35 Ksh/kWh in March and April 2018. In May, June and July 2018 FCC declined to 4.95 Ksh/kWh, 4.75 Ksh/kWh and 4.6 Ksh/kWh respectively. From August to December 2018 the FCC remained constant at 2.5 Ksh/kWh.

Figure 6: Fuel Cost Charge (Ksh/kWh) Jan-2015 to Nov-2018



Source: EPRA

Figure 7: Cumulative Connectivity Rate by End of December 2018



Source: EPRA

Table 2: Number of Customers Per Tariff Category

TARIFF CATEGORY	2013/14	2014/15	2015/16	2016/17	2017/18
DC	2,481,856	3,305,934	4,565,907	5,839,865	6,404,632
SC	278,929	296,735	313,764	328,576	341,306
C11	2,728	2,940	3,087	3,150	3,227
C12	333	348	378	405	527
C13	36	43	43	57	64
C14	24	31	35	41	53
C15	27	32	32	33	41
IT	789	802	809	799	1120
SL	3,261	5,039	6,318	9,356	10,120
TOTAL	2,7679,83	3,611,904	4,8903,73	6,182,282	6,761,090

Source: KPLC Data, 2019

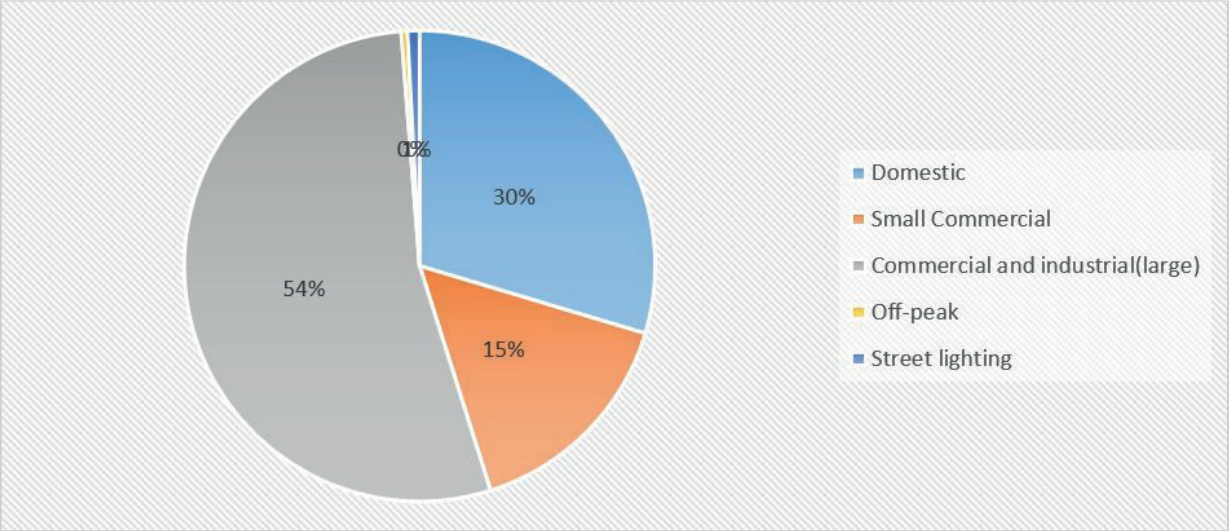
2.6 Electricity consumption

28. Electricity consumption during the same period registered a growth rate of 16.7% increasing from 6751 GWh to 7881 GWh. Domestic consumers form the largest portion of all connected customers. As of June 2018, this group constituted 94.7% of all metered customers. Within this category of consumers, about 52.8% consume 10 units and below. Small commercial consumers rank second constituting about 5.1% of all connected customers. Large power consumers take up approximately 0.1% of all connected consumers. However, they are the largest power consumers using over 50% of the total units sold.

2.6.1 Analysis of Electricity Sales by Customer Category, (GWh)

29. Table 2 shows consumption of electricity by different customer categories in GWh from 2007/08 to 2017/18 for customers connected in the interconnected system (Excluding those in off grid network). During the financial year 2017/18, the commercial industrial customer tariff category had the highest consumption at 4,225GWh, representing 54% of the total consumption. This was followed by domestic customers at 2,335GWh (30%), small commercial 1,225 GWh (15%), and street lighting which categorically consumed 66GWh (1%).

Figure 8: Electricity Sales in GWh by Customer Category 2017/18



Source: EPRA

2.7 Electricity Transmission Data

30. The national grid is operated as an integrated network linked by 400 kV, 220 kV and 132 kV transmission systems; there are also a limited number of 66 kV transmission lines. Construction of the largest power highway, the 500HVDC Ethiopia-Kenya-Tanzania line is ongoing. Grid stability is one of the main challenges facing the sector, and deficiencies lead to frequent power outages as well as technical and non-technical losses. As a result, grid operators, Kenya Power and KETRACO, have put an emphasis on system reliability and the introduction of smart grid technologies.

Table 3: Kenya's Electricity Transmission circuit network in Kilometers, 2007-2018

Voltage (KV)	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
400KV										96.8	1244.4
220KV	1323	1323	1331	1331	1331	1331	1434	1527	1452	1555	1686
132KV	2122	2085	2211	2343	2343	2436	2513	2527	3087	3208	3322
66KV	632	632	655	655	758	1097	1212	1212	977	1000	1168
40KV	29	29						21370			
33KV	11163	12633	13812	15271	15384	16136	20778	32823	27497	30846	34508
415/240V or 433/ 250V									110778	139642	152803
11KV	21918	23573	25485	26250	27219	28818	30860	23502	35383	37234	38968
TOTAL	37186	40274	43494	45850	47035	49818	56797	82961	179174	213582	233700

Source: KPLC/KETRACO, 2019

Table 4: Approved Solar PV Licenses FY 2017/2018

Category	Number of Licenses
Solar P V Contractors/Vendors (SPVC)	133
Solar PV System Manufacturers/Importers (SPVM)	194
Solar PV Technicians	133

Source: EPRA, 2019

Table 5: Approved Electrical Licenses and Electrical Contractor Registrations 2017/18

License Class	Electrical Licenses/Registrations	
	Electrical Licenses	Electrical Contractor Registrations
C2	136	32
C1	128	37
B	38	22
A1	36	28
A2	2	4
Total	**340**	**123**
Cumulative Total as at June 2018	**4433**	**1463**

Source: EPRA, 2019

Table 6: Approved Energy Auditors for Designated Facilities 2017/18

Category	Number of Licenses
Energy Audit Firms (EAF)	4
Energy Auditors (EA)	16

Source: EPRA, 2019

Table 7: Approved Power Undertakings 2017/18

SN	Name of Plant	Location (County)	Licensed Capacity (MW)	Energy Source	Licensed Capacity by Source (MW)
FY 2017/2018					
1	Homa Bay Biogas One Ltd	Homa Bay	8	Biogas	8
2	Nzoia Sugar Co. Ltd	Bungoma	7	Biomass	8.5
3	Pwani Oil Products Limited	Kilifi	1.5		
4	Hydro Project Service Peters Ltd	Meru	0.51	Hydro	21.51
5	Kengen Sangoro	Kisumu	21		
6	Chania Green Generation Ltd	Kajiado	50	Solar	90
7	Malindi Solar	Malindi	40		
8	KenGen Muhoroni	Kisumu	30	Thermal (GT)	30
9	KenGen Ngong I wind	Kajiado	6.8	Wind	20.4
10	KenGen Ngong II wind	Kajiado	13.6		
				Total Licensed Capacity (MW)	**178.41**

Source: EPRA, 2019

3.
PETROLEUM AND GAS SUB-SECTOR

31. This sub-section provides data on the petroleum and gas sectors in Kenya for the year 2018. The petroleum sector is organised into three sub-sectors: the upstream, mid-stream and downstream sub-sectors. The upstream sub-sector involves the process of exploration, development and production of crude oil and natural gas. The mid-stream section involves storage, refining of crude oil into consumable petroleum products and transportation. In the downstream section, refined products are made available to the consumers through supply and distribution to registered petroleum retail stations.

3.1 Upstream Operations Data

32. Petroleum exploration in Kenya began in the 1950s within the Lamu Basin. It was not until 2012 when the first commercially viable oil discovery was made in the Tertiary Rift, followed by significant gas discoveries in the offshore Lamu Basin. To date, over 86 wells have been drilled, a majority based along the Tertiary Rift. An estimation of over 4 billion barrels of crude oil reserves have been encountered in the Lokichar sub-basin by Tullow PLC and its partners, with recovery of oil estimated to be over 750 million barrels.

33. Kenya has four (4) petroleum exploration basins including: Lamu Basin, Anza Basin, Mandera Basin and Tertiary Rift Basin. Oil and gas exploration undertaken in the last 6 decades saw a breakthrough in March 2012 with the discovery well – Ngamia 1, in the Lokichar Basin, Turkana County. As at December 2015, seventy-four (74) wells had been drilled with twelve (12) hydrocarbon discoveries to date, nine (9) of which are in Turkana County. The other three are in Anza Basin and Offshore Lamu.

34. As at December 2015, there were forty-six (46) petroleum exploration blocks in Kenya of which 44 have been licensed and are operated by twenty-three (23) International Oil Exploration Companies.

35. Domestic crude oil deposits have been located in Turkana, the northern part of Kenya bordering Uganda and South Sudan. Extraction is ongoing. The crude oil is transported to Mombasa via road for export through the Early Oil Piloting Scheme (EOPS). The commercial viability of domestic refining of the crude oil is still being analysed.

Table 8: Summary of Basins and Wells Drilled

Basin	Area (Sq. KM)	Wells Drilled	Average Sediment Thickness
Lamu	26,1000	19	12,000
Mandera	43,404	2	10,000
Anza	81,319	15	10,000
Tertiary Rift	105,673	34	40,00

Source: MOPM, 2019

3.2 Imports of Petroleum and Gas Products

36. Petroleum is one of the prime movers of the country's social and economic development. Petroleum products are predominantly used in transport, commercial and industrial sectors. Kenya is a net importer of refined petroleum products. The Ministry of Petroleum and Mining coordinates this activity with oil marketing companies through the Open Tender System (OTS). The Kenya Pipeline Company (KPC) provides product movement infrastructure including storage and oil pipeline services.

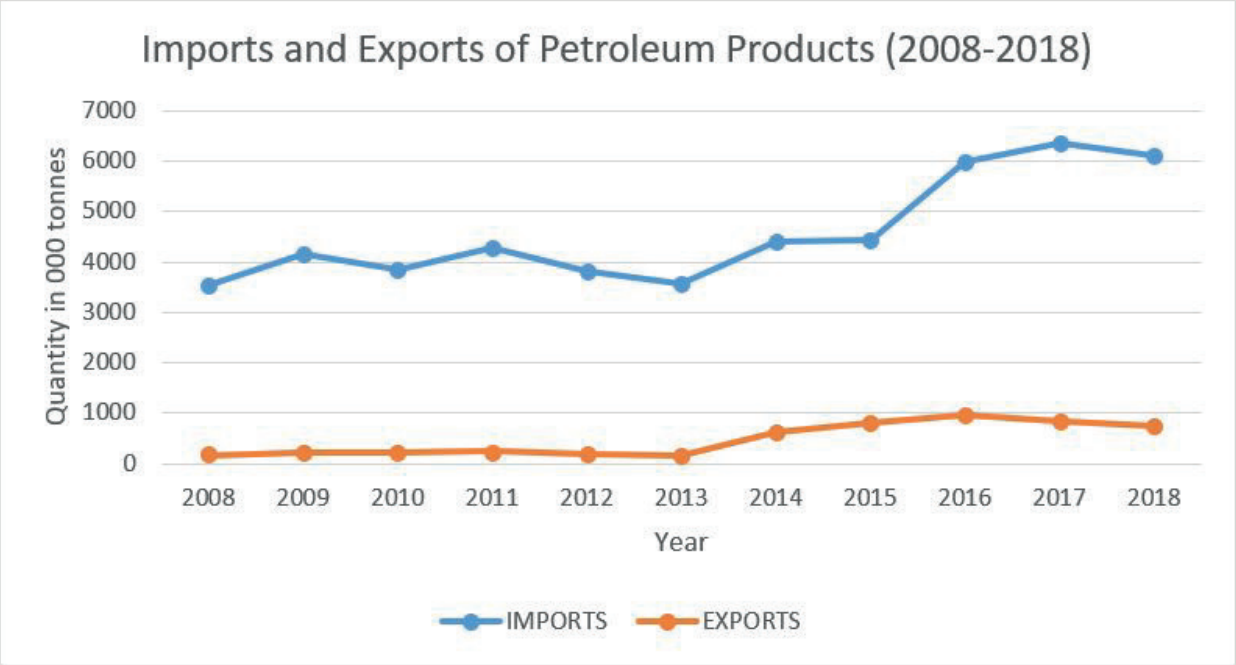
37. The total quantity of petroleum products imported into the country has increased from 3,976.3 thousand tonnes in 2008 to 6,114.4 thousand tonnes in 2018. This represents a growth rate of 53.8% although there are some fluctuations in the trend. The most significant change occurred in 2016 when the value of the petroleum imports increased from 4,431.7 thousand tonnes in 2015 to 5,990 thousand tonnes in 2016.

Table 9: Quantity of Petroleum Products Imports ('000 Tonnes).

Year	Crude petroleum	Petroleum fuels	Lubricating oils	Lubricating greases	TOTAL	% change P.A
2007	1598.7	1999.9		93.2	3,691.8	
2008	1687.7	1704.5	12.4	118.6	3,523.2	(4.5%)
2009	1610.1	2559	17	265	4,151.1	17.8%
2010	1551.5	2071.9	3	218.2	3,844.6	(7.4%)
2011	1772.1	2235.6	0	278	4,285.7	11.5%
2012	997	2803.4	7.1	1.8	3,809.3	(11.1%_
2013	567.4	2985.9	6.9	2.3	3,562.5	(6.5%)
2014		4400.2	6.8	2.4	4,409.4	23.8%
2015		4418.1	10.8	2.8	4,431.7	0.5%
2016		5978.3	9.1	2.6	5,990	35.2%
2017		6334	11.2	2.5	6,347.7	6%
2018		6101.1	10.0	2.6	6,114.4	(3.7%)

Source: KNBS, 2019 & EPRA, 2019

Figure 9: Quantity of Petroleum Imports and Exports



Source: EPRA Computations from various sources

3.3 Market and Competition Data for Petroleum and Gas

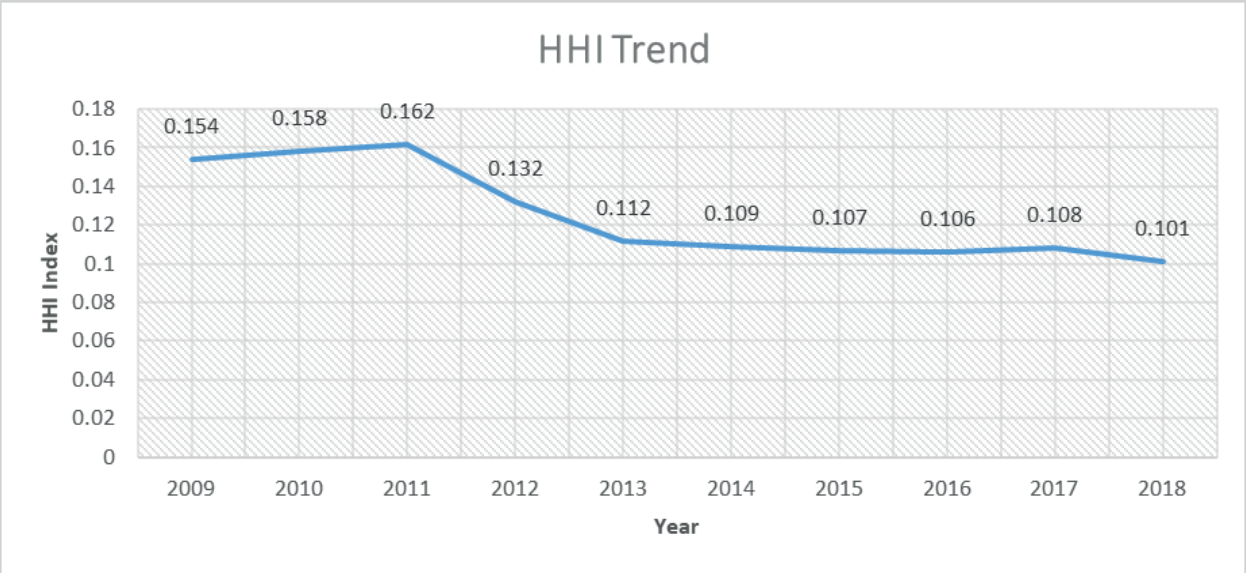
39. There were over seventy two (72) registered oil marketing companies in Kenya as of 2018. These are companies, which market, sell and distribute oil products such as diesel, kerosene, gasoline (petrol), lubricants, and liquefied petroleum gas (LPG). Importation of petroleum products through the OTS allows all the OMCs to access petroleum products at the same price and therefore ensures competition in the petroleum market. However, the market is still largely oligopolistic with the largest three companies; Vivo, Total and Kenol Kobil, which are multinationals, holding above 50% in market share.

Table 10: Market Shares of Oil Marketing Companies

Oil Marketing Company	Market share
VIVO	18.70%
TOTAL	16.60%
KENOL KOBIL	14.90%
OLA ENERGY	7.10%
N.O.C.K	5.90%
GULF ENERGY	4.70%
PETRO	3.60%
BE ENERGY	2.70%
GAPCO	2.30%
HASS	2.00%
GALANA	1.70%
ENGEN KENYA	1.40%
TOSHA ENERGY	1.30%
DELBIT	1.20%
ONE PETROLEUM	1.10%
TEXAS	1.10%
ORYX	1.00%
RH DEVANI	1.00%
OTHERS	11.70%
TOTAL	100.00%

Source: EPRA, 2019

Figure 11: HHI Trend of the Petroleum Industry, 2009-2018



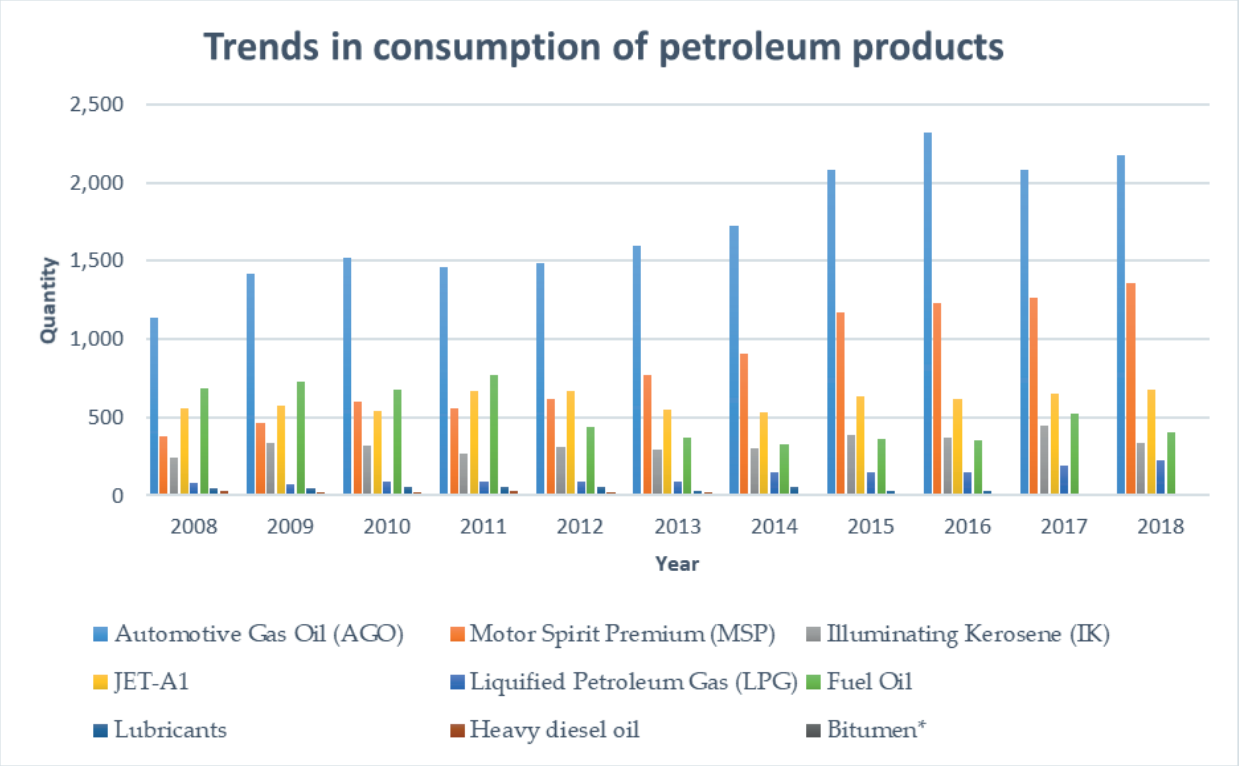
Source: EPRA Computations

40. The HHI for 2018 was 0.101, which was lower than the HHI for 2011 which was 0.162. This suggests that competition in the petroleum sub-sector has increased over the years, a fact attributed to effective and fair regulation. A few small firms in the industry have grown to secure a substantial portion of the market share hence improving on product accessibility which is an essential element in security of supply.

3.4 Consumption of Petroleum Products in Kenya

41. Automotive Gas Oil, the dual-purpose fuel consumed in the transport and agriculture sectors, increased from 1,141 thousand tonnes in 2008 to 2,173 thousand tonnes in 2018. Motor gasoline which is mostly used in the transport sector registered a significant growth from 381 thousand tonnes in 2008 to 1,359 thousand tonnes in 2018 owing to the rise in number of the vehicles entering the domestic market. The use of LPG in homes, educational and health institutions has risen from 84 thousand tonnes in 2008 to 222 thousand tonnes in 2018. Illuminating kerosene, the most popular fuel for use by households in lighting and cooking registered about 339 thousand cubic metres in 2018 as compared to about 245 thousand cubic metres consumed in 2008. In general, the demand for petroleum products increased from 5,166.8 thousand tonnes in 2016 to 5,170 thousand tonnes in 2018.

Figure 12: Trends in Consumption of Petroleum products, 2008-2018.



Source: Computations Based on EPRA Data

Table 11: Consumption of Petroleum Products, 2007-2018.

PRODUCT CONSUMPTION	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Automotive Gas Oil (AGO)	1,117	1,141	1,416	1,517	1,462	1,486	1,601	1,721	2,081	2,318	2,086.20	2,173
Motor Spirit Premium (MSP)	367	381	462	597	562	619	775	904	1,170	1,227	1,267.40	1,359
Illuminating Kerosene (IK)	265	245	333	316	270	309	296	300	390	372	448.00	339
JET-A1	641	562	571	540	671	671	551	529	635	619	649.70	674
Liquified Petroleum Gas (LPG)	77	84	75	88	92	94	93	150	149	152	189.30	222
Fuel Oil	615	690	729	680	772	437	371	328	358	351	525.00	402
Lubricants	49	49	47	56	58	56	29	55	30	27		
Heavy diesel oil	40	30	24	25	28	21	19	3	0	1	1.20	0
Bitumen*	17	12	0	0	0	1	1	1	1	1		

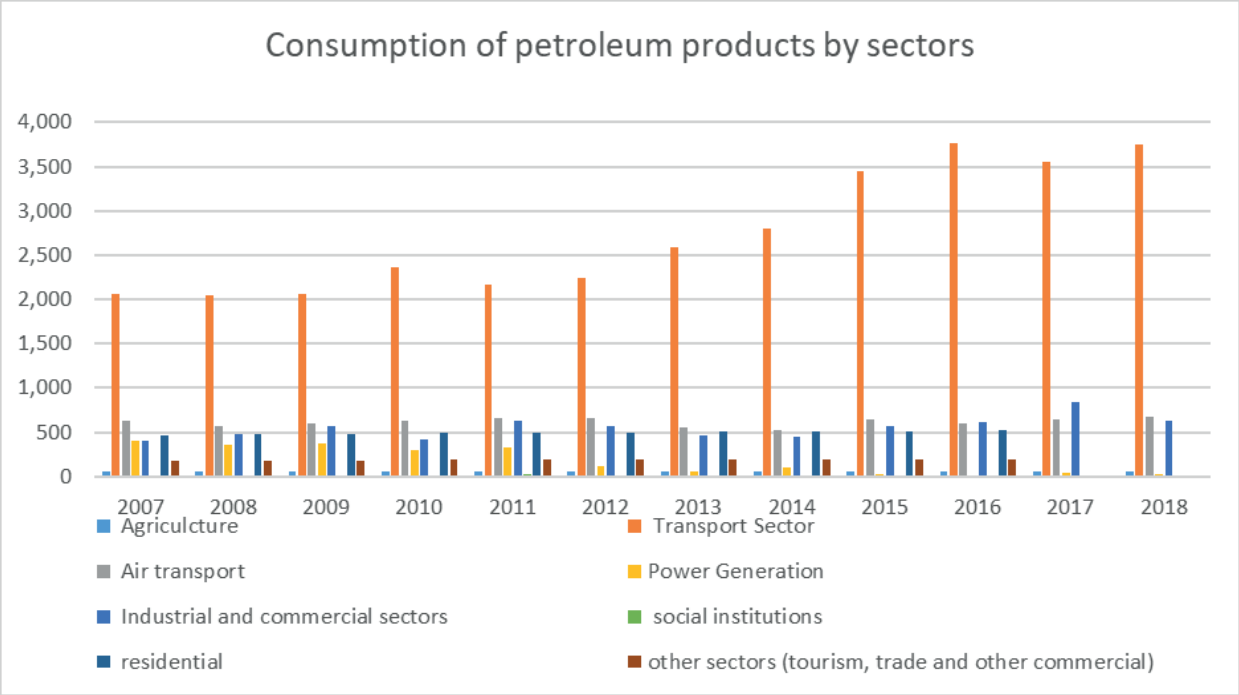
Source: KNBS, Various Sources

3.4.1 Consumption of Petroleum Products by Sector

42. The bulk of petroleum products is consumed in manufacturing, commercial, transport, residential, power generation and street lighting. The transport sector is the largest consumer of petroleum products followed by manufacturing, agriculture and power generation respectively. Over the years, the transport sector generally consumed more than 65% of the total net domestic sales of petroleum products as compared to the manufacturing sector, which consumed less than 20% of the total net domestic sales of petroleum products.

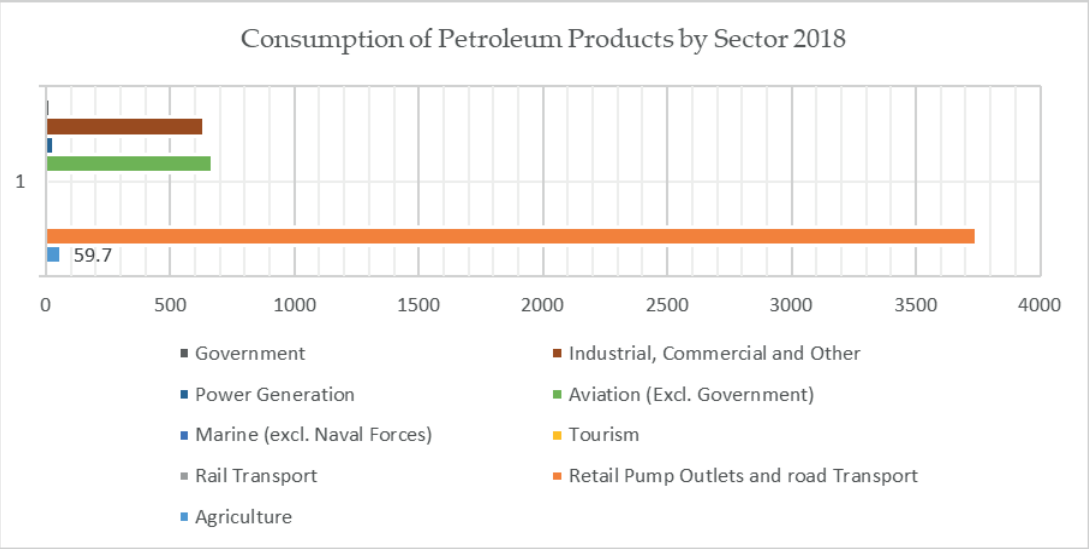
Source: Computations based on EPRA Data, 2019.

Figure 13: Consumption of Petroleum Products by Sector, 2007-2018.



Source: Computations based on EPRA Data, 2019

Figure 14: Sector wise Consumption of Petroleum Products in 2018



Source: Computations based on KNBS Data

3.5 Petroleum and Gas Infrastructure

43. The petroleum and gas infrastructure in Kenya not only ensures security of supply and access in the country but also supports the East African Community (EAC) and countries in the Great Lakes region such as the Democratic Republic of Congo in the Eastern Region, and South Sudan and Ethiopia in the Northern Region. The petroleum supply chain is supported by the following critical infrastructure as discussed below:

3.5.1 Import Terminals

44. At the moment the country imports all her petroleum and gas products. The products are mainly sourced from the Middle East, Europe and Asia and imported mainly through the port of Mombasa. In order to handle products with the highest standards of environmental management and safety, the country has developed various oil terminal infrastructure to handle imports. These have been developed by the Government and related agencies or through Public Private Partnerships (PPPs) in the case of Africa Oil and Gas Limited (AGOL) that handles Liquefied Petroleum Gas. The key oil terminals include:

- **Kipevu Oil Jetty (KOT):** This is located at the Kipevu area, Mombasa County and handles large petroleum vessels. The Product is then transferred to the government owned Kipevu Oil Storage Facillity (KOSF).
- **Shimanzi Oil Terminal (SOT):** This is used for importation of petroleum by small vessels.
- **Mbaraki:** This is a privately owned facility.
- **Africa Gas & Oil Limited (AGOL):** This is a dedicated LPG facility built under concessionary terms from the Kenya Ports Authority (KPA). It is connected to a common user manifold. The only storage depot connected to it is the AGOL mainland facility.
- **Kisumu Oil Jetty:** This is located on the shores of Lake Victoria and is used for the exportation of petroleum products to the countries bordering the lake.

3.5.2 Petroleum Pipeline Network

46. **Petroleum pipelines:** The pipeline system consists of trunk lines and distribution lines from Mombasa running through Nairobi to the Western Kenya towns of Nakuru, Eldoret and Kisumu totaling to about 1,804km. The Kenya Pipeline Company recently commissioned 'Line-5', which is a twenty (20) inch pipeline in order to ensure efficiency and security of supply.

3.5.3 Petroleum and Gas Retail Networks

47. Kenya has over 1,800 retail stations. Stations are classified as Tier 1, 2, 3 and 4 depending on land area, services offered and storage capacity.

3.6 Licensing of Petroleum and Gas

48. The Petroleum Act CAP 116 was enacted in 1948 (with a major revision in 1972) and was the major law governing the petroleum sub-sector until 2006. The petroleum sub-sector was highly regulated with price controls for the main products. When the sector was liberalised in 1994, various challenges were experienced such as proliferation of substandard petroleum facilities and products. To address the challenge, Sessional Paper No. 4 of 2004 set pace for a new law to regulate the petroleum sector, hence the enactment Energy Act No. 12, of 2006.

49. Following the enactment of the Energy Act No. 12 of 2006, the Electricity Regulatory Board (ERB) was transformed to the Energy Regulatory Commission (ERC). The ERC was mandated to regulate the petroleum, renewable energy and electricity sub-sectors. The Energy Act, 2006 was further repealed and a new Energy Act, 2019 and Petroleum Act, 2019 enacted in March 2019. The Energy Act, 2019, provided for the transition of the ERC to the Energy and Petroleum Regulatory Authority which came with expanded mandates. Additionally, Section 74(1) (a) of the Petroleum Act, 2019 gives the Authority the mandate to grant licenses, permits or certificates to any person willing to undertake importation, exportation, bulk storage or transportation of petroleum crude or refined products. Petroleum licensees are classified into the following categories:

Table 12: Petroleum Licensees 2018

Licensee	Number
Importers of Petroleum Products	115
Storage Depots	26
LPG storage and FillingStations	64
Pipeline Transportation	1
Wholesalers and Exporters	540
Transportation by Road	100
Retailers	1800
Petroleum Tankers	640
Petroleum Drivers	600

Source: EPRA

50. Some of the companies operate in almost all the above licensable spheres. Observance of fair competition is regulated in liaison with the Competition Authority of Kenya (CAK).

3.7 Pricing Data for Petroleum and Gas

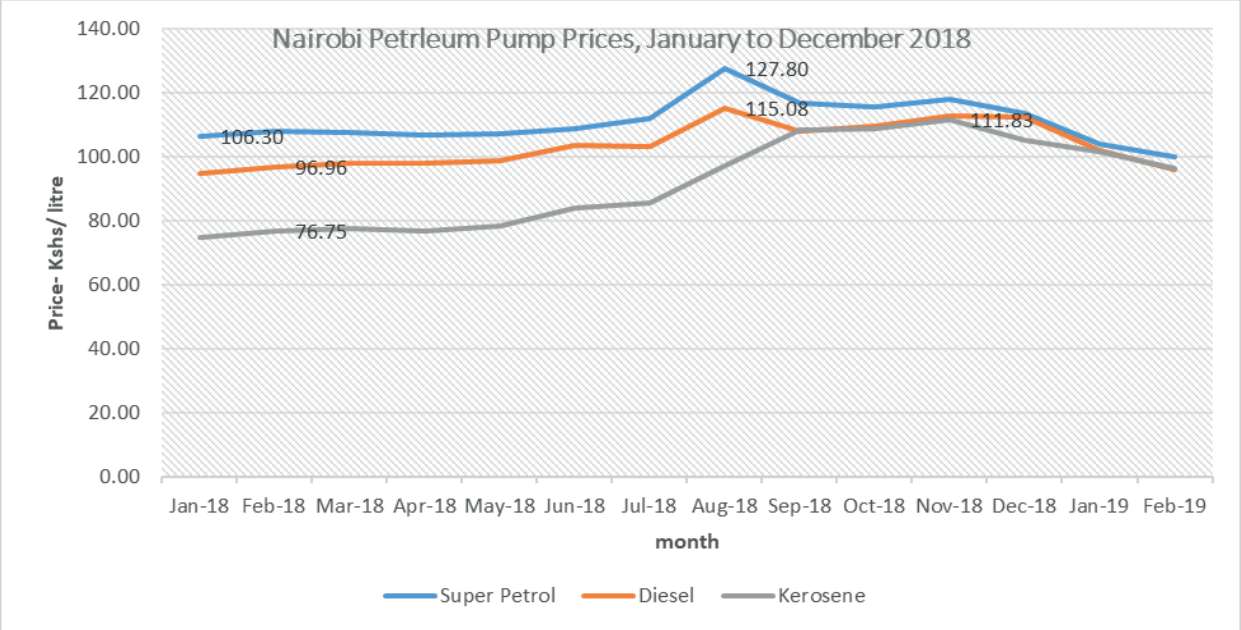
51. In accordance with Section 101(y) of the Petroleum Act 2019, EPRA is mandated to determine the wholesale and retail prices of petroleum and petroleum products. In compliance with the statute, the Authority regulates the maximum petroleum pump prices for Diesel, Super Petrol and Illuminating Kerosene. The Authority publishes maximum pump prices for all major towns around the country every 14th day of the month.

52. The analysis of petroleum pump prices displayed mixed performance in the last one year. For Nairobi, Super Petrol pump prices increased from 106.30 Ksh/litre in January 2018 to 127.80 Ksh/litre in August 2018. This was followed by a decline to 116.79 Ksh/litre in September of the same year and further to 113.54 Ksh/litre in December. Diesel pump prices increased from 94.82 Ksh/litre in January to 112.82 Ksh/litre in November though there were fluctuations within the trend. Kerosene pump prices steadily increased from Kshs 74.78 Ksh/litre in January 2018 to 111.83 Ksh/litre then declined to 105.22 Ksh/litre in December 2018.

53. As observed in the Figure 15, prices of Kerosene and Diesel were the same in September 2018. This was as result of the introduction of an adulteration tax for Kerosene to discourage adulteration due to the tax differentials. Fuel adulteration remains a challenge due to unethical behavior of some marketers who have not embraced patriotism and fair competition. The Authority has however created a new directorate of Enforcement and Consumer Protection and this has reduced the malpractices to a huge extent due to heightened surveillance efforts.

54. The LPG prices are not regulated. This is mainly because the LPG infrastructure is still underdeveloped. However, with improvement of infrastructure, the OTS can be introduced to deepen competition

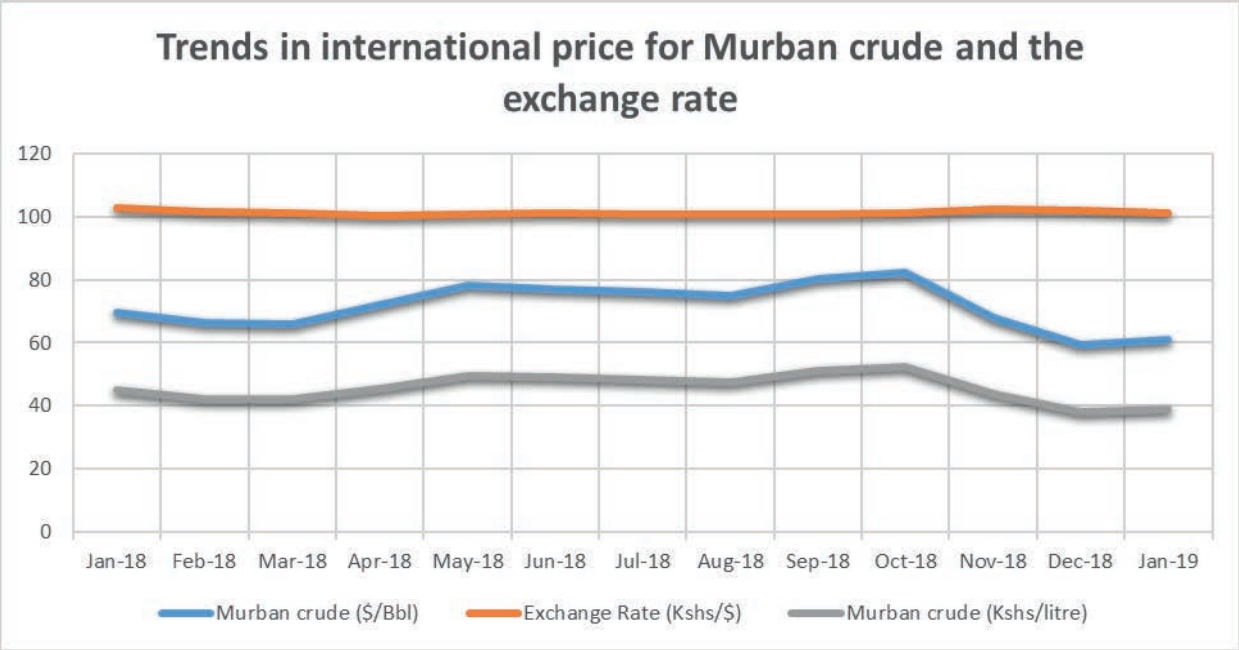
Figure 15: Nairobi Petroleum Pump Prices, Jan-Dec 2018.



Source: EPRA, 2019

55. With regard to the international oil and gas markets, there was an increase in the international price of Murban crude oil from $76.30/Bbl to $82.30/Bbl from July to October 2018. This was followed by a decline to $68.000/Bbl in November and further to $ 59.50/Bbl in December 2018. Consequently, the price of Murban crude increased significantly from 48.28 Ksh/litre in July to 52.36 Ksh/litre in October followed by a decline to 43.81 Ksh/litre in November 2018 and further to 38.23 Ksh/litre in December 2018. The country had 86 licensed petroleum companies as at December 2018.

Figure 16: Trends in International Price for Murban Crude and the Exchange Rate



Source: Computations based on EPRA data

Table 13: Approved List of Firms Undertaking Importation, Exportation and Wholesale of Petroleum Products with the Exception of LPG as of December 2018

No.	LicenceNumber	Company Name	Expiry Date
1	ERC/PET/3973	ALBA PETROLEUM LIMITED	12/01/2019
2	ERC/PET/3964	DALBIT PETROLEUM LIMITED	12/01/2019
3	ERC/PET/3972	FOSSIL FUELS LIMITED	12/01/2019
4	ERC/PET/3956	HASS PETROLEUM KENYA LIMITED	12/01/2019
5	ERC/PET/3970	OLYMPIC PETROLEUM LIMITED	12/01/2019
6	ERC/PET/3955	PETRO OIL KENYA LIMITED	12/01/2019
7	ERC/PET/3983	TOTAL KENYA LIMITED	12/01/2019
8	ERC/PET/4015	BANODA OIL LIMITED	23/01/2019
9	ERC/PET/3988	CITY OIL (K) LIMITED	23/01/2019
10	ERC/PET/4026	HASMACK COMPANY LIMITED	07/02/2019
11	ERC/PET/4025	TEXAS ENERGY LTD	07/02/2019
12	ERC/PET/4034	ELIORA ENERGY LIMITED	08/02/2019
13	ERC/PET/4040	ROYAL ENERGY (K) LIMITED	08/02/2019
14	ERC/PET/4072	SOCIETE PETROLIERE KENYA LIMITED	20/02/2019
15	ERC/PET/4073	AWALI GROUP LIMITED	21/02/2019
	Licence Number	Company Name	Expiry Date
16	ERC/PET/4075	ILADE OIL CO. LIMITED	22/02/2019
17	ERC/PET/4102	MS OIL LIMITED	05/03/2019
18	ERC/PET/4084	NATIONAL OIL CORPORATION OF KENYA	05/03/2019
19	ERC/PET/4090	SAVANNA ENERGY KENYA LIMITED	05/03/2019
20	ERC/PET/4115	NETGAS AND ENERGY LIMITED	12/03/2019
21	ERC/PET/4107	ORYX ENERGIES KENYA LIMITED	12/03/2019
22	ERC/PET/4131	JAK LINE COMPANY LTD	21/03/2019
23	ERC/PET/4136	ONE PETROLEUM LIMITED	21/03/2019
24	ERC/PET/4135	TECAFLEX LIMITED	21/03/2019
25	ERC/PET/4182	EMKAY INTERNATIONAL LIMITED	05/04/2019
26	ERC/PET/4155	MOIL KENYA LIMITED	05/04/2019
27	ERC/PET/4161	ZACOSIA TRADING LIMITED	05/04/2019
28	ERC/PET/4194	MERIDIAN ENERGY LIMITED	06/04/2019
29	ERC/PET/4193	TESLOR CORPORATION LIMITED	06/04/2019
30	ERC/PET/4188	TOSHA PETROLEUM (KENYA) LIMITED	06/04/2019
31	ERC/PET/4208	BACHULAL POPATLAL (KENYA) LIMITED	13/04/2019
32	ERC/PET/4210	RED STAR PETROLEUM LIMITED	13/04/2019
33	ERC/PET/4211	ENGEN KENYA LIMITED	16/04/2019
34	ERC/PET/4218	AFRO PETROLEUM LTD	19/04/2019
35	ERC/PET/4236	BUZEKI ENTERPRISES LIMITED	19/04/2019

Source: EPRA, 2019

36	ERC/PET/4232	MENA ENERGY LIMITED	19/04/2019
37	ERC/PET/4241	ASHARAMI SYNERGY LIMITED	30/04/2019
38	ERC/PET/4240	ASTROL PETROLEUM COMPANY LIMITED	30/04/2019
39	ERC/PET/4253	HARED ENERGY LIMITED	30/04/2019
40	ERC/PET/4276	TAAM PETROLEUM LIMITED	30/04/2019
41	ERC/PET/4291	BULK PETROLEUM LIMITED	18/05/2019
42	ERC/PET/4307	EPPIC OIL (K) LIMITED	18/05/2019
43	ERC/PET/4342	DESERT STAR OIL CO.LIMITED	25/05/2019
44	ERC/PET/4376	BRAIN FIELD OIL AND GAS LIMITED	30/05/2019
45	ERC/PET/4385	GLOBAL PETROLEUM PRODUCTS KENYA LIMITED	30/05/2019
46	ERC/PET/4404	MOGAS KENYA LIMITED	30/05/2019
47	ERC/PET/4280	RIVA PETROLEUM DEALERS LIMITED	30/05/2019
48	ERC/PET/4458	BUSHRA ENERGY LIMITED	26/06/2019
49	ERC/PET/4552	LUQMAN PETROLEUM LIMITED	06/07/2019
50	ERC/PET/4531	OILCOM (K) LIMITED	06/07/2019
51	ERC/PET/4579	TOWBA PETROLEUM COMPANY LIMITED	13/07/2019
	LicenceNumber	Company Name	Expiry Date
52	ERC/PET/4609	EVON INTERNATIONAL ENERGY LIMITED	17/07/2019
53	ERC/PET/4636	LINK OIL LTD	17/07/2019
54	ERC/PET/4607	OILPRO LIMITED	17/07/2019
55	ERC/PET/4604	PERFORMANCE PARTS LIMITED	17/07/2019
56	ERC/PET/4615	RANWAY TRADERS LIMITED	17/07/2019
57	ERC/PET/4622	VIVO ENERGY KENYA LIMITED	17/07/2019
58	ERC/PET/4639	KOSMOIL PETROLEUM (EA) LIMITED	25/07/2019
59	ERC/PET/4703	RAMJI HARIBHAI DEVANI LIMITED	25/07/2019
60	ERC/PET/4723	AFTAH PETROLEUM(K)LTD	27/07/2019
61	ERC/PET/4767	GAPCO KENYA LIMITED	02/08/2019
62	ERC/PET/4746	OIL ENERGY KENYA LIMITED	02/08/2019
63	ERC/PET/4744	PETROCAM KENYA LTD	02/08/2019
64	ERC/PET/4819	AXON ENERGY LIMITED	16/08/2019
65	ERC/PET/4832	JOJES OIL DEALERS LIMITED	16/08/2019
66	ERC/PET/4842	GASLINE PETROLEUM LIMITED-Conditional License	24/11/2018
67	ERC/PET/4897	OCEAN ENERGY LIMITED	31/08/2019
68	ERC/PET/4895	REGNOL OIL (K) LIMITED	31/08/2019
69	ERC/PET/4967	EAST AFRICAN GASOIL LIMITED	12/09/2019
70	ERC/PET/5037	KAYMAN ENERGY LIMITED	28/09/2019
71	ERC/PET/5039	TORCH ENERGY LTD	28/09/2019
72	ERC/PET/5068	KENCOR PETROLEUM LIMITED	05/10/2019

Source: EPRA, 2019

4.
RENEWABLE ENERGY

4.1 Solar Energy

56. Kenya's geographical location astride the equator, gives the country a unique opportunity for a vibrant solar energy market. The country receives good solar insolation all year round coupled with moderate to high temperatures estimated at 4-6 kWh/m^2/day. The percentage of solar energy harnessed for commercial and domestic applications is insignificant compared to the available potential. Solar energy can be used for lighting, heating, drying and generating electricity.

4.1.1 Installed Capacity of Solar Power

57. The Garissa Solar Power Plant with an installed capacity of 54.5MW is the only solar power plant connected to the national grid and is owned by the Rural and Renewable Energy Corporation (REREC) formerly the Rural Electrification Authority (REA). The national grid covers only a small percentage of the national territory. Connectivity in rural areas is especially low. Solar home systems provide an alternative to allow rural dwellers to access electricity without connecting to the grid.

4.1.2 Solar Home Systems

58. An estimated 500,000 rural households in Kenya have solar home systems. This success has been largely due to private sector activity. The high level of uptake has been through the sale of products that best fit the purchasing power of rural households, and by making these products available within the mobility range of potential customers. Companies such as M-Kopa, Sun King, Mobisol and Azuri offer consumers a battery package capable of running three or four lights, TV and a sound system. Payment modes vary with most clients paying monthly by use of mobile platforms for three years before taking full ownership of the equipment.

4.1.3 Solar Water Heating Installations

59. Solar water heating systems are mainly used in homes, hotels, hospitals and educational institutions. As of December 2014, a survey to determine the number of installed solar water heating (SWH) units was launched. The demand for solar water heating (SWH) is however, projected to grow to more than 800,000 SWH units by 2020, equivalent to 300,000 Tonnes of Oil Equivalent (TOE). This represents a growth rate of 20% per annum. This demand will mainly be from domestic, institutional and small commercial consumers spurred by the operationalisation of the Energy (Solar Water Heating) Regulations, 2012.

4.2 Bioenergy

60. Bio-energy is the energy derived from various sources of solids, liquids and gaseous biomass including fuel wood, charcoal, ethanol, bio-diesel and biogas. Biomass contribution to Kenya's final energy demand is 70% and provides for more than 90% of rural household energy needs. The main sources of biomass in Kenya include charcoal, wood-fuel and agricultural waste. The government has identified the existence of a substantial potential for power generation using forestry and agro-industry residues including bagasse. The total energy generated through cogeneration using sugarcane bagasse is 193MW. Mumias Sugar company, an independent power producer, generates 35MW out of which 26MW is dispatched to the grid. However, opportunities within other sugar factories estimated to be up to 300MW have not been exploited.

4.2.1 Biogas Installations in Kenya

61. Biogas in Kenya is widely produced with over 8,000 biogas plants utilising various raw materials e.g. agricultural waste, slaughter house wastes, municipal waste etc. However, the situation is amorphous in the sense that there is no consolidated data on biogas production making it a challenge in determining the country's installed capacity.

62. Biogas potential in Kenya has been identified in municipal waste, sisal and coffee production. The total installed electric capacity potential for all sources ranges from 29-139MW, which is about 3.2 to 16.4% of the total electricity production.

4.3 Wind Energy

63. Wind energy uses naturally occurring energy of the wind for practical purposes like generating electricity, charging batteries, or pumping water. Large modern wind turbines operate together in wind farms to produce electricity for utilities.

64. Kenya has a proven wind energy potential of as high as 346 W/m2 and speeds of over 6m/s in parts of Marsabit, Kajiado, Laikipia, Meru, Nyandarua, Kilifi, Lamu, Isiolo, Turkana, Samburu, Uasin Gishu, Narok and Kiambu County among others. With the rising cost of oil, exploitation of wind energy has become more attractive. Substitution of thermal generation with wind power plants will cut down on the large amounts of foreign exchange required to import fossil fuels for the thermal power plants.

65. The installed capacity of wind plants as by 2018 was 336MW.The grid connected wind turbines in Kenya are: KenGen 25.5MW wind plant in Ngong comprising of thirty 850kW turbines, Lake Turkana wind power (310MW), Marsabit wind power and Habasweni wind power plant.

5.
OTHER ENERGY SOURCES AND CROSS CUTTING ISSUES

5.1 Coal Generated Energy

66. Coal is a combustible black or brownish-black sedimentary rock, formed as rock strata called coal seams. Coal is mostly carbon with variable amounts of other elements; chiefly hydrogen, sulfur, oxygen, and nitrogen. Coal is formed if dead plant matter decays into peat. Over millions of years, the heat and pressure of deep burial converts the peat into coal.

5.1.1 Coal Exploration

67. The Ministry of Energy has been conducting coal exploration in the Mui Basin since 1999, covering an area of 500 square kilometers. Two promising blocks have been concessioned to a Chinese company. To ease exploration logistics, the ministry subdivided the Mui Basin into four coal blocks, A, B, C and D, measuring 121.5, 117.5, 131.5 and 120 kilometer squared, respectively. Seventy-one exploration and appraisal wells have been drilled in the Mui Basin, mainly concentrated in Block C where 56 wells were drilled to depths ranging from 75 to 445 metres. Some 32 wells have intersected coal.

68. To fast track exploration, development and production, the Government has decided to concession all four blocks to private companies through a competitive international bidding process.

5.2 Nuclear energy

69. Kenya has embarked on a programme to see the country generate 1 GW (1,000 MW) from Nuclear sources between 2020 and 2022. By 2030 the country is projected to have installed a capacity of 4 GW of nuclear energy, generating about 19% of Kenya's energy needs. Meaning that nuclear power would be the second largest source of energy in Kenya after geothermal power. This will be spearheaded by the Nuclear Power Energy Agency (NuPEA) formaly the Kenya Nuclear Electricity Board.

6.
ENERGY MATRIX FOR KENYA

70. EPRA has developed Energy Balances for Kenya which show the flow of energy from production, through transformation to final consumption in one common unit of measurement i.e. thousand tonnes of oil equivalent (ktoe). Energy Balances are generally considered as the best way of presenting the energy flows in a given economy. Various multi-lateral agencies including Eurostat, the International Energy Agency (IEA) and the United Nations (UN) also construct Energy Balances.

71. An Energy Balance is an accounting framework for the compilation and reconciliation of data on all energy entering, exiting and used within the national territory of a given country during a reference period. The Energy Balance expresses all forms of energy in a common accounting unit, and shows the relationship between the inputs to and the outputs from the energy transformation industries.

72. In the Energy Balance, all energy flows should be accounted for, and the balance is based on the first law of thermodynamics, which states that "the amount of energy within any closed system is fixed and can neither be increased nor diminished unless energy is brought into or sent out from that system".

73. Energy balances show the commodity balances in a way that explains fuel conversion and the dependence of supply of one fuel on one another. It presents the energy flow as the primary fuels are processed or used and as the consequent secondary fuels are produced and used.

74. The presentation of energy statistics expressed in natural units in the form of commodity balances between the supply and use of the energy commodities provides a check on the completeness of the data and a simple means of assembling the main statistics of each commodity so that key data is easily obtained. However, because fuels are mainly bought for their heat-raising properties and can be converted into different fuel products, it is also helpful to present the supply and use data in energy units. The format adopted is termed as the 'energy balance', and allows users to see the fuel conversion efficiencies and the relative importance of the different fuel supplies in their contribution to the economy. The energy balance is also the natural starting point for the construction of various indicators of energy consumption (for example consumption per capita or per unit of GDP) and of energy efficiency. The energy balance also acts as a high-level check on the data accuracy as apparent energy gains in conversion processes or large losses indicate data problems.

75. The energy balance is a multipurpose tool. The main purposes of its compilation are:

a) To enhance the relevance of energy statistics by providing comprehensive and reconciled information on the given energy situation within a national territory;
b) To provide comprehensive information on energy supply and demand in national territories in order to understand energy security, the formulation of energy policies, the effective functioning of energy markets and other relevant policy goals;
c) To serve as a quality tool to ensure the consistency and comparability of basic statistics;
d) To ensure comparability between different years and between different countries;
e) To establish the basis for estimation of CO2 emissions;
f) To provide the basis for aggregated indicators (e.g. energy intensity);
g) To compute efficiencies of all the transformation processes occurring in the country (e.g. refining, electricity production by combustion of fuels, etc.);
h) To allow calculation of relative shares of various products (including renewables vs non-renewables) or sectors to the country total;
i) To provide an input for forecast modelling; and
j) To provide a common framework for international comparisons.

76. The scope of an energy balance is determined, amongst other things, by the territory, product and flow boundaries:

i. Territory boundary – defined by the boundary of the national territory of the compiling country;
ii. Product boundary – defined by the scope of all energy products shown in the balance columns;
iii. Flow boundary – defined by the scope of energy flows (uses) shown in the balance rows.

77. Product and flow boundaries are fixed in the short term. If new sources of energy are discovered and used, they should be reflected in the balance. The scope of energy balance does not include:

i. Passive energy such as heat gain of building and solar energy falling on the land to grow crops, etc.
ii. Energy resources and reserves;
iii. Extraction of any materials not included in primary energy production; and
iv. Non-energy products not used for energy purposes (e.g. waste and wood are covered in the energy balance only to the extent that they are used for energy production and not used for other purposes).

78. The energy balance shows the content of the commodity balances translated into a standard energy unit. In Kenya, tonnes of oil equivalent (toe) are used, though alternatives such as joules (J) , therms (CCF) or Gigawatt hours (GWh) could be used. The energy balance shows, all fuels together with the flows from production to final use, including the movements between fuel categories, for example gas produced, may be transformed into electricity and then consumed by the domestic sector.

6.1 Structure of the Energy Balance for Kenya

79. The energy balance presents an overall view of the energy supplies for Kenya; the relative importance of each energy commodity; dependence on imports; the contribution of our own fossil and renewable resources and the interdependence of commodities on one another.

80. The energy balance is constructed from the commodity balances and is normally presented by arranging the data in columns by fuel type. Heat sold is also included and treated as a fuel. An energy balance contains three main blocks of rows as follows:

81. Top block - flows representing energy entering and leaving the national territory as well as stock change to provide information on supply of energy on the national territory during the reference period.

82. Middle block – flows showing how energy is transformed, transferred, used by energy industries and lost in distribution and transmission.

83. Bottom block – flows reflecting final energy consumption and non-energy use of energy products.

84. A separate row is reserved for the statistical difference (defined as the difference between primary supply and primary demand).

85. The main sections of the energy balance are described as follows, drawing out some of the differences of treatment compared with the commodity balances.

86. Primary energy supply: Within the energy balance, production covers extraction of primary fuels and the generation of primary electricity (hydro, nuclear, wind). The production of secondary fuels (refined petroleum products such as petrol) and secondary electricity (generated from coal-fired power stations) are shown in the transformation section and not in the indigenous production row at the top of the balance. For fossil fuels, indigenous production represents the marketable quantity extracted from the reserves. Indigenous production of primary electricity comprises hydro-electricity, wind and nuclear energy. The energy value for hydro-electricity is taken to be the energy content of the electricity produced from the hydro power plant and not the energy available in the water driving the turbines. A similar approach is adopted for electricity from wind generators where the electricity is regarded as the primary energy form because there are currently no other uses of the energy resource "upstream" of the generation. For nuclear, an estimate of the heat content of the steam from the reactor is used as a measure of production output.

87. The other elements of the supply part of the balance are identical to those in the commodity balances, imports, exports, marine bunkers and stock change. Exports and international marine bunkers are normally shown with negative signs, to indicate that they are taken away from the production figure before determining a measure of primary supply.

88. A stock build carries a negative sign to denote withdrawal from supply whilst a stock draw carrying a positive sign shows addition to supply. Primary supply expresses the national requirement for primary energy commodities from all sources and foreign supplies of secondary commodities. It is an indicator of the use of indigenous resources and external energy supplies. Both the amount and mixture of fuels in final consumption of energy commodities will differ from the primary supply. The "mix" of commodities in final consumption will be much more dependent on the manufacture of secondary commodities, in particular electricity. Primary supply is the combination of the indigenous production, trade, marine bunkers and stock changes (taking their signs into account).

89. Transformation: This plays a key role in moving primary electricity from its own column in the balance into the electricity column, so that it can be combined with electricity from fossil fueled power stations and the total disposals shown.

90. Indigenous production of primary electricity comprises of nuclear electricity, hydro electricity and electricity from wind generation. Nuclear electricity is obtained by passing steam from nuclear reactors through conventional steam turbine sets. The electrical energy from hydro and wind is transferred from the Primary electricity column to the Electricity column using the transfers row because electricity is the form of primary energy and no transformation takes place.

91. Quantities of fuels entering the transformation activities (fuels into electricity generation and heat generation, crude oil into petroleum products (refineries), or coal into coke ovens) are shown with a negative sign to represent the input while the resulting production is shown as a positive number. For electricity generated by major power producers, the inputs are shown in the major power producers row of the coal & peat, crude oils, petroleum products, gas, geothermal, solar & wind, combustible, renewable and waste, primary electricity and heat columns. The total energy input to electricity generation is the sum of the values in these ten columns. The total column shows total electricity generated from these inputs. Within the transformation section, the negative figures in the Total column represent the losses in the various transformation activities. This is a convenient consequence of the sign convention chosen for the inputs and outputs from transformation. Any positive figures represent a transformation gain and, as such, are an indication of incorrect data.

92. Energy industry use and final consumption in which the figures for final consumption and energy industry use follow, in general, the principles and definitions described under Concepts and Definitions.

6.2 Actual Energy Matrix for Kenya 2009-2018

93. The actual energy balance matrix from 2009 to 2018 is provided in the annexes for ease of presentation. As can be observed, Kenya is still highly dependent on primary sources of energy, which are mainly biomass based. In order to achieve sustainable energy development, there is need for a clear policy on utilizing the available resources well, while at the same time improving efficiency in energy conversion and use. The analysis of the energy balance has been done in excel and model worksheets built for 2009-2018. A summary of aggregated values is also provided.

6.3 Results and Discussions of the Kenyan Energy Matrix

94. By International Standards, in 2018 Kenya is still a modest consumer of energy. The total electricity generation was at 11,180.64 GWh in 2018 compared to 10,360GWh in 2017. This was an increase from the previous year by around 7.9% (Economic Survey, 2019). Hydro generated power registered a significant increase of 43.6% recording 3,986 GWh up from 2,776.6 GWh in 2017. Solar power generation increased from 0.30 GWh in 2017 to 13.765 GWh in 2018. This is attributed to an injection of power by the 50MW Garissa Solar Power plant by REREC. Wind power generation increased from 60.98 GWh in 2017 to 374.19 GWh due to commissioning of the 310MW Lake Turkana Wind Power Plant in 2018. Geothermal power generation increased by 7.9% from 4756 GWh in 2017 to 5127.8 GWh in 2018. Domestic demand for electricity increased from 8,410.1 GWh in 2016 to 8,702.3 GWh in 2018 with sales to domestic and small commercial consumers increasing from 3,528.3 GWh to 3,665.9 GWh over the same period. According to the Kenya Integrated Household Budget Survey (KIHBS) report of 2015/2016, firewood, LPG and charcoal remain as the main source of cooking accounting for 54.6%, 13.4% and 14.6% of the total households. However, use of firewood is more predominant in the rural areas with 84.3% of all households depending on it as a source of energy.

95. More precisely, 85% of electricity is generated using renewable energy sources, which predominantly consist of Geothermal contributing 45.9% and Hydro at 35.7% respectively, while 13.8% is from thermal non-renewable sources. The total electricity, which is generated, is shared by more than 74% of the country's population leaving less than 25% of the population without access to electricity. This means that some people use either charcoal or firewood as their source of energy especially in the rural areas.

96. The following items characterize production and use:

a. Petroleum: The total volume of petroleum products imported into the country increased from 5.99 million tonnes in 2016 to 6.34 million tonnes in 2017 while domestic petroleum exports declined by 2.1 per cent to 32.4 thousand tonnes in 2017. In 2018, the total volume of petroleum products imported into the country decreased by 3.2% to 6.1 million tonnes (Economic Survey, 2019). The decrease emanates from reduced power generation from thermal plants subsequently decreasing the demand of petroleum fuels from 44.7 thousand tonnes in 2017 to 34.2 thousand tonnes in 2018. Thermal generation takes place with either diesel or oil and these are very costly options. Similarly, the Industrial and commercial sectors demand for petroleum products decreased by 24.1%.

b. Wind: At present, the country has an installed capacity of 336.1 MW in wind farms operated by KenGen's Ngong Wind Farm (26.1 MW) and the Lake Turkana Wind Power Plant (LTWP) (310 MW). The commissioning of LTWP increased wind power generation from 0.58% in 2017 to 3.34% in 2018.

c. Hydropower: The country is well endowed with hydropower resources, which are spread out nationwide. However, optimal generation is lower because the generation capacity of hydro-powered plants is affected by erratic rain patterns. This has always reduced the output of Kenya's hydropower stations. During the year under review, hydro capacity remained unchanged at 826.2 MW. Hydropower generation however recorded the highest increase from 2776.6 GWh in 2017 to 3986 GWh in 2018, growth of 43.6%.

d. Geothermal: Kenya is among the few countries in Africa exploring geothermal potential. The discovery of Kenya's geothermal energy resources dates back to the 1950s, when the first t est w ells w ere drilled at Olkaria. In 2017 the country had an installed capacity of 652 MW from geothermal compared to an installed capacity of 251.4MW in 2013. In the Least Cost Power Development Plan (LCPDP), geothermal power has been identified as a cost effective power option. Exploration potential for geothermal energy opportunities in the Rift valley are steadily ongoing. In 2013, geothermal accounted for 14% of Kenya's total electricity net generation, and the geothermal installed capacity was 251 megawatts. The country has the potential to produce 10,000 megawatts of geothermal-powered electricity. According to the Integrated Energy Agency (IEA) website, Kenya's state-owned Geothermal Development Company, geothermal capacity is experiencing fast growth. In 2017 the capacity increased to 652 MW compared to 251 MW registered in 2013 according to the Economic survey of 2018. With the commissioning of more generative capacity at the 'OrPower 4' plant at Olkaria, geothermal will soon overtake hydropower in terms of power generation with an additional 158MW to the grid, and construction of a number of facilities is also underway.

e. Firewood & Charcoal: Charcoal and firewood are the predominant fuels majorly used for cooking in Kenya. According to the Kenya Integrated Household Budget Survey (KIHBS) of 2015/2016, 54.6% of the total national population rely on firewood and 14.6% use charcoal for cooking purposes. Firewood is mainly a rural fuel with over 84.3% of the rural population dependent on it while 16.1% of the urban population rely on it. Consequently, 8.9% of the urban population use charcoal while 21.9 % of urban population rely on charcoal for cooking purposes.

6.4 Summary of the Overall Energy Balances for Kenya

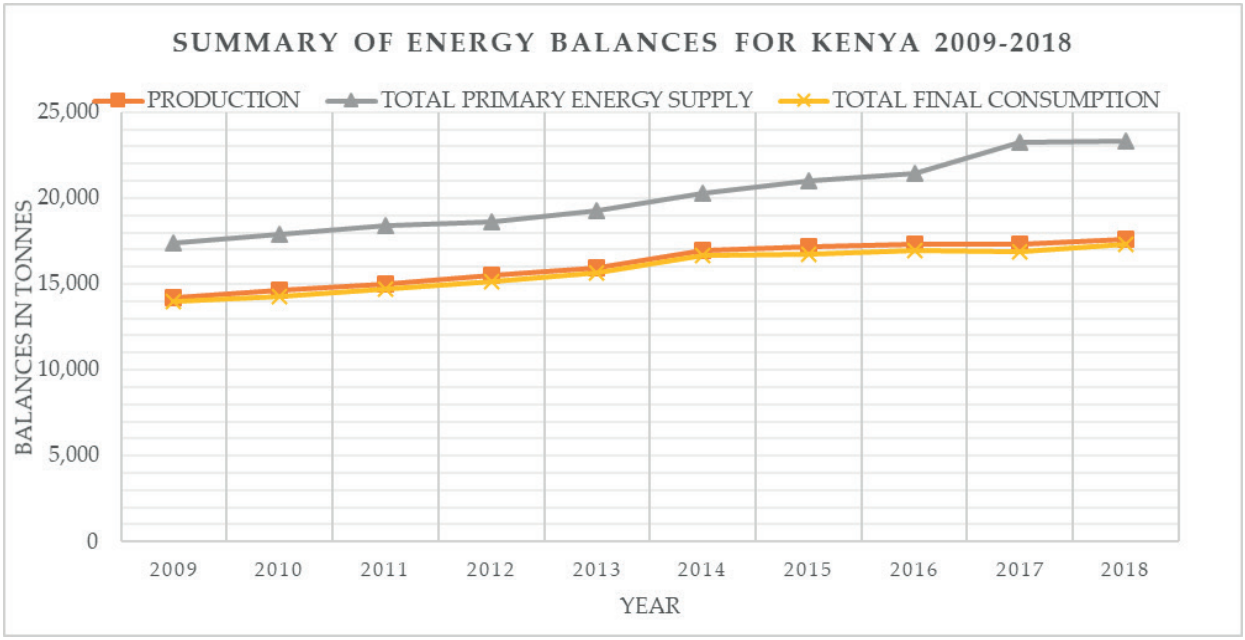
97. The overall energy balance for Kenya indicates that total indigenous production, primary energy supply and total final energy consumption have generally been increasing. This is primarily driven by growth in population and expansion in the economy. The total production has increased to 17,575 tonnes in 2018 from 17,306 tonnes in 2017. With regard to total primarily energy supply, it increased from 23,277 in 2017 to 23,361 tonnes in 2018. Lastly, with regard to total final energy consumption, it increased from 16,868 tonnes in 2017 to 17,324 tonnes in 2018. It is important to note that total indigenous production and total final energy consumption have very small differences, an indication that Kenya is primarily producing energy that only meets her needs with very little excess capacity that can be exported to her neighbors. This is true particularly in electricity where the country imports more that it exports to Uganda in the current energy exchange agreement. Table 9 and Figure 17 below provide a summary of the energy balances for Kenya 2009 to 2018.

Table 14: Summary of Energy Balances for Kenya ('000 Tonnes), 2009-2018

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Production	14,236	14,634	15,017	15,485	15,953	16,920	17,151	17,285	17,306	17,575
Total Primary Energy Supply	17,357	17,909	18,424	18,640	19,279	20,290	21,029	21,429	23,277	23,361
Total Primary Energy Consumption	13,971	14,293	14,690	15,136	15,659	16,671	16,762	16,972	16,868	17,324

Source: EPRA, 2019

Figure 17: Summary of Energy Balances for Kenya, 2009-2018



Source: EPRA, 2019

7.
GREENHOUSE GAS EMISSIONS

7.1 Energy Emissions and Climate Change

98. Climate change impacts pose significant hazards to socio-economic development in Kenya. This is through prolonged droughts, unreliable weather patterns, and the emergence of new pests and diseases.

99. With the expanding economy, energy emissions have been increasing over time, driven by transportation, electricity and heat production, and other fuel combustion. The transport sector, dominated by road transport, is a significant and growing contributor to Kenya's Green House Gases (GHG) emissions: Kenya's total vehicle fleet (excluding motorcycles) has more than tripled in recent years, leading to severe traffic congestion in major cities. By the end of 2018, the transport sector consumed 75% of all petroleum products, power generation 12% and the industrial and commercial sector(s) at 12%. The shares of energy consumption are positively correlated to the level of emissions.

100. Electricity generation also drives energy emissions. Power generation has more than tripled between 2000 to 2018, with hydro and geothermal taking a growing share of the electricity mix. As of December 2018, 28.4% of electricity was generated from hydropower pumped storage plants, 9.60% from petrol thermal power plants, 44.6% from geothermal, 14% from wind, and 3.4% was generated from biofuels. In terms of consumption, 54% of electricity is consumed by the industrial sector, 30% by the residential sector while 15% is consumed by the commercial sector.

7.2 Grid Emission Factor for Kenya

101. A "Grid Emission Factor" refers to a CO2 emission factor (tCO2/MWh) which will be associated with each unit of electricity provided by an electricity system. It is a parameter to determine the baseline emissions for Clean Development Mechanism (CDM) projects in the renewable energy sector (hydro, wind, solar PV, and geothermal power, etc.) and waste heat/gas recovery sector.

102. This ratio is based on total emissions from fossil fuels consumed for electricity generation, in both electricity-only and combined heat and power plants (CHP), divided by output of electricity generated from all fossil and non-fossil fuel sources. Both main activity producers and auto producers have beenincluded in the calculation.

103. The Net grid emission factor for Kenya in 2018 was estimated at 0.3322 kgCO2/kWh. This is an indication that it is one of the cleanest in Africa and the region. This is mainly attributed to the high contribution of renewable energy in the generation mix, which is at 85% of the total energy generated. Some African Countries such as South Africa (1.069 kgCO2/kWh), Egypt (0.50 kgCO2/kWh) and Zimbabwe (0.6 kgCO2/kWh) have higher grid emission factors than Kenya. India with (1.33 kgCO2/kWh) and China (0.97 kgCO2/kWh), Estonia 1.90 (kgCO2/kWh) have very high grid emission factors. The average world emission factor was 0.6235 as of August 2011.

Table 15: Grid Emission Factors

Country	Electricity - specific factors (kgCO2/kWh	IEA Composite /Heat factors (kgCO2/kWh)
Egypt	0.5009	0.4598
Ethiopia	0.1189	0.1185
Ghana	0.2147	0.2143
Kenya	0.3322	0.3285
Zimbabwe	0.6003	0.6187
South Africa	1.069	0.8349
Zambia	0.0032	0.0031
China, Peoples Republic	0.9746	0.74483
India	1.333	0.9682
U.S.A	0.5471	0.535
IEA EUROPE	0.4537	
Africa	0.7357	0.6192
World	0.6235	0.5023

Source: Brander et al., (2011)

8.
CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

104. Kenya has a stable and expanding energy supply which is central to her ambition of being an industrialised middle-income country, as set out in the vision 2030 development strategy. The nation is fortunate in its energy mix; renewable energy sources such as Hydro, Geothermal, Solar and Wind energy already play a significant role in power generation. Moreover geothermal, solar and wind have room for expansion. Additionally, the recent discovery of oil may soon establish Kenya as a crude oil exporter.

105. Kenya continues to improve on her carbon footprint with regards to power generation and use. The Energy Act, 2019 and Petroleum Act. 2019 will strengthen the country's position in electricity, renewable energy, petroleum and gas sub-sectors.

106. Competition and market share analysis have shown that the country is doing well in widening its energy markets. KenGen is a dominant player in power generation. This dominance is mainly attributed to the previous power structure that was vertically integrated but with increased unbundling and open access coupled with increased private sector participation, it is unlikely that this will remain the case in the near future.

8.2 Recommendations

107. This Report has provided a snapshot of statistics that will be featured in the annual Energy Statistics Report. This is in line with best practices among other regulators such as the Central Bank of Kenya (CBK), the Capital Markets Authority (CMA), and the Communication Authority of Kenya (CAK) among others. This first report makes the following recommendations:

Refine and improve the data collection template for all energy services produced and consumed in the country including related trade statistics

Publish the Energy Statistics report annually to inform the public, consumers and investors on the key energy trends in the country

EPRA should enhance partnerships and collaboration with other state agencies such as the Kenya National Bureau of Statistics (KNBS), Kenya Pipeline Company (KPC), Kenya Revenue Authority (KRA), Capital Markets Authority (CMA), Kenya Power and the Central Bank of Kenya (CBK) to ensure quality trade and balance of payment statistics. This will help strengthen the macroeconomic stability of the sector.

Expansion of renewable energy sources (wind, solar and geothermal power generation). This can be achieved by providing incentives such as tax exemptions, speedy approval processes to the interested parties and providing a framework for private sector investment.

Further investment in expanding and modernizing the transmission network to reach more parts of the country and minimize losses.

Adoption of new technologies and innovations that lead to reduced greenhouse gas emissions.

9.
BIBLIOGRAPHY

Kenya Power and Lighting Company Limited (2019), Annual Report 2018/19

EPRA (2018, 2019), Various Reports

Kenya National Bureau of Statistics (2019), Economic Survey 2019, Government Printer

Kenya National Bureau of Statistics (2018), Economic Survey 2018, Government Printer

Kenya National Bureau of Statistics (2017), Economic Survey 2017, Government Printer

Kenya National Bureau of Statistics (2016), Economic Survey 2016, Government Printer

Central Bank of Kenya, Various Publications and website data

Ministry of Energy (2019), Various Statistics

Ministry of Petroleum and Mining (2018, 2019), Various Statistics

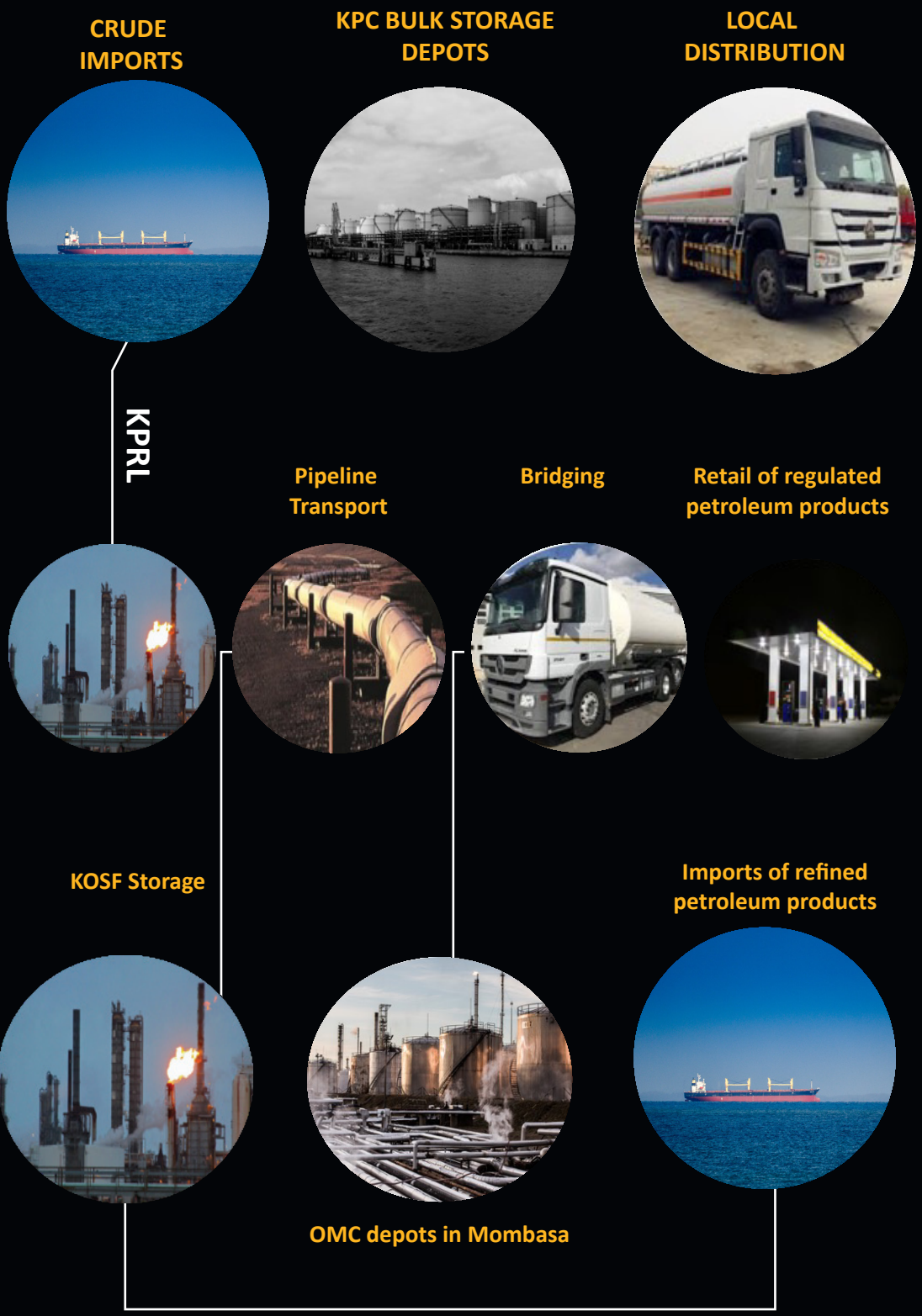
International Energy Agency, Various statistics

Matthew B, Aman. S, Wylie. C, Haughton.A, Lovell. J, Electricity-Specific emission factors for grid electricity

https://ecometrica.com/assets/Electricity-specific-emission-factors-for-grid-electricity.pdf

ANNEXURES

Annex 1: Structure of the Petroleum Sector's Supply Chain



10.
ANNEXES

Annex 1: Requirements for Issuance of Petroleum Licenses (Except LPG)

1. Oil Marketing Companies intending to trade in Jet A1 or other aviation petroleum fues
a) Proof of General Aviation Insurance for Third Party Insurance liability with a minimum cover of USD 500 million b) Proof of ownership of into plane refueling dispenser or evidence of lease of the equipment from a licensed supplier of Jet A1 at the airport or airstrip of operation c) Proof of office space at the airport or airstrip of operation
2. Import, Export and Wholesale of Fuel Oil - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Certificate of Incorporation/Business registration certificate d) Valid tax compliance certificate from Kenya Revenue Authority e) Single Business Permit for the office premises from the County Government f) Work permits Class "G" for foreign directors as per the CR12 g) Proof of application for membership to a National Oil Spill Contingency Group
3. Import, Export and Wholesale of Bitumen - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Certificate of Incorporation/Business registration certificate d) Valid tax compliance certificate from Kenya Revenue Authority e) Single Business Permit for the office premises from the County Government f) Work permits Class "G" for foreign directors as per the CR12
4. Bunkering of Petroleum Products (Except LPG) - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Certificate of Incorporation/Business registration certificate d) Valid tax compliance certificate from Kenya Revenue Authority e) Work permits Class "G" for foreign directors as per the CR12 f) Single Business Permit for the office premises from the County Government g) Proof of application for membership to a National Oil Spill Contingency Group
5. Export and Wholesale of Petroleum Products (Except LPG) - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Certificate of Incorporation/Business registration certificate d) Valid tax compliance certificate from Kenya Revenue Authority e) Single Business Permit for the office premises from the County Government f) Work permits Class "G" for foreign directors as per the CR12

6. Export and Wholesale of Jet A1 - New Application
a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies b) Valid Tax Compliance Certificate from Kenya Revenue Authority c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors d) Single Business Permit to operate business from the respective County Government e) Work Permits Class "G" for foreign directors as per CR12 f) Proof of ownership of into plane refueling dispenser or evidence of long-term lease of the equipment (minimum 5 years) from a licensed supplier of Jet A1 at the airport or airstrip of operation. g) Valid license for Import, Export and Wholesale of Petroleum Products (Except LPG) h) Proof of General Aviation Insurance for Third Party Insurance liability with a minimum cover of USD 500 million
7. Storage of petroleum products (Except LPG) - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies **b)** Legible copies of Identification documents for directors (IDs/passports) **c)** Certificate of Incorporation/Business registration certificate **d)** Valid tax compliance certificate from Kenya Revenue Authority **e)** Single Business Permit for the office premises from the County Government **f)** Work permits Class "G" for foreign directors as per the CR12 **g)** Environmental Impact Assessment licence from NEMA **h)** Confirmation from KEBS that the facility complies with the Kenya Standard (Inspection Report) **i)** Fire clearance certificate from the respective County Government **j)** Certificate of registration of workplace from DOSHS **k)** Valid certificate of Calibration of the petroleum tanks
8. Transport of petroleum products (Except LPG) - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Certificate of incorporation/business registration certificate d) Work permits Class "G" for foreign directors as per the CR12 e) Valid tax compliance certificate from KRA f) Single Business Permit for the office premises from the County Government g) A valid certificate of calibration for the tanker mounted on each vehicle h) Fire certificate for the vehicle from the County Government i) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer j) Log books for each prime mover and trailer (Attach lease agreement if not in the name of owner/company) k) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

9. Transport of by rail (Except LPG) - New Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Certificate of Incorporation / Business Registration Certificate
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
e) Single Business Permit to operate business from the respective County Government
f) Work Permits Class "G" for foreign directors as per CR12
g) Scanned original copy of valid mechanical inspection certificate for each wagon
h) Scanned original copy of valid certificate of calibration for each Petroleum Wagon
i) Scanned original copy of fire certificate for each wagon from the County Government
j) Scanned original copy of proof of ownership of each petroleum wagon or lease agreement with owner of the wagons
k) List of locomotive drivers and their certifications
l) Scanned original copy of valid Medical Surveillance certificate for each locomotive driver from DOSHS approved doctors

10. Retail of petroleum products (Except LPG) - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA
f) Single Business Permit for the office premises from the County Government
g) Proof of ownership of the petrol Service Station (Ownership documents of the petrol service station OR Long term lease (Minimum 5 years)
h) Environmental Impact Assessment License (EIA) or Environmental Audit acknowledgment letter from NEMA
i) Certificate of compliance with the Physical Planning Act of 1999
j) Fire certificate from the Chief Fire Officer Respective County Government;
k) A valid copy of certificate of registration of work place from DOSHS
l) A valid copy Fuel dispensing Meter calibration certificate(s) from Weights and Measures Department
m) A valid certificate of calibration for the Underground Storage tank(s)
n) A scanned copy of Pressure test Report for the Storage tank(s)(not older than 60 months)

11. Retail of petroleum products (Except LPG) -Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA
e) Single Business Permit for the office premises from the County Government
f) Environmental Impact Assessment license (EIA) or Environmental Audit acknowledgment letter from NEMA
g) Fire certificate from the Chief Fire Officer Respective County Government
h) A valid copy of certificate of registration of work place from DOSHS
i) A valid copy Fuel dispensing Meter calibration certificate(s) from Weights and Measures Department
j) A valid certificate of calibration for the Underground Storage tank(s)
k) A scanned copy of Pressure Test Report for the Storage tank(s) (not older than 60 months)

12. Import, Export and Wholesale of Petroleum Products (Except LPG) - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Valid Tax Compliance Certificate from Kenya Revenue Authority d) Single Business Permit for the office premises from the County Government e) Work permits Class "G" for foreign directors as per the CR12 f) Proof of valid membership to a National Oil Spill Contingency Group g) Proof of fulfillment of line fill obligations from Kenya Pipeline Company Limited h) Clearance letter from Kenya Maritime Authority (KMA) on Compliance with International Oil Pollution Compensation Fund i) Proof of online submission of annual purchases and sales data j) Proof of operations in Kenya with sales volume of a total 6.6 Million liters of either/or combination of PMS, AGO or IK within 1 year or ownership of 5 licensed retail outlets that meet the Kenya Standard or Proof of ownership of one (1) licensed petroleum depot
13. Import, Export and Wholesale of Fuel Oil - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports c) Valid Tax Compliance Certificate from Kenya Revenue Authority d) Single Business Permit for the office premises from the County Government e) Legible copies of Identification documents for directors (IDs/passports) f) Work permits Class "G" for foreign directors as per the CR12 g) Proof of membership to a National Oil Spill Contingency Group h) Clearance letter from Kenya Maritime Authority (KMA) on Compliance with International Oil Pollution Compensation Fund
14. Import, Export and Wholesale of Bitumen - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Work permits Class "G" for foreign directors as per the CR12 d) Valid Tax Compliance Certificate from Kenya Revenue Authority e) Single Business Permit for the office premises from the County Government
15. Bunkering of Petroleum Products (Except LPG) - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Legible copies of Identification documents for directors (IDs/passports) c) Certificate of Incorporation/Business registration certificate d) Valid tax compliance certificate from Kenya Revenue Authority e) Work permits Class "G" for foreign directors as per the CR12 f) Single Business Permit for the office premises from the County Government g) Proof of membership to a National Oil Spill Contingency Group.

16. Export and Wholesale of Petroleum Products (Except LPG) Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA
e) Single Business Permit for the office premises from the County Government

17. Export and Wholesale of Jet A1 – Renewal Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
d) Single Business Permit to operate business from the respective County Government
e) Work Permits Class "G" for foreign directors as per CR12
f) Proof of ownership of into plane refueling dispenser or evidence of long-term lease of the equipment (minimum 5 years) from a licensed supplier of Jet A1 at the airport or airstrip of operation.
g) Valid licence for Import, Export and Wholesale of Petroleum Products (Except LPG)
h) Proof of General Aviation Insurance for Third Party Insurance liability with a minimum cover of USD 500 million

18. Storage of petroleum products (Except LPG) - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Single Business Permit for the office premises from the County Government
e) Work permits Class "G" for foreign directors as per the CR12
f) Proof of undertaking of annual Environmental Audit acknowledgment letter from NEMA
g) Fire clearance certificate from the respective County Government
h) Certificate of registration of workplace from DOSHS
i) Proof of submission of monthly stocks data
j) Valid certificate of Calibration of the petroleum

19. Transport of petroleum products (Except LPG) - Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Valid tax compliance certificate from KRA
d) Work permits Class "G" for foreign directors as per the CR12
e) Single Business Permit for the office premises from the County Government
f) A valid certificate of calibration for the tanker mounted on each vehicle
g) Fire certificate for the vehicle from the County Government
h) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer
i) Log books for each prime mover and trailer (Attach lease agreement if not in the name of owner/company)
j) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

1. Transport of by rail (Except LPG) - Renewal Application
a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
d) Single Business Permit to operate business from the respective County Government
e) Work Permits Class "G" for foreign directors as per CR12
f) Scanned original copy of valid mechanical inspection certificate for each wagon
g) Scanned original copy of valid certificate of calibration for each Petroleum Wagon
h) Scanned original copy of fire certificate for each wagon from the County Government
i) Scanned original copy of proof of ownership of each petroleum wagon or lease agreement with owner of the wagons
j) List of locomotive drivers and their certifications
k) Scanned original copy of valid Medical Surveillance certificate for each locomotive driver from DOSHS approved doctors

Annex 2: Requirements for Issuance of LPG Licenses

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Identification documents (IDs or Passports) for all the directors c) Certificate of incorporation/business registration certificate d) Work permits Class "G" for foreign directors as per the CR12 e) Valid tax compliance certificate from KRA f) Single Business Permit to for the premises from the County Government
2. Export and Wholesale of LPG in Bulk - New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Identification documents (IDs or Passports) for all the directors c) Certificate of incorporation/business registration certificate d) Work permits Class "G" for foreign directors as per the CR12 e) Valid tax compliance certificate from KRA f) Single Business Permit to for the premises from the County Government g) Letter of intent from a licensed LPG Importer
3. Wholesale of LPG in Cylinders -New Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Identification documents (IDs or Passports) for all the directors c) Certificate of incorporation/business registration certificate d) Work permits Class "G" for foreign directors as per the CR12 e) Valid tax compliance certificate from KRA f) Single Business Permit to for the premises from the County Government g) Fire clearance certificate from the respective County Government h) Certificate of registration of workplace from DOSHS i) Proof of importation/manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/Authority for distributing cylinders from a licensed LPG cylinder brand owners j) Proof of cylinder brand ownership registration from Kenya Industrial Property Institute (KIPI)/letter of authority from brand owner k) Weighing scale calibration certificate from Weights and Measures Department
4. Storage & Filling of LPG in Bulk - New Application
a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies b) Certificate of Incorporation/Business registration certificate c) Valid tax compliance certificate from Kenya Revenue Authority d) Single Business Permit for the premises from the County Government e) Legible copies of Identification documents for directors (IDs/passports) f) Work permits Class "G" for foreign directors as per the CR12 g) Environmental Impact Assessment license from NEMA h) Fire clearance certificate from the respective County Government

i) Confirmation from Kenya Bureau of Standards that the facility complies with the Kenya Standard (Inspection Report)
j) Certificate of registration of workplace from DOSHS
k) Proof of importation/manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/Authority for filling of cylinders from licensed LPG cylinder brand owners
l) Proof of cylinder brand ownership registration from Kenya Industrial Property Institute (KIPI)/letter of authority from brand owner
m) Weighing scale calibration certificate from Weights and Measures Department
n) Valid calibration certificate(s) for the LPG tank(s)
o) Valid report(s) on Examination of LPG tank(s) from DOSHS approved Inspector

5. Transport of LPG in bulk - New Application

a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Certificate of incorporation/business registration certificate
d) Work permits Class "G" for foreign directors as per the CR12
e) Valid tax compliance certificate from KRA
f) Single Business Permit for the office premises from the County Government
g) A valid certificate of calibration for the tanker mounted on each vehicle
h) Fire certificate for the vehicle from the County Government office by Chief Fire Officer
i) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer
j) Log books for each prime mover and trailer (Attach lease agreement if not in the name of owner/company)
k) Valid report on examination for LPG tank mounted on each vehicle
l) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

6. Retail of LPG in Cylinders - New Application

a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies
b) Certificate of Incorporation / Business Registration Certificate
c) Valid Tax Compliance Certificate from Kenya Revenue Authority
d) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors
e) Single Business Permit to operate business from the respective County Government
f) Work Permits Class "G" for foreign directors as per CR12
g) Scanned copy of distributorship agreement from LPG Cylinder brand owner or licensed wholesaler
h) Scanned original copy of a valid weighing scale calibration certificate from Weights and Measures department
i) Scanned original copy of a valid fire certificate for the premises from the County Government

7. Retail of LPG in Cylinders - Renewal Application
a) CR12 from the Registrar of companies (Not older than one (1) year) for limited companies b) Valid Tax Compliance Certificate from Kenya Revenue Authority c) Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors d) Single Business Permit to operate business from the respective County Government e) Work Permits Class "G" for foreign directors as per CR12 f) Scanned copy of distributorship agreement from LPG Cylinder brand owner or licensed wholesaler g) Scanned original copy of a valid weighing scale calibration certificate from Weights and Measures department h) Scanned original copy of a valid fire certificate for the premises from the County Government
8. Import, Export and Wholesale of LPG in Bulk - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies b) Identification documents (IDs or Passports) for all the directors c) Work permits Class "G" for foreign directors as per the CR12 d) Valid tax compliance certificate from KRA e) Single Business Permit to for the premises from the County Government f) Proof of annual data submission
9. Export and Wholesale of LPG in Bulk - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies b) Identification documents (IDs or Passports) for all the directors c) Work permits Class "G" for foreign directors as per the CR12 d) Valid tax compliance certificate from KRA e) Single Business Permit to for the premises from the County Government
10. Wholesale of LPG in Cylinders - Renewal Application
a) CR 12 from Registrar of Companies (not older than 12 months) for Limited Companies; b) Identification documents (IDs or Passports) for all the directors c) Work permits Class "G" for foreign directors as per the CR12 d) Valid tax compliance certificate from KRA e) Single Business Permit to for the premises from the County Government f) Fire clearance certificate from the respective County Government g) Proof of importation/manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/Authority for distributing cylinders from a licensed LPG cylinder brand owners. h) Proof of cylinder brand ownership registration from Kenya Industrial Property Institute (KIPI)/letter of authority from brand owner i) Certificate of registration of workplace from DOSHS j) Weighing scale calibration certificate from Weights and Measures Department

11. Storage & Filling of LPG in Bulk - Renewal

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies
b) Valid Tax Compliance Certificate from Kenya Revenue Authority
c) Single Business Permit for the premises from the County Government
d) Legible copies of Identification documents for directors (IDs/passports)
e) Work permits Class "G" for foreign directors as per the CR12
f) Proof of undertaking of annual Environmental Audit acknowledgment letter from NEMA
g) Fire clearance certificate from the respective County Government
h) Certificate of registration of workplace from DOSHS
i) A valid certificate of weighing scale calibration from Weights and Measures Department
j) Valid calibration certificate(s) for the LPG tank(s)
k) Valid report(s) on Examination of LPG tank(s) from DOSH approved Inspector
l) Proof of importation/manufacture of 5,000 cylinders of either 1, 3, 6 or 13kgs (Attach cylinder count report from ERC)/Authority for filling of cylinders from licensed LPG cylinder brand owners.

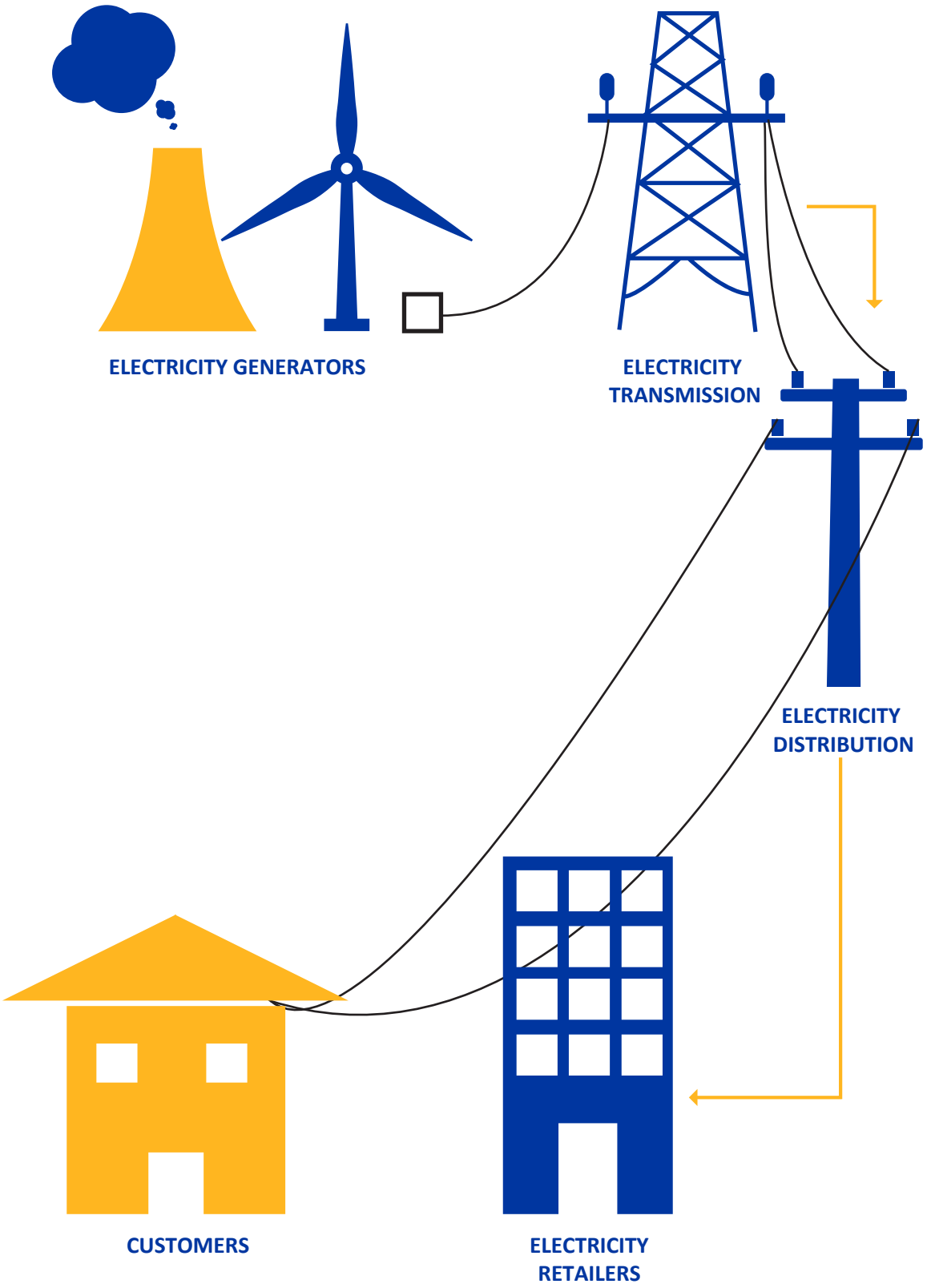
12. Transport of LPG in bulk -Renewal Application

a) CR 12 from Registrar of Companies (not older than 12 months old) for Limited Companies
b) Legible copies of Identification documents for directors (IDs/passports)
c) Work permits Class "G" for foreign directors as per the CR12
d) Valid tax compliance certificate from KRA
e) Single Business Permit for the office premises from the County Government
f) A valid certificate of calibration for the tanker mounted on each vehicle
g) Fire certificate for the vehicle from the County Government office by Chief Fire Officer
h) A valid Motor Vehicle Inspection Certificate for each prime mover and trailer
i) Log books for each prime mover and trailer (Attach lease agreement if not in the name of owner/company)
j) Valid report on examination for LPG tank mounted on each vehicle
k) A list of vehicles; prime mover paired to trailer where necessary (In Microsoft Excel)

13. Driver Certification (Petroleum products including LPG)

a) Scanned original copies of Identification documents (IDs or Passports) for driver
b) Valid Certificate of Fitness for Drivers from Designated Health Practitioners (DOSHS approved Doctors)
c) A valid driving license for each driver
d) Certificate of Good Conduct
e) Passport size photo of the driver

Annex 3: Structure of Kenya's Electricity Supply Chain



Annex 4: Power System Capacity as at December 2018

COMPANY	Installed Capacity	Effective Capacity
KenGen		
a. Hydro Power Plants		
Tana	20.0	20.0
Kamburu	94.2	90.0
Gitaru	225.0	216.0
Kindaruma	72.0	70.5
Masinga	40.0	40.0
Kiambere	168.0	164.0
Turkwel	106.0	105.0
Sondu Miriu	60.0	60.0
Sangoro	21.0	20.0
Small Hydros	11.7	11.2
Hydro Total	818	797
b. Thermal Power Plants		
Kipevu I Diesel	73.5	60.0
Kipevu 3 Diesel	120.0	115.0
Muhoroni GT	60.0	56.0
Thermal Total	254	231
c. Geothermal Power Plants		
Olkaria I	45	44
Olkaria II	105	101
Eburru Hill	2.4	2.4
Olkaria Wellhead OW37	5.0	5.0
Olkaria Wellhead OW37 kwg 12	5	5
Olkaria Wellhead OW37 kwg 13	5	5
Olkaria Wellhead OW43	12.8	12.8
Olkaria Wellhead OW905	5	5
Olkaria Wellhead OW914&OW915	37.8	37.8
Olkaria Wellhead OW919	5	5
Olkaria Wellhead OW39	5	5
Olkaria IV	140	140
Olkaria I units 4 and 5	140	140
Geothermal Total	513	508

Source: EPRA 2019

d. Wind Power Plants		
Ngong I	11.9	11.9
Ngong II	13.6	13.6
Wind Total	25.5	25.5
KenGen Total	1,610	1,561
1. G overnment of Kenya (Rural Electrification Programme)		
Off-grid Diesel	28.9	19.5
Off-grid Solar	0.7	0.2
Off-gridWind	0.6	0.0
Total Offgrid	30.2	19.7
2. Independent Power Producers (IPP) - Thermal & Geothermal		
Iberafrica Diesel	52.5	52.5
Tsavo Diesel	74.0	74.0
Biojoule Kenya Limited	2.0	2.0
Mumias - Cogeneration	26.0	21.5
OrPower 4 -Geothermal (1st plant)	63.8	63.8
OrPower 4 -Geothermal (2nd plant)	39.6	39.6
OrPower 4 -Geothermal (3 rd plant)	17.6	17.6
OrPower 4 -Geothermal (4th plant)	29.0	29.0
Rabai Diesel	90.0	88.6
Thika Diesel	87.0	87.0
Gulf Diesel	80.32	80.32
Triumph Diesel	83.0	83.0
Imenti FiT hydro	0.283	0.283
Gikira FiT hydro	0.514	0.514
Genpro Teremi Falls	5.0	5.0
KTDA Gura	2.0	2.0
KTDA Chania	0.5	0.5
Strathmore Solar	0.25	0.25
Lake Turkana Wind Power	310.0	300.0
Garrissa Solar	50.0	50.0
IPP Total	1,013	997
3. Imports		
UETCL	0	0
EEPCO	0	0
TANESCO	0	0

Source: EPRA 2019

Annex 5: Schedule of Electricity Tariffs for 2018/19

Code	Customer Type (Code Name)	Energy Limit kWh/Month	Charge Method	Unit	Approved Charge Rates
DC-L	Domestic - Lifeline	0-100	Energy	Ksh/kWh	10
DC-O	Domestic - Ordinary	> 100	Energy	Ksh/kWh	15.8
SC 1	Small Commercial 1	0- 100	Energy	Ksh/kWh	10
SC 2	Small Commercial 2	> 100 -15,000	Energy	Ksh/kWh	15.6
CI1	Commercial/ Industrial	> 15,000	Energy	Ksh/KVA	12
			Demand	Ksh/KVA	800
CI2	Comm./ Industrial	No. Limit	Energy	Ksh/kWh	10.9
			Demand	Ksh/KVA	520
CI3	Comm./ Industrial	No. Limit	Energy	Ksh/kWh	10.5
			Demand	Ksh/KVA	270
CI4	Comm./ Industrial	No. Limit	Energy	Ksh/kWh	10.3
			Demand	Ksh/KVA	220
CI5	Comm./ Industrial	No Limit	Energy	Ksh/kWh	10.1
			Demand	Ksh/KVA	220
SL	Street Lighting	No Limit	Energy	Ksh/kWh	7.5

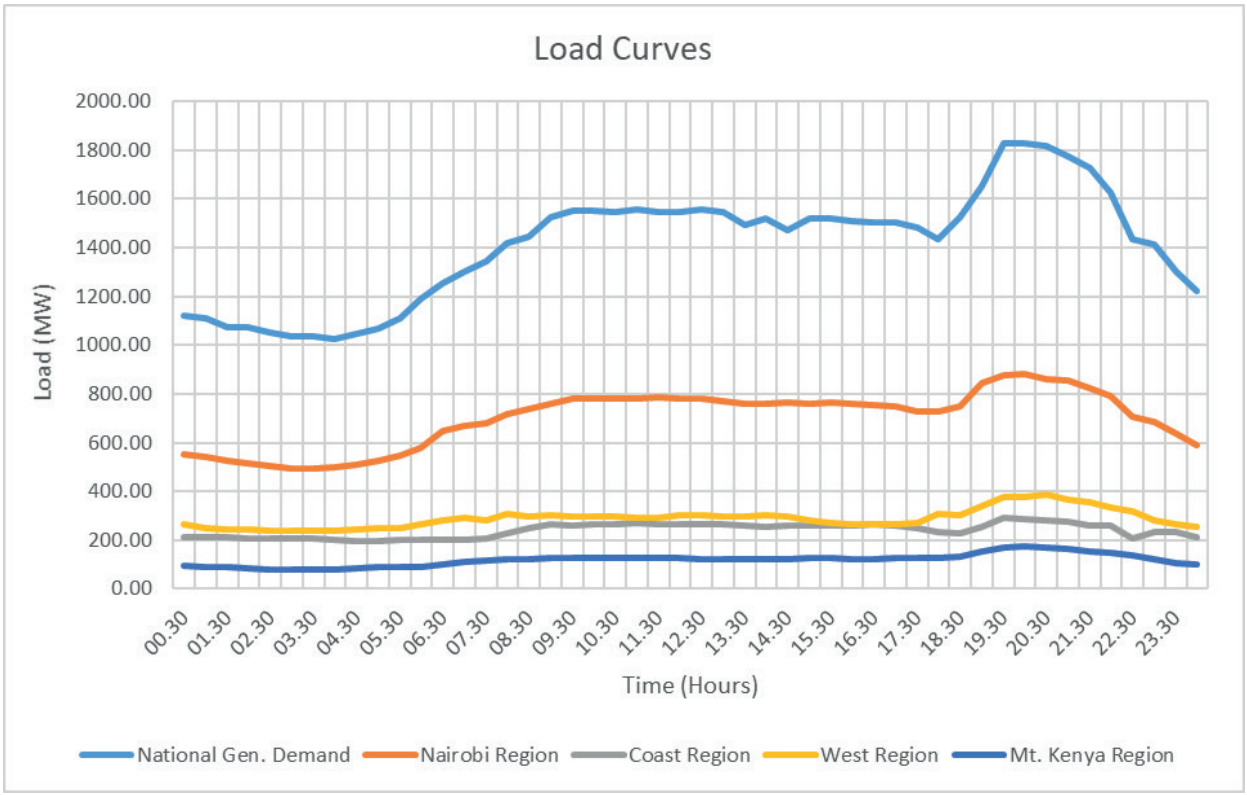
Source: EPRA 2019

Annex 6: Average water levels of Large Hydros

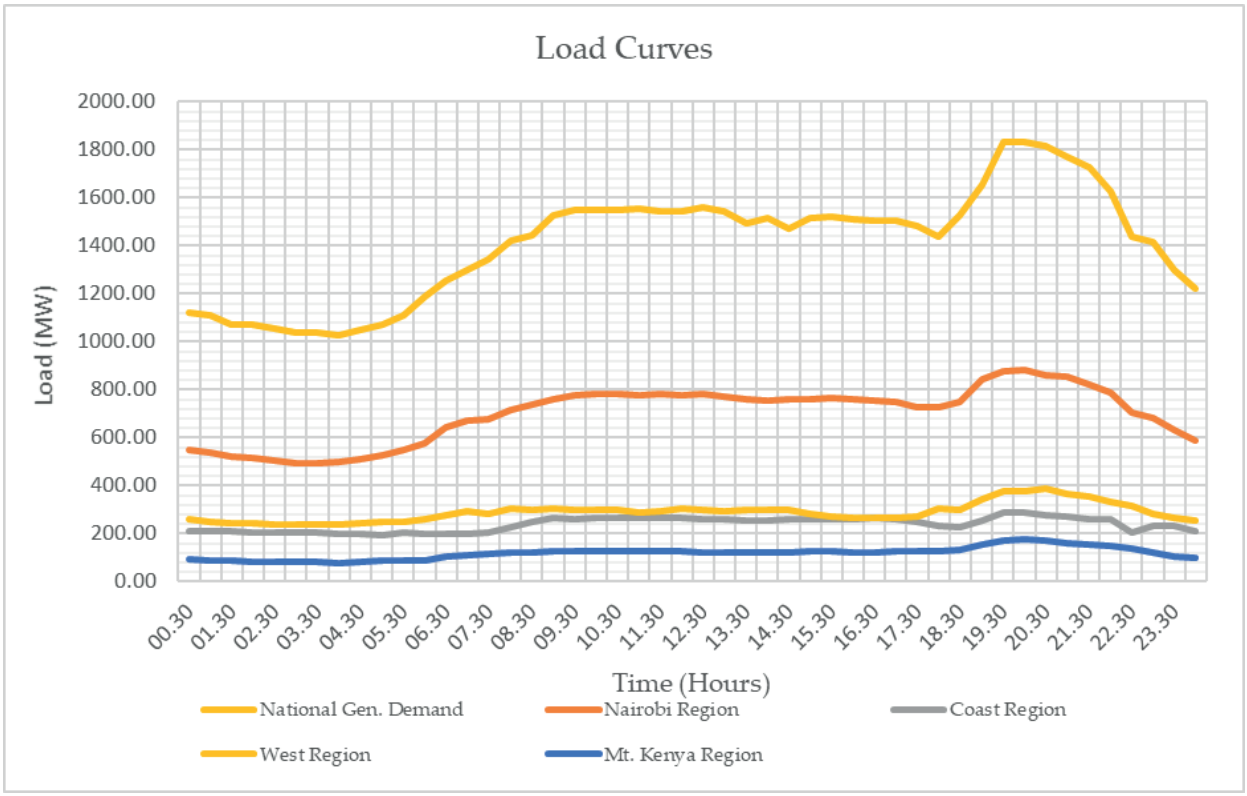
RESERVOIR	Average Water Levels (MASL) as at 28th November 2018
Masinga Dam	1051.45
Kamburu Dam	1000.88
Gitaru Dam	923.41
Kindaruma	778.94
Kiambere Dam	698.91
Turkwel Dam	1128.13

Source: EPRA 2019

Annex 7: Load Curves as at 28th November 2018



Source: EPRA 2019



Source: EPRA 2019

Annex 8: Kenya's Energy Matrix, 2009

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	-	-	-	-	280.90	89.30	13,866.00	0.00	0.00	14,236.20
Imports	94.60	1,610.10	2,145.90	-	0.00	-	-	-	3.30	-	3,853.90
Exports	-	-	-	-	0.00	-	-	-	-2.30	-	-2.30
International Marine Bunkers**	-	-	49.40	-	0.00	-	-	-		-	49.40
International Aviation Bunkers**	-	-	-633.87	-	0.00	-	-	-	-	-	-633.87
Stock Changes	-	-	-145.20	-	0.00	-	-	-	-	-	-145.20
Total Primary Energy Supply(TPES)	**94.60**	**1,610.10**	**1,416.23**		**0.00**	**280.90**	**89.30**	**13,866.00**	**0.00**		**17,357.13**
	-				0.00						0.00
Transfers	-	-	-	-	0.00	-	-	-	-	-	0.00
Statistical differences	-	148.00	875.00	-	0.00	-	-	967.00	296.00	-	2,286.00
	-	-	-	-	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-643.80		0.00	-280.90	-89.30	-91.00	264.94	-	-840.06
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	-1,605.00	1,605.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-4,614.78	-	-	-4,614.78
Own Use	-	-	-113.00	-	0.00	-	-	-	-14.59	-	-127.59
Distribution Losses	-	-	-	-	0.00	-	-	-	-90.00	-	-90.00
Total Final Consumption(TFC)	**94.60**	**153.10**	**3,139.43**		**0.00**	**0.00**	**0.00**	**10,127.22**	**456.35**	-	**13,970.70**
					0.00						0.00
Industry& commercial sector	**94.60**	**0.00**	**570.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**263.00**	**0.00**	**927.60**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**2,662.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2,662.70**
International Civil Aviation	-	-		-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	592.40	-	0.00	-	-	-	-	-	592.40
Road trnasport &retail pump outlets	-	-	2,054.50	-	0.00	-	-	-	-	-	2,054.50
Rail transport	-	-	8.50	-	0.00	-	-	-	-	-	8.50
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	7.30	-	0.00	-	-	-	-	-	7.30
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**855.56**	**0.00**	**0.00**	**0.00**	**0.00**	**9,708.00**	**0.00**	**0.00**	**0.00**
Residential	-	-	384.00	-	0.00	-	-	9,708.00	139.00	-	10,231.00
Government	-	-	18.90	-	0.00	-	-	-	-	-	18.90
Agriculture/ Forestry	-	-	26.30	-	0.00	-	-	-	-	-	26.30
Tourism	-	-	8.30	-	0.00	-	-	-	-	-	8.30
Power generation	-	-	372.20	-	0.00	-	-	-	-	-	372.20
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	45.86	-	0.00	-	-	-	-	-	45.86
					0.00						0.00
Non-Energy Use	**0.00**	**0.00**	**126.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	0.00	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/TransfEner	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 9: Kenya's Energy Matrix, 2010

Supply& Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	277.20	124.00	14,233.00	-	-	14,634.20
Imports	165.20	1,551.50	1,941.10	-	0.00	2.60	-	-	2.70	-	3,663.10
Exports	-	-		-	0.00		-	-	-2.70	-	-2.70
International Marine Bunkers**	-	-	10.61	-	0.00		-	-		-	10.61
International Aviation Bunkers**	-	-	-668.86	-	0.00	-	-	-	-	-	-668.86
Stock Changes	-	-	273.10	-	0.00	-	-	-	-	-	273.10
Total Primary Energy Supply(TPES)	**165.20**	**1,551.50**	**1,555.95**		**0.00**	**279.80**	**124.00**	**14,233.00**	**0.00**	**0.00**	**17,909.45**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	148.00	875.00	-	0.00	-	-	967.00	296.00	-	2,286.00
	-	-	-	-	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-791.50		0.00	-279.80	-124.00	-91.00	337.00	-	-949.30
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	-1,551.00	1,551.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-4,764.00	-	-	-4,764.00
Own Use	-	0.00	-83.00	-	0.00	-	-	-	-5.00	-	-88.00
Distribution Losses	-	-	-	-	0.00	-	-	-	-101.00	-	-101.00
Total Final Consumption(TFC)	**165.20**	**148.50**	**3,107.45**		**0.00**	**0.00**	**0.00**	**10,345.00**	**527.00**	-	**14,293.15**
					0.00						
Industry& commercial sector	**165.20**	**0.00**	**414.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**275.62**	**0.00**	**855.42**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**3,003.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3,003.90**
International Civil Aviation	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	625.10	-	0.00	-	-	-	-	-	625.10
Road trnasport &retail pump outlets	-	-	2,362.50	-	0.00	-	-	-	-	-	2,362.50
Rail transport	-	-	0.20	-	0.00	-	-	-	-	-	0.20
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	16.10	-	0.00	-	-	-	-	-	16.10
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**734.40**	**0.00**	**0.00**	**0.00**	**0.00**	**9,379.00**	**122.00**	**0.00**	**10,235.40**
Residential	-	-	337.00	-	0.00	-	-	9,379.00	122.00	-	9,838.00
Government	-	-	15.80	-	0.00	-	-	-	-	-	15.80
Agriculture/ Forestry	-	-	33.90	-	0.00	-	-	0.00	-	-	33.90
Tourism	-	-	7.40	-	0.00	-	-	-	-	-	7.40
Power generation	-	-	300.30	-	0.00	-	-	-	-	-	300.30
Fishing	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	40.00	-	0.00	-	-	-	-	-	40.00
				-	0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**193.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**193.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA Data; Various sources

Annex 10: Kenya's Energy Matrix, 2011

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total'
Indegenous Production	-	0.00	0.00	-	0.00	276.60	124.10	14,616.00	-	-	15,016.70
Imports	236.30	1,772.10	2,119.80	-	0.00	2.90	-	-	3.20	-	4,134.30
Exports	-	-	-	-	0.00	-	-	-	-3.60	-	-3.60
International Marine Bunkers**	-	-	22.57	-	0.00	-	-	-	-	-	22.57
International Aviation Bunkers**	-	-	-712.30	-	0.00	-	-	-	-	-	-712.30
Stock Changes	-	-	-34.00	-	0.00	-	-	-	-	-	-34.00
Total Primary Energy Supply(	**236.30**	**1,772.10**	**1,396.07**		**0.00**	**279.50**	**124.10**	**14,616.00**	**-0.40**		**18,423.67**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	148.00	875.00	-	0.00	-	-	967.00	296.00	-	2,286.00
	-	-	-	-	0.00	-	-	-	-	-	0.00
Electricity Plants	-	-	-716.90	-	0.00	-279.50	-124.10	-91.00	368.00	-	-843.50
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	-1,778.00	1,703.00	-	0.00	-	-	-	-	-	-75.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-4,893.00	-	-	-4,893.00
Own Use	-	0.00	-89.00	-	0.00	-	-	-	-5.00	-	-94.00
Distribution Losses	-	-	-	-	0.00	-	-	-	-114.00	-	-114.00
Total Final Consumption(TFC)	**236.30**	**142.10**	**3,168.17**		**0.00**	**0.00**	**0.00**	**10,599.00**	**544.60**	0.00	**14,690.17**
					0.00						
Industry& commercial sector	**236.30**	**0.00**	**632.50**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**295.87**	**0.00**	**1,164.67**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**2,859.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2,859.30**
International Civil Aviation	-	-		-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. go	-	-	665.70	-	0.00	-	-	-	-	-	665.70
Road tmasport &retail pump out	-	-	2,159.50	-	0.00	-	-	-	-	-	2,159.50
Rail transport	-	-	7.30	-	0.00	-	-	-	-	-	7.30
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	26.80	-	0.00	-	-	-	-	-	26.80
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**721.80**	**0.00**	**0.00**	**0.00**	**0.00**	**9,632.00**	**132.00**	**0.00**	**10,485.80**
Residential	-	-	294.00	-	0.00	-	-	9,632.00	132.00	-	10,058.00
Government	-	-	21.00	-	0.00	-	-	-	-	-	21.00
Agriculture/ Forestry	-	-	30.40	-	0.00	-	-	-	-	-	30.40
Tourism	-	-	7.70	-	0.00	-	-	-	-	-	7.70
Power generation	-	-	328.70	-	0.00	-	-	-	-	-	328.70
Fishing	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	40.00	-	0.00	-	-	-	-	-	40.00
					0.00						0.00
Non-Energy Use	**0.00**	**0.00**	**234.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**234.00**
_of which petrochemical feedsto	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/TransfEner	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 11: Kenya's Energy Matrix, 2012

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	345.30	130.30	15,009.00	-	-	15,484.60
Imports	211.30	997.10	2,744.20	-	0.00	3.40	-	-	3.60	-	3,959.60
Exports	-	-		-	0.00		-	-	-2.70	-	-2.70
International Marine Bunkers**	-	-	13.52	-	0.00		-	-		-	13.52
International Aviation Bunkers**	-	-	-712.09	-	0.00	-	-	-	-	-	-712.09
Stock Changes	-	-	-102.70	-	0.00	-	-	-	-	-	-102.70
Total Primary Energy Supply(TPE	**211.30**	**997.10**	**1,942.94**		**0.00**	**348.70**	**130.30**	**15,009.00**	**0.90**		**18,640.24**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	148.00	875.00	-	0.00	-	-	967.00	296.00	-	2,286.00
	-	-	-	-	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-757.60		0.00	-348.70	-130.30	-91.00	405.00	-	-922.60
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	-997.00	992.10	-	0.00	-	-	-	-	-	-4.90
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-4,614.78	-	-	-4,614.78
Own Use	-	0.00	-113.00	-	0.00	-	-	-	-5.00	-	-118.00
Distribution Losses	-	-	-	-	0.00	-	-	-	-130.00	-	-130.00
Total Final Consumption(TFC)	**211.30**	**148.10**	**2,939.44**		**0.00**	**0.00**	**0.00**	**11,270.22**	**566.90**	-	**15,135.96**
					0.00						
Industry& commercial sector	**211.30**	**0.00**	**566.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**293.19**	**0.00**	**1,070.59**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**2,924.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2,924.90**
International Civil Aviation	-	-		-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	665.50	-	0.00	-	-	-	-	-	665.50
Road tmasport &retail pump outlets	-	-	2,234.70	-	0.00	-	-	-	-	-	2,234.70
Rail transport	-	-	11.60	-	0.00	-	-	-	-	-	11.60
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	13.10	-	0.00	-	-	-	-	-	13.10
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**205.86**	**0.00**	**0.00**	**0.00**	**0.00**	**9,708.00**	**144.00**	**0.00**	**10,057.86**
Residential	-	-	0.00	-	0.00	-	-	9,708.00	144.00	-	9,852.00
Government	-	-	12.60	-	0.00	-	-	-	-	-	12.60
Agriculture/ Forestry	-	-	22.50	-	0.00	-	-	-	-	-	22.50
Tourism	-	-	6.20	-	0.00	-	-	-	-	-	6.20
Power generation	-	-	118.70	-	0.00	-	-	-	-	-	118.70
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	45.86	-	0.00	-	-	-	-	-	45.86
					0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**11.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**11.70**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 12: Kenya's Energy Matrix, 2013

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	381.30	153.10	15,419.00	-	-	15,953.40
Imports	208.90	567.40	2,917.00	-	0.00	4.20	-	-	3.60	-	3,701.10
Exports	-	-		-	0.00		-	-	-2.80	-	-2.80
International Marine Bunkers**	-	-	26.42	-	0.00		-	-		-	26.42
International Aviation Bunkers**	-	-	-591.07	-	0.00	-	-	-	-	-	-591.07
Stock Changes	-	-	192.10	-	0.00	-	-	-	-	-	192.10
Total Primary Energy Supply(TPE	**208.90**	**567.40**	**2,544.45**		**0.00**	**385.50**	**153.10**	**15,419.00**	**0.80**		**19,279.15**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	148.00	875.00	-	0.00	-	-	967.00	296.00	-	2,286.00
	-	-	-	-	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-689.00		0.00	-385.50	-153.10	-91.00	402.00	-	-916.60
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	-1,627.30	1,627.30	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-4,741.80	-	-	-4,741.80
Own Use	-	0.00	-113.00	-	0.00	-	-	-	-5.00	-	-118.00
Distribution Losses	-	-	-	-	0.00	-	-	-	-130.00	-	-130.00
Total Final Consumption(TFC)	**208.90**	**-911.90**	**4,244.75**		**0.00**	**0.00**	**0.00**	**11,553.20**	**563.80**	-	**15,658.75**
					0.00						
Industry& commercial sector	**208.90**	**0.00**	**462.30**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**308.34**	**0.00**	**979.54**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**3,205.70**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3,205.70**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	592.40	-	0.00	-	-	-	-	-	592.40
Road trnasport &retail pump outlets	-	-	2,573.70	-	0.00	-	-	-	-	-	2,573.70
Rail transport	-	-	14.20	-	0.00	-	-	-	-	-	14.20
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	25.40	-	0.00	-	-	-	-	-	25.40
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**151.16**	**0.00**	**0.00**	**0.00**	**0.00**	**9,976.90**	**139.00**	**0.00**	**10,267.06**
Residential	-	-	0.00	-	0.00	-	-	9,976.90	139.00	-	10,115.90
Government	-	-	7.20	-	0.00	-	-	-	-	-	7.20
Agriculture/ Forestry	-	-	28.50	-	0.00	-	-	-	-	-	28.50
Tourism	-	-	5.50	-	0.00	-	-	-	-	-	5.50
Power generation	-	-	64.10	-	0.00	-	-	-	-	-	64.10
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	45.86	-	0.00	-	-	-	-	-	45.86
				-	0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**6.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**6.20**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 13: Kenya's Energy Matrix, 2014

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	306.90	250.90	16,361.76	-	-	16,919.56
Imports	328.70	0.00	3,958.19	-	0.00	13.60	-	-	13.62	-	4,314.11
Exports	-	-	-585.23	-	0.00		-	-	-2.65	-	-587.88
International Marine Bunkers**	-	-	19.34	-	0.00		-	-		-	19.34
International Aviation Bunkers**	-	-	-567.53	-	0.00	-	-	-	-	-	-567.53
Stock Changes	-	-	192.70	-	0.00	-	-	-	-	-	192.70
Total Primary Energy Supply(TPES	**328.70**	**0.00**	**3,017.49**		**0.00**	**320.50**	**250.90**	**16,361.76**	**10.97**		**20,290.32**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	-148.00	875.00	-	0.00	-	-	967.00	296.00	-	1,990.00
	-	-	-	-	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-222.30	0.00	0.00	-306.90	-250.90	-4.30	785.80	-	1.40
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	0.00	0.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-5,478.04	-	-	-5,478.04
Own Use	-	0.00	0.00	-	0.00	-	-	-	-17.30	-	-17.30
Distribution Losses	-	-	-	-	0.00	-	-	-	-115.20	-	-115.20
Total Final Consumption(TFC)	**328.70**	**-148.00**	**3,670.19**	**0.00**	**0.00**	**13.60**	**0.00**	**11,846.42**	**960.27**	**-**	**16,671.17**
					0.00						
Industry& commercial sector	**328.70**	**0.00**	**418.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**700.68**	**0.00**	**1,447.93**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**3,112.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3,112.77**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	492.02	-	0.00	-	-	-	-	-	492.02
Road trnasport &retail pump outlets	-	-	2,589.03	-	0.00	-	-	-	-	-	2,589.03
Rail transport	-	-	14.47	-	0.00	-	-	-	-	-	14.47
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	17.25	-	0.00	-	-	-	-	-	17.25
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**138.87**	**0.00**	**0.00**	**0.00**	**0.00**	**11,846.42**	**259.59**	**0.00**	**12,244.88**
Residential	-	-	0.00	-	0.00	-	-	11,846.42	252.76	-	12,099.18
Government	-	-	8.63	-	0.00	-	-	-	-	-	8.63
Agriculture/ Forestry	-	-	33.77	-	0.00	-	-	-	-	-	33.77
Tourism	-	-	4.73	-	0.00	-	-	-	-	-	4.73
Power generation	-	-	91.74	-	0.00	-	-	-	-	-	91.74
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	0.00	-	0.00	-	-	-	6.83	-	6.83
				-	0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 14: Kenya's Energy Matrix, 2015

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geotherm al, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	302.80	388.70	16,459.93	-	-	17,151.43
Imports	348.60	0.00	4,667.12	-	0.00	5.10	-	-	5.059	-	5,025.88
Exports	-	-	-795.23	-	0.00		-	-	4.02	-	-791.21
International Marine Bunkers**	-	-	0.31	-	0.00		-	-		-	0.31
International Aviation Bunkers**	-	-	-682.34	-	0.00	-	-	-	-	-	-682.34
Stock Changes	-	-	324.60	-	0.00	-	-	-	-	-	324.60
Total Primary Energy Supply(TPES)	**348.60**	**0.00**	**3,514.46**		**0.00**	**307.90**	**388.70**	**16,459.93**	**9.08**		**21,028.67**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	-148.00	875.00	-	0.00	-	-	967.00	-296.00	-	1,398.00
	-	-	-	0.00	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-121.40	0.00	0.00	-302.90	-388.70	0.00	818.10	-	5.10
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	0.00	0.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-5,510.91	-	-	-5,510.91
Own Use	-	0.00	0.00	-	0.00	-	-	-	-17.30	-	-17.30
Distribution Losses	-	-	-	-	0.00	-	-	-	-141.10	-	-141.10
Total Final Consumption(TFC)	**348.60**	**-148.00**	**4,268.06**	**0.00**	**0.00**	**5.00**	**0.00**	**11,916.02**	**372.78**		**16,762.46**
					0.00						
Industry& commercial sector	**348.60**	**0.00**	**515.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**271.99**	**0.00**	**1,135.86**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**3,685.69**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3,685.69**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	574.35	-	0.00	-	-	-	-	-	574.35
Road tmasport &retail pump outlets	-	-	3,075.49	-	0.00	-	-	-	-	-	3,075.49
Rail transport	-	-	33.23	-	0.00	-	-	-	-	-	33.23
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	2.61	-	0.00	-	-	-	-	-	2.61
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**67.10**	**0.00**	**0.00**	**0.00**	**0.00**	**11,916.02**	**100.74**	**0.00**	**12,083.86**
Residential	-	-	0.00	-	0.00	-	-	11,916.02	98.11	-	12,014.13
Government	-	-	6.94	-	0.00	-	-	-	-	-	6.94
Agriculture/ Forestry	-	-	26.75	-	0.00	-	-	-	-	-	26.75
Tourism	-	-	4.32	-	0.00	-	-	-	-	-	4.32
Power generation	-	-	29.09	-	0.00	-	-	-	-	-	29.09
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	0.00	-	0.00	-	-	-	2.63	-	2.63
				-	0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 15: Kenya's Energy Matrix, 2016

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geotherm al, s olar, wind etc	Combus tible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	340.50	385.60	16,558.69	-	-	17,284.79
Imports	343.50	0.00	5,114.49	-	0.00	7.40	-	-	7.43	-	5,472.82
Exports	-	-	-890.41	-	0.00		-	-	-3.36	-	-893.77
International Marine Bunkers**	-	-	0.10	-	0.00		-	-		-	0.10
International Aviation Bunkers**	-	-	-640.29	-	0.00	-	-	-	-	-	-640.29
Stock Changes	-	-	205.30	-	0.00	-	-	-	-	-	-
Total Primary Energy Supply(TPES)	**343.50**	**0.00**	**3,789.20**		**0.00**	**347.90**	**385.60**	**16,558.69**	**4.07**		**21,428.96**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	148.00	875.00	-	0.00	-	-	967.00	296.00	-	1,263.00
	-	-	-	0.00	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-126.56	0.00	0.00	-340.72	-385.60	0.00	865.39	-	12.51
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	0.00	0.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-5,543.97		-	-5,543.97
Own Use	-	0.00	0.00	-	0.00	-	-	-	-19.04	-	-19.04
Distribution Losses	-	-	-	-	0.00	-	-	-	-169.11	-	-169.11
Total Final Consumption(TFC)	**343.50**	**148.00**	**4,537.64**	**0.00**	**0.00**	**7.18**	**0.00**	**11,981.72**	**977.31**	-	**16,972.34**
					0.00						
Industry& commercial sector	**343.50**	**0.00**	**547.81**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**713.07**	**0.00**	**1,604.38**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**3,918.49**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3,918.49**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	610.63	-	0.00	-	-	-	-	-	610.63
Road tmasport &retail pump outlets	-	-	3,269.75	-	0.00	-	-	-	-	-	3,269.75
Rail transport	-	-	35.33	-	0.00	-	-	-	-	-	35.33
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	2.78	-	0.00	-	-	-	-	-	2.78
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**71.34**	**0.00**	**0.00**	**0.00**	**0.00**	**11,981.72**	**264.11**	**0.00**	**12,317.16**
Residential	-	-	0.00	-	0.00	-	-	11,981.72	257.22	-	12,238.93
Government	-	-	7.37	-	0.00	-	-	-	-	-	7.37
Agriculture/ Forestry	-	-	28.44	-	0.00	-	-	-	-	-	28.44
Tourism	-	-	4.60	-	0.00	-	-	-	-	-	4.60
Power generation	-	-	30.93	-	0.00	-		-	-	-	30.93
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	0.00	-	0.00	-	-	-	6.89	-	6.89
				-	0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 16: Kenya's Energy Matrix, 2017

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	238.80	409.00	16,658.04	-	-	17,305.84
Imports	462.70	0.00	6,691.01	-	0.00	19.70	-	-	19.74	-	7,193.15
Exports	-	-	-889.88	-	0.00		-	-	1.06	-	-888.82
International Marine Bunkers**	-	-	9.46	-	0.00		-	-		-	9.46
International Aviation Bunkers**	-	-	-689.62	-	0.00	-	-	-	-	-	-689.62
Stock Changes	-	-	347.20	-	0.00	-	-	-	-	-	347.20
Total Primary Energy Supply(TPES)	**462.70**	**0.00**	**5,468.18**		**0.00**	**258.50**	**409.00**	**16,658.04**	**20.80**		**23,277.22**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	-	148.00	875.00	-	0.00	-	-	-967.00	296.00	-	-671.00
	-	-	-	0.00	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-217.93	0.00	0.00	-238.80	-409.04	0.00	890.95	-	25.17
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	0.00	0.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-5,577.24	-	-	-5,577.24
Own Use	-	0.00	0.00	-	0.00	-	-	-	-19.60	-	-19.60
Distribution Losses	-	-	-	-	0.00	-	-	-	-166.63	-	-166.63
Total Final Consumption(TFC)	**462.70**	**148.00**	**6,125.24**	**0.00**	**0.00**	**19.70**	**-0.04**	**10,113.80**	**1,021.53**	-	**16,867.93**
					0.00						
Industry& commercial sector	**462.70**	**0.00**	**991.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**745.32**	**0.00**	**2,199.80**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**4,979.83**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4,979.83**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	763.49	-	0.00	-	-	-	-	-	763.49
Road transport &retail pump outlets	-	-	4,195.01	-	0.00	-	-	-	-	-	4,195.01
Rail transport	-	-	13.98	-	0.00	-	-	-	-	-	13.98
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	7.34	-	0.00	-	-	-	-	-	7.34
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**153.65**	**0.00**	**0.00**	**0.00**	**0.00**	**10,113.80**	**276.06**	**0.00**	**10,543.51**
Residential	-	-	0.00	-	0.00	-	-	10,113.80	268.85	-	10,382.66
Government	-	-	21.92	-	0.00	-	-	-	-	-	21.92
Agriculture/ Forestry	-	-	68.00	-	0.00	-	-	-	-	-	68.00
Tourism	-	-	10.78	-	0.00	-	-	-	-	-	10.78
Power generation	-	-	52.95	-	0.00	-		-	-	-	52.95
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	0.00	-	0.00	-	-	-	7.20	-	7.20
					0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

Annex 17: Kenya's Energy Matrix, 2018

Supply&Consumption in (ktoe)	Coal&Peat	Crude oil	Petroleum Products	Gas	Nuclear	Hydro	Geothermal, solar, wind etc	Combustible Renewables and waste	Electricity	Heat	Total*
Indegenous Production	-	0.00	0.00	-	0.00	342.77	474.50	16,757.99	-	-	17,575.26
Imports	690.85	0.00	6,445.72	-	0.00	0.00	-	-	112.07	-	7,248.64
Exports	3.38	-	-781.50	-	0.00		-	-	30.28	-	-747.84
International Marine Bunkers**	-	-	9.88	-	0.00		-	-		-	9.88
International Aviation Bunkers**	-	-	-718.40	-	0.00	-	-	-	-	-	-718.40
Stock Changes	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Total Primary Energy Supply(TPES)	**687.47**	**0.00**	**4,955.70**		**0.00**	**342.77**	**474.50**	**16,757.99**	**142.35**		**23,360.79**
					0.00						
Transfers	-	-	-	-	0.00	-	-	-	-	-	
Statistical differences	0.00	148.00	875.00	0.00	0.00	-	-	-967.00	-296.00	-	-240.00
	-	-	-	0.00	0.00	-	-	-	-	-	0.00
Electricity Plants	-		-132.94	0.00	0.00	-342.83	-440.99	0.00	961.65	-	44.89
CHP Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Heat pumps	-	-	-	-	0.00	-	-	-	-	-	0.00
Gas Works	-	-	-	-	0.00	-	-	-	-	-	0.00
Petroleum Refineries	-	0.00	0.00	-	0.00	-	-	-	-	-	0.00
Coal Transformation	-	-	-	-	0.00	-	-	-	-	-	0.00
Liquefaction Plants	-	-	-	-	0.00	-	-	-	-	-	0.00
Other Transformation	-	-	-	-	0.00	-	-	-5,610.70	-	-	-5,610.70
Own Use	-	0.00	0.00	-	0.00	-	-	-	-21.16	-	-21.16
Distribution Losses	-	-	-	-	0.00	-	-	-	-210.23	-	-210.23
Total Final Consumption(TFC)	**687.47**	**148.00**	**5,697.76**	**0.00**	**0.00**	**-0.06**	**33.51**	**10,180.29**	**576.62**		**17,323.59**
					0.00						
Industry& commercial sector	**687.47**	**0.00**	**697.34**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**420.71**	**0.00**	**1,805.53**
Iron and Steel	-	-	-	-	0.00	-	-	-	-	-	0.00
Chemical and Petrochemical	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Ferrous Metals	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Metallic Minerals	-	-	-	-	0.00	-	-	-	-	-	0.00
Transport Equipment	-	-	-	-	0.00	-	-	-	-	-	0.00
Machinery	-	-	-	-	0.00	-	-	-	-	-	0.00
Mining and Quarrying	-	-	-	-	0.00	-	-	-	-	-	0.00
Food and Tobacco	-	-	-	-	0.00	-	-	-	-	-	0.00
Paper Pulp and Print	-	-	-	-	0.00	-	-	-	-	-	0.00
Wood and Wood Products	-	-	-	-	0.00	-	-	-	-	-	0.00
Construction	-	-	-	-	0.00	-	-	-	-	-	0.00
Textile and Leather	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-specified (Industry)	-	-	-	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Transport sector	**0.00**	**0.00**	**4,866.14**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**4,866.14**
International Civil Aviation	-	-	-	-	0.00	-	-	-	-	-	0.00
Domestic Air Transport(excl. govt)	-	-	737.20	-	0.00	-	-	-	-	-	737.20
Road transport &retail pump outlets	-	-	4,109.83	-	0.00	-	-	-	-	-	4,109.83
Rail transport	-	-	13.51	-	0.00	-	-	-	-	-	13.51
Pipeline Transport	-	-	0.00	-	0.00	-	-	-	-	-	0.00
Marine(excl. Naval forces)	-	-	5.60	-	0.00	-	-	-	-	-	5.60
Non-specified (Transport)	-	-	0.00	-	0.00	-	-	-	-	-	0.00
					0.00						0.00
Other sectors	**0.00**	**0.00**	**134.07**	**0.00**	**0.00**	**0.00**	**0.00**	**10,180.29**	**155.83**	**0.00**	**10,470.18**
Residential	-	-	0.00	-	0.00	-	-	10,180.29	151.76	-	10,332.05
Government	-	-	20.53	-	0.00	-	-	-	-	-	20.53
Agriculture/ Forestry	-	-	65.55	-	0.00	-	-	-	-	-	65.55
Tourism	-	-	10.43	-	0.00	-	-	-	-	-	10.43
Power generation	-	-	37.55	-	0.00	-	-	-	-	-	37.55
Fishing	-	-		-	0.00	-	-	-	-	-	0.00
Non-specified other	-	-	0.00	-	0.00	-	-	-	4.07	-	4.07
					0.00	-	-	-	-	-	0.00
Non-Energy Use	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
_of which petrochemical feedstocks	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use Ind/Transf/Ener	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Transport	-	-	-	-	0.00	-	-	-	-	-	0.00
Non-Energy Use in Oth. Sect	-	-	-	-	0.00	-	-	-	-	-	0.00

Source: Computations based on EPRA & KNBS Data; Various sources

EPRA PUBLICATION 2019

CONTACT US

Energy and Petroleum Regulatory Authority, Eagle Africa Centre, Longonot Rd, Upperhill

P.O Box 42681-00100 GPO, Nairobi – Kenya
Tel: +254-20-2847000/200/2717675
Cell: +254-722 200947/734414333
Hotline: +254 709 336 000/708 444 000
Fax: +254 20 2717603
Email: info@epra.go.ke
Website: www.epra.go.ke

EPRA Kenya

@EPRA_Ke