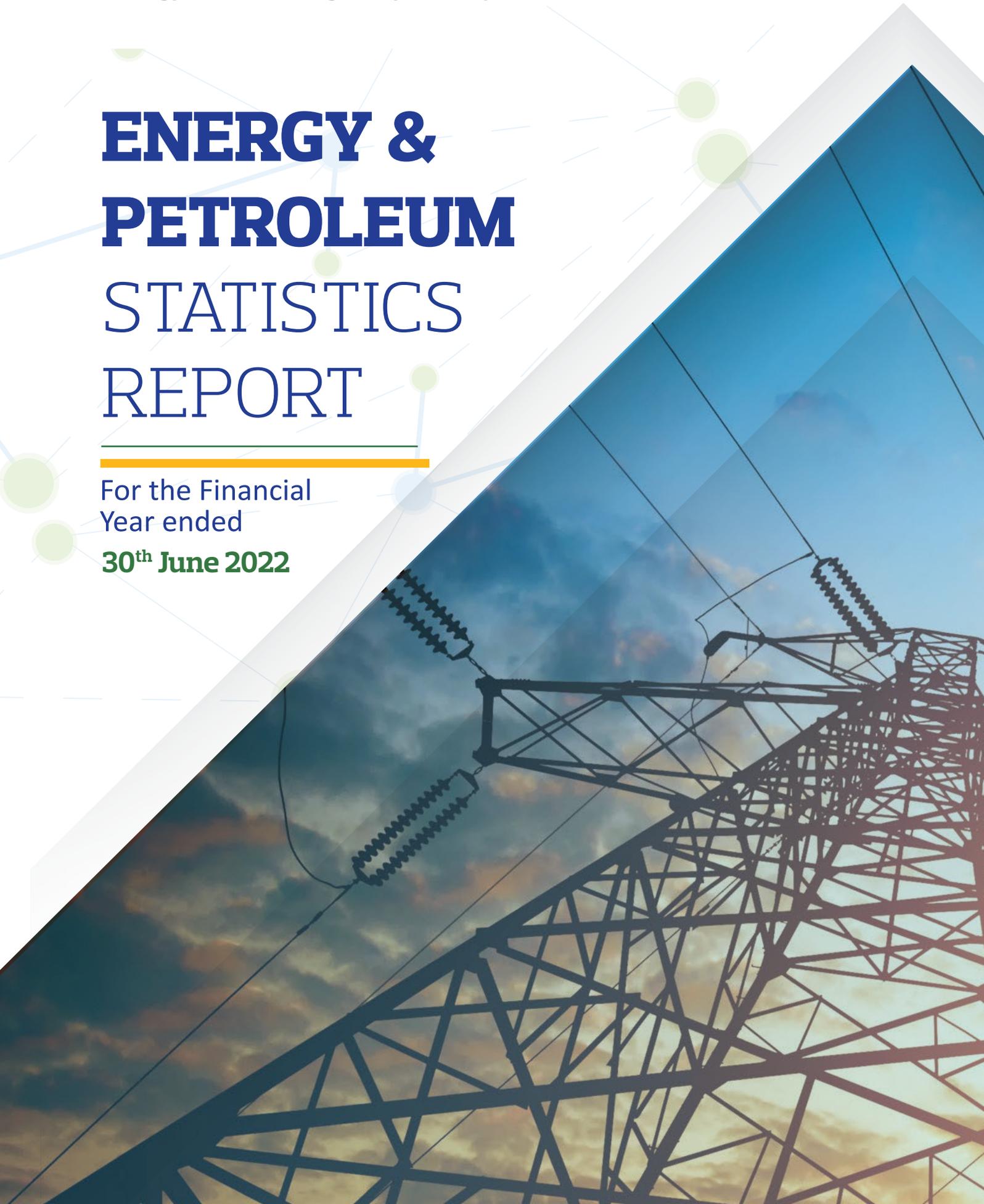


# **ENERGY & PETROLEUM STATISTICS REPORT**

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For the Financial  
Year ended  
**30<sup>th</sup> June 2022**



# About EPRA

The Energy and Petroleum Regulatory Authority (EPRA) is established under the Energy Act, 2019 as the regulatory agency responsible for economic and technical regulation of the electricity, renewable energy, petroleum and coal subsectors.

## Our Mission

Enhancing lives by ensuring there is sustainable, cost efficient and quality energy and petroleum.

## Our Vision

A leading regulator driving sustainable and clean energy and petroleum for all.

## Our Rallying Call

Quality energy, quality life.



# About this report

This report presents key statistics on the performance of the electricity, petroleum and renewable energy subsectors during the financial year 2021/2022. Statistics on the electricity subsector include generation, transmission, distribution, retail and cross border trade. Statistics on the petroleum subsector include the upstream development, midstream and downstream operations and infrastructural developments. Additionally, the report presents the future outlook of the energy sector.

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# ABBREVIATIONS AND ACRONYMS

<b>AGO</b>	Automotive Gas oil
<b>CMA</b>	Capital Markets Authority
<b>DPK</b>	Dual Purpose Kerosene
<b>EEU</b>	Ethiopian Electric Utility
<b>EPRA</b>	Energy and Petroleum Regulatory Authority
<b>ERC</b>	Energy Regulatory Commission
<b>ERI</b>	Electricity Regulatory Index
<b>FEC</b>	Fuel Energy Cost
<b>FERFA</b>	Foreign Exchange Rate Fluctuation Adjustment
<b>GDP</b>	Gross Domestic Product
<b>GWh</b>	Giga-Watt hour
<b>HHI</b>	Herfidahl Hirschman Index
<b>IPP</b>	Independent Power Producer
<b>LPG</b>	Liquefied Petroleum Gas
<b>LTWP</b>	Lake Turkana Wind Power
<b>MWh</b>	Mega-Watt hour
<b>NDC</b>	Nationally Determined Contributions
<b>NOCK</b>	National Oil Corporation of Kenya
<b>NSC</b>	Network Service Contract
<b>OTS</b>	Open Tender System
<b>OMCs</b>	Oil Marketing Companies
<b>KETRACO</b>	Kenya Electricity Transmission Company
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KPC</b>	Kenya Pipeline Company
<b>KRA</b>	Kenya Revenue Authority
<b>PMS</b>	Premium Motor Spirit
<b>PPA</b>	Power Purchase Agreement
<b>RGI</b>	Regulatory Governance Index
<b>RSI</b>	Regulatory Substance Index
<b>ROI</b>	Regulatory Outcome Index

# DIRECTOR GENERAL'S MESSAGE

I am pleased to present the fourth edition of the Energy and Petroleum Statistics report which highlights the performance of the sector during the Financial Year 2021/2022. The year was characterized by the economic recovery from the crippling effects of the Covid-19 pandemic with GDP expanding by 7.5 per cent in 2021. The economic recovery was mainly driven by resumption of most economic activities after the lifting of the Covid-19 containment measures. The nominal GDP rose from KSh. 10,716.0 billion in 2020 to KSh. 12,098.2 billion in 2021, representing an increase of 12.9 per cent.

In the electricity subsector, the economic recovery was marked by a 3.2% increase in peak demand to 2,056.67 MW from the 1,993.63 MW recorded in the previous financial year. This peak demand was recorded on 14<sup>th</sup> June 2022.

As a result of investments made in developing the renewable energy subsector, 86.98% of the energy generated during the year was obtained from renewable energy sources. Contribution from solar energy increased by 120 MW following the addition of 40 MW from Cedate Solar power plant, 40 MW from Selenkei Solar power plant and 40MW from Malindi Solar Power Plant. Geothermal power installed capacity increased by 86 MW generated from Olkaria 1 unit 6.

The quantity of petroleum products imported into the country for local use increased from 4,994,577 cubic meters in the previous financial year to 5,539,884 cubic meters. The demand for Liquefied Petroleum Gas (LPG) maintained an upward trend with consumption hitting 373,865 metric tonnes in 2021. The increased demand in LPG consumption is a positive indicator of the shift towards adoption of clean cooking energy sources.

I believe that this report presents a comprehensive overview of the status of the energy sector. We remain committed to implementing our mandate of gathering and sharing key energy statistics and information that keeps the energy sector abreast of its growth, achievements and areas of improvement.

Lastly, on behalf of the Authority, I take this opportunity to thank all sector stakeholders for the support throughout the year. I look forward to our collaborative efforts as we work towards attaining our development objectives.

## THE YEAR AT A GLANCE

### Key developments

1. KETRACO was designated as the system operator by the Authority in January 2022. This role has previously been undertaken by Kenya Power.
2. The 308km 400kV Olkaria-Lessos-Kisumu transmission line was completed and energized in August 2021. The line is currently operated at 220kV. It shall eventually be energized at 400kV between Olkaria and Lessos once the 400kV substations are completed at both ends and remain at 220kV between Lessos and Kisumu. The line now delivers up to 120MW of geothermal energy from Olkaria II to Kisumu.
3. The 63km Olkaria-Narok-Bomet 132kV transmission line was completed and energized in May 2022. The line has stabilized electricity supply to Narok and its environs that previously relied on long medium voltage lines from Naivasha and Nakuru for their bulk supplies. The line forms the first part of the Olkaria-Narok-Bomet transmission project.
4. Four (4) new power plants were added to the national grid in the reporting period. These are the 86MW Olkaria I unit 6, 40 MW Cedate Solar and the 40 MW Selenkei Solar power plants in Uasin Gishu County and 40MW Malindi Solar.

**Daniel Kiptoo Bargarior, OGW**  
Director General

# THE YEAR IN NUMBERS



**3,074.34 MW**

Installed  
Electricity Capacity



**Ksh. 1,575,000**

Savings made  
through the Time  
of Use tariffs



**703,331**

New customers connected  
to the national grid



**2<sup>nd</sup>**

Kenya ranked 2<sup>nd</sup> in the  
Electricity Regulatory Index (ERI)



**86.98%**

Of the energy generated obtained  
from renewable energy



**13.9%**

Increase in LPG  
consumption



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# 1.

## STATISTICS FOR THE ELECTRICITY SUB-SECTOR

This section presents a summary of the performance of the various segments of the electricity supply chain, including electricity generation, transmission, distribution and retail. It also covers the evolution of tariffs, competition analysis, reliability indices and emissions.

### 1.1 Installed Capacity

Installed capacity refers to the maximum power generation capacity that a country's power plants can achieve. The installed capacity comprises both grid connected units and off-grid units. Table 1 shows a comparison of the installed capacity in the financial year 2020/2021 and 2021/2022.

**Table 1: A comparison of the Installed Capacity in the Financial 2020/2021 and 2021/2022**

	2020-21		2021-22	
Hydro	838	28.20%	837.58	27.24%
Geothermal	863.13	29.04%	949.13	30.87%
Wind	435.5	14.65%	435.5	14.17%
Thermal	720.32	24.24%	646.32	21.02%
Solar	90.25	3.04%	170	5.53%
Biomass	2	0.07%	2	0.07%
Off-grid	22.8	0.77%	33.81	1.10%
<b>Total</b>	<b>2,972</b>	<b>100.0%</b>	<b>3,074.34</b>	<b>100.0%</b>

The installed capacity increased by 102.34 MW from 2,972MW as at June 2021 to 3,074.34 MW as at June 2022. Geothermal and solar generation increased by 86 MW and 120 MW respectively. The increased contribution from the two sources is attributed to the addition of 40 MW from Cedate Solar power plant, 40 MW from Selenkei Solar power plant, 40MW from Malindi Solar and 86 MW from Olkaria 1 unit 6 to the grid.

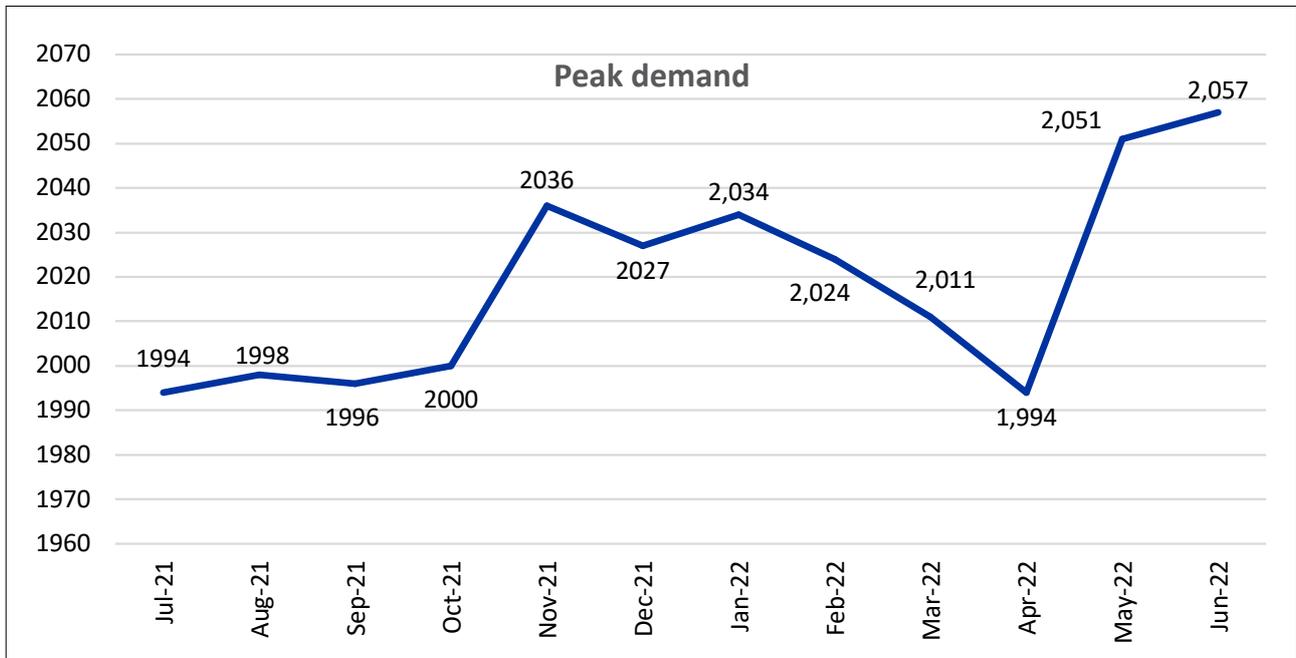
With an installed capacity of 949.13 MW, geothermal now account for 30.87% of the total installed capacity up from 849 MW in June 2021. The installed solar power capacity increased to 5.53% up from 3.04%.

Thermal power electricity installed capacity reduced from 748.7 MW in June 2021 to 646.32 MW in June 2022 following the retirement of Tsavo Power whose power purchase contract lapsed in September 2021. The installed wind power capacity remained unchanged at 435.5 MW.

## 1.2 Electricity Monthly Peak Demand

Peak demand is a measure of the highest load on our electricity grid throughout the year. It occurs between 2000hrs-2030hrs in the Coastal region and 1930hrs-2000hrs for the rest of the country. The peak demand for the financial year was 2,056.67 MW, a 3.2% improvement from the 1,993.63 MW recorded in the previous financial year. This peak demand was recorded on 14th June 2022. Figure 1 presents the monthly peak demand during the review period.

**Figure 1: A trend in peak demand between July 2021-June 2022**



## 1.3 Electrical Energy Generated

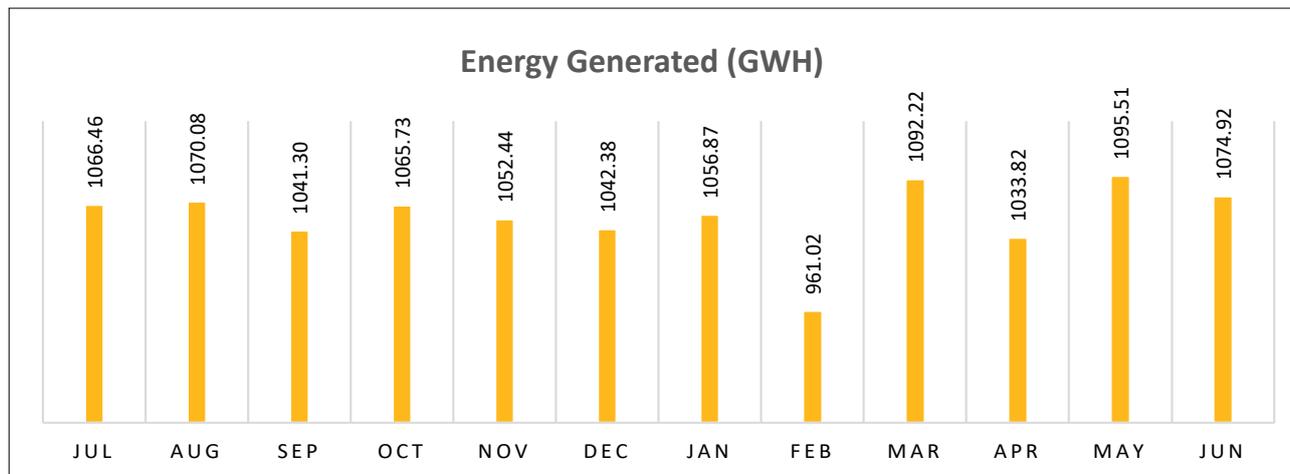
This term refers to electrical energy that was delivered to the national grid by the various power producers in the country and it is measured in MWh or GWh. The electrical energy generated increased by 4.55% from 12,101.17 GWh in June 2021 to 12,652.74 GWh in June 2022. Hydro and geothermal were the major energy sources with a combined contribution of 65.62% while wind and solar accounted for 18.69%. Contribution from wind and solar sources increased by 352 GWh and 225 GWh respectively. Table 2 below presents a comparison by energy source between the two reporting periods.

**Table 2: A comparison of contribution to energy generation by source**

	2020/2021		2021/2022	
Hydro	4,142.18	34.23%	3,348.71	26.47%
Thermal	940.03	7.77%	1,647.75	13.02%
Wind	1,700.45	14.05%	2,052.26	16.22%
Geothermal	5,033.69	41.60%	4,953.15	39.15%
Bagasse/Biogas	0.33	0.00%	0.38	0.00%
Imports	196.55	1.62%	337.50	2.67%
Solar	87.94	0.73%	312.99	2.47%
<b>Total</b>	<b>12,101.17</b>		<b>12,652.74</b>	

The highest electricity generated, 1,095.51 GWh, was recorded in May 2022 while the lowest for the year was 961.02 GWh recorded in the previous month. The trend of energy generated by month is as shown in figure 2.

**Figure 2: Trend in monthly electricity generation**



## 1.4 Energy Curtailment

Energy curtailment occurs when demand falls below available generation as a measure to safeguard the power system. This curtailment is done between 0000hrs-0430hrs when demand is at its lowest while output from sources such as wind, solar and geothermal at its highest. In the period July 2021 to June 2022, 285.51 GWh of electrical energy was curtailed. This is 1.93% of total energy generated in that period. Out of this, 244.06 GWh was from geothermal sources while 41.45 GWh was from wind. Table 3 presents a summary of energy curtailment for the period July 2021 to June 2022.

**Table 3: A summary of energy curtailment by month**

Month	Geothermal (MWh)	Wind (MWh)	Total (MWh)
Jul-21	35,979	0	35,979
Aug-21	39,586	0	39,586
Sep-21	41,647	0	41,647
Oct-21	20,043	0	20,043
Nov-21	3,846	24,457	28,303
Dec-21	0	16,996	16,996
Jan-22	646	0	646
Feb-22	0	0	0
Mar-22	4,347	0	4,347
Apr-22	11,006	0	11,006
May-22	40,355	0	40,355
June-22	46,604	0	46,604
<b>Total</b>	<b>244,059</b>	<b>41,453</b>	<b>285,512</b>

Source: Kenya Power

## 2. ELECTRICITY PRICING

Electricity pricing is determined by factors such as the cost of power generation, pass through charges, system losses, taxes and levies.

### 2.1 Power Purchase Agreements (PPAs)

PPAs form the base costs of power by defining how much power is sold and at what cost. During the financial year 2021/22, the Authority received and approved the following PPAs:

- The Electricity Supply Agreement (ESA) between KPLC and Ethiopia Electric Utility (EEU) for cross border supply at Moyale and Sololo.
- The PPA between KPLC and KENGEN for the 56MW Muhoroni Gas Turbine Power plant.
- The PPA between KPLC and KENGEN for the 30MW Olkaria 1 Geothermal Power plant.
- The Energy Exchange Agreement (EEA) between KPLC and Uganda Electricity Transmission Company Limited (UETCL).

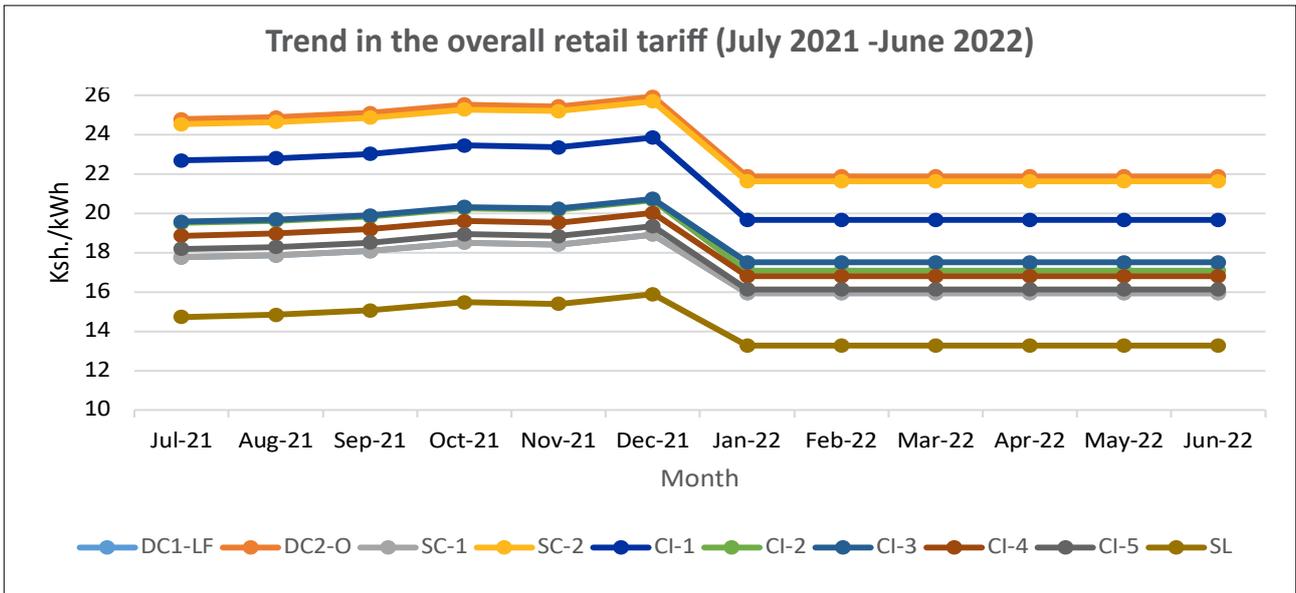
### 2.2 Retail Electricity Tariffs

A presidential directive to lower end user power tariffs by 33% was issued in December 2021. This reduction would be implemented in two phases effective January 2022. The retail tariff was reviewed accordingly with a 15% reduction in the first phase. The tariff is effective for a period of one year. The table 4 presents the approved energy charges for each customer category.

**Table 4: Retail Electricity Tariff by consumer category effective 1st January 2022**

Customer Category	Energy Limit (kWh/ Month)	Charge Rate Ksh./kWh	Demand Charge Ksh./kWh
DC- Lifeline	0-100	7.70	-
DC-Ordinary	>100-15000	12.60	-
Small Commercial SC-1	0-100	7.70	-
Small Commercial SC-2	>100-15000	12.40	-
Commercial and Industrial CI 1	No limit	8.70	800
Commercial and Industrial CI 2	No limit	8.10	520
Commercial and Industrial CI 3	No limit	8.00	270
Commercial and Industrial CI 4	No limit	7.80	220
Commercial and Industrial CI 5	No limit	7.60	220
<b>Street Lighting</b>	<b>No Limit</b>	<b>5.50</b>	<b>-</b>

Overall tariff for all customer categories declined in January 2022 and remained constant up to June 2022 as a result of the 15% tariff reduction. Figure 3 presents the trend of the overall tariff for the different customer categories.



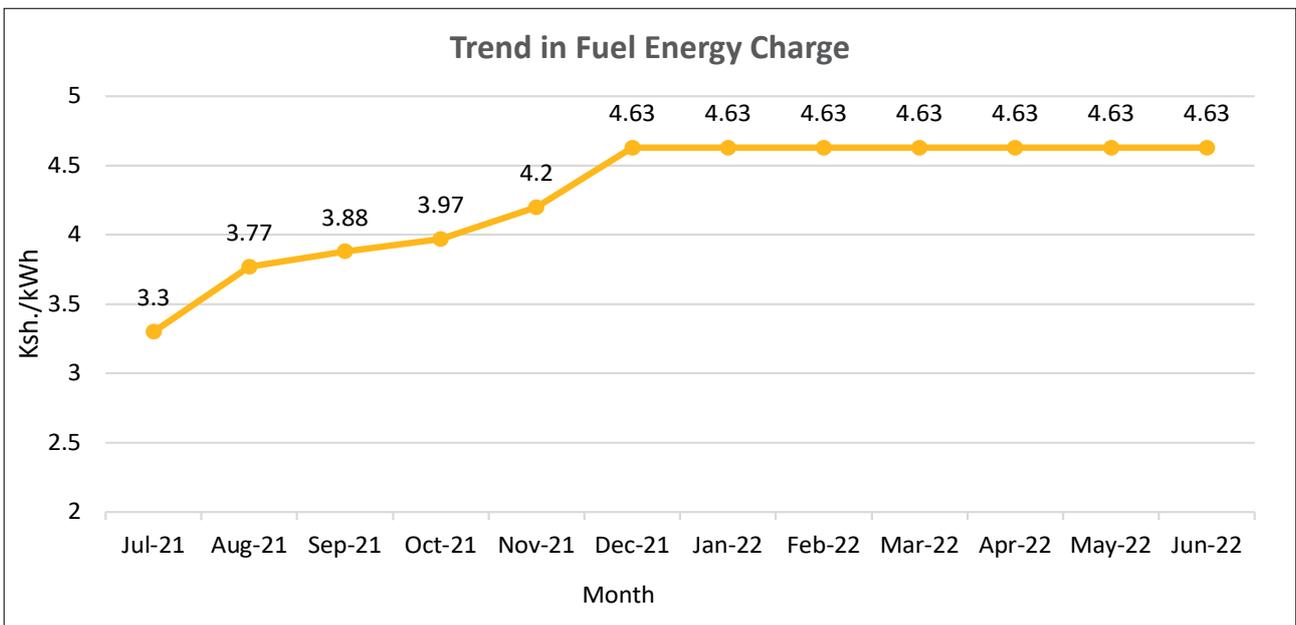
### 2.3 Pass Through Charges

Pass-through charges refer to additional costs incurred by electricity generating plants and transferred to customers. These charges are approved by EPRA and include Fuel Energy Cost (FEC), Foreign Exchange Rates Fluctuations Adjustments (FERFA), Water Resource Management Authority (WARMA) levy, Inflation Adjustments and taxes.

The FEC rate is computed monthly and the applicable charge is set to mitigate against any sharp increases in electricity prices. In this regard, when the computed FEC 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 FEC falls below the set cost.

During the period under review, the FEC continuously increased from 3.3Ksh./kWh in July 2021 to 4.63Ksh./kWh in December 2021. The fluctuation in FEC is attributed to poor hydrology, fluctuating wind output and breakdowns in geothermal power plants which resulted in high thermal dispatch. The FEC remained constant at 4.63Ksh./kWh from December 2021 to June 2022 as shown in figure 4.

**Figure 4: FEC evolution from July 2021- June 2022**



The pass-through costs for the period July 2020 to June 2022 are summarized in table 5.

**Table 5: Electricity pass-through costs**

Pass Through Cost Ksh./kWh	FEC	FERFA	INFA	WARMA
Jul-21	3.3	1.1612	0.47	0.0193
Aug-21	3.77	0.6889	0.47	0.0167
Sep-21	3.88	0.7647	0.47	0.016
Oct-21	3.97	1.0392	0.47	0.0157
Nov-21	4.2	0.7342	0.47	0.0181
Dec-21	4.63	0.7314	0.47	0.0174
Jan-22	4.63	0.7314	0.47	0.0174
Feb-22	4.63	0.7314	0.47	0.0174
Mar-22	4.63	0.7314	0.47	0.0174
April-22	4.63	0.7314	0.47	0.0174
May-22	4.63	0.7314	0.47	0.0174
June-22	4.63	0.7314	0.47	0.0174

## 2.4 Time of Use Tariff

In 2018, the Authority introduced Time of Use (ToU) tariffs targeting commercial and industrial consumers. The ToU is a pricing plan that seeks to encourage customers to use electricity at times when it is available at a cheaper rate.

In the period under review, a total of 18,109 customers benefited from the ToU tariffs discounts, realizing savings of KSh. 1,575,000 million. The number of beneficiaries and the corresponding savings are summarized in table 6.

**Table 6: Monthly TOU beneficiaries and savings**

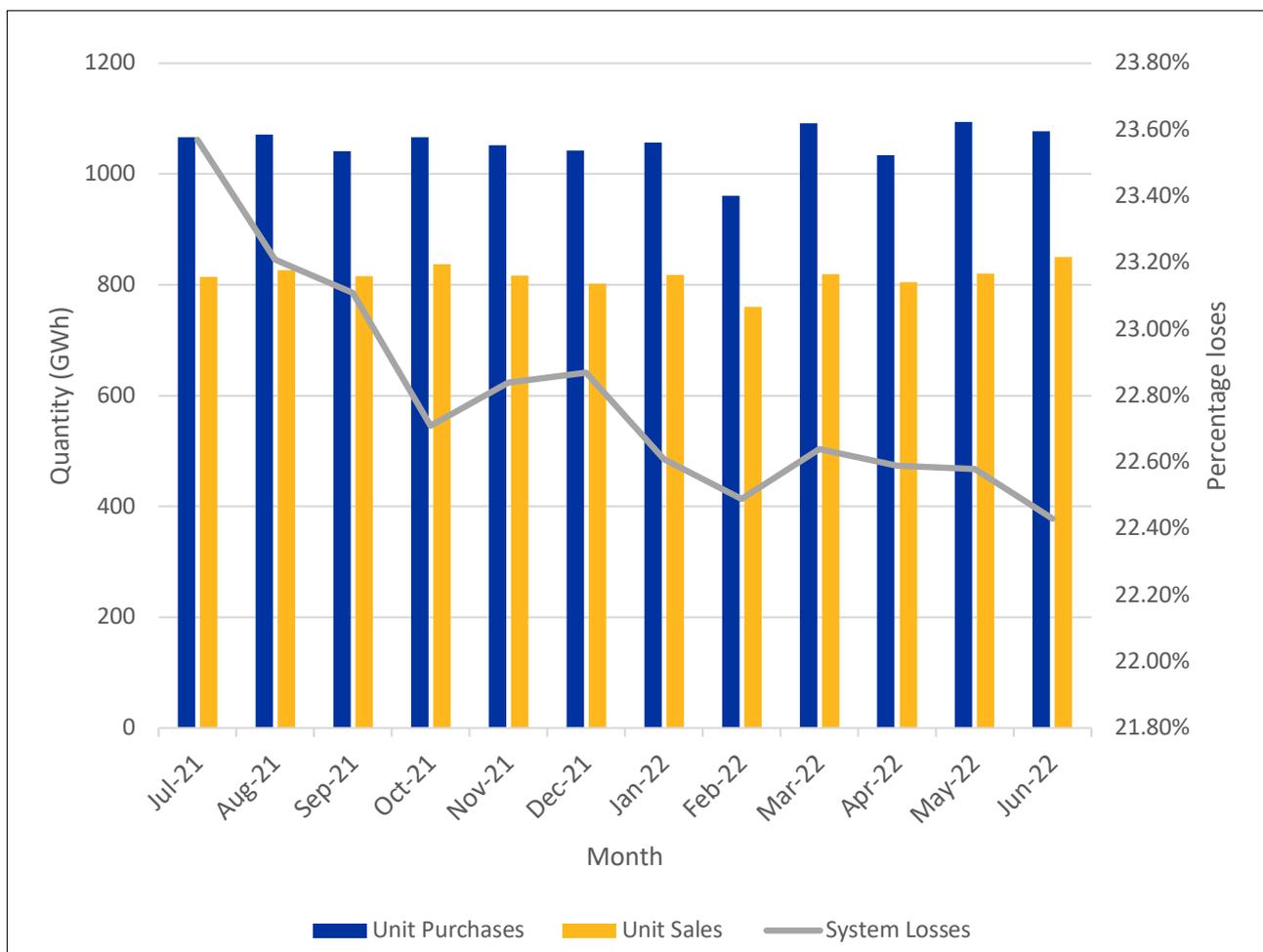
Month	No. of Beneficiaries	Savings (Ksh. Million)
Jul-21	1,344	173.9
Aug-21	1,827	176.3
Sep-21	1,366	133.6
Oct-21	1,861	223.1
Nov-21	1,756	174.2
Dec-21	1,294	135.0
Jan-22	1,616	150.8
Feb-22	1,022	48.4
Mar-22	1,756	89.9
Apr-22	1,294	72.2
May-22	1,614	100.7
Jun-22	1,359	96.6
<b>TOTAL</b>	<b>18,109</b>	<b>1,575</b>

Source: Kenya Power

## 2.5 System Losses

System losses refers to electrical energy lost during transmission and distribution (technical losses) and unbilled electrical energy delivered to consumers (commercial losses). Technical losses are inherent to the power system and are proportional to the efficiency of the transmission and distribution network. Commercial losses include power supplied to illegal connections, meter tampering and fraudulent use of electrical energy. In the period between July 2021 and June 2022, cumulative system losses of 22.43% were recorded against the 19.9% benchmark set by the Authority. Figure 5 shows monthly system losses as a function of energy purchased by the offtaker, KPLC, from power producers and energy sold to consumers. The table entails both technical and commercial losses.

**Figure 5: A summary of system losses from June 2021 – July 2022**

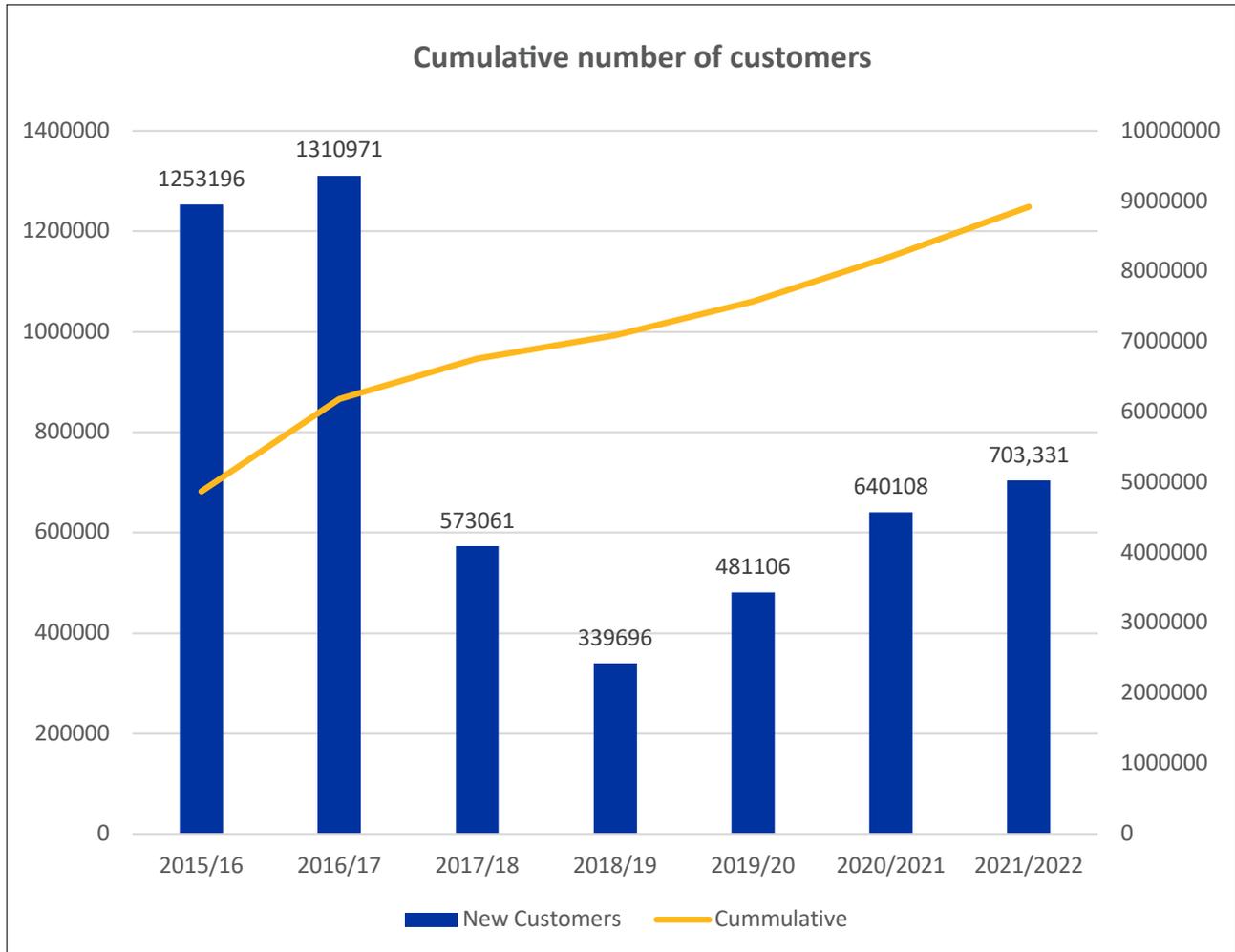


Source: Kenya Power

### 3. ELECTRICITY ACCESS

During the review year, 703,331 new customers were connected bringing the cumulative number of connected customers to 8,919,584. As illustrated in figure 6, there has been an upward trend in the number of connected consumers. This is attributed to Government initiatives such as rural electrification and the Last Mile Connectivity Program which aims at improving electricity access in urban and rural areas.

**Figure 6: Number of customers connected to the grid Source: Kenya Power**



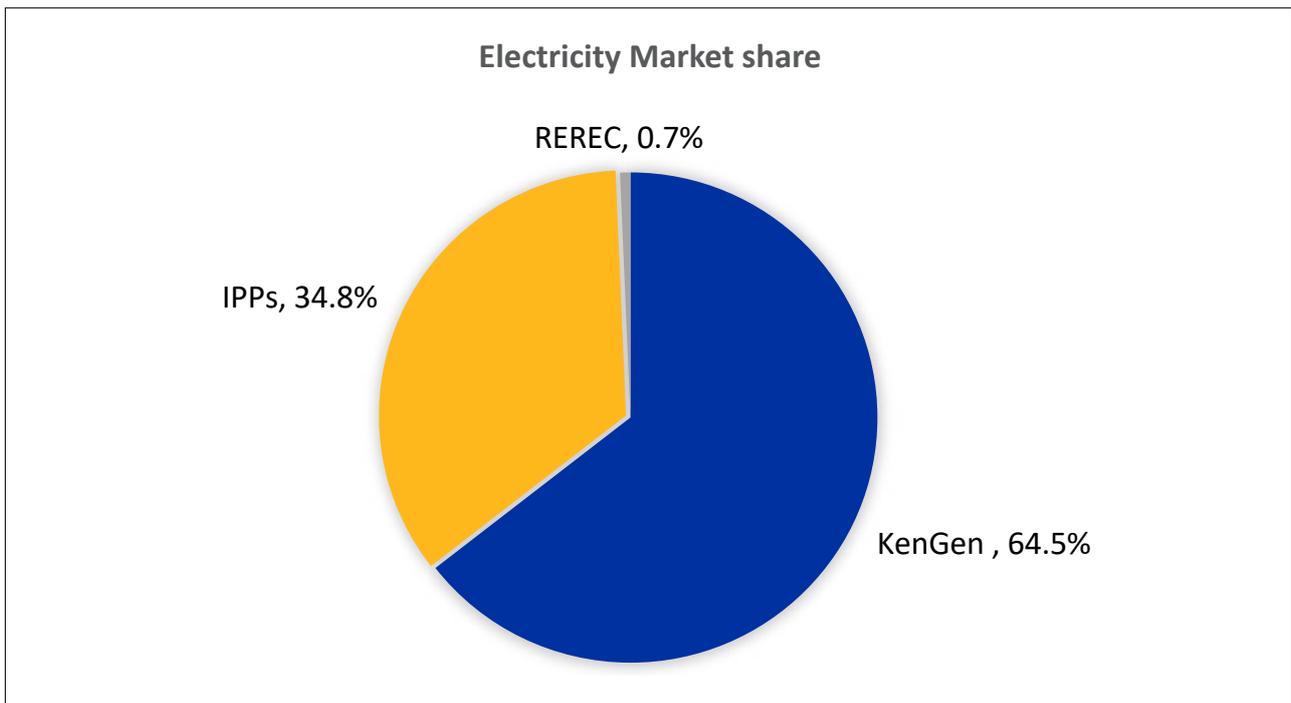
Source: Kenya Power

## 4.

# ELECTRICITY SUBSECTOR COMPETITION ANALYSIS

Competition Analysis in the electricity sector is based on energy purchased. KenGen continues to dominate the market since most of its plants are either base load (for the case of Geothermal) or intermittent and therefore have a high availability factor. However, there is a small percentage of demand that is met through off grid plants and captive power generation. Figure 7 shows the market shares of the electricity sector for the period under review.

**Figure 7: Electricity sector market share as at June 2022**



### 4.1 The Herfindahl Hirschman Index

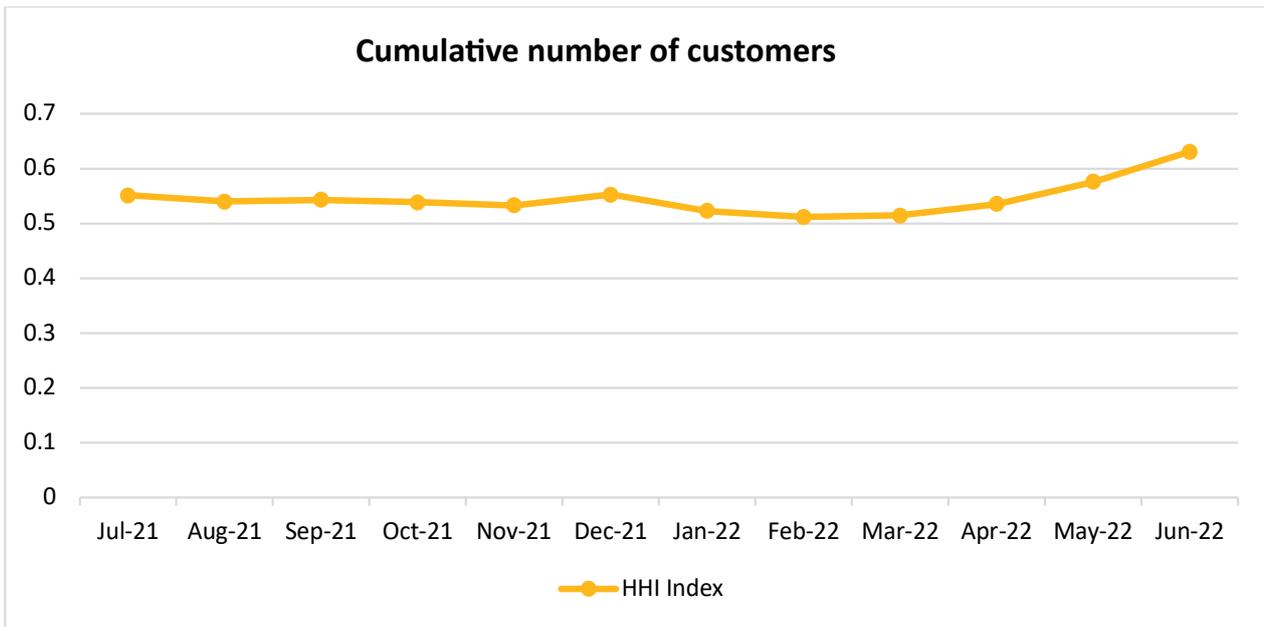
The Authority uses the Herfindahl Hirschman Index (HHI) to analyze competition in the electricity Sector. HHI is a statistical measure of concentration of firms in a market that gives insight on the market structure as well as state of competition. It is calculated by squaring the market shares of all firms in the market and summing the squares as follows:

$$HHI = \sum_{i=1}^K (MS_i)^2$$

MS<sub>i</sub> represents the market share of the firm and k represents the total number of firms in the market.

A HHI of below 0.1 indicates a healthy market competition. As shown in figure 9, the HII for the electricity sub sector is above the recommended threshold. This is attributed to Kengen's dominance in energy generation.

**Figure 8: Trend in Electricity HHI Index**



## 4.2 Reliability Indices

Reliability indices measure how frequently outages occur in the power supply system and how they affect customers and for how long these outages last.

### Customer Average Interruption Duration Index (CAIDI)

This index measures the average outage duration that any given customer would experience.

$$CAIDI = \frac{\text{Sum of customer interruption durations per reporting period}}{\text{Total number of customers interrupted per reporting period}}$$

### The System Average Interruption Duration Index (SAIDI)

SAIDI is the average outage duration for each customer served, and is calculated as:

$$SAIDI = \frac{\text{Sum of all customer interruptions}}{\text{Total number of customers served per reporting period}}$$

SAIDI is measured in units of time, often minutes or hours.

### The System Average Interruption Frequency Index (SAIFI)

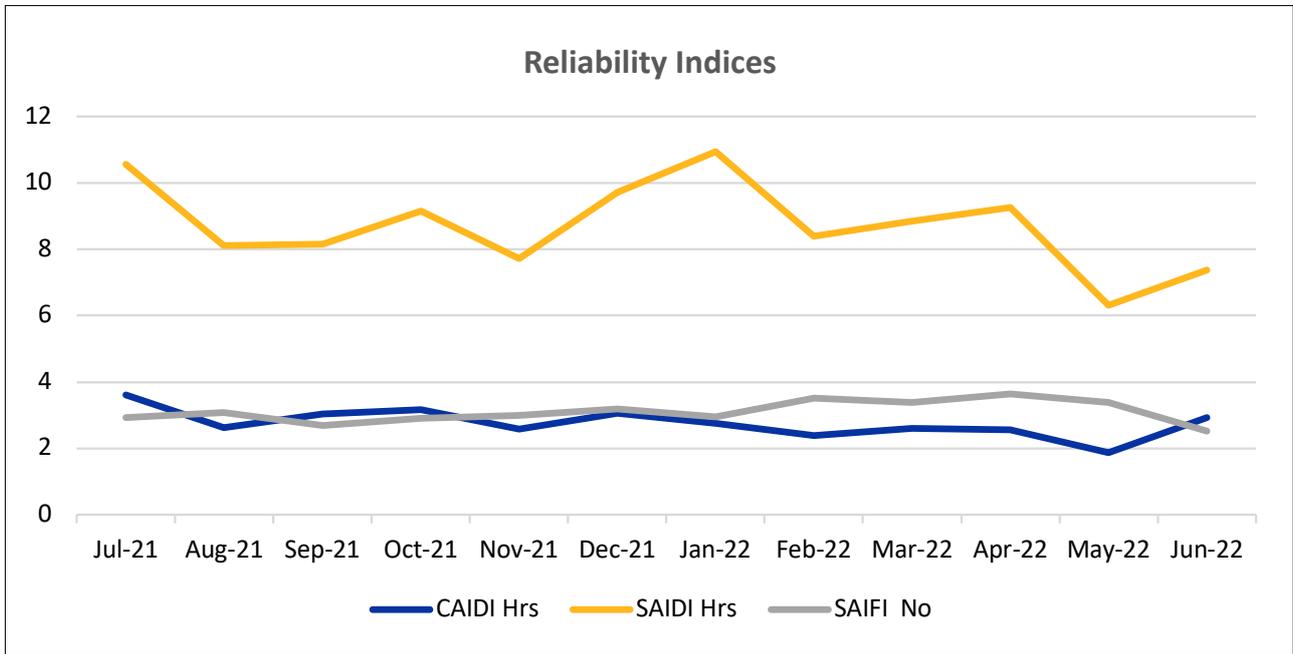
Is the average number of interruptions that any given customer experiences, and is calculated as:

$$SAIFI = \frac{\text{Total number of customers interrupted per reporting period}}{\text{Total number of customers served per reporting period}}$$

SAIFI is measured in units of interruptions per customer.

Between the period July 2021 to June 2022, the average SAIFI was 3.10, while CAIDI was 2.76. The low SAIFI and CAIDI recorded over the period is a manifestation of the vast upgrade of the transmission and distribution system by the government. Figure 9 below shows the SAIFI and CAIDI for the year.

**Figure 9: Trend in the reliability indices during the Financial Year 2021-2022**



## 5. LICENSING OF POWER UNDERTAKINGS

During the period under review, the Authority approved the following power undertaking licences:

### a) Generation and Retail Supply Licence (C&I)

No	Licensee	Technology	Category	Capacity	Location	County
1.	Ofgen Ltd.	Solar	Generation	500kW	Sotik	Bomet
2.	Ofgen Ltd.	Solar	Retail	500kW	Sotik	Bomet
3.	Lean Energy Solutions Ltd.	Solar	Generation	120kW	Murang'a	Murang'a
4.	Lean Energy Solutions Ltd.	Solar	Retail	120kW	Murang'a	Murang'a
5.	Ecoligo Ltd.	Solar PV	Generation	550kW	Shimanzi,	Mombasa
6.	Ecoligo Ltd.	Solar PV	Retail	550kW	Shimanzi	Mombasa
7.	BE AFRICA C&I Ltd.	Solar PV	Generation	932kW	Junction Mall	Nairobi
8.	BE AFRICA C&I Ltd.	Solar PV	Retail	932kW	Junction Mall	Nairobi
9.	BE AFRICA C&I Ltd.	Solar PV	Generation	751kW	Thika	Kiambu
10.	BE AFRICA C&I Ltd.	Solar PV	Retail	751kW	Thika	Kiambu
11.	Ecoligo Ken Assets One Ltd.	Solar PV	Generation	999kW	Githunguri	Kiambu
12.	Cp Solar Resources Ltd.	Solar PV	Retail	1.7W	Thika	Kiambu
13.	BE AFRICA C&I Ltd.	Solar PV	Generation	1MW	Kitumbe	Bomet
14.	BE AFRICA C&I Ltd.	Solar PV	Retail	1MW	Kitumbe	Bomet
15.	BE AFRICA C&I Ltd.	Solar PV	Generation	1MW	Chomogonday	Kericho
16.	BE AFRICA C&I Ltd.	Solar PV	Retail	1MW	Chomogonday	Kericho
17.	Crossboundary Energy Kenya Ltd.	Solar PV	Generation	1.51MW	Kandara Business Park	Murang'a
18.	Crossboundary Energy Kenya Ltd.	Solar PV	Retail	1.51MW	Kandara Business Park	Murang'a

## b) Generation Licences

No	Licensee	Technology	Location	Capacity	County
1.	Umoja Rubber Products Limited	Solar PV	Kikambala	1.1MW	Kilifi
2.	Menengai Oil Refineries Limited	Solar PV and Diesel	Nakuru	4.1MW	Nakuru
3.	Kenya Electricity Generating Company PLC	Geothermal	Olkaria V	172.8MW	Nakuru
4.	Kapa Oil Refineries Limited	Solar	Kapa Oil Refineries	2.5MW	Machakos
5.	Kenya Electricity Generating Company Plc	Geothermal	Olkaria I Unit VI	83MW	Nakuru
6.	West Kenya Sugar Company Limited	Bagasse	West Kenya Sugar	12MW	Kakamega
7.	Sukari Industries Limited	Bagasse	Homa Bay	6MW	Homa Bay
8.	James Finlay (Kenya) Limited	Hydro	Dimbolil	300kW	Kericho
9.	James Finlay (Kenya) Limited	Hydro	Saosa	440kW	Kericho
10.	James Finlay (Kenya) Limited	Hydro	Kaporet	140kW	Kericho
11.	James Finlay (Kenya) Limited	Hydro	Chemamul	374kW	Kericho
12.	James Finlay (Kenya) Limited	Hydro	Masobet	1.07MW	Kericho
13.	James Finlay (Kenya) Limited	Biogas	Saosa	180kW	Kericho
14.	James Finlay (Kenya) Limited	Solar PV	Kitumbe	30kW	Kericho
15.	James Finlay (Kenya) Limited	Diesel	Central PowerHouse	3.4MW	Kericho
16.	James Finlay (Kenya) Limited	Diesel	Changana	990kW	Kericho
17.	James Finlay (Kenya) Limited	Diesel	Chepkembe	16kW	Kericho
18.	James Finlay (Kenya) Limited	Diesel	Chomogonday	1.2MW	Kericho
19.	James Finlay (Kenya) Limited	Diesel	Finance	192kW	Kericho
20.	James Finlay (Kenya) Limited	Diesel	Flowers II	400kW	Kericho
21.	James Finlay (Kenya) Limited	Diesel	Flowers	15kW	Kericho
22.	James Finlay (Kenya) Limited	Diesel	Flowers I	224kW	Kericho
23.	James Finlay (Kenya) Limited	Diesel	Kitumbe	1.68W	Kericho
24.	James Finlay (Kenya) Limited	Diesel	Kymulot	920kW	Kericho
25.	James Finlay (Kenya) Limited	Diesel	Lemotit	688kW	Kericho
26.	James Finlay (Kenya) Limited	Diesel	Medical	14kW	Kericho
27.	James Finlay (Kenya) Limited	Diesel	Saosa Volvo	2.24MW	Kericho
28.	Renewvia Energy Kenya Limited	Solar PV	Ringiti Island	20kW	Homa Bay
29.	Renewvia Energy Kenya Limited	Solar PV	Ndeda Island	30kW	Homa Bay
30.	Renewvia Energy Kenya Limited	Solar PV	Oyamo Island	12kW	Homa Bay
31.	CP Solar Resources Limited	Solar PV	Thika	1.7MW	Kiambu
32.	Powergen Renewable Energy East Africa Limited	Solar PV	Canteen Village	13kW	Kericho
33.	Powergen Renewable Energy East Africa Limited	Solar PV	Chelimo Village	26kW	Kericho

34.	Powergen Renewable Energy East Africa Limited	Solar PV	Kapsuser West Village	20kW	Kericho
35.	Powergen Renewable Energy East Africa Limited	Solar PV	Kericho Central Village	20kW	Kericho
36.	Powergen Renewable Energy East Africa Limited	Solar PV	Kiptetan Village	20kW	Kericho
37.	Powergen Renewable Energy East Africa Limited	Solar PV	Lower Village	13kW	Kericho
38.	Powergen Renewable Energy East Africa Limited	Solar PV	Main Village	26kW	Kericho
39.	Powergen Renewable Energy East Africa Limited	Solar PV	Masobet A Village	20kW	Kericho
40.	Powergen Renewable Energy East Africa Limited	Solar PV	Masobet B Village	26kW	Kericho
41.	Powergen Renewable Energy East Africa Limited	Solar PV	Mbiri Village	20kW	Kericho
42.	Powergen Renewable Energy East Africa Limited	Solar PV	Mwangaza Village	7kW	Kericho
43.	Powergen Renewable Energy East Africa Limited	Solar PV	Nairobi Area Village	26kW	Kericho
44.	Powergen Renewable Energy East Africa Limited	Solar PV	Tagabi Main Village	20kW	Kericho
45.	Kenya Electricity Generating Company PLC	Geothermal	Eburru Hill	2.4MW	Nakuru
46.	Magiro Hydro Electricity Limited	Run off river Hydro	Kahinduini	22kW	Murang'a
47.	Magiro Hydro Electricity Limited	Run off river Hydro	Gitugu	18kW	Murang'a
48.	Magiro Hydro Electricity Limited	Run off river Hydro	Kiawambogo	60kW	Murang'a

### c) Distribution and Supply

No	Licensee	Technology	Category	Capacity	Location
1.	Sotik Highlands Tea Estate Ltd.	Diesel	Nyamira	1.424MW	Nyamira
2.	Sotik Tea Company Ltd.	Diesel	Aroget	1.98MW	Bomet

## 6. LICENSING OF ELECTRICAL WORKERS AND CONTRACTORS

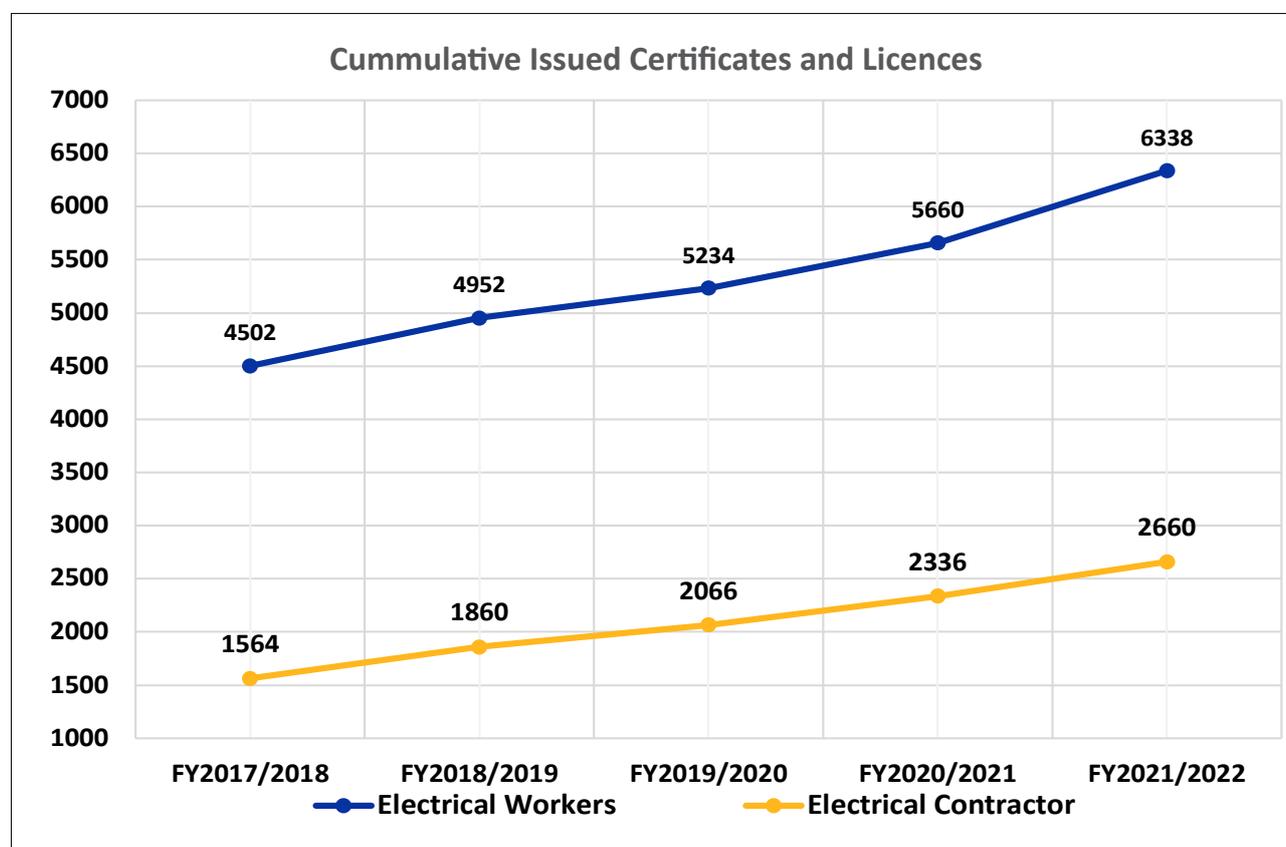
The Energy Act 2019 requires the Authority to license electrical workers and contractors who undertake electrical installation works. The licencing process aims at ensuring that persons undertaking electrical installation works are competent thereby enhancing functionality and safety of installations. In the year under review, 667 electrical workers and 324 electrical contractors were licensed. This increased the total number of licensed electrical workers to 6,338 from 5,660 while the number of licensed electrical contractors grew from 2,336 to 2,660. Table 7 presents the number of electrical worker certificates and electrical contractor licences issued in the period under review.

**Table 7: Electrical Worker and Contractor Licences issued in the Financial Year 2021/2022**

	Number of Issued Certificates/Licences					
	C2	C1	B	A2	A1	Total
Electrical Workers	325	202	79	9	52	667
Electrical Contractors	107	124	43	4	46	324

Figure 10 shows the cumulative number of issued electrical worker certificates and electrical contractor licences.

**Figure 10: Trend in the growth of licensed Electrical Workers and Contractors**



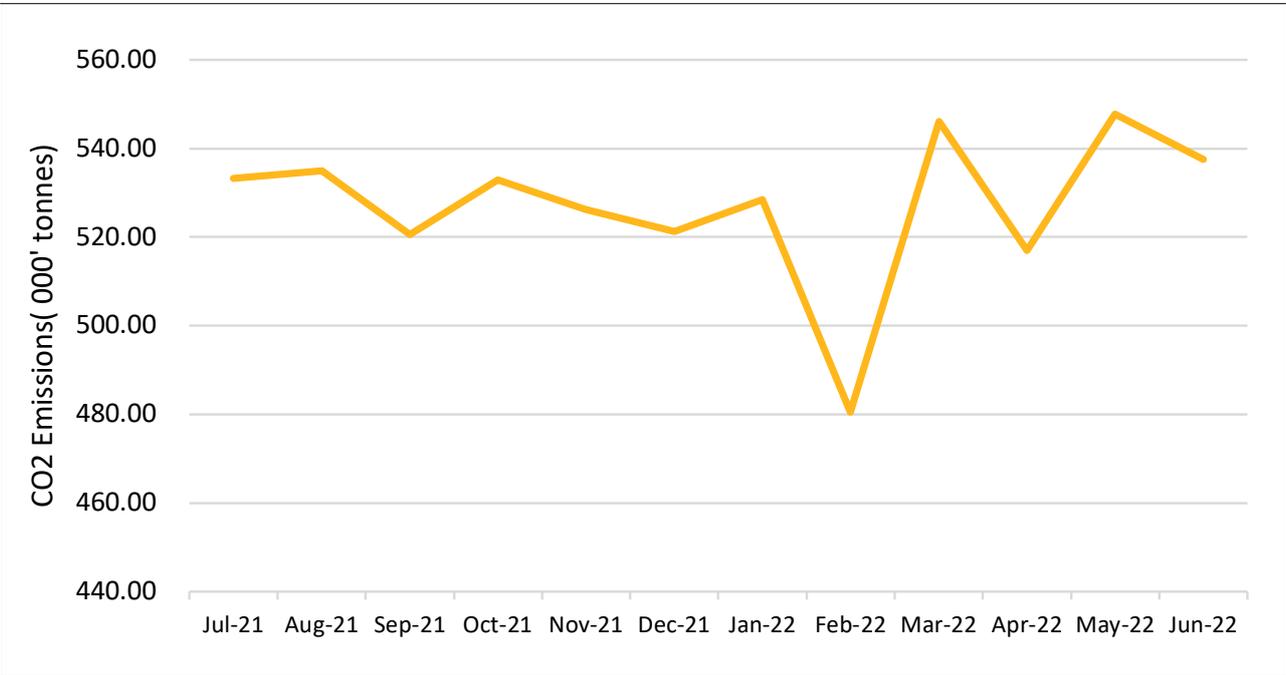
# 7.

## GREENHOUSE GAS (GHG) EMISSIONS

Following the UN Climate Change Conference in Glasgow (COP26) in November 2021, Kenya reaffirmed the Paris Agreement’s goal of limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit temperature increase to 1.5 °C above pre-industrial levels. Kenya’s Nationally Determined Contributions (NDC) 2020-2030 seeks to reduce greenhouse gas emissions by 32% by 2030 through initiatives such as increasing the share of renewable energy contribution to the national grid.

The CO2 emissions have been fluctuating with electricity generation with the lowest recorded in February 2022 at 480.51 thousand tonnes CO2 and the highest in May 2022 at 547.76 thousand tonnes CO2. The national grid emission factor for Kenya is 0.5tCO2/MWh. This factor accounts for CO2 emissions for electricity generation and supply.

**Figure 11: Trend of CO2 Emissions**



## 8.

# ELECTRICITY REGULATORY INDEX (ERI)

The African Development Bank (AfDB) Electricity Regulatory Index (ERI) measures the level of development of electricity sector regulatory frameworks in African countries and the capacity of regulatory authorities to effectively carry out their relevant functions and duties. The ERI is made up of three pillars or sub-indices: The Regulatory Governance Index (RGI); the Regulatory Substance Index (RSI); and the Regulatory Outcome Index (ROI).

Kenya emerged second in the 2021 edition which featured 43 countries. Table 8 shows a summary of the performance of the top five (5) countries.

**Table 8: ERI index ranking 2021 Source: AfDB, ERI Report 2021**

Country	RGI	RSI	ERIGS	ROI	ERI	RANK
Uganda	0.951	0.939	0.945	0.717	0.823	1
<b>Kenya</b>	<b>0.899</b>	<b>0.839</b>	<b>0.869</b>	<b>0.544</b>	<b>0.688</b>	<b>2</b>
Tanzania	0.912	0.903	0.907	0.493	0.6693	3
Namibia	0.902	0.818	0.86	0.5123	0.663	4
Egypt	0.784	0.816	0.80	0.464	0.609	5

Source: AfDB, ERI Report 2021



# 9

## RENEWABLE ENERGY

Through the Least Cost approach, the government has prioritized the development of geothermal, wind and solar energy plants for grid-interconnected projects.

The installed capacity of renewable energy sources as at June 2022 was 2,481.69MW, which accounts for 78.55% of the total installed capacity. In the period under review, 86.98% of the energy generated in Kenya was obtained from renewable energy resources. Table 9 presents a summary of the renewable energy installed capacity per technology.

**Table 9: Renewable Energy Installed Capacity**

Year	2022
Hydro	837.58MW
Geothermal	949.13MW
Wind	435.5MW
Bioenergy	89.48MW
Solar	170MW
<b>Total</b>	<b>2,481.69MW</b>

### 9.1 Geothermal Development

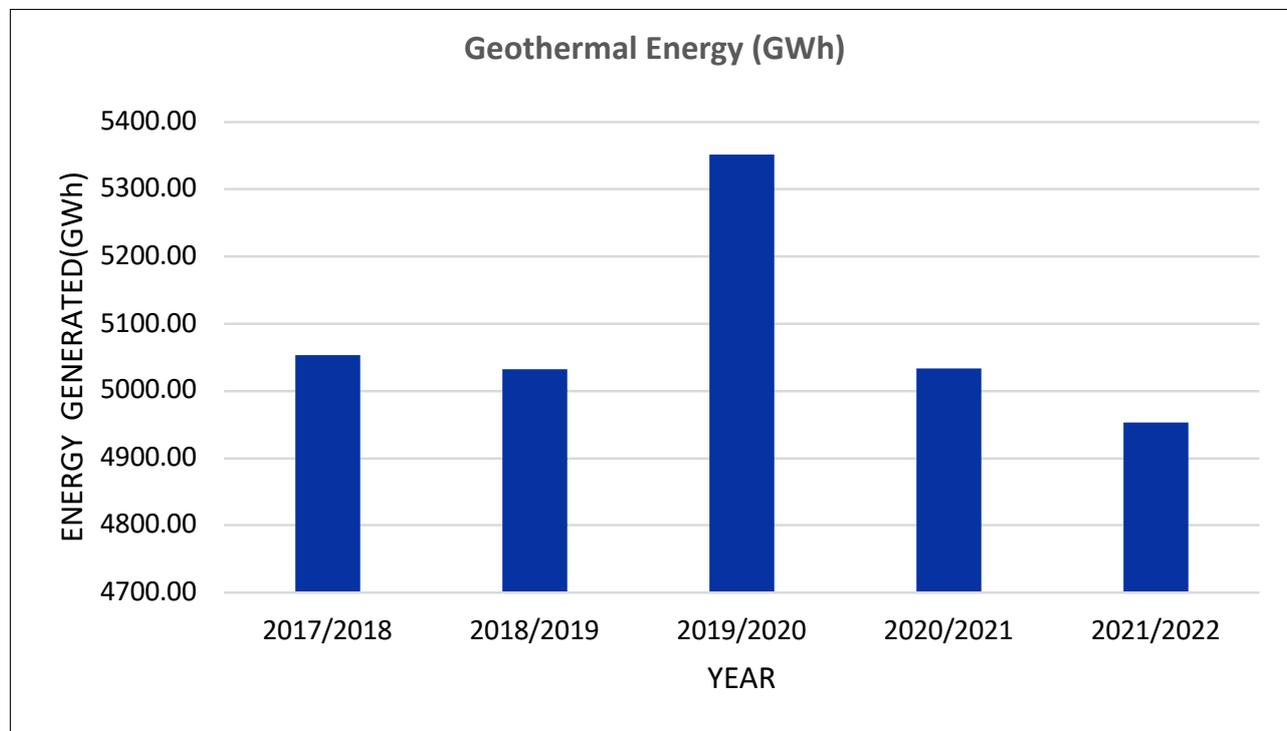
Kenya ranks first in Africa and seventh in the world in installed geothermal power generating capacity. In the period under review Olkaria 1 unit 6 with a nameplate capacity of 86 MW was added to the country's geothermal capacity bringing Kenya's geothermal capacity to 949.13MW. Table 10 provides a list of installed geothermal plants and the respective power capacity.

**Table 10: Operational Geothermal Plants in Kenya**

S/No	Plant	Nameplate Capacity (MW)
1.	Olkaria I	45
2.	Olkaria II	104.49
3.	Olkaria IV	149.85
4.	Olkaria V	172.33
5.	Olkaria 1 Unit 4 & 5	150.52
6.	Orpower 4 Inc. I	63.8
7.	Orpower 4 Inc. II	39.6
8.	Orpower 4 Inc. III	17.6
9.	Orpower 4 Inc. IV	29
10.	Eburru Wellheads	2.44
11.	Wellhead Units	88.5
12.	Olkaria 1 Unit 6	86
	<b>Total</b>	<b>949.13</b>

In the period under review, geothermal energy accounted for 39.14% of Kenya’s energy mix. Figure 12 illustrates the geothermal energy generated between 2017 and 2022. The geothermal energy generated in 2021/2022 was 4,953.15 GWh, a decrease from 5,033.69GWh in 2020/2021 and 5,351.88GWh in 2019/2020. This is attributed to declined output from Olkaria 1 AU and Olkaria V due to technical breakdowns.

**Figure 12: Trends in Geothermal Energy Generation since 2017**

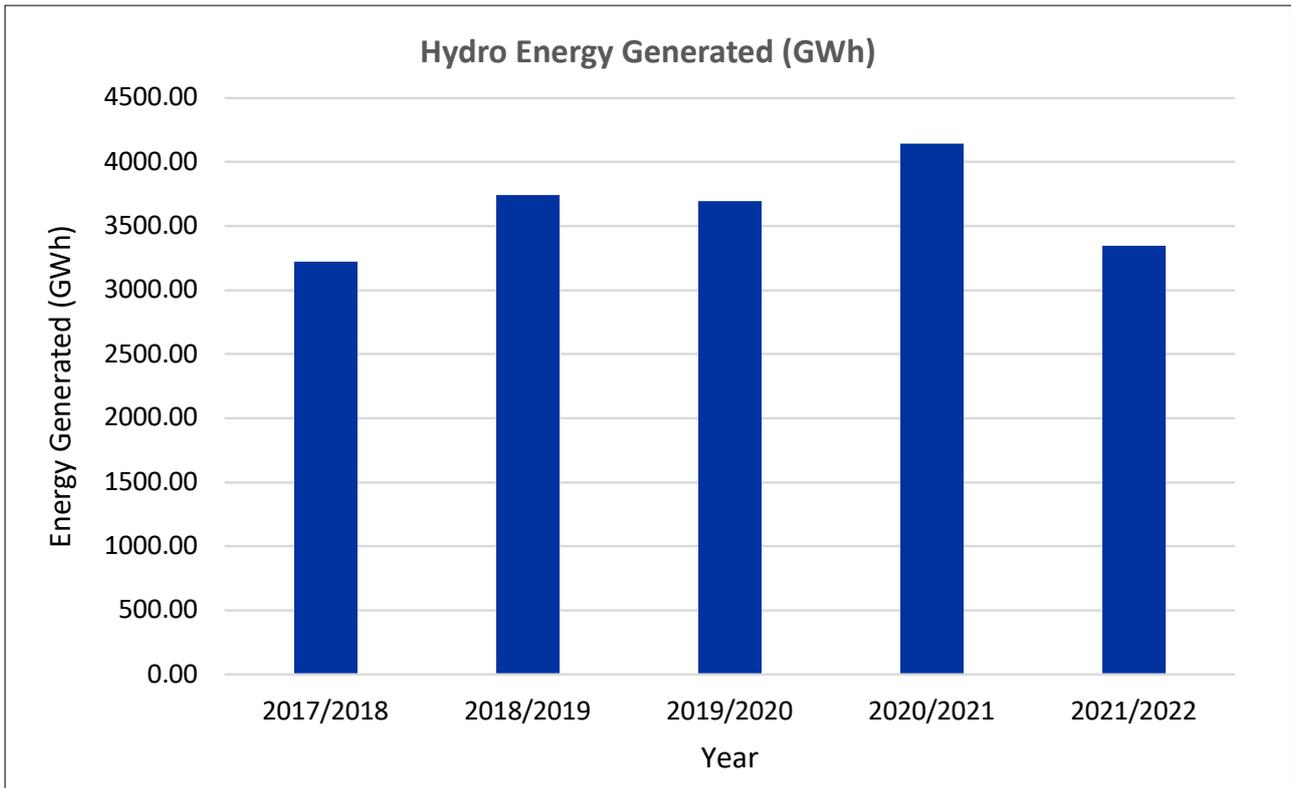


## 9.2 Hydro Power

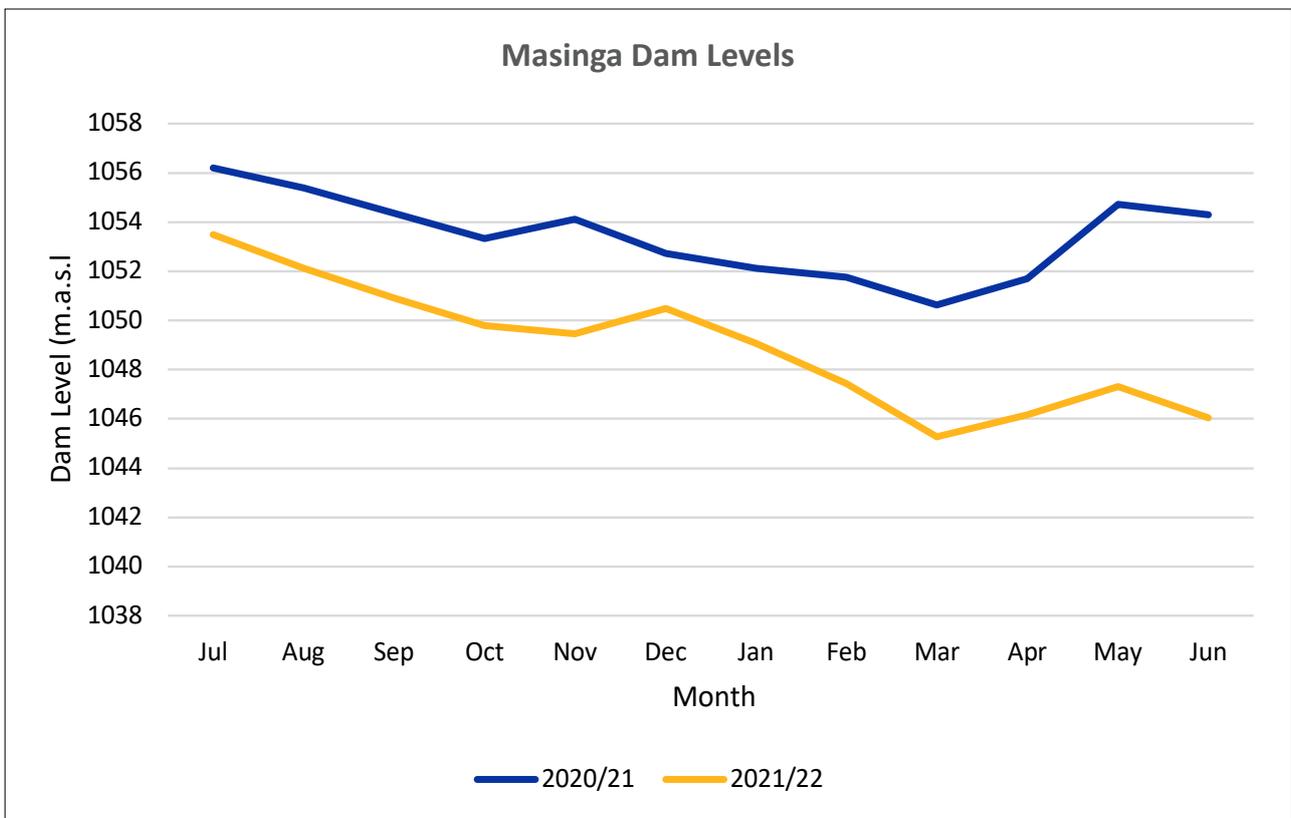
The total installed large hydropower capacity as at June 2022 was 838 MW. Kenya has an estimated small hydropower potential of 3,000 MW which remains unexploited.

In the period under review, the energy generated from hydro decreased from 4,142.18 GWh to 3,349 GWh as shown in Figure 13. The reduction in hydro energy generated is attributed to poor hydrology. This is illustrated in figure 14, 15 and 16, which shows the monthly dam levels for Masinga, Kiambere and Turkwel dams respectively. It can be observed that the dam levels for the financial year 2021/2022 were lower than in the previous year in all the three dams. The operational hydro plants assist in generation frequency control and are expected to be more significant as the share or variable renewable energy in Kenya’s generation mix grows.

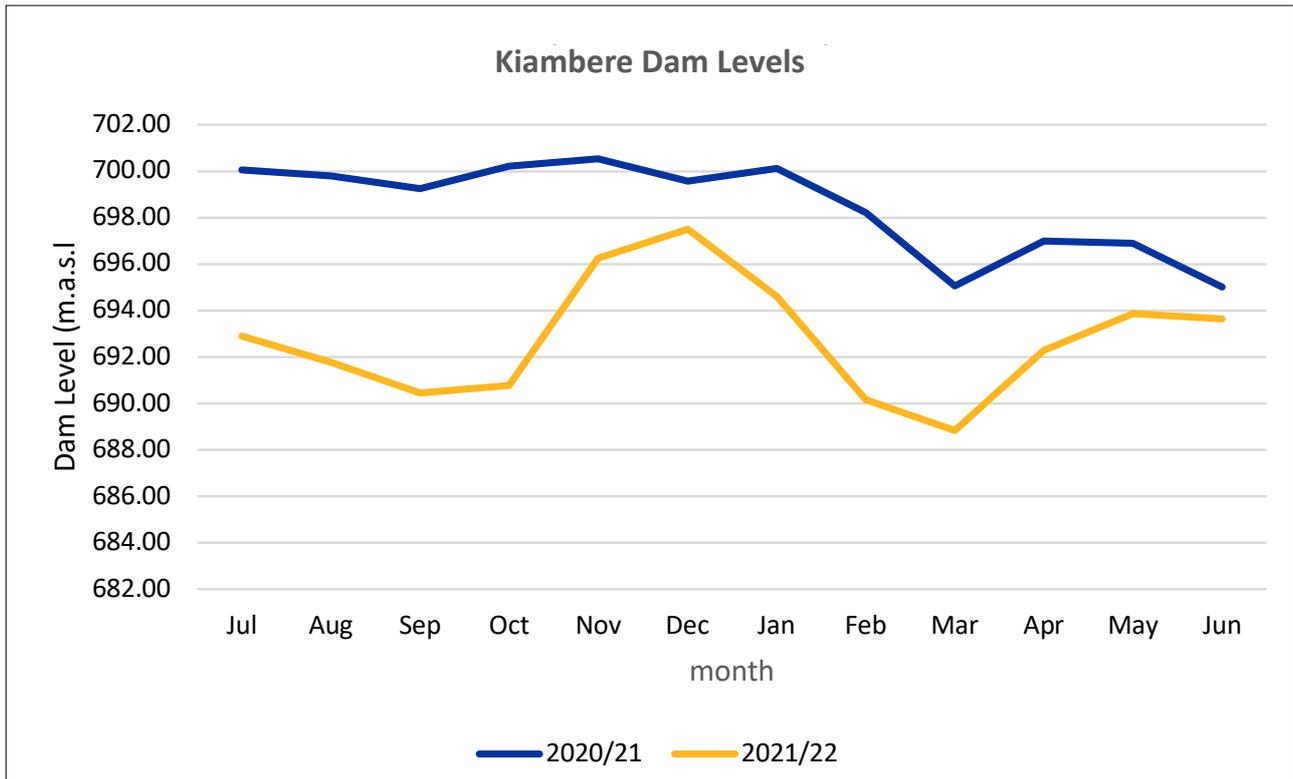
**Figure 13: Hydro energy generated between 2017 and 2022**



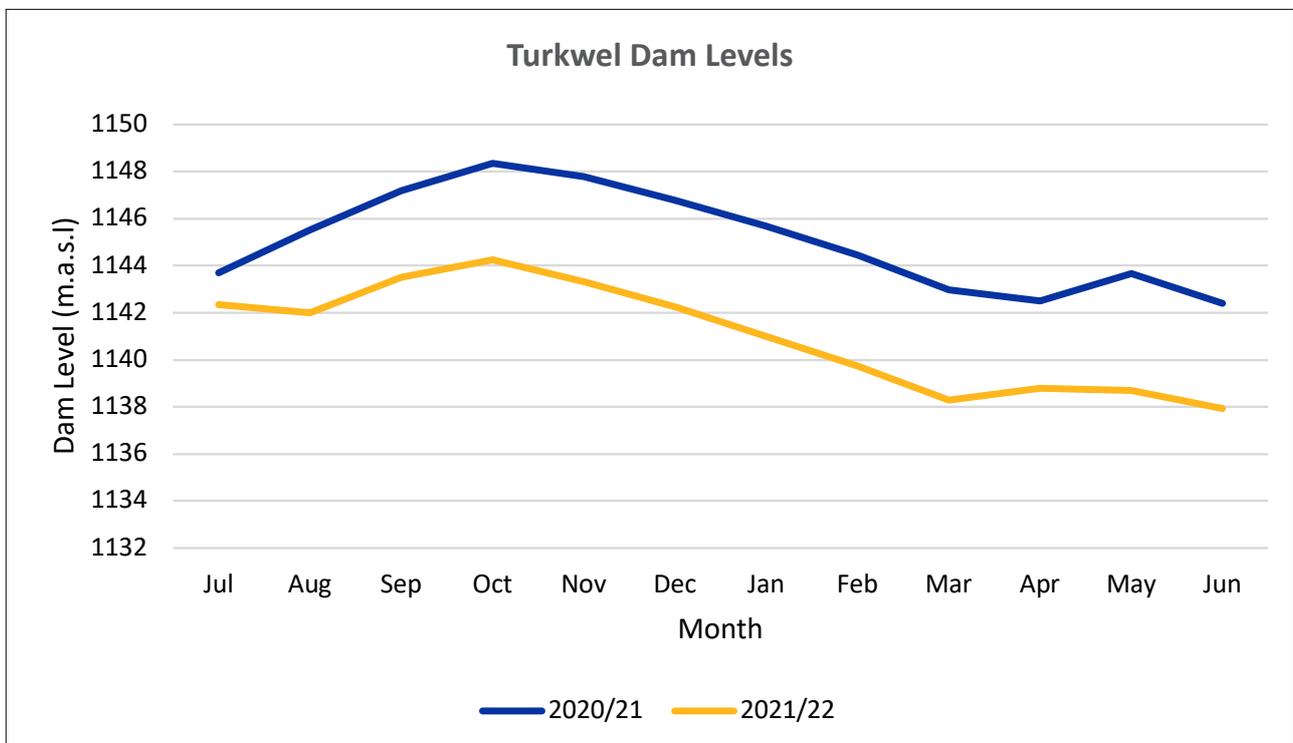
**Figure 14: Masinga dam levels in 2020 and 2022**



**Figure 15: Kiambere dam levels in 2020 and 2022**



**Figure 16: Turkwel dam levels in 2020 and 2022**



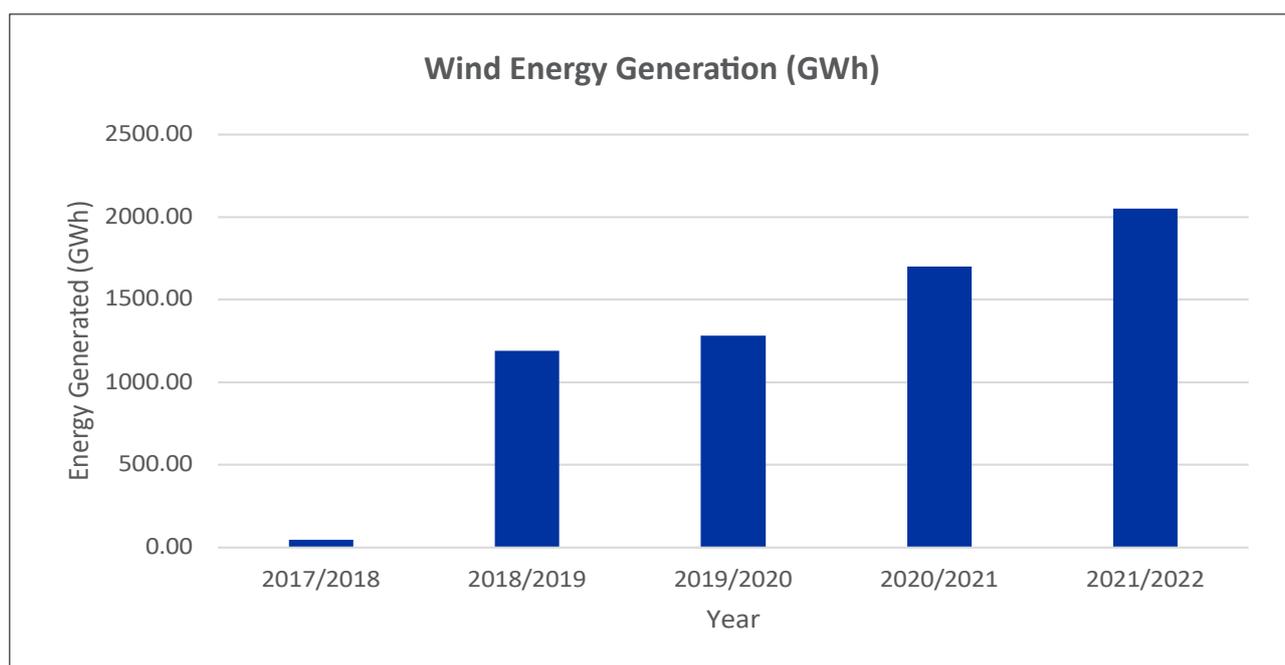
## 9.3 Wind Energy

Kenya is endowed with favorable wind speeds with 73% of the country experiencing wind speeds of 6 m/s or higher at a 100 meters above ground level. Of this, 28,228 sq.km experiences wind speeds of between 7.5 – 8.5 m/s and 2,825 sq.km experiences wind speeds of between 8.5 – 9.5 m/s.

The country has an installed wind capacity of 435.5MW. Lake Turkana Wind Plant (310MW), Ngong Wind (25.5MW) and Kipeto Wind Farm (100MW) are the only wind plants connected to the grid.

In the period under review, wind contributed 16.22% to Kenya’s energy mix. This was the highest recorded wind contribution with an energy generated value of 2,052.26 GWh. This is illustrated in figure 17.

**Figure 17: Wind Energy Generated between 2017 and 2022**



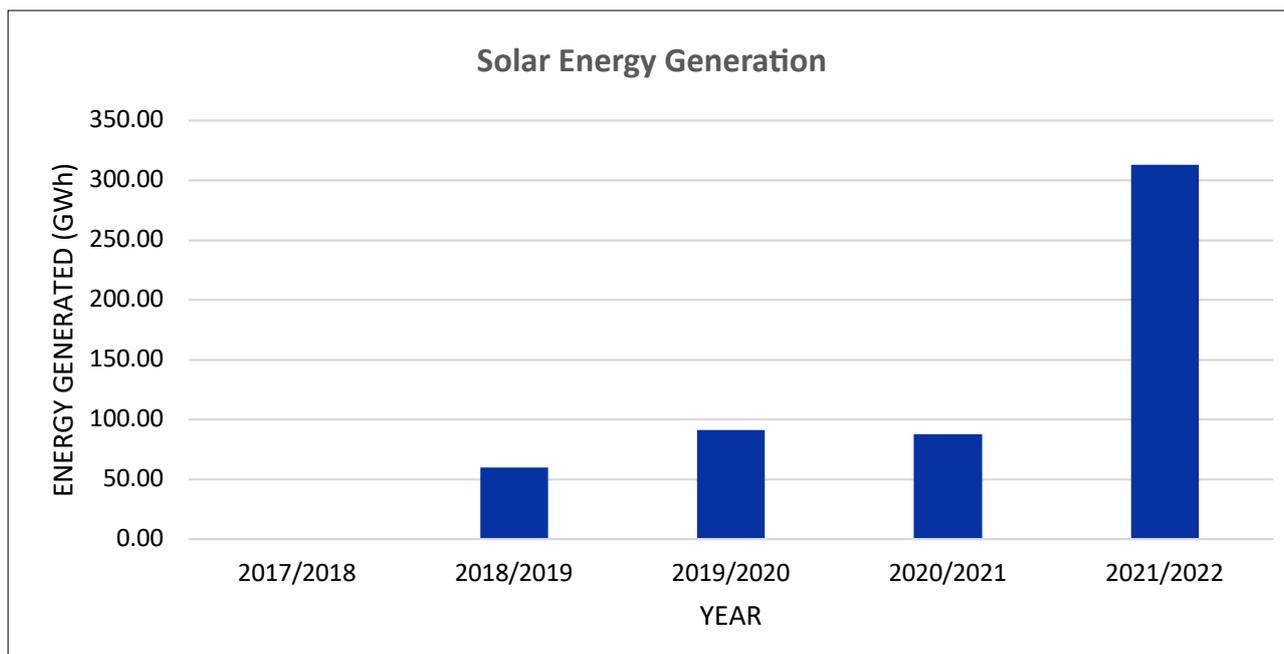
## 9.4 Solar Energy

Kenya’s geographical location astride the equator gives it a unique opportunity for a vibrant solar energy market. The country receives good solar insolation all year round estimated at 4-6 kWh/m<sup>2</sup>/day.

There has been a significant growth in the utilization of solar photovoltaic (PV) systems in Kenya due to a global decline in the cost of these systems and the development and enforcement of facilitative regulations by the Authority. The installed solar systems include utility scale projects, commercial and industrial solar PV systems, mini grids, solar water pumping systems, solar streetlights, solar home systems and consumer devices.

Kenya has four (4) utility scale solar photovoltaic plants with a combined installed capacity of 170 MW. These are Garissa Solar Power (50MW), Selenkei solar (40MW), Cedate solar (40MW) and Malindi solar (40MW). In the period under review, these plants contributed 2.47 % to Kenya’s energy mix. Figure 18 shows the contribution of solar photovoltaic systems to the national grid between 2017 and 2022. The exponential increase in solar energy generated between 2020/2021 and 2021/2022 is attributed to the commissioning of Selenkei, Cedate and Malindi solar plants.

**Figure 18: Solar energy generated between 2017 and 2022**



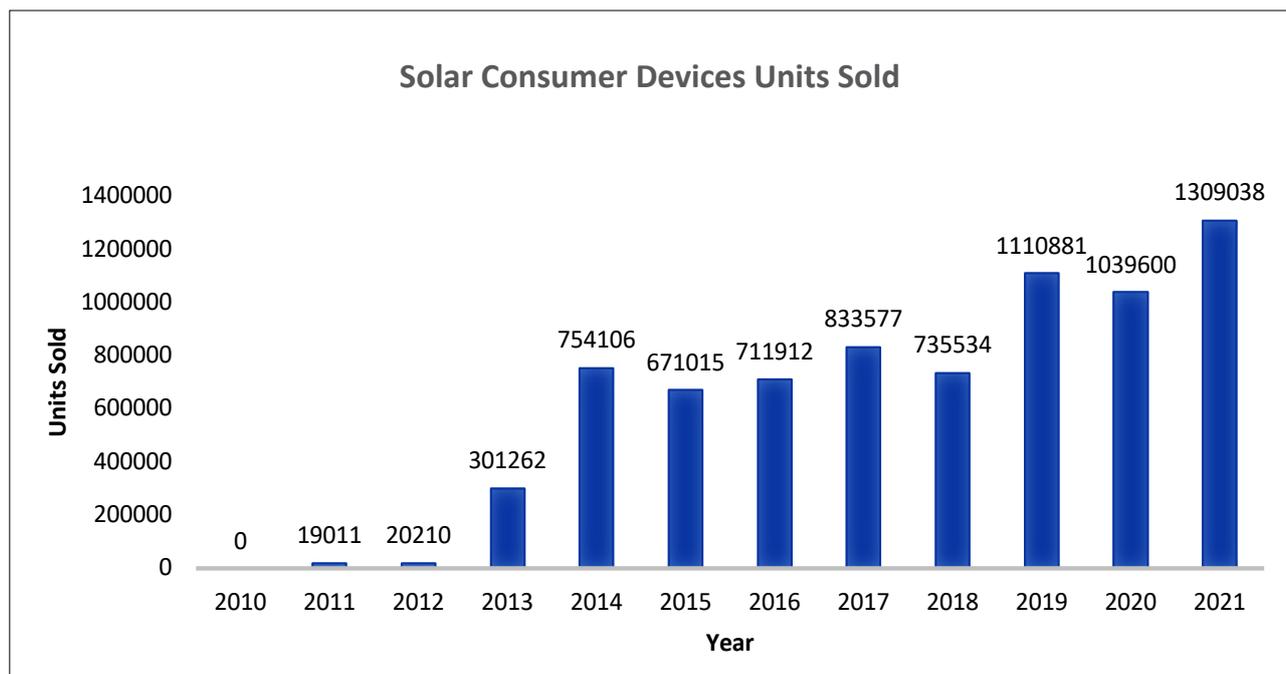
In addition to the utility scale projects, there has been a significant growth in the installation of solar photovoltaic systems for commercial and industrial use. As at June 2022, the Authority had licensed captive solar photovoltaic systems with a combined capacity of 23.99 MW.

## 9.5 Solar Photovoltaic Consumer Devices

Solar photovoltaic consumer devices play a supplementary role in universal electricity access. These are off the shelf systems with all the components required to provide basic energy services. They are sold either as an integrated product or a kit with a peak power rating of the PV module not exceeding 350 Wp, the working voltage of any of the components not exceeding 35 VDC and no design expertise required to choose appropriate system components.

Figure 20 shows solar PV consumer devices sold between 2010 and 2021. There has been a steady growth in the use of consumer devices over the years with at least 7.5 million units sold. The key players in the consumer devices market include Greenlight Kenya Limited, Dlight Limited, Mkopa Solar Kenya Limited, Pamoja Life Limited, Biolite, Sunculture and Suntransfer Kenya Limited.

**Figure 19: Solar consumer devices sold between 2010 and 2021**



## 9.6 Mini-Grids

Mini-Grids refer to integrated systems for local electricity generation, transmission and distribution that can operate in isolation from the national electricity grid. Mini-grids play a critical role in achieving universal energy access in Kenya. As at June 2022, the Authority had approved 60 private and 41 public mini-grids for generation of electricity. The private mini-grids have a cumulative installed capacity of 22 MW with 20 MW being drawn from solar photovoltaic systems. Kenya Power operates the public mini-grids which include 31 MW of thermal, 2.26 MW of solar and 0.55 MW of wind installed capacity.

In the period under review, the Authority approved mini-grid tariff applications for the following sites:

- i) Kudura Power East Africa for 10 sites in Busia County
- ii) Talek Power for a site in Narok County
- iii) Renewvia Limited in Ringiti Island, Homabay County
- iv) Renewvia Limited in Nakukulas, Lorengelup, Lomekwi, Locheremoit, Kangitan Kori, Kapelbok and Katiko sites in Turkana County
- v) JKUAT Seed Project, 12 kWp Solar Minigrid project in Olderkesi, Narok County
- vi) Erdemann Properties in Great Wall Gardens 3, Machakos County

## 9.7 Bioenergy

Bioenergy 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 about 70% and provides for more than 90% of rural household energy needs. The government has identified the existence of a substantial potential for power generation using forestry and agro-industry residues including bagasse.

In the period under review, the Authority licensed four (4) bagasse plants to generate energy for captive use and to feed to the national grid: namely Transmara Sugar Company Limited, Kibos Sugar and Allied Industries, West Kenya Sugar Company Limited and Sukari Industries Limited with a combined capacity of 44.5MW. A list of facilities generating electricity from bioenergy is provided in table 11.

**Table 11: Facilities generating electricity from bioenergy sources**

S/No	Facility	Capacity (MW)	Technology	County
1.	Bidco	2.1	Biomass	Thika
2.	Kwale International Sugar Company Limited	2	Bagasse	Kwale
3.	Butali Sugar Mills Ltd	11	Bagasse	Kakamega
4.	Chemelil Sugar Co. Ltd	3	Bagasse	Kisumu
5.	South Nyanza Sugar Co.	8.7	Bagasse	Migori
6.	DWA Estates Limited	1.4	Biomass	Makueni
7.	Nzoia Sugar Co. Ltd.	7	Bagasse	Bungoma
8.	Pwani Oil Products Ltd	1.5	Biomass	Kilifi
9.	Biojoule Kenya Ltd	2.1	Biogas	Nakuru
10.	Transmara Sugar Company Limited	8.5	Bagasse	Kisii
11.	James Finlay (Kenya) Limited	0.18	Biogas	Kericho
12.	West Kenya Sugar Company Limited	12	Bagasse	Kakamega
13.	Sukari Industries Limited	6	Bagasse	Homabay
14.	Kibos Sugar and Allied Industries	18	Bagasse	Kisumu
<b>Total</b>		<b>89.48</b>		



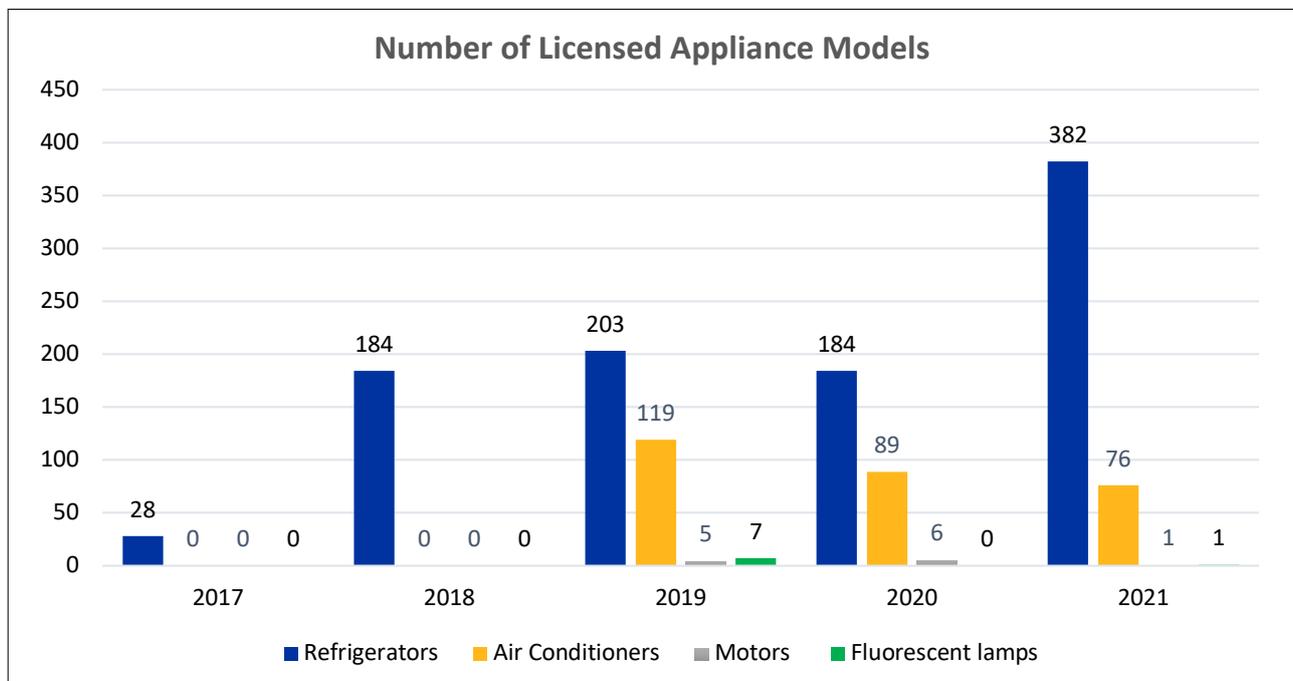
# 10. ENERGY EFFICIENCY

Energy efficiency and conservation have been identified as key factors in improving performance in industrial, commercial and institutional facilities. The Authority encourages energy efficiency and conservation through enforcement of two regulations; the Energy (Energy Management) Regulations 2012 and the Energy (Appliances' Energy Performance and Labelling) Regulations, 2016. The former focuses on energy efficiency for facilities designated as medium and high-energy consumers while the latter ensure energy efficiency for electrical appliances.

In the period under review, 288 commercial and industrial facilities performed energy audits in order to monitor their energy consumption and to identify energy saving opportunities. The projected energy savings from implementation of the energy conservation measures for the year was 306.26 GWh.

Similarly, in the period under review, the Authority licensed 382 refrigerators, 76 air conditioners, 1 motor and 1 fluorescent lamp. Figure 20 shows licensed appliances between 2017 and 2021.

**Figure 20: Licensed appliances between 2017 and 2021**



# 11.

## PETROLEUM SUBSECTOR

The petroleum subsector in Kenya comprises three segments: upstream, midstream and downstream. The upstream segment comprises exploration, development and production of crude oil and natural gas. Currently, the mid-stream segment involves storage and transportation of crude oil and has potential to be expanded to include refining of crude oil. The downstream segment involves the supply, distribution and marketing of petroleum products.

### 11.1 Upstream

In 2021, there were thirteen (13) Hydro Carbon discoveries, with oil discoveries having been made in the Tertiary Rift Basin. Additionally, gas discoveries were made in offshore Lamu Basin, Anza Basin and Mbawa 1 well while Sunbird 1 well had both oil & gas discoveries. Three blocks in Offshore Lamu Basin and Anza Basin have since been surrendered to the Government.

Efforts are underway to introduce an Integrated Field Development Plan. The plan will provide technical guidance and serve as a blueprint for optimizing the development and production of the fields. The proposed development will cover 10 fields within the South Lokichar basin. The field development will be undertaken in two phases with phase 1 development targeting mature resources with a plateau of 120,000 barrels per day while phase 2 targets maturing of the remaining six fields to extend the plateau. The total land requirement for the upstream development area and the 84km water pipeline is approximately 22,000 acres and 614 acres respectively.

The 852 km Lokichar Lamu crude oil pipeline project that is expected to transport the processed crude from the central processing facility to Lamu port is currently at the project development stage (PreFID). The Front End Engineering Design (FEED) is already complete and the Environmental and Social Impact Assessment (ESIA) report submitted to NEMA for approval.

### 11.2 Midstream and Downstream subsector

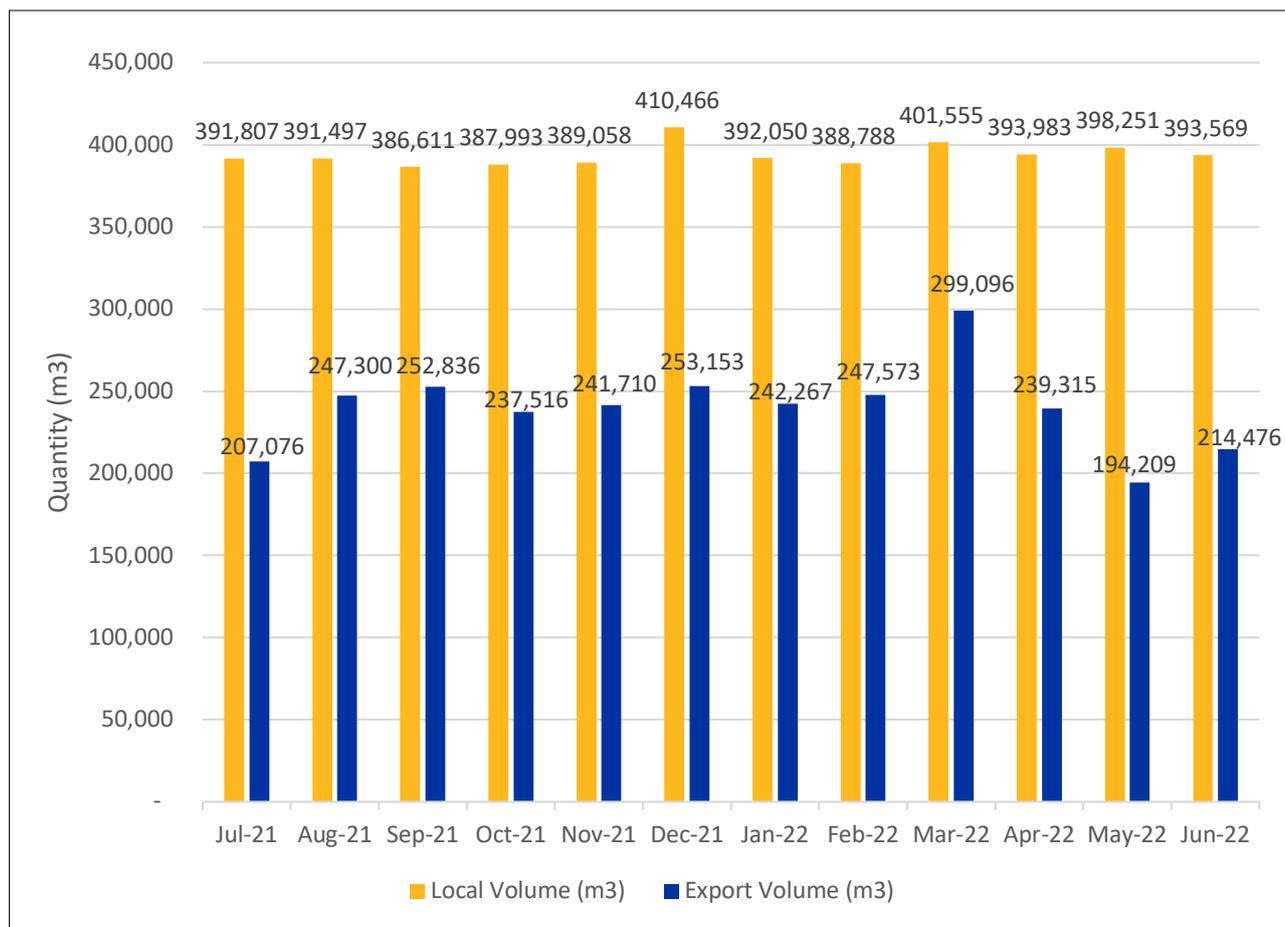
The mid-stream subsector entails storage, refining of crude oil into consumable petroleum products and transportation of the same. Kenya imports all its petroleum products requirements. The Ministry of Petroleum and Mining coordinates the importation of petroleum products through a tender system referred to as the Open Tender System (OTS).

The OTS provides for benefits such as planned importation of petroleum products resulting in enhanced security of supply for the region and reduced demurrage costs, competitive bidding and economies of scale hence overall reduction in the costs. Further, the OTS ensures equitable sharing of common user facilities, supports entry of more Oil Marketing Companies (OMCs) thus enhancing competition and provides for an auditable process of price regulation that protects both consumers and investors. Additionally, it establishes a framework for importation of petroleum products that conform to the approved standards of quality.

Petroleum products imported through the OTS are majorly handled by the Kenya Pipeline Company (KPC) who provide product movement infrastructure including storage and oil pipeline services.

The pipeline throughput statistics for the period under review are as indicated in figure 21.

**Figure 21: KPC’s throughputs during the financial year 2021/2022**



Source: KPC

The total pipeline infrastructure currently in use spans approximately 1,342 km. The pipeline network runs from the port of Mombasa to Kisumu port and is split into different sections as indicated in the table 12.

**Table 12: Pipeline infrastructure**

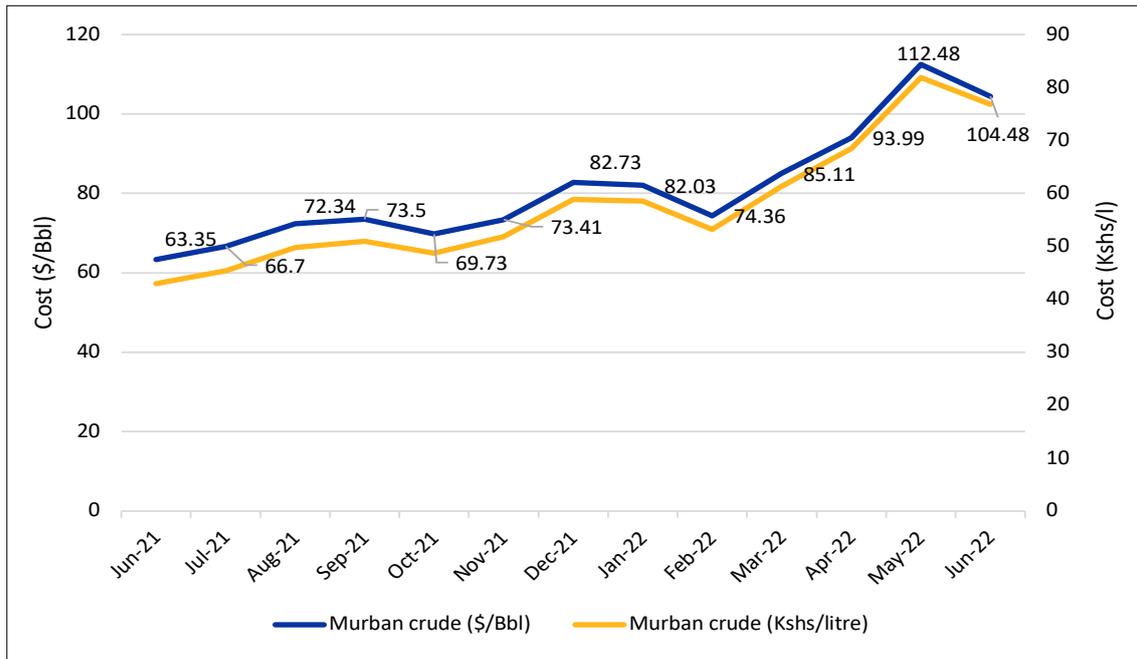
Acronym	Pipeline Diameter (Inches)	Pipeline length (km)	Flow rate (m3/hr)
Line 2	6 & 8	325	220
Line 3	6	121	140
Line 4	14	325	311
Line 5	20	450	1,200
Line 6	10	121	280

Source: KPC

### 11.3 Evolution of international crude oil prices

The Authority uses the Murban crude oil benchmark to evaluate prices of petroleum products. During the period under review, the international Crude Oil Prices increased from 66.70 \$/Bbl in July 2021 to 73.50 \$/Bbl in September 2021 then declined to 69.73 \$/Bbl in October 2021. The crude oil prices then increased to 82.03\$/Bbl in January 2022 before declining to 74.36\$/Bbl in February 2022. This was followed by an increase to 112.48 \$/Bbl in May 2022. The increase in April and May 2022 was attributed to geopolitical tension arising from the Russia-Ukraine conflict that resulted in crude oil and natural gas supply disruptions.

**Figure 22 : Trend in Murban Crude oil prices**

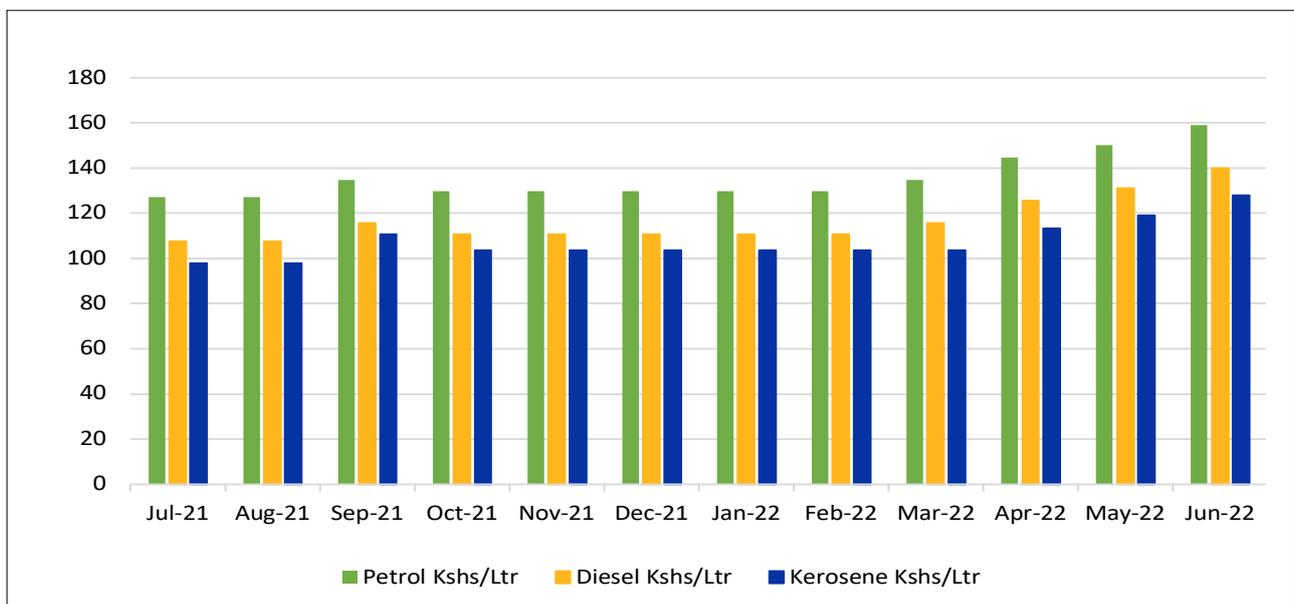


## 11.4 Local Petroleum Prices

The Authority sets, reviews and approves contracts, tariffs and charges for common user petroleum logistics facilities. These cost elements are fundamental in the pricing of local petroleum products. The Authority, on 14th of every month publishes maximum prices for Premium Motor Spirit (PMS), Automotive Gas Oil (AGO) and Illuminating Kerosene (IK).

A price neutral status was maintained in the period October 2021 to February 2022 despite an increase in the landed cost of petroleum products. This was done to cushion the citizenry from the escalating prices of petroleum. To facilitate this, the Government utilised funds collected through the Petroleum Development Levy under the Petroleum Development Levy (Amendment), Order 2021. Figure 23 presents the trend of the Nairobi pump prices for the period July 2021 to June 2022.

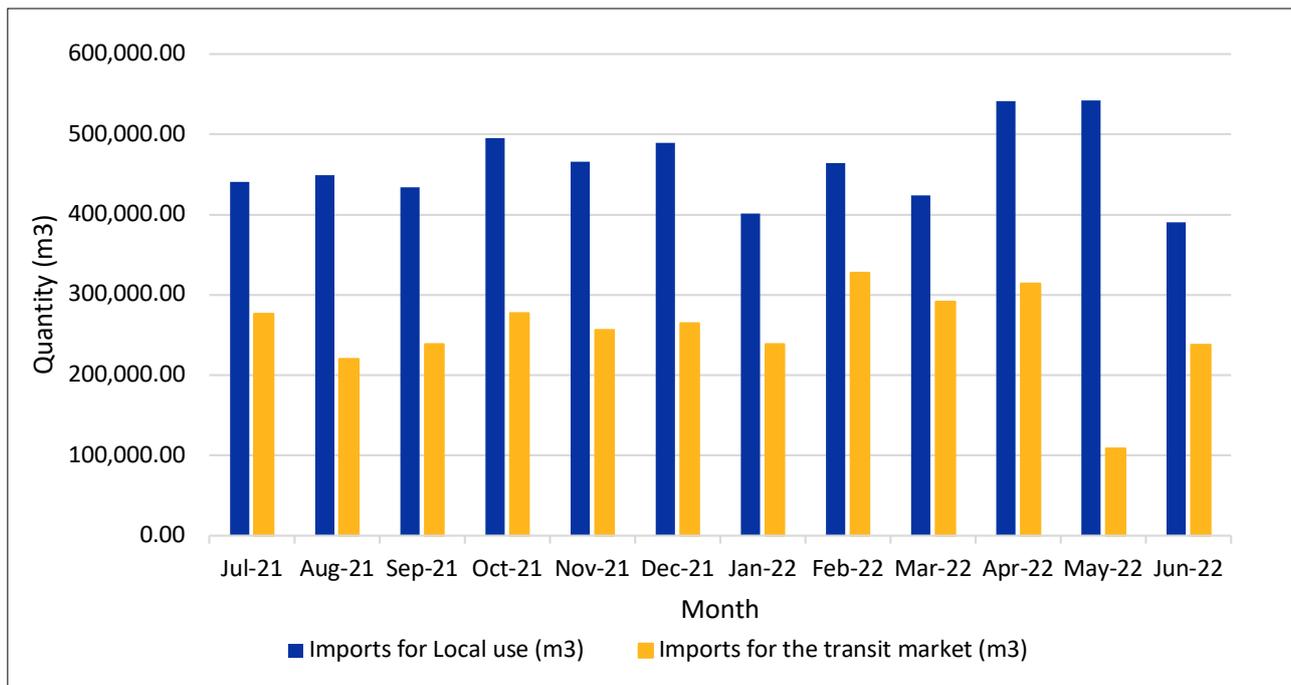
**Figure 23: Trend in Nairobi Pump Prices (July 2021-June 2022)**



## 11.5 Petroleum supply and demand

The quantity of petroleum products imported into the country for local use through the OTS increased from 4,994,577 cubic meters in the financial year 2020/2021 to 5,539,884 cubic meters in the financial year 2021/2022. Imports meant for the transit market reduced from 3,739,033.84 cubic meters to 3,052,312 cubic meters. Figure 24 gives a summary of the trend in petroleum products imports by market for the period under review.

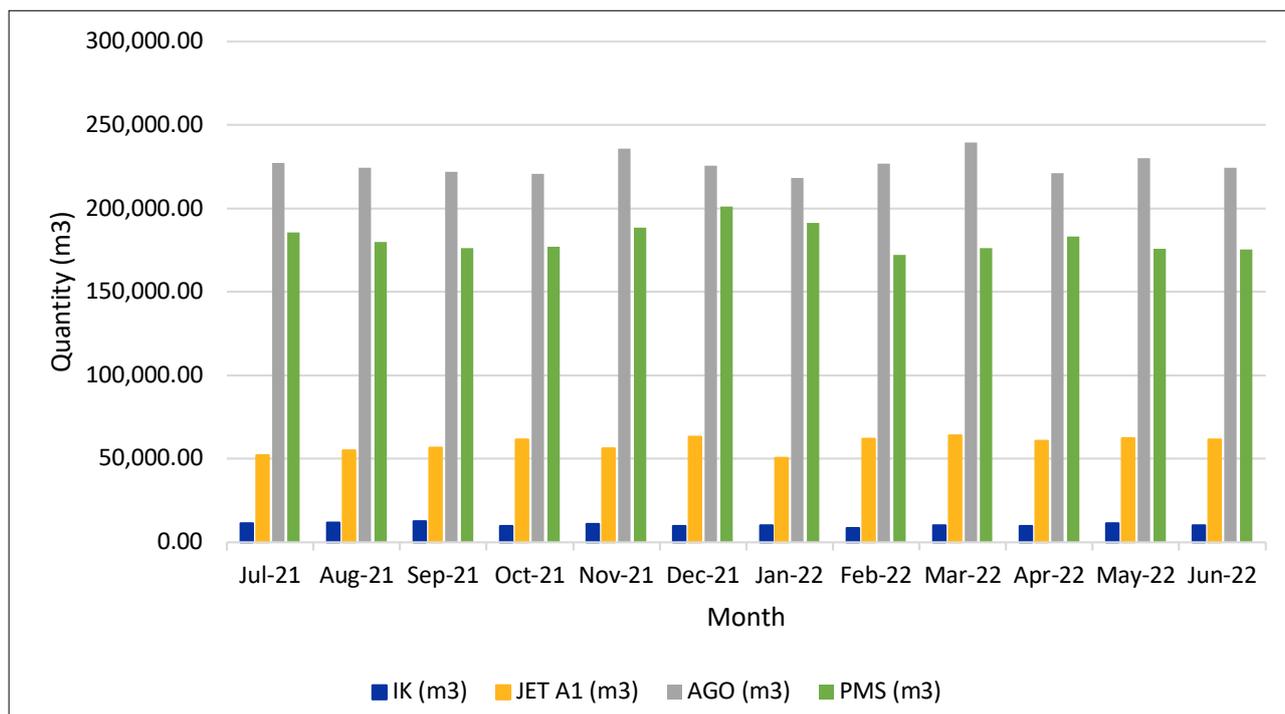
**Figure 24: Trend in Quantity of Petroleum imports for local use vs that meant for the transit market**



The total domestic demand for petroleum products imported through the OTS increased by 4.55% per cent to 5,738,216.27 m<sup>3</sup> in the financial year 2021/2022. This was partly attributed to a 30.18% increase in the demand for jet fuel as a result of the opening up of the economy and resumption of air travel across the world.

Diesel remains the most consumed petroleum product with 2,717,077.21 Million cubic metres sold followed by super petrol with an estimated consumption of 2,182,665.51 cubic meters. Figure 26 presents a trend in the consumption of petroleum products.

**Figure 25: Trend in Consumption of Petroleum Products**



## 11.6 Sector consumption of petroleum products

Total net domestic sales of petroleum fuels increased by 11.0 per cent to 5.2 million tonnes which is attributed to the robust recovery of the economy in 2021 fueling demand for the products. All economic sectors, except tourism, registered a rise in net domestic sales of petroleum products. Fuel sales for power generation increased by 94.5% to 147,500 tonnes. Similarly, fuel sales for rail transport almost doubled from 11,400 tonnes in 2020 to 19,400 tonnes in 2021. Domestic sales to the aviation sector increased by 27.2% to 499,400 tonnes while sales to the tourism sector decreased by 7.1% to 6,000 tonnes in 2021. Table 13 presents trends in the consumption of Petroleum products since 2017.

**Table 13: Consumption of Petroleum Products by Sector**

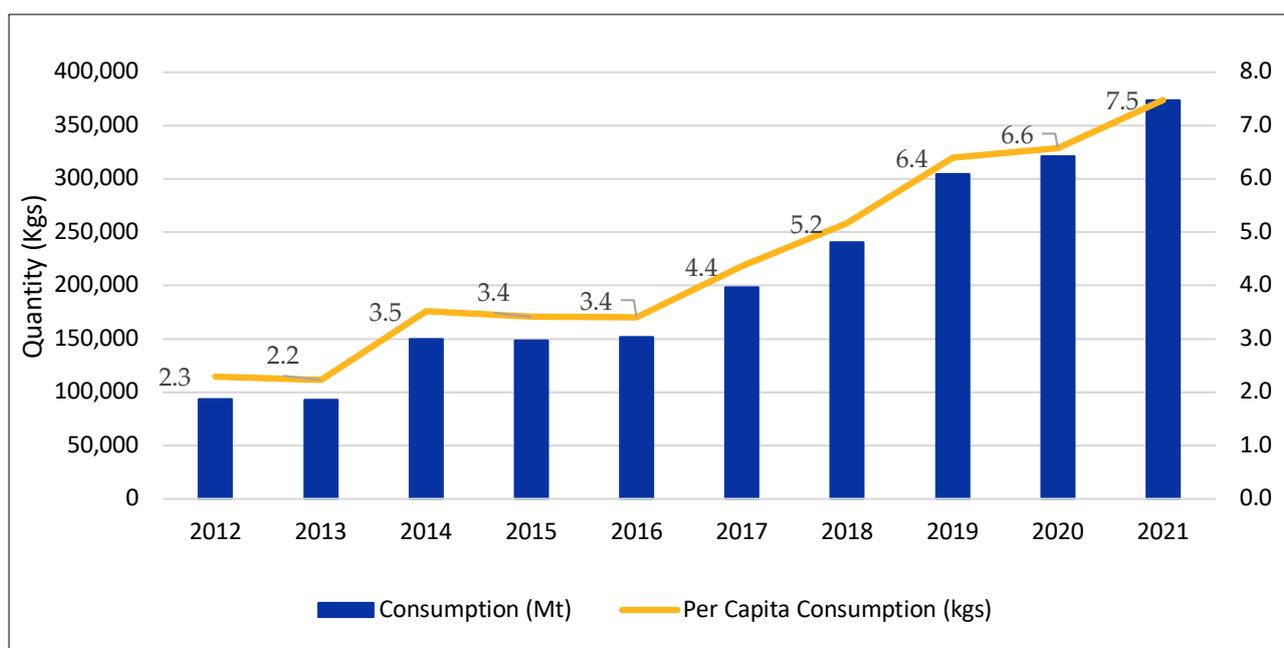
<b>CONSUMPTION BY SECTORS (Thousand Tonnes)</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
Agriculture	56.5	56.5	56.5	59.7	25.7	24.8	26.6
Retail pump Outlets and road transport	3451.6	3760.6	3553	3743	3752	3650.5	3937.8
Air transport (exc. Government)	637.7	598.4	644.5	671.4	710.8	392.7	499.4
Power Generation	32.3	15.3	44.7	34.2	29.1	75.8	147.5
Industrial and Commercial sectors	572.1	615.9	837.2	635.1	635.5	494.4	530.5
Government	7.7	11.3	18.5	18.7	15.6	21.5	22.8
Tourism	4.8	5.1	9.1	9.5	13.9	6.5	6
Marine (exc. Naval forces)	2.9	2.3	6.2	5.1	5.6	1.1	2.1
Rail transport	36.9	44	11.8	12.3	19	11.4	19.4

Source: KNBS, Economic Survey 2022

## 11.7 Consumption of LPG

Demand for Liquefied Petroleum Gas (LPG) has maintained an upward trend with consumption hitting 373,865 metric tonnes in 2021, a 13.9% increase from the 320,909 metric tonnes recorded in 2020. The total number of Bulk LPG storage facilities increased to 120 with a combined storage capacity of approximately 34,000 metric tonnes. This is a significant increase from the 8 facilities that were operational in 2012. The facilities are distributed across 25 counties, which is a reflection of efforts made to improve LPG access to consumers. The trend in consumption of LPG is summarized in figure 26.

**Figure 26: Per Capita Consumption of LPG (Kgs)**



## 11.8 Competition in the Petroleum Sector (Market shares and HHI)

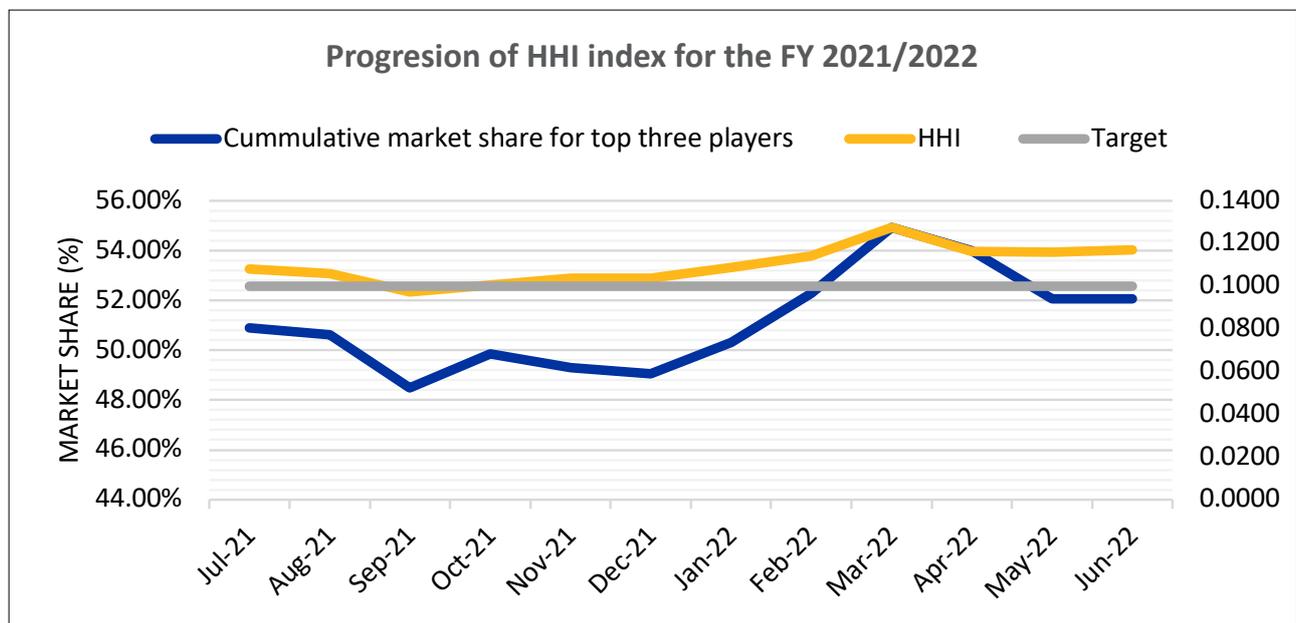
There were 111 registered Oil Marketing Companies (OMCs) and approximately 4,373 retail stations in Kenya as at June 2022. Table 14 presents the market share of the OMCs for the period under review.

OMC	Local sales volume for OTS imported products (m3)	% Share
Vivo Energy Kenya Limited	1,367,483.39	23.83%
Total Energies Marketing Kenya Plc	992,464.06	17.30%
Rubis Energy Kenya Plc	574,935.98	10.02%
Ola Energy Kenya Limited	391,449.00	6.82%
Oryx Energies Kenya Limited	238,733.09	4.16%
Be Energy Limited	187,475.06	3.27%
Tosha Petroleum (Kenya) Limited	149,120.16	2.60%
Galana Oil Kenya Limited	139,254.44	2.43%
Hass Petroleum Kenya Limited	118,330.00	2.06%

Gapco Kenya Limited	116,282.61	2.03%
Petro Oil Kenya Limited	115,781.00	2.02%
Fossil Supplies Limited	110,028.00	1.92%
Stabex International Ltd	94,710.87	1.65%
Gulf Energy Holdings Limited	87,494.46	1.52%
Lake Oil Limited	79,274.18	1.38%
Others	975,400.01	17.00%
<b>Total</b>	<b>5,738,216.28</b>	<b>100.00%</b>

The Herfindahl–Hirschman Index (HHI) for the petroleum industry decreased from 0.1105 in 2021 to 0.1099 in 2022. The HHI is above the Authority’s target of 0.1 although it is projected to improve with the entry of more players into the market.

**Figure 27: HHI Index for downstream petroleum**



## 11.9 Petroleum Licensing

The Authority grants licenses, permits or certificates to any persons intending to undertake importation, exportation, bulk storage or transportation of petroleum products.

Table 15 summarizes the licenses issued as at June 2022.

**Table 15: Summary of active petroleum licenses as at June 2022**

<b>License Category</b>	<b>Number</b>
Driver Certification	7,256
Retail of LPG in Cylinders	1,801
Transport of petroleum products(Except LPG) by Road	955
Export and Wholesale of Petroleum Products(Except LPG)	1,129
Retail of Petroleum Products (except LPG)	243
Transport of LPG in Cylinders	266
Storage & Wholesale of LPG in cylinders	156
Import, Export and Wholesale of Petroleum Products (Except LPG)	113
Storage & Filling of LPG in Cylinders	91
Transport of LPG in bulk by Road	101
Import, Export and Wholesale of LPG in bulk	56
Transport of Jet-A1	40
Storage of petroleum products(Except LPG)	31
Export and Wholesale of LPG in bulk	31
Export & wholesale of Jet-A1	42
Import, Export and Wholesale of Fuel Oil	13
Import, Export and Wholesale of Bitumen	13
Bunkering of Petroleum Products (Except LPG)	8

## 12. OTHER ENERGY SOURCES

This section presents an overview of other energy sources that are used in Kenya besides the indigenous sources primarily used for power generation. Some of the other energy sources that will play a critical role in Kenya’s future energy mix include coal and nuclear power.

### 12.1 Coal

Coal is one of the energy resources that is underexploited in Kenya considering the substantial deposits and relatively low production costs. The low cost of coal makes it suitable as a fuel for industrial heating and power generation.

Kenya has proven coal reserves in the Mui Basin, Kitui County. The coal basin stretches across an area of 500 square kilometers and is divided into four blocks: A (Zombe – Kabati), B (Itiku – Mutitu), C (Yoonye – Kateiko) and D (Isekele – Karunga). Coal of substantial depth of up to 27 meters was discovered in the basin. An estimated 400 million tons of coal reserves were confirmed in Block C109. The Government of Kenya has awarded the contract for mining of coal in Blocks C and D.

Coal is gaining prominence as a captive power source in industries owing to its low cost. Table 16 presents a list of licensed captive coal generation projects.

**Table 16: Licensed captive coal generation plants**

Facility	Technology	Capacity (MW)
Devki Energy Co. Ltd	Waste heat recovery	15
National Cement Co. Ltd	Waste heat recovery	13.5
Cemtech Ltd	Coal	30
<b>Total</b>		<b>58.5</b>

### 12.2 Nuclear

The development of nuclear power in Kenya is spearheaded by the Nuclear Power and Energy Agency (NuPEA). The development follows guidelines issued by the International Atomic Energy Agency. The activities undertaken so far include pre-feasibility studies, human resource capacity building, electric grid study, strategic environmental assessment, regulatory framework development and public engagement.



# 13.

## ENERGY MATRIX FOR KENYA

### 13.1 Structure of the Energy Balance for Kenya

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. The statistics provided under this section are based on calendar year figures.

### 13.2 Kenyan Energy Matrix

The total electricity generation increased from 11,611.34GWh in 2020 to 12,414.28 GWh in 2021. Geothermal remained the major source of generated electricity in the country recording an average of 40.6% of total generated electricity. Wind power registered a substantial increase from 1,331.36 GWh in 2020 to 1984.80 GWh in 2021. Solar generation increased from 88.42GWh in 2020 to 167.42 GWh in 2021. Hydropower registered a decline of 13.33% from 4,240.42GWh in 2020 to 3,674.99 GWh in 2021. Thermal generation increased by 67.28% from 754.42GWh in 2020 to 1262.01 GWh in 2021.

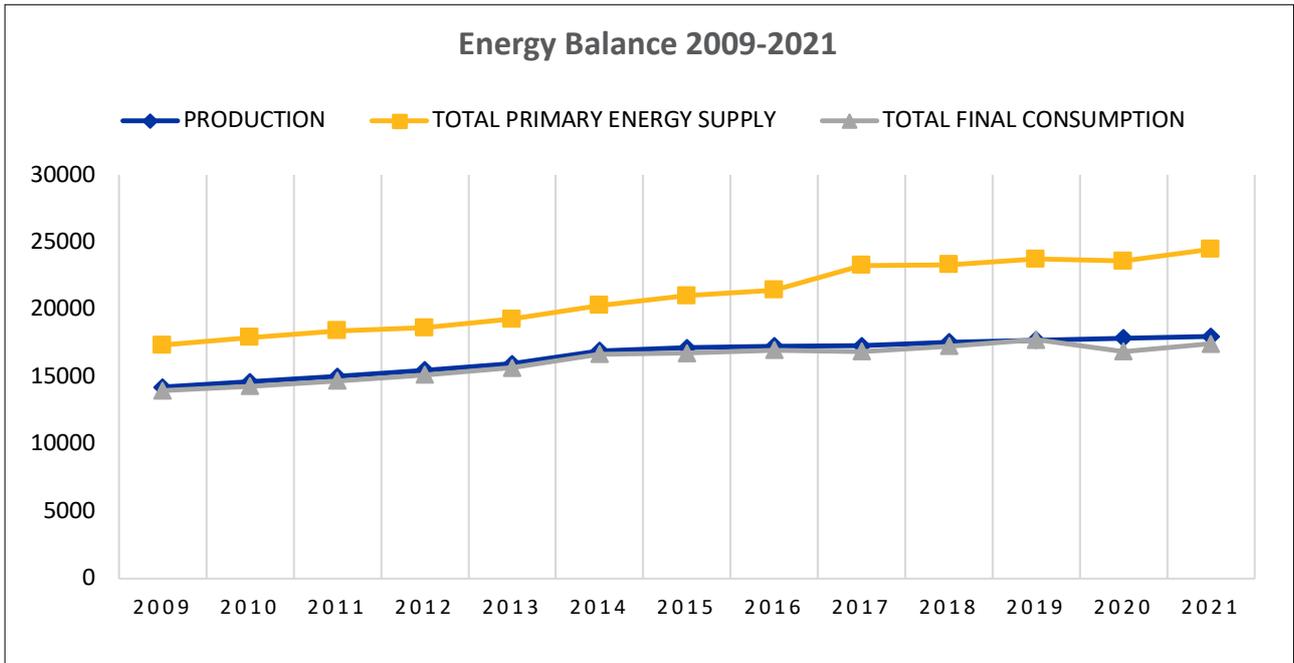
The quantity of petroleum products imported increased by 12.0 per cent from 5,735.1 thousand tonnes to 6,421.9 thousand tonnes in 2021. The rise in imports was mainly due to an increase in mobility after the up-lifting of the Covid 19 containment measures. The volume of total petroleum exports decreased from 832.1 thousand tonnes in 2020 to 610.8 thousand tonnes in 2021. The share of re-exports to total exports dropped marginally from 96.6 per cent in 2020 to 96.3 per cent in 2021.

### 13.3 Summary for the overall Energy Balance

An analysis of the energy balance shows that the total indigenous production, primary energy supply and total final energy consumption have generally been increasing except for the year 2020 which recorded a decline due to the impact of Covid 19. The increase has been driven by population growth and expansion of the economy. The total production increased from 17,867.31 tonnes in 2020 to 17,995.65 tonnes in 2021. The total energy supply increased from 23,583.13 tonnes in 2020 to 24,472.52 tonnes in 2021. Similarly, the total final consumption increased from 16,880.88 tonnes in 2020 to 17,453.07 tonnes in 2021. Figure 28 presents a summary of the energy balances since 2009.



Figure 28: Kenya's energy balance



# 14.

## FUTURE OUTLOOK

Electricity demand in Kenya has been steadily rising in recent years with peak demand increasing by 3.1% on average each year. This is despite an increase in self-generation by consumers. Power plants therefore need to be developed at a similar rate or higher to guarantee supply.

Geothermal generation currently accounts for a major portion of base load generation and shall continue to hold a leading position due to the relatively low generation costs and immunity from weather conditions. Additionally, the country has a huge geothermal capacity in various places in the Rift Valley that is yet to be tapped.

Hydros remains critical for stability of the grid as they provide a quick response spinning reserve thus help in tracking changes in generation and demand more so with the increase of Variable Renewable Energy (VREs) in the generation mix.

The imminent commissioning of the 1,047km Ethiopia-Kenya 500kV HVDC transmission line is expected to improve Kenya's security of supply and reduce the overall cost of power. This link, together with the 400kV Kenya-Tanzania (Isinya-Arusha-Singida) interconnector and the 400kV Lessos-Tororo, is expected to form the backbone of the East African Power Pool (EAPP) network.

There has been renewed interest by industry players to construct bulk receiving terminals along the Kenyan coastline. The government, through KPC, has fast-tracked the process of setting up a bulk LPG terminal and is now actively engaged with the environmental Authority, NEMA, to acquire an environmental impact assessment licence for the project. The terminal is meant to address the increased demand for LPG and enhance competition in the importation of bulk LPG into the country. In addition to this, a number of private players are looking at building and increasing capacity for bulk LPG receipt facilities in and around the Mombasa port which will increase availability and reduce the cost of the commodities.

The new Kipevu Oil terminal is bound to be a game changer in the importation of petroleum products into the country. With 4 berths capable of handling vessels with a capacity of up to 120,000 DWT, the Jetty allows for the simultaneous evacuation of petroleum products from these vessels thus shortening the time spent by these vessels at the port. This will help to reduce the demurrage charges occasioned by delayed berthing of vessels calling at the Mombasa port.



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