



BIANNUAL ENERGY AND PETROLEUM STATISTICS REPORT

FINANCIAL YEAR 2022/2023



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 sectors.



Our Mission

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 sectors.



Our Vision

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



Our Rallying Call

Quality energy, quality life.



Our Core Values



Professionalism



Integrity



Responsiveness



Mutual Respect



Teamwork



ABOUT THIS REPORT

This report presents key half year statistics on the performance of the electricity, petroleum and renewable energy subsectors for financial year 2022/23. Statistics on electricity comprise generation, transmission, distribution and retail. The renewable energy section covers the installed capacity for the various technologies. Statistics on petroleum include the upstream, midstream and downstream operations and infrastructural developments.

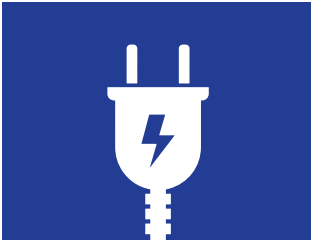
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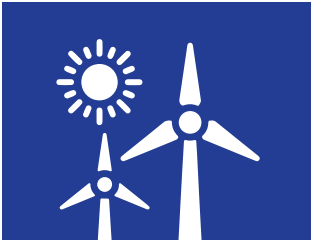
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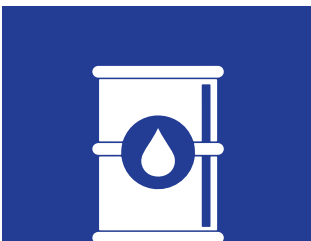
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ABBREVIATIONS AND ACRONYMS

AGO	Automotive Gas oil
CMA	Capital Markets Authority
DPK	Dual Purpose Kerosene
EEP	Ethiopian Electric Power
EPRA	Energy and Petroleum Regulatory Authority
FEC	Fuel Energy Cost
FERFA	Foreign Exchange Rate Fluctuation Adjustment
GWh	Giga-Watt hour
HHI	Herfidahl Hirschman Index
HDVC	High Voltage Direct Current
IPP	Independent Power Producer
LPG	Liquefied Petroleum Gas
LTWP	Lake Turkana Wind Power
MVA	Mega-Volt Ampere
MWh	Mega-Watt hour
NDC	Nationally Determined Contributions
NOCK	National Oil Corporation of Kenya
NSC	Network Service Contract
OTS	Open Tender System
OMCs	Oil Marketing Companies
KETRACO	Kenya Electricity Transmission Company
KPC	Kenya Pipeline Company
KRA	Kenya Revenue Authority
KV	Kilo Volt
PMS	Premium Motor Spirit
PPA	Power Purchase Agreement



DIRECTOR GENERAL'S MESSAGE

I am pleased to present to you the biannual statistics report covering the period between July-December 2022. This report includes sectoral achievements, challenges as well as emerging issues that characterised the reporting period.

The electricity subsector experienced notable developments including the commissioning of the 500kV Kenya-Ethiopia High Voltage Direct Current (HVDC) transmission line which provides an additional 200 MW to the grid. It is worth noting that this transmission line is the first HVDC line in Kenya's transmission network and the longest in the East and Central Africa Region covering a route length of 612 km in Kenya and 433 km in Ethiopia.

Industrial and commercial power users continued to reap the benefits of the Time of Use (ToU) tariff which provides them with a discount of 50 % for use of electricity during off-peak hours between 10 p.m. and 6 a.m. during weekdays. The TOU tariff beneficiaries saved a combined total of Ksh. 714.2 million during the review period. I believe that such gains will boost the competitiveness of Kenya's manufacturing sector.

The renewable energy subsector continued to witness positive growth which demonstrates Kenya's commitment to the promotion of the renewable energy projects. In the period under review, 87.42 % of the total energy generated was obtained from renewable energy resources. Geothermal energy dominated Kenya's energy mix by contributing 45.50 %. The commissioning of 40 MW Alten solar plant increased the share of installed solar capacity by 1.2% to stand at 6.8 % of the total generated power available.

This report also includes data on energy technologies such as Waste Heat Recovery and energy efficiency measures that the manufacturing sector has adopted in an endeavour to improve competitiveness and efficiency.

The gazettment of the Petroleum (Pricing) Regulations, 2022 in October was a key achievement for the petroleum subsector. The regulations empower the Authority to cap the maximum wholesale and retail prices of petroleum products in line with the Petroleum Act 2019.

This report also highlights efforts made under the fuel marking program which monitors the quality of fuel designated for local consumption and for export. This program aims at shielding consumers from losses arising from malpractices such as fuel adulteration.

The objective of this publication is to equip readers with information that will provide a deeper understanding of the energy sector. I wish to reaffirm EPRA's commitment to provide data that will create value to our stakeholders, guide decision making and promote the transformation of the sector.

A handwritten signature in black ink, appearing to be 'Daniel Kiptoo Bargoria', written over a circular scribble.

Daniel Kiptoo Bargoria, OGW
Director General



HIGHLIGHTS



Commissioning of the 500kV Kenya-Ethiopia High Voltage Direct Current (HVDC) transmission line providing an additional 200 MW to the national grid. Other transmission projects commissioned during the period include the Olkaria – Narok 132kV line and 220/66kV Athi-River substation.



Submission of the revised Field Development Plan for blocks 10BB and 13T by the KJV (Tullow Kenya B.V, Africa Oil and Total Energies Marketing PLC).



Commissioning of the 40 MW Alten solar photovoltaic plant. The plant increased the utility scale installed Solar PV capacity from 170 MW to 210 MW.

Gazettement of the Petroleum (Pricing) Regulations, 2022 in October which will empower the Authority to enforce the maximum wholesale and retail prices of petroleum products in line with the Petroleum Act 2019.



Operations of the Kisumu Oil Jetty (KOJ) commenced in December 2022 with the first export of 1,178 m³ leaving KOJ for Uganda on 27th December 2022.



Captive power plants play a key role in enhancing supply of electricity and competitiveness in doing business. The captive capacity was 280.76 MW as at 31st December 2022.



A new peak of 2,149 MW was recorded on 14th December 2022.



87.42% of the energy generated in Kenya was obtained from renewable energy resources.



Kenya Power connected 105,613 new customers to the grid bringing the cumulative number of connected customers to 9,010,856.



ELECTRICITY

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 electricity supply and demand, retail tariffs, competition analysis, reliability indices and greenhouse gas emissions.

1.1 Electricity Supply and Demand

1.1.1 Installed Capacity

Installed capacity refers to the combined maximum power generation capacity of a country's power plants. Table 1 shows the country's total installed capacity as at December 2022, which comprises grid connected, licensed captive and off grid generation units.

Table 1: Installed, Effective and Captive Power Capacity as at 31st December 2022

Technology	Interconnected Capacity (MW)		Captive Capacity (MW)	Total Installed Capacity	% Total Installed
	Installed	Effective			
Hydro	838.5	809.6	29.04	867.54	25.50%
Geothermal	950	871.1	3.7	953.7	28.04%
Thermal	681.9	645.4	21.33	703.23	20.67%
Wind	436.1	425.5	-	436.1	12.82%
Solar	212.6	212.2	53.71	266.31	7.83%
Bioenergy	2	2	89.48	91.48	2.69%
Imports	200	75	-	200	-
Waste Heat Recovery	-	-	83.5	83.5	2.45%
Total	3,321	3,041	280.76	3,601.76	100.00%

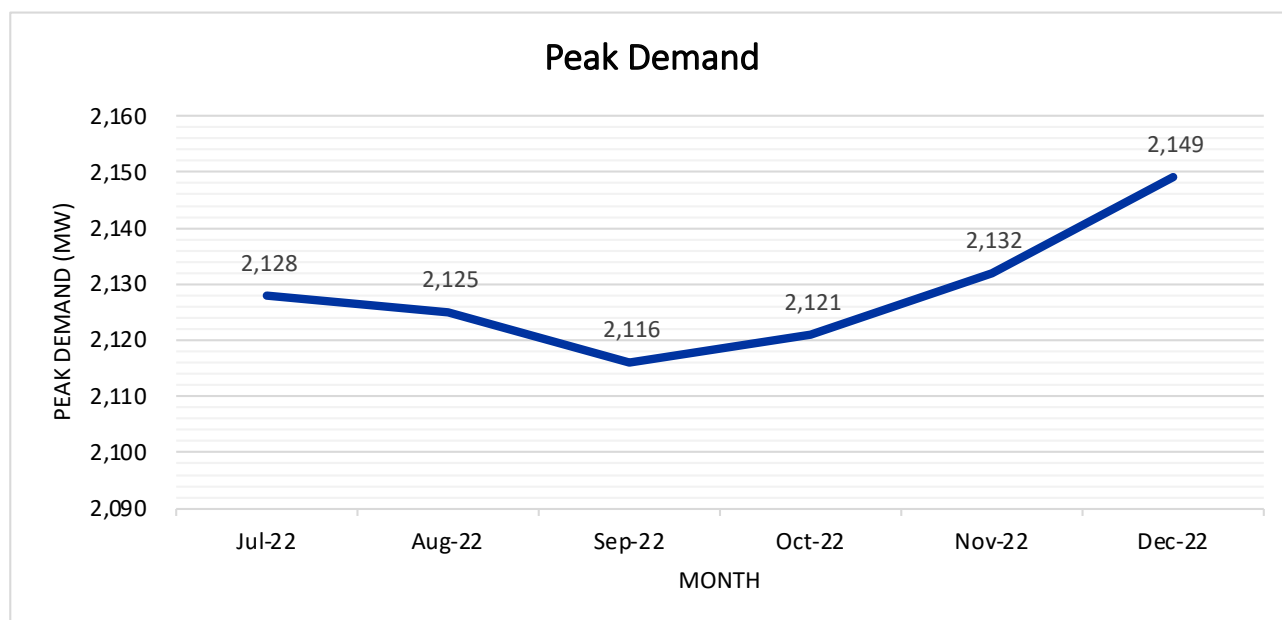
In the review period, the installed interconnected capacity increased by 240 MW. The increase is attributed to the commissioning of the Kenya-Ethiopia High Voltage Direct Current (HVDC) transmission line providing an additional 200 MW and the commissioning of 40 MW Alten solar photovoltaic plant. The Alten plant increased the share of interconnected installed Solar PV capacity by 1.2% from the 5.6% recorded in June 2022. With an installed capacity of 953.7 MW, geothermal accounts for 27.97 % of Kenya's installed capacity.

The captive capacity was 280.76 MW as at 31st December 2022. This comprised primarily of 89.48 MW of bioenergy (biomass, bagasse and biogas) and 53.71 MW of solar photovoltaic systems. The waste heat recovery capacity increased to 83.5 MW in November following the commissioning of the 55 MW Devki Steel Mills waste heat recovery plant in Kwale County.

1.1.2 Electricity Monthly Peak Demand

Peak demand is a measure of the highest load demand in the interconnected network for a specified period. It occurs between 2000hrs-2030hrs in the Coastal region and 1930hrs-2000hrs for the rest of the country. The peak demand reached 2,149 MW which was recorded on 14th December 2022.

Figure 1 : Trend in the peak demand between July and December 2022



1.1.3 Electrical Energy Generated

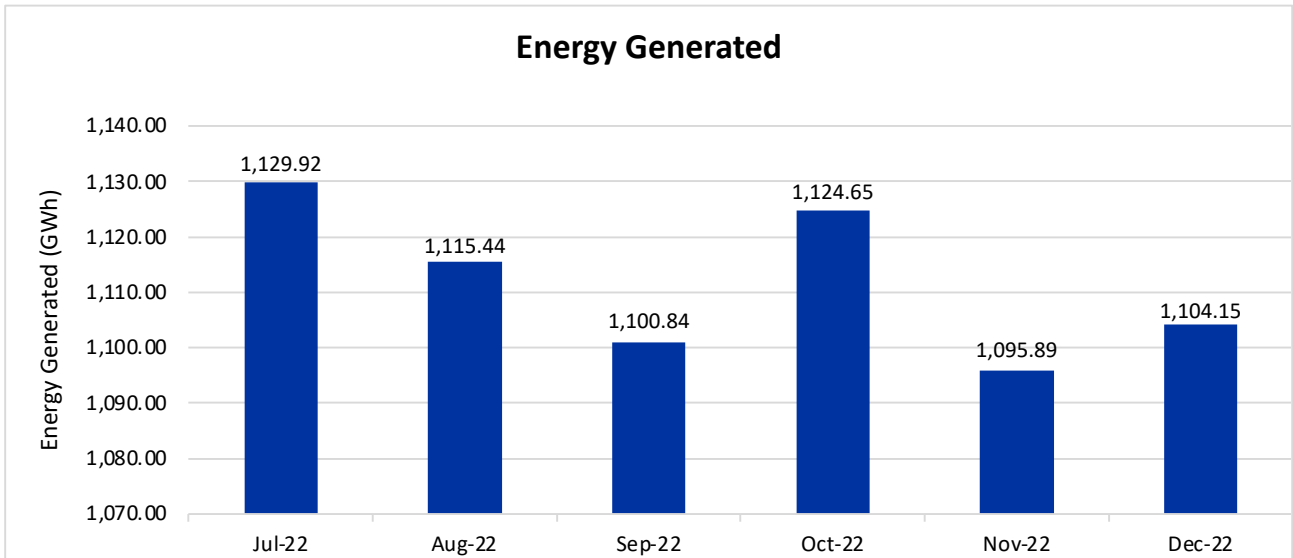
Electrical energy generated refers to electrical energy that was delivered to the national grid by the various power producers in the country. The electrical energy generated for the period under review was 6,670.887 GWh. Geothermal provided the highest share of energy generated at 45.50% followed by Hydro and Wind at 21.80% and 17.22% respectively. Thermal sources accounted for 10.43% of the energy generated. Table 2 presents the energy generated and the contribution from each energy source.

Table 2: A summary of energy generated from July to December 2022

Technology	Energy Generated (GWh)	
Hydro	1,454.396	21.80%
Thermal	695.930	10.43%
Wind	1,148.628	17.22%
Geothermal	3,034.953	45.50%
Bagasse/Biogas	0.102	0.00%
Imports	143.402	2.15%
Solar	193.475	2.90%
Total	6,670.887	100%

The highest energy was generated in July at 1,129.92 GWh while the lowest energy was generated in November at 1,095.89 GWh. The trend of energy generated by month is shown in figure 2.

Figure 2: Trend in monthly electricity generation



1.1.4 Energy Curtailment

Energy curtailment occurs when demand falls below available generation as a measure to safeguard the power system. Energy curtailment occurs between 0000hrs and 0430hrs when demand is lowest. In the period under review, 317,449 GWh of electrical energy was curtailed. This represents 4.76% of the total energy generated. Table 3 presents a summary of energy curtailed during the period under review.

Table 3: Energy curtailment by month

Month	Geothermal (MWh)	Wind (MWh)	Total (MWh)
Jul-22	50,258	0	50,258
Aug-22	65,718	1,414	67,132
Sep-22	58,757	0	58,757
Oct-22	56,302	0	56,302
Nov-22	0	44,900	44,900
Dec-22	3,700	36,400	40,100
Total	234,735	82,714	317,449

1.1.5 Electricity Reliability Indices

Reliability indices are metrics that measure the reliability of a power system. They comprise:

Customer Average Interruption Duration Index (CAIDI)

This index measures the average outage duration that any given customer would experience and is calculated as;

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

The System Average Interruption Duration Index (SAIDI)

This is the average outage duration in hours for each customer served, and is calculated as;

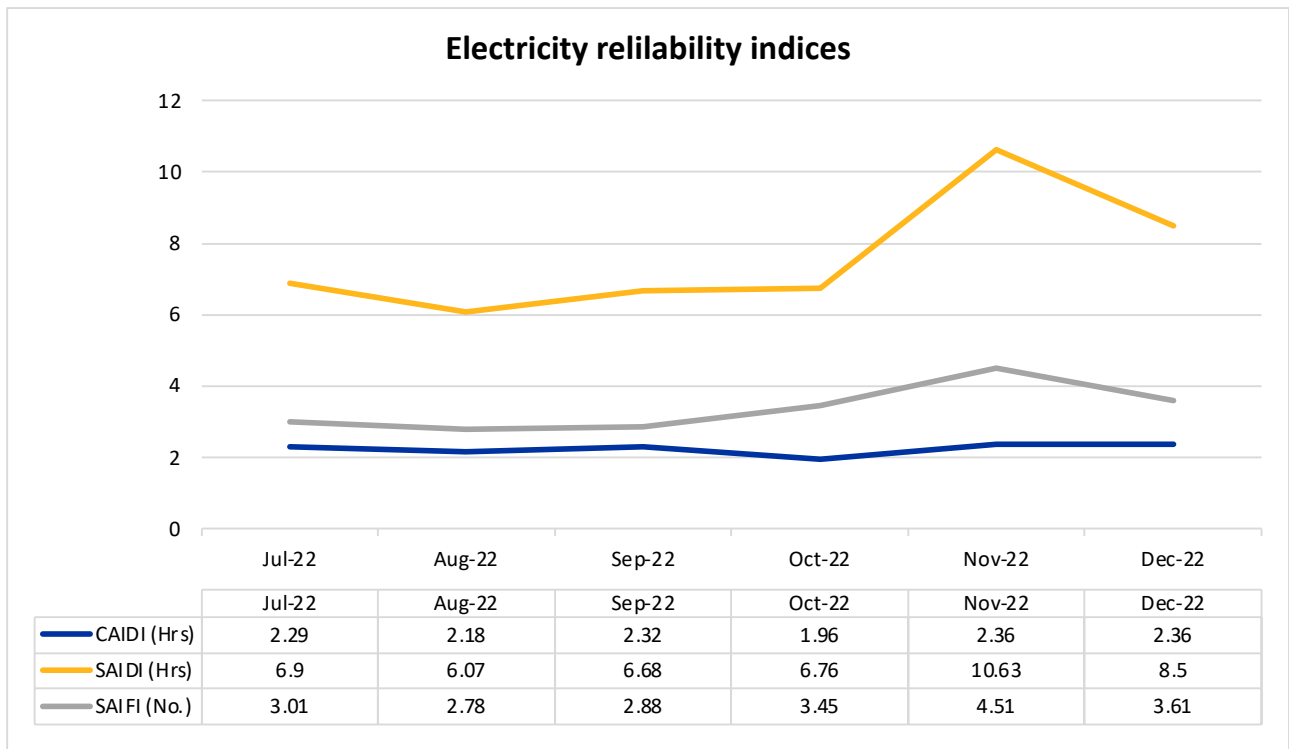
$$SAIDI = \frac{\text{Sum of all customer interruptions}}{\text{Total number of customers served per reporting period}}$$

The System Average Interruption Frequency Index (SAIFI)

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

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

Figure 3: Trend in the reliability indices between July and December 2022



As shown in Figure 3, electricity supply reliability was low in November with a system average interruption duration of 10.63 hours. This is attributed to partial and national blackouts experienced during the month. The Kenya Power system experienced a partial blackout on 2nd November 2022 at 1102 hours affecting Nairobi, Mt. Kenya and Coast regions. The partial blackout was caused by a trip of a 105 MVA transformer at Olkaria1AU. All customers were restored within 9.32 hours. Further, there was a nationwide blackout on 24th November 2022 at 1456 hours following a trip on 200 MVA Transformer 3 and 200 MVA Transformer 4 at Isinya substation. All customers were restored within 6.52 hours. The reliability of the system is expected to improve with upgrades in the transmission and distribution network.

1.2 Electricity Pricing

Electricity prices are set with the aim of attaining sufficient revenue to meet generation, transmission and distributions requirements. The pricing system is reflective of the cost of power generation, pass through charges, system losses, taxes and levies.

1.2.1 Power Purchase Agreement

A Power Purchase Agreement (PPA) is a contract between a power generator and a utility or company and it defines how much power is sold and at what cost. During the period under review, the Authority approved the following power purchase agreements and service contracts:

- | | | | | | | | |
|----------|---|----------|--|----------|---|----------|--|
| 1 | PPA between Kenya Power and Ethiopia Electric Power (EEP) for 200 MW. | 2 | The Transmission Interconnection Agreement between Kenya Power, KETRACO, and Ethiopian Electric Power (EEP). | 3 | PPA between Rentco Renewable Energy Limited and Kipkebe Limited for a 1.3MW solar Power Plant at Kipkebe and Keritor Tea Factories. | 4 | PPA between Everseasons Limited and Bureti and Chemalal Tea Factories for a 1.671MW Hydro Power Plant in Bureti, Kericho County. |
|----------|---|----------|--|----------|---|----------|--|

1.2.2 Base Electricity Tariff

The existing retail tariff was approved in July 2018. A new tariff providing a 15% reduction in the end user tariff was approved in January 2022 valid for a period of one year. The Authority is currently reviewing the base tariff adjustment for the tariff control period 2022/2023-2025/2026.

1.2.3 Pass-Through Costs

Pass-through charges are approved by EPRA to cover additional charges incurred by electricity generating plants. They 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 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.

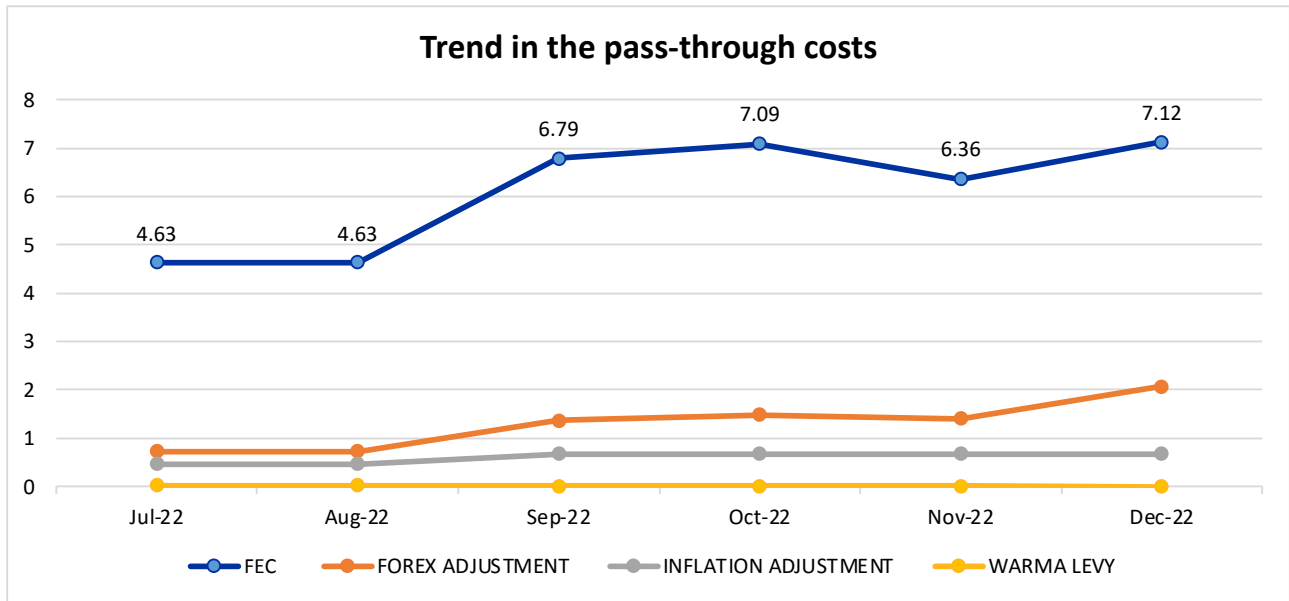
The FEC increased from Ksh. 4.63kWh in August to Ksh. 7.09/kWh in October. The highest FEC was recorded at Ksh. 7.12/kWh in the month of December 2022. The fluctuations in FEC are attributed to poor hydrology, fluctuating wind output and breakdowns of some geothermal power plants.

The WARMA Levy was highest at Ksh. 0.0174/kWh in the months of July and August 2022. This was attributed to a higher hydropower generation compared to the other months in the period under review. The rest of the months recorded a decline in the WARMA levy. The WARMA Levy is determined by the amount of electricity generated from hydropower plants.

The highest FERFA levy was recorded at Ksh. +2.0718/kWh in December 2022. This is attributed to the fluctuations of the US Dollar against the Kenyan Shilling for expenses related to power generation.

Actual inflation adjustment on end-user tariffs stood at Ksh. 0.47 /kWh in the months of July and August and Ksh. 0.67/kWh for the months of October to December 2022. Figure 4 presents the trend in pass-through costs during the period.

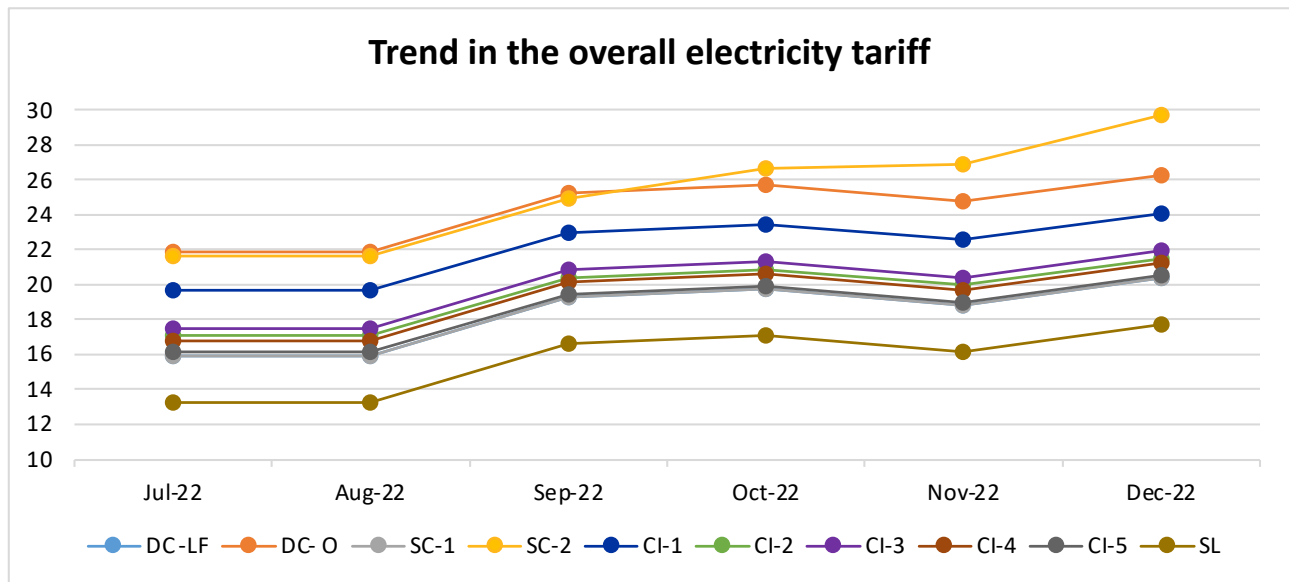
Figure 4: Trend in pass-through costs from July 2022 to December 2022



1.2.4 Evolution of the Overall Electricity Tariff

The overall electricity tariff, covering both the cost of producing energy and the pass-through charges, remained constant for all customer categories in the months of July and August. The tariff then slightly increased in September and October before decreasing in November followed by a further increase in December as presented in figure 5.

Figure 5: Trend in the overall electricity tariff



1.2.5 Time of Use Tariff (TOU) Tariff

The ToU tariffs targets commercial and industrial consumers with the aim of incentivizing them to consume electricity during the off-peak hours. The tariff provides a 50% discount provides a 50% discounted tariff on the energy charge rates during the off-peak periods (2200hrs to 0600hrs during weekdays, 1400hrs to 0800hrs Saturdays and the whole day on Sundays and during Public Holidays) on premises that electricity consumption thresholds are met.

The TOU beneficiaries saved a combined total of Ksh 714.2 million during the review period.

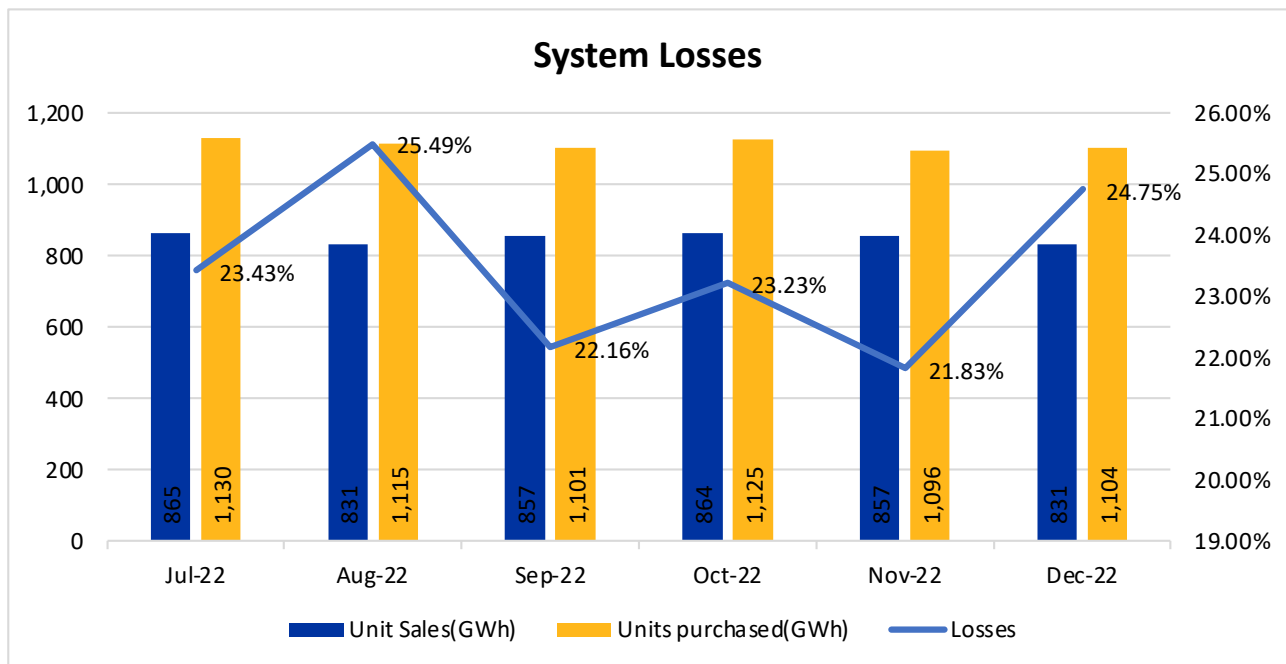
Table 4: A summary of the number of TOU beneficiaries, electricity demand and savings

Month	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
No. of Beneficiaries	1,423	1,190	1,205	1,865	1,489	1,466
Electricity demand based on beneficiaries (MW)	59.5	53.7	54.8	86.5	74.4	61.2
Savings by Customers (Kshs Million)	113.5	97.8	94.6	167.2	121.1	120

Source: Kenya Power

1.2.6 System Losses

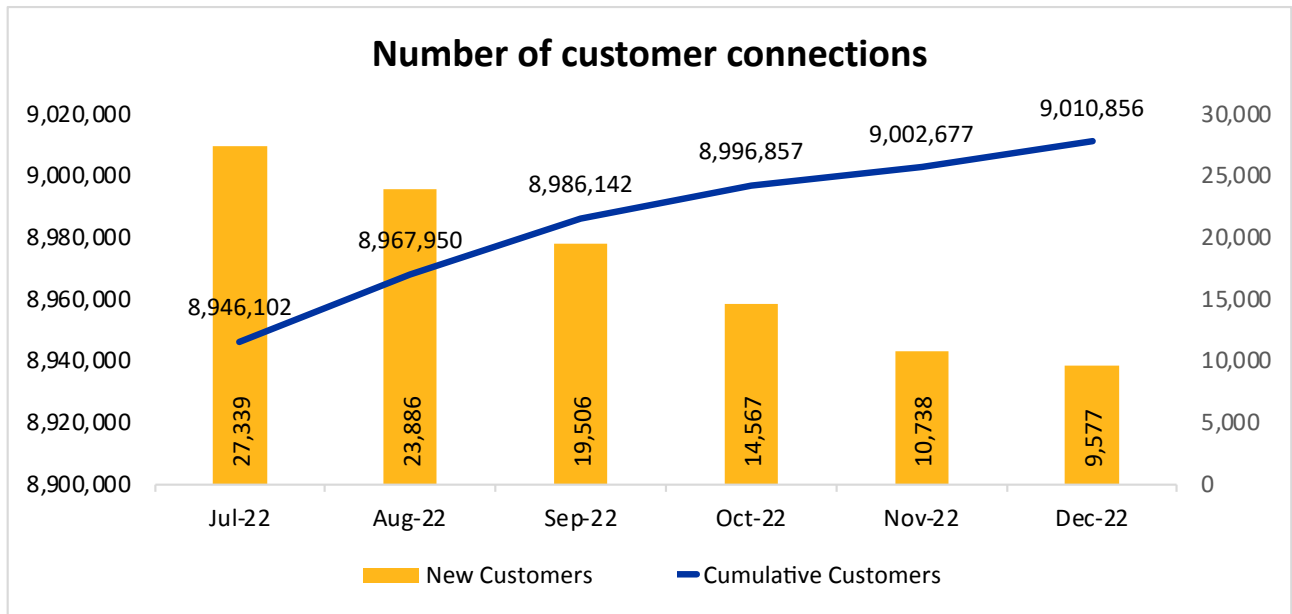
System losses refers to electrical energy lost between the point of generation and the point of consumption. They are calculated as the proportion of energy purchased not billed. System losses are either technical or commercial. Technical losses are inherent to the power system and are proportional to the efficiency of the transmission and distribution network. Commercial losses include power supplied to illegal connections, meter tampering and fraudulent use of electrical energy. During the review period, Kenya Power purchased 6,671 GWh and sold 5,104 GWh. The system losses for the period accounted for 23.49% against the allowed system losses of 19.9%. Figure 6 shows monthly system losses as a function of energy purchased for the period under review.

Figure 6: A trend of system losses from July to December 2022

1.3 Electricity Access

In the review period, 105,613 new customers were connected bringing the cumulative number of connected customers to 9,010,856. Figure 7 shows the month-on-month connections and the cumulative number of connected customers.

Figure 7: Cumulative and month on month customer connections

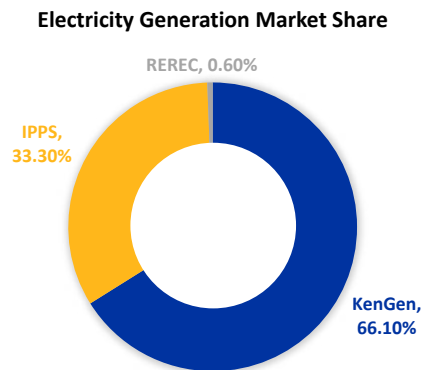


1.4 Electricity Subsector Competition Analysis

1.4.1 Market Share

The market share of the electricity market is based on units purchased. KenGen continued to dominate the energy 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 exist a small percentage of demand met through off grid plants, minigrid and captive power generation. Figure 8 shows the market shares of the electricity sector for the period under review.

Figure 8: Electricity generation market share as at December 2022



1.4.2 The Herfindahl Hirschman Index

The Herfindahl Hirschman Index (HHI) analyzes competition in the electricity sector by measuring the concentration of firms in a market thereby giving insight on the state of competition. It is calculated by squaring the market shares of all firms in the market and summing the squares as follows:

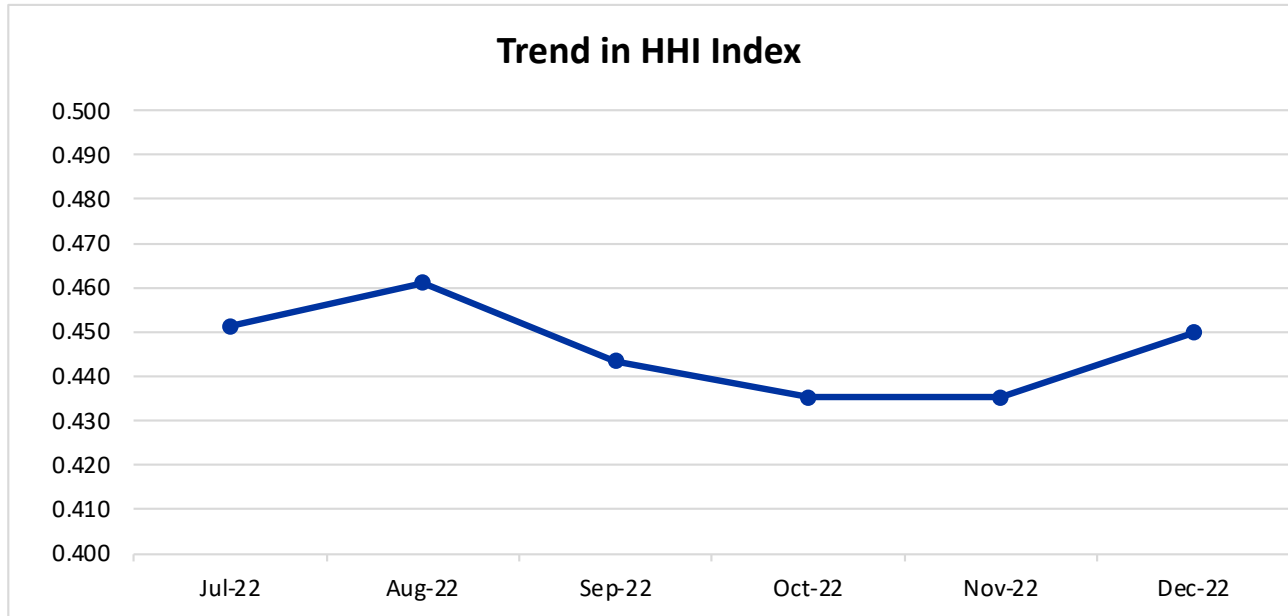
$$HHI = \sum_{i=1}^K (MS_i)^2$$

Where, MS_i represents the market share of the firm and k represents the total number of firms in the market.

A market with a HHI below 0.1 is considered as competitive, a HHI of above 0.1 to 0.25 is moderately concentrated while a HHI of 0.25 or greater is highly concentrated. A low degree of concentration means that the industry is closer to a perfect competition scenario, where many firms of more or less equal size share the market. A high HHI generally indicate a decrease in competition and an increase of market power, and vice versa.

The average HHI over the six month period was 0.446 against the recommended threshold of 0.1. This is attributed to KenGen's dominance in energy generation.

Figure 9: Trend in the HHI index between July and December



1.5 Licensing

1.5.1 Electrical Workers and Contractors

The Energy Act 2019 requires the Authority to license electrical workers and contractors who undertake electrical installation works. The licensing process aims at ensuring that persons undertaking electrical installation works are competent thereby enhancing functionality and safety of installations. In the half year under review, 180 electrical workers and 221 electrical contractors were licensed. This increased the total number of licensed electrical workers to 6,518 from the 6,338 recorded in June 2022 while the number of licensed electrical contractors grew from 2,660 to 2,881. Table 5 presents the number of electrical worker certificates and electrical contractor licences issued in the period under review.

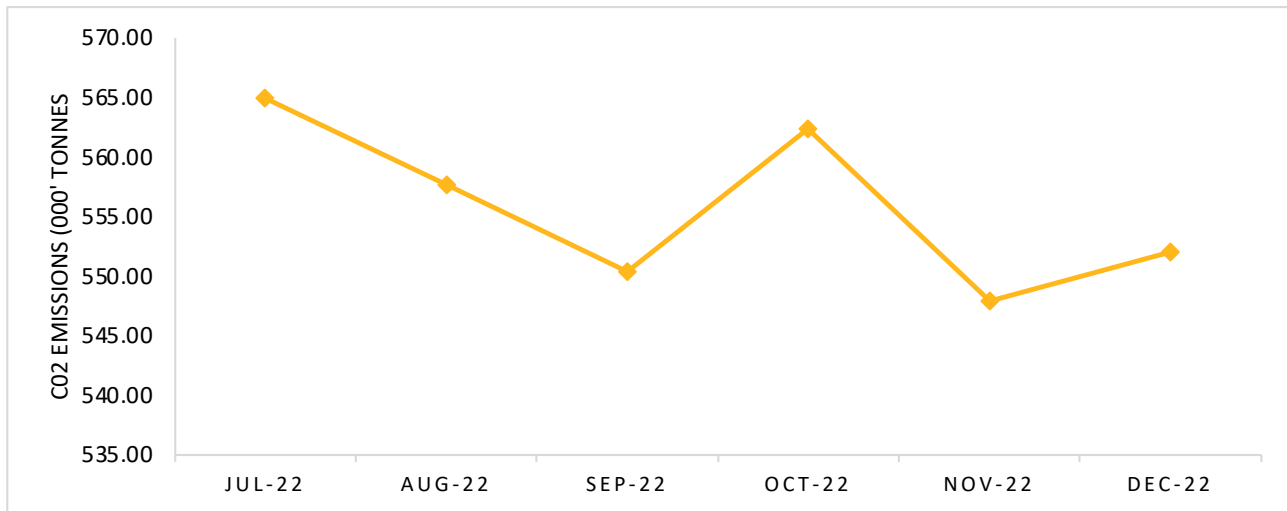
Table 5: Electrical Worker and Contractor Licences issued in the Half Year 2022/23

	Number of Issued Certificates/Licences					
	C2	C1	B	A2	A1	Total
Electrical Workers	67	79	10	3	21	180
Electrical Contractors	113	70	15	4	19	221

1.6 Greenhouse Gas Emissions

The Green House Gas (GHG) emissions for the electricity sub-sector are estimated based on the electrical energy generated in the period under review and the prevailing grid emission factor. The national grid emission factor for Kenya is 0.5tCO₂/MWh. Figure 10 shows the electricity generation CO₂ emissions from July to December 2022. The highest CO₂ emissions were 564.96 thousand tonnes in the month of July which recorded high electricity generation.

Figure 10: A trend of CO₂ emission from July to December 2022



1.7 Electricity Transmission Infrastructure

The Kenya Electricity Transmission Company Limited (KETRACO) is responsible for developing and maintaining the national power transmission grid to enhance the quality, reliability and security of electricity supply in Kenya. In the period under review KETRACO commissioned the following projects;

- The 132 kV Olkaria-Narok Transmission line which was commissioned in July 2022. The project links the Olkaria substation to the new Narok 132/33kV substation. The project covers a route length of 68 km and is expected to increase the reliability in the South Rift Valley region.
- In October 2022, KETRACO commissioned the 220/66kV Athi River substation. The project is part of the Nairobi Ring Project and is expected to offer an alternative supply path for power into the Nairobi Metropolitan Region and increase transformation capacity thereby easing pressure on the existing substations.
- The 500kV Ethiopia-Kenya High Voltage Direct Current (HVDC) transmission line was commissioned in November 2022. The line provides an additional capacity of 200 MW to the national grid. The transmission line links the Woliyita Converter station in Ethiopia to the Suswa Converter station in Narok, Kenya. It is the first HVDC line in Kenya's transmission network and the longest in the East and Central Africa Region covering a route length of 612 km in Kenya and 433 km in Ethiopia.

The commissioning of the three projects brings KETRACO's transmission network to 3,402.1km.

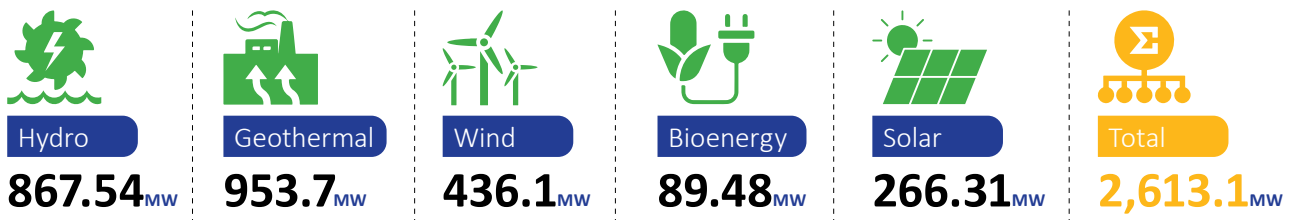


RENEWABLE ENERGY

The government has been prioritizing the development of geothermal, wind and solar energy plants for gridinterconnected projects. This is in efforts to facilitate the attainment of the 100% transition to renewable energy by 2030.

The installed capacity of renewable energy sources was 2,613.1 MW as at December 2022 which accounts for 76.93% of the total installed capacity. In the period under review, 87.42% of the total energy generated was obtained from renewable energy resources. A summary of the renewable energy installed capacity per technology is presented below.

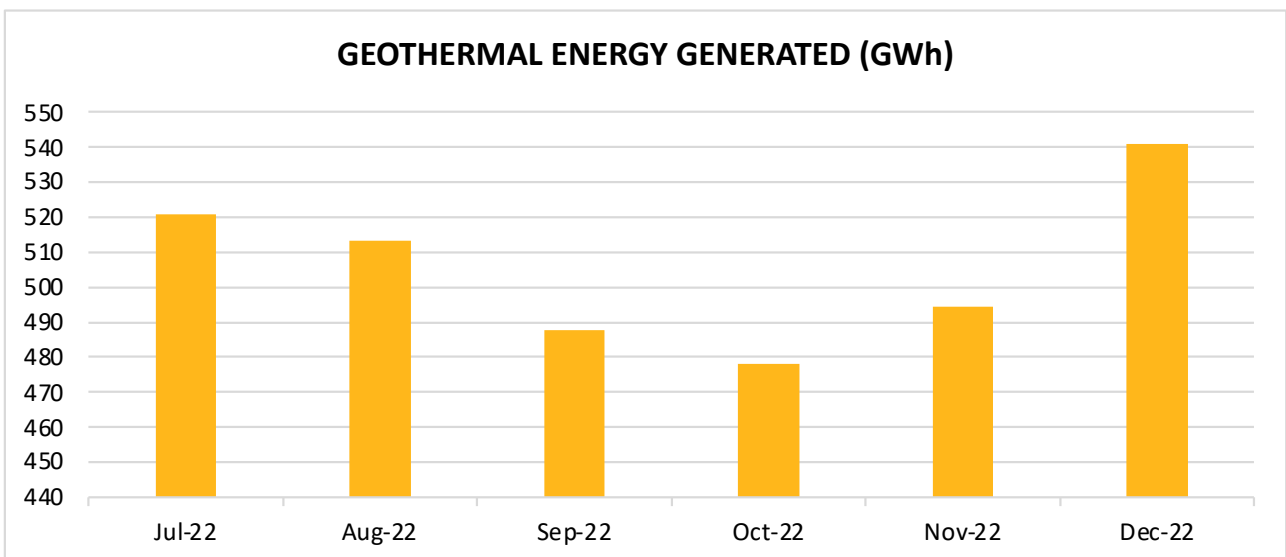
Installed Renewable Energy Capacity as of December 2022.



2.1 Geothermal Development

Kenya ranks first in Africa and seventh in the world with an installed geothermal power generating capacity of 953.7 MW. In the period under review, 3,034.953 GWh of geothermal energy was generated accounting for 45.50% of Kenya’s energy mix. Figure 11 illustrates the trend in geothermal energy generated between July and December 2022. The increase in energy generated in December is attributed to lower curtailment.

Figure 11: Geothermal energy generation between July and December 2022



2.2 Hydropower

The total installed hydropower capacity was 867.54MW as at December 2022. This consists of 838.50 MW of interconnected installed capacity and 29.04 MW of captive installed capacity. In the period under review, 1,454.396 GWh of hydropower was generated accounting for 21.80% of Kenya’s electricity generation mix. The trend in hydro energy generated over the review period is provided in Figure 12. The decrease in hydro energy generation between September and December is attributed to poor hydro regime. Masinga and Turkwel hydro power plants, which have the largest reservoirs, recorded their lowest dam levels in three years as illustrated in Figure 13 and 14.

Figure 12: Trends in hydro energy generation between July and December 2022

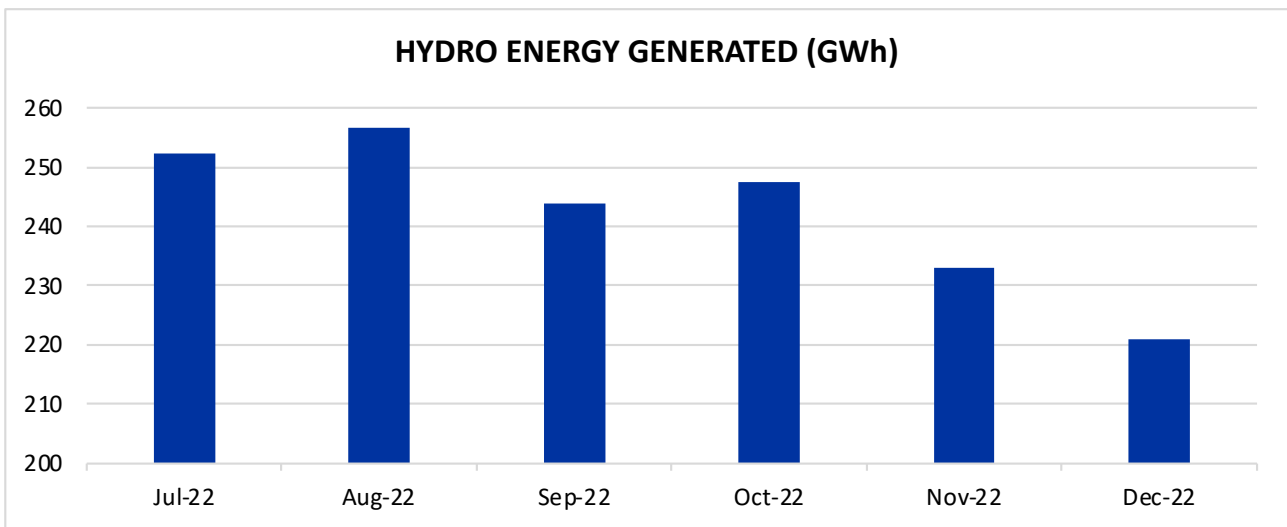


Figure 13: A biannual trend of Masinga dam levels from the FY 2020/21 to 2022/23

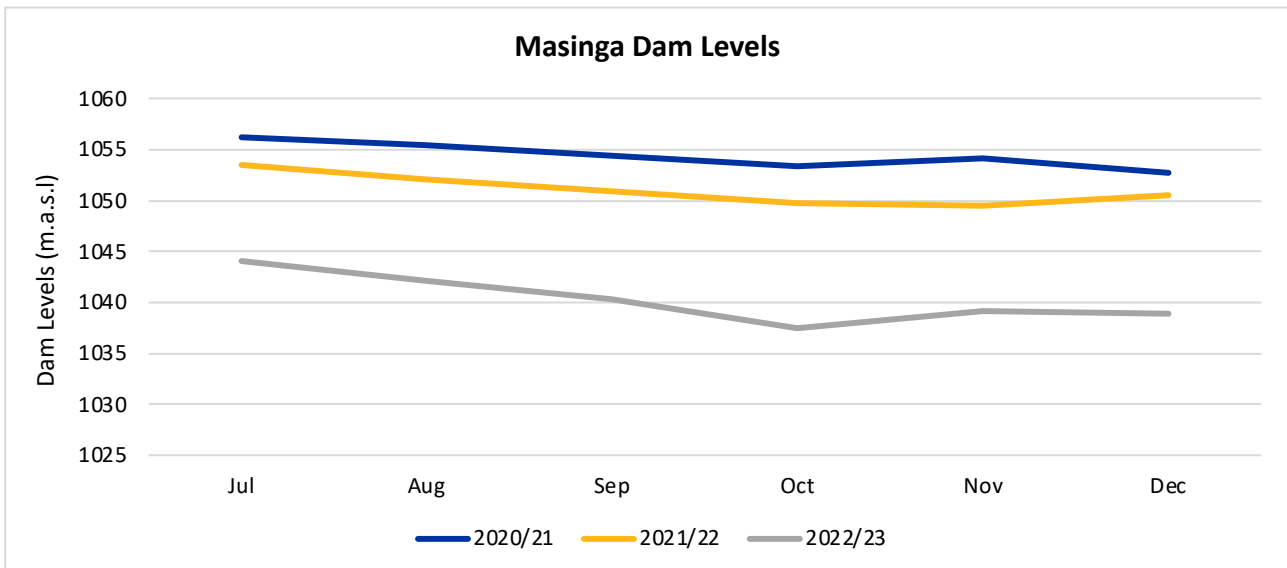
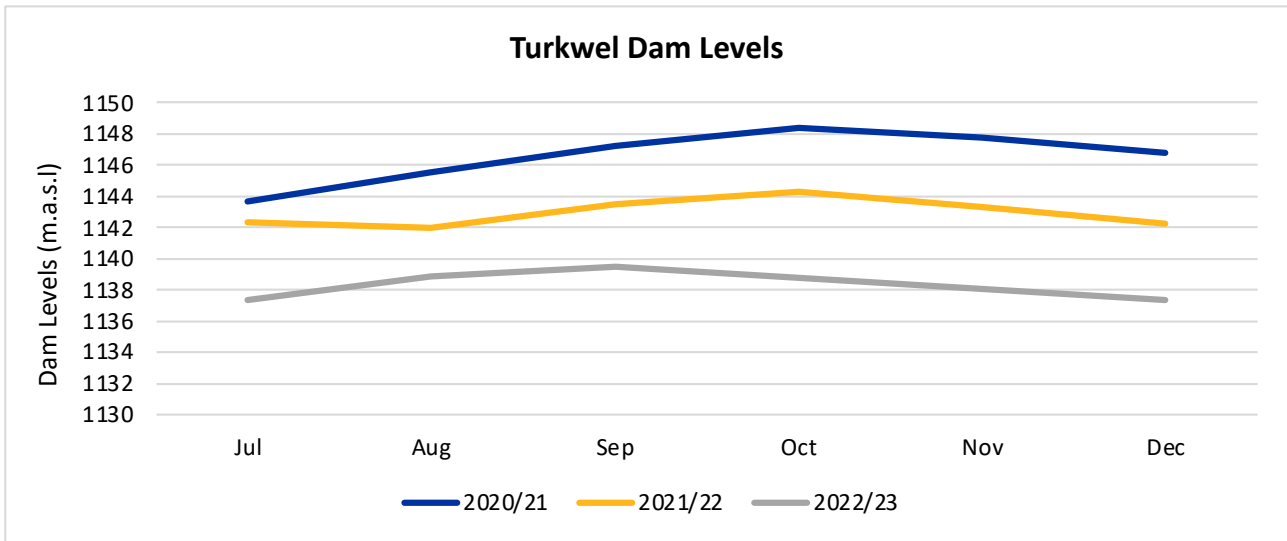


Figure 14: A biannual trend of Turkwel dam levels from the FY 2020/21 to 2022/23

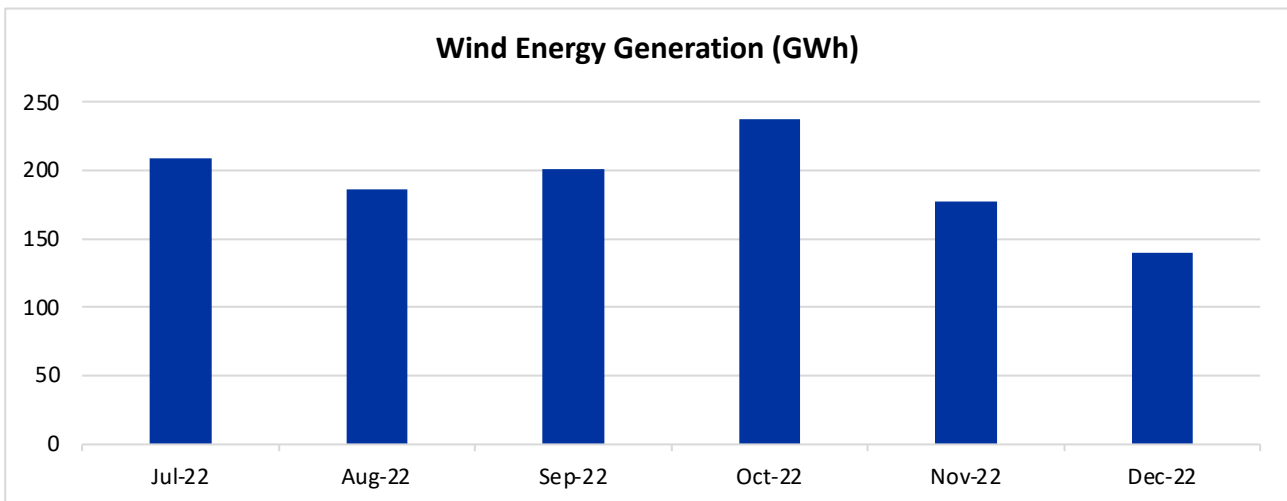


2.3 Wind Energy

The country has an installed wind capacity of 436.1 MW. Lake Turkana Wind Plant (310MW), Ngong Wind (25.5MW) and Kipeto Wind Farm (100MW) are the only wind plants connected to the grid. Kenya Power operates 0.6 MW of off-grid wind generation.

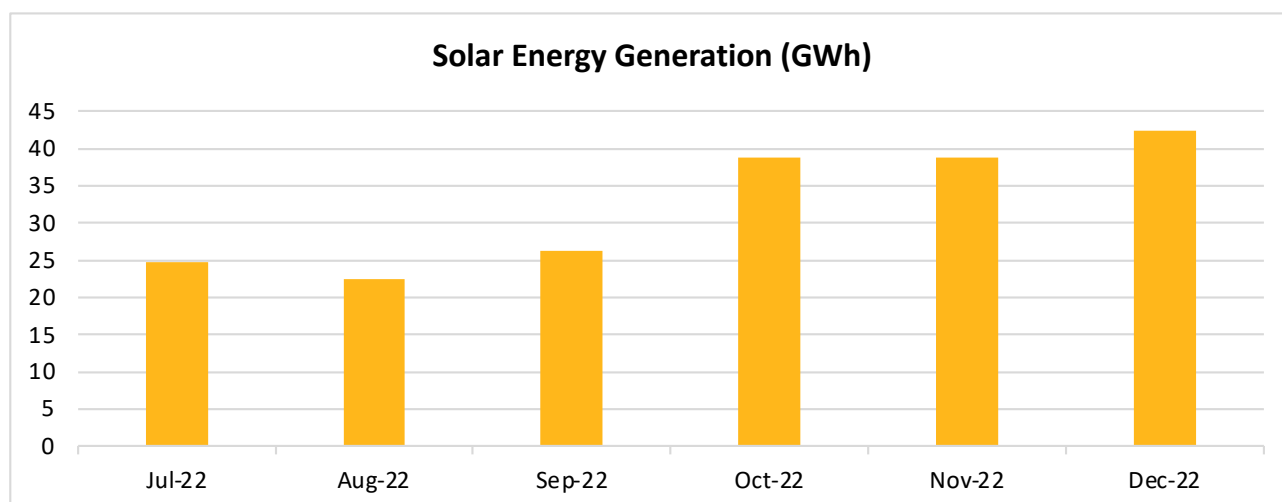
In the period under review, wind contributed 17.22% to Kenya’s energy mix. Figure 15 shows wind energy generation over the review period.

Figure 15: Wind energy generated between July and December 2022



2.4 Solar Energy

Alten Solar Project was commissioned in October providing an additional 40 MW of solar photovoltaic capacity to the power system. This brings the utility scale solar installed capacity to 210 MW. The other plants are Garissa Solar (50MW), Cedate (40MW), Selenkei (40MW) and Malindi Solar (40MW). In the period under review, these plants contributed 2.90% to Kenya’s energy mix. As demonstrated in figure 16, there was a notable increase in solar energy generation between October and December following the commissioning of Alten Solar Project.

Figure 16: Monthly solar energy generation

In addition to the utility scale projects, there has been a significant increase in installation of solar photovoltaic systems for commercial and industrial use. As at December 2022, the Authority had licensed captive solar photovoltaic systems with a combined capacity of 53.71 MW.

The Energy (Solar Photovoltaic Systems) Regulations 2012 requires that Solar PV systems are installed by persons licensed by the Authority. This is to ensure safety and quality of service in the solar PV value chain. In the period under review, the Authority licensed 75 technicians to install solar systems. Further, 132 companies were licensed to either construct, sell or import solar systems.

2.5 Bioenergy

Bioenergy refers to energy derived from sustainable organic matter. Bioenergy may be exploited in several forms such as firewood, biochar, briquettes, bagasse, biogas, syngas, bioethanol and biodiesel. In Kenya, the different forms of bioenergy are utilized in open fire cooking, improved biomass cook stoves, industrial biomass boilers, furnaces, internal combustion engines, lighting lamps and in electricity generation.

In August 2022, the Authority issued the biofuels guidelines. The policy document outlines approval requirements for biofuels business in Kenya to enhance the safe use of biofuels and adoption of the relevant Kenya Standards. The guidelines apply to the production, transportation, exportation, storage, packaging and sale of bioethanol as a cooking fuel, biogas or biodiesel.

As at December 2022, the bioenergy installed electricity capacity was 89.48 MW derived mostly from biogas, bagasse and biomass plants.



OTHER ENERGY SOURCES

In Kenya, coal is utilized as a raw material and energy source in the production of cement and steel. The process of production of cement and steel is energy intensive and produces waste heat that can be utilized for energy generation. The development of waste heat recovery projects in these industries is gaining prominence driven by the need to enhance efficiency, decrease production costs and increase competitiveness of the industry's products.

The installed capacity from captive waste heat recovery projects as at December 2022 was 83.5 MW. A list of licensed waste heat recovery plants is provided below. The capacity increased by 55 MW in the period under review following the commissioning of the Devki Steel Mills waste heat recovery project at its facility in Samburu, Kwale County.

Licensed Captive Coal and Waste Heat Recovery Plants

Devki Energy Co. Ltd
(Merrueshi)

Capacity

15_{MW}

National Cement Co.
Ltd (Merrueshi)

Capacity

13.5_{MW}

Cemtech Ltd

Capacity

30_{MW}

Devki Steel Mills Ltd
(Samburu Plant)

Capacity

55_{MW}



ENERGY EFFICIENCY

Energy efficiency facilitates energy security, manufacturing competitiveness and environmental sustainability. The Authority is vested with the responsibility of promoting energy efficiency through enforcement of the Energy (Energy Management) Regulations 2012 and the Energy (Appliances' Energy Performance and Labelling) Regulations, 2016.

The Energy (Energy Management) Regulations 2012 provides for designation of energy consuming facilities. In 2013, the Authority published this designation, and put the threshold at the consumption of 180,000 kwh of energy per year. The designated energy consuming facilities are required to conduct energy audits once every three years to monitor their energy consumption and to identify energy saving opportunities. To facilitate these audits, the Authority licenses energy auditors and energy audit firms. In the period under review, the Authority licensed 3 energy auditors and 5 energy audit firms.

The licensed auditors submit energy audits energy audit undertaken for the Authority's review and approval. In the period under review 222 commercial and industrial facilities submitted energy audit reports for review. They consisted of 197 medium facilities and 4 large energy consuming and 21 small energy consumers. The facilities realized projected energy savings of 282.674 GWh following the implementation of the audit recommendations.

The Energy (Appliances' Energy Performance and Labelling) Regulations, 2016 seeks to ensure that the following electrical appliances that are manufactured or imported into the country are energy efficient.



Domestic refrigerators



Non-ducted air conditioners



Three phase induction motors



Compact fluorescent lamps



Double capped lamps



Ballasts for fluorescent lamps

During the review period the Authority licensed 25 air conditioning appliance models and 60 refrigerator models that met the minimum energy performance standards.



PETROLEUM

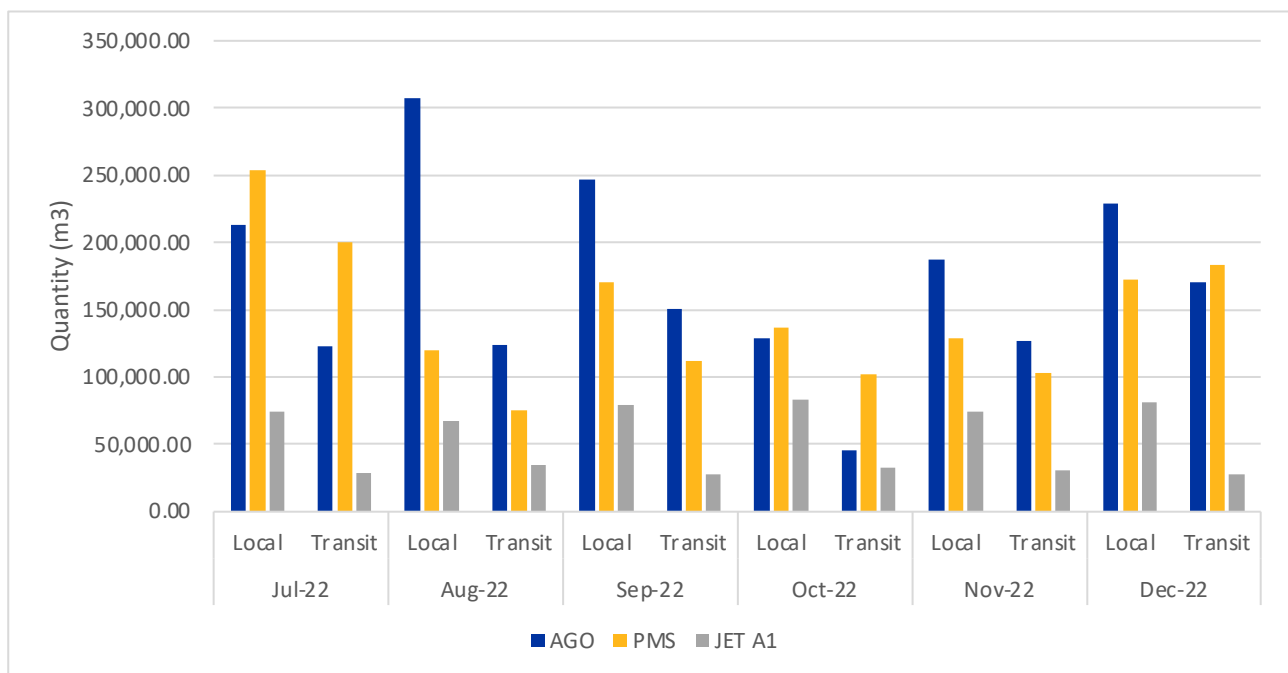
The petroleum subsector comprises upstream, midstream and downstream petroleum segments. This section presents a summary of the performance of the various segments of the petroleum subsector and entails supply, domestic consumption, pipeline throughput, pricing, fuel quality and Liquefied Petroleum Gas (LPG) compliance.

5.1 Petroleum Supply and Demand

5.1.1 Petroleum Imports

The Ministry of Energy and Petroleum coordinates the importation of petroleum products through a tender system referred to as the Open Tender System (OTS). A total of 4,451,472.64 m³ was imported through OTS during the review period. The share of volumes for the domestic market accounted for 62% of the total volume. The monthly trend in imports is shown in figure 17.

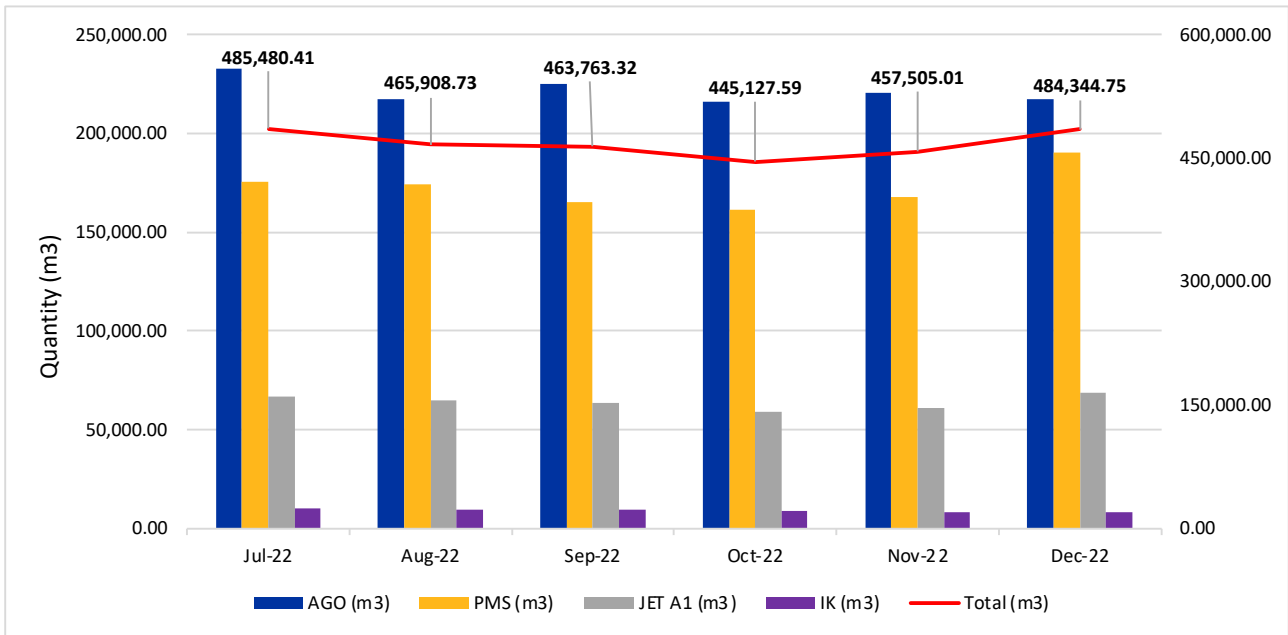
Figure 17: Trend in OTS imports from July to December 2022



5.1.2 Domestic Petroleum Consumption

The total domestic demand for petroleum products decreased by 2.58% to 2,802,129.80 m³ compared to a similar period in 2021. The decreased consumption could be attributed to suppressed demand occasioned by high fuel prices in the local and international market.

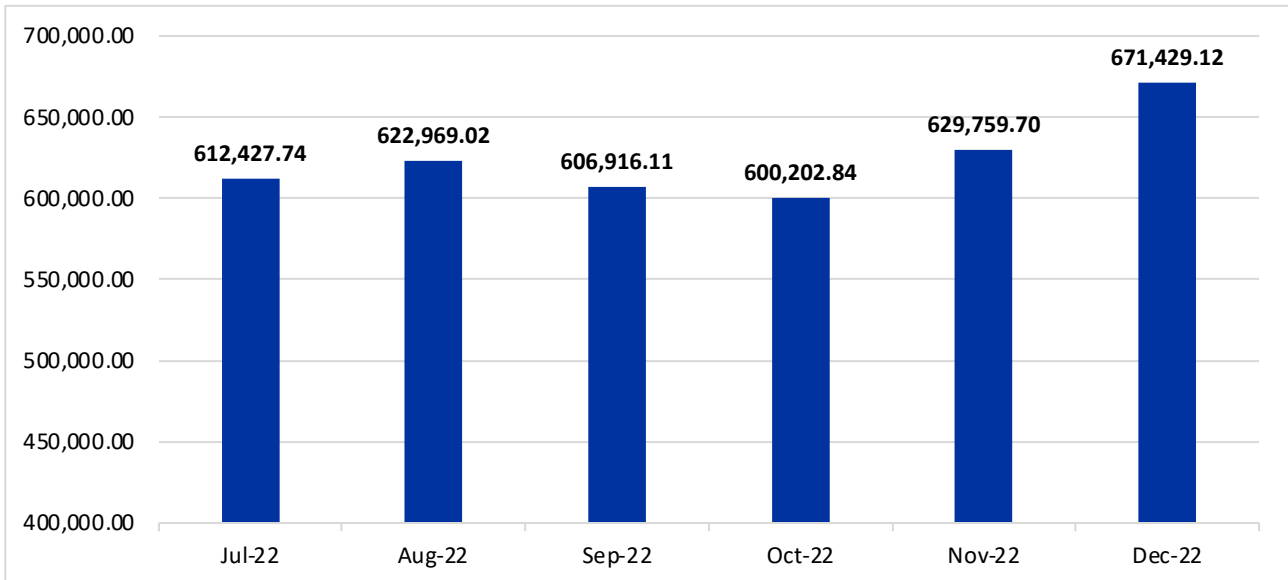
Figure 18: Trend in the consumption of petroleum products



5.1.3 Pipeline Throughput

Petroleum products imported through the OTS are majorly handled by the Kenya Pipeline Company (KPC). The pipeline throughput statistics for the period under review are indicated in Figure 19.

Figure 19: Pipeline throughput from July to December 2022



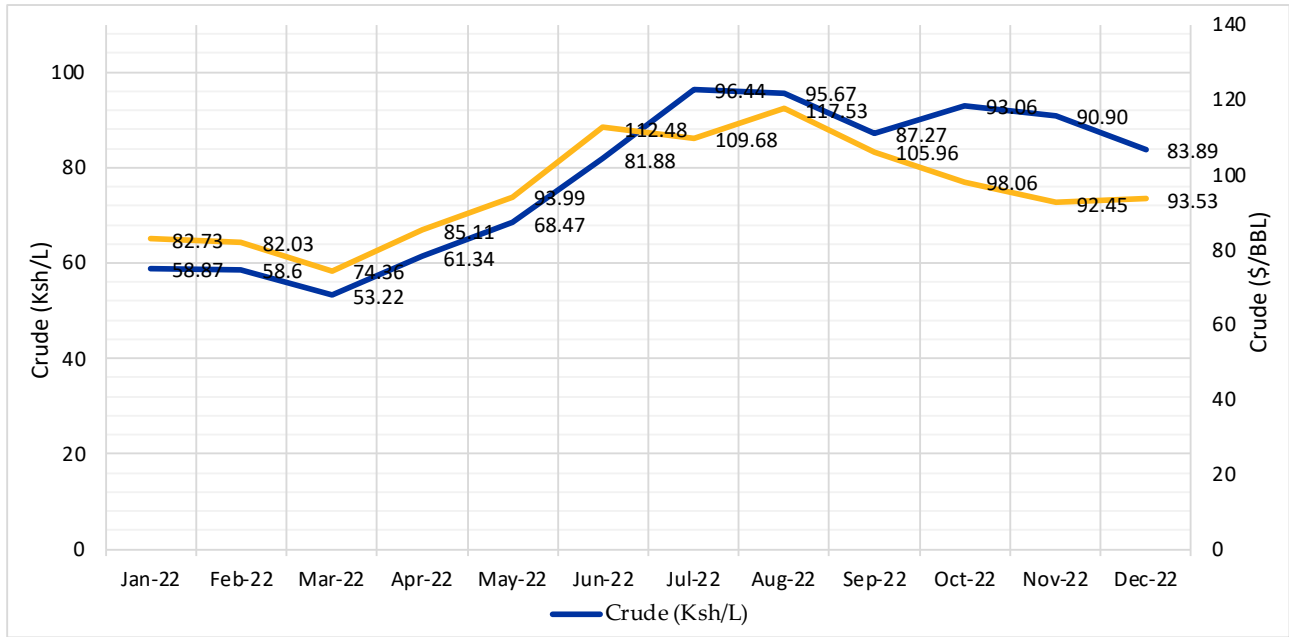
Similar to the trend in petroleum demand, the pipeline throughput increased towards the end of the year which is attributed to increased travel during the festive period.

5.2 Petroleum Prices

5.2.1 International Crude Oil prices

During the period under review, the international Crude Oil Prices recorded a peak price of 96.44\$/Bbl in July 2022 and a minimum price of 87.27\$/Bbl in September 2022. There was a general downward trend in Murban crude oil prices in the second half of 2022. The decrease in crude prices was occasioned by the easing of the Russia - Ukraine conflict coupled with overall world oil demand reduction caused by the resurgence of COVID-19 cases in countries like China, which is considered the world’s largest consumer of oil.

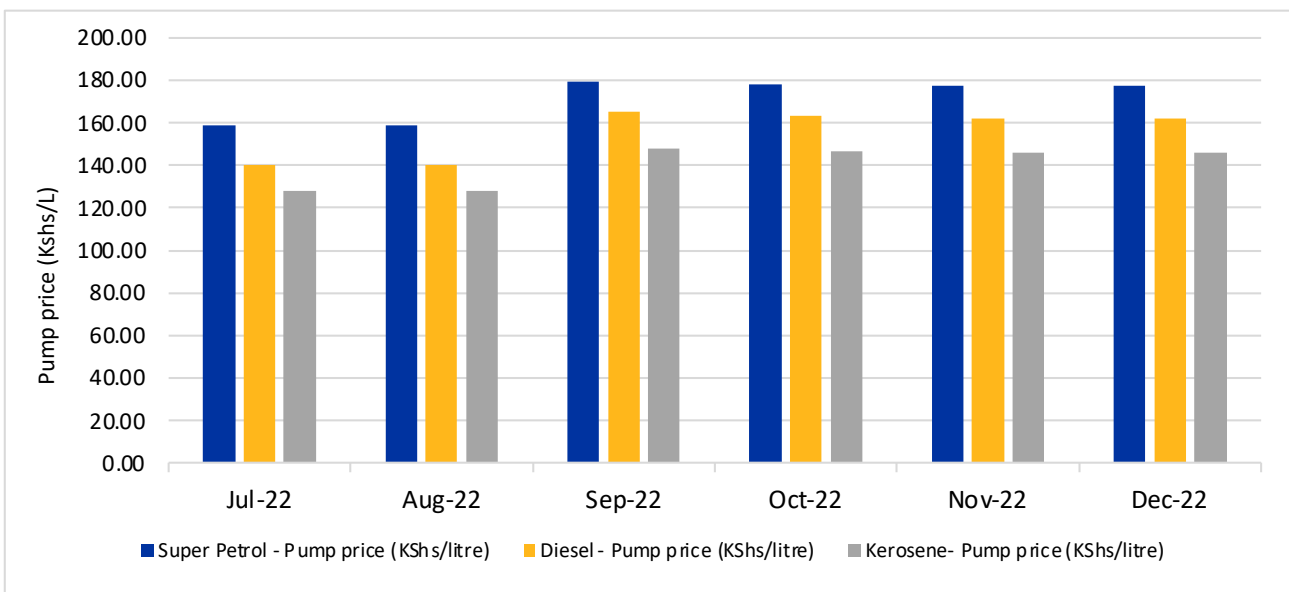
Figure 20: Trend in Murban Crude oil prices



5.2.2 Local Petroleum Prices

The Authority publishes maximum prices for super petrol(PMS), Diesel(AGO) and Illuminating Kerosene (IK) on the 14th day of every month. Figure 21 shows the trend of the Nairobi pump prices for the period July 2022 to December 2022.

Figure 21: Trend of Nairobi Pump Prices for the period July 2022 to December 2022



5.3 Fuel Quality

The Authority has a fuel marking program that monitors the quality of fuel designated for local consumption and export. Marking is done at petroleum depots within the country on Illuminating Kerosene (IK) and all export products except Jet A-1 to deter diversion of products meant for export into the local market, control adulteration and prevent loss of revenue. Table 6 shows the volumes of petroleum products marked in the period under review.

Table 6: A summary of petroleum products marked between July and December 2022

Month	Export volumes marked	Kerosene volumes marked
July	153,137,942	6,395,031
August	201,722,012	8,055,112
September	234,662,770	9,636,666
October	245,677,957	8,890,000
November	279,809,783	8,940,679
December	317,407,629	9,397,459
Total	1,432,418,093	51,314,947

The Authority also monitors the quality of fuel sold in retail stations with the aim of preventing motor vehicle adulteration or sale of export-bound fuel. During the review period 6,686 samples were collected from various retail sites across the country. The average compliance was 98.88%. Table 7 shows the sample tests conducted in the monitoring exercise and a quarterly compliance level during the review period.

Table 7: Sampled retailed sites and compliance levels

Quarter	Samples sites	Compliance Level
July- Sept 22	1,360	98.44%
Oct- Dec 22	5,326	99.32%
Total	6,686	Average Compliance: 98.88%

The compliance levels remained high due to continuous quality monitoring of petroleum products.

5.4 LPG Compliance

The Authority conducts regular compliance inspections on LPG facilities to determine regulatory compliance, operational safety, plant and equipment maintenance, emergency preparedness and risk management.

Table 8 shows the inspections done during the period under review and an average compliance score arising from the inspections.

Table 8: LPG Compliance Inspections Analysis

Month 2022	Retail/ Wholesale Sites Inspections	Average Compliance(%)	LPG Tankers Inspections	Average (Compliance%)	LPG Filling Plants Inspections	Average Compliance (%)
July - Sept	420	57.45	27	80.45	9	63.96
Oct - Dec	420		27		9	
Total	840		54		18	

The Authority is keen on enhancing public education and enforcement in a bid to boost compliance in the LPG sector.

5.5 Petroleum Subsector Competition Analysis

5.5.1 Market Shares

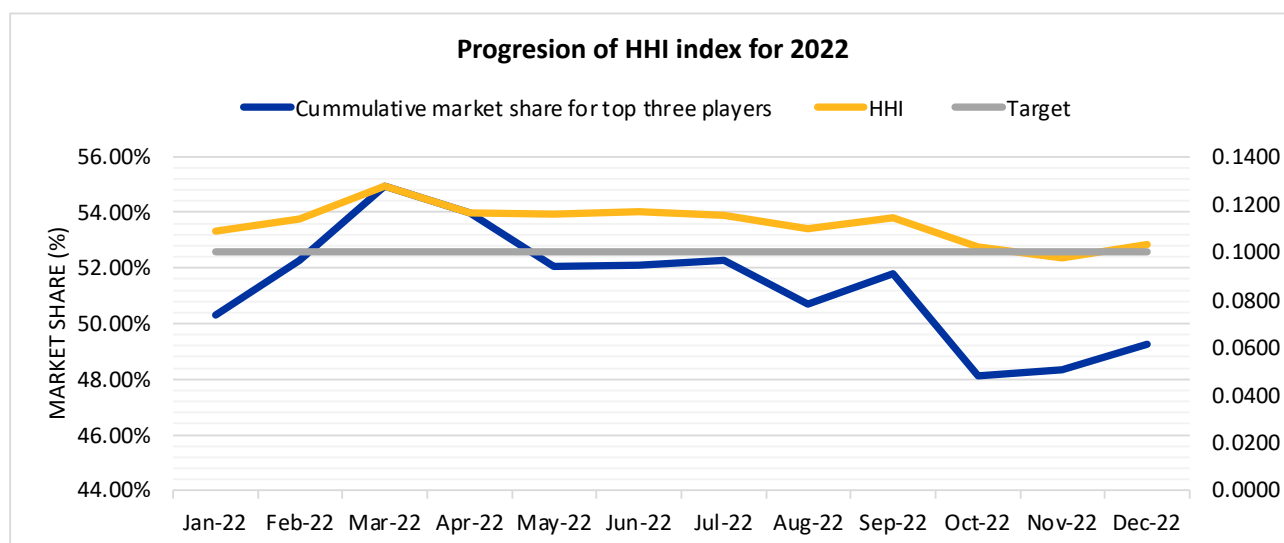
There were 122 registered Oil-Marketing Companies (OMCs) as at December 2022. These companies market petroleum products; diesel, kerosene, gasoline (petrol), lubricants, and LPG. Table 9 presents the market shares of the OMCs during the review period.

Table 9: Market share of Oil-Marketing Companies

OMC	Local sales volume for OTS imported products (m3)	% Share
Vivo Energy Kenya Limited	638,468.03	22.79%
TotalEnergies Marketing Kenya Plc	459,050.32	16.39%
Rubis Energy Kenya Plc	306,070.96	10.93%
Ola Energy Kenya Limited	214,139.00	7.64%
Oryx Energies Kenya Limited	154,320.61	5.51%
Stabex International Ltd	107,447.69	3.84%
Be Energy Limited	101,906.66	3.64%
Galana Oil Kenya Limited	74,332.29	2.65%
Lake Oil Limited	59,851.38	2.14%
Hass Petroleum Kenya Limited	54,362.00	1.94%
Petro Oil Kenya Limited	53,131.00	1.90%
Gapco Kenya Limited	49,749.00	1.78%
Tosha Petroleum (Kenya) Limited	41,910.03	1.50%
Gulf Energy Holdings Limited	41,827.40	1.49%
Texas Energy Ltd	39,363.17	1.41%
Fossil Supplies Limited	30,246.00	1.08%
Lexo Energy Kenya Limited	26,735.80	0.95%
Riva Petroleum Dealers Limited	20,150.21	0.72%
One Petroleum Limited	20,022.00	0.71%
Dalbit Petroleum Limited	19,908.88	0.71%
Others	288,282.17	10.28%

5.5.2 Herfindahl–Hirschman Index (HHI)

The Herfindahl–Hirschman Index (HHI) for the downstream petroleum subsector as at December 2022 was 0.1118. This is an increase from 0.1099 recorded in FY 2021/22 indicating a marginal decline in competition. The HHI was above the Authority's target of 0.1 although it is projected to improve with the entry of more players into the market.

Figure 22: HHI Index for downstream petroleum

5.6 Petroleum Licensing

The Authority grants licenses, permits or certificates to any persons intending to undertake the importation, exportation, bulk storage or transportation of petroleum products. Table 10 summarizes the licenses issued as of December 2022.

Table 10: Summary of Active Petroleum Licenses as of December 2022

Type of licence	Licences issued
Driver Certification	4,317
Transport of petroleum products(Except LPG) by Road	967
Export and Wholesale of Petroleum Products(Except LPG)	551
Retail of LPG in Cylinders	473
Retail of Petroleum Products (except LPG)	395
Transport of LPG in Cylinders	153
Storage & Wholesale of LPG in cylinders	122
Transport of LPG in bulk by Road	95
Import, Export and Wholesale of Petroleum Products (Except LPG)	62
Storage & Filling of LPG in Cylinders	53
Transport of Jet-A1	46
Storage of petroleum products(Except LPG)	26
Import, Export and Wholesale of LPG in bulk	24
Export & wholesale of Jet-A1	22
Export and Wholesale of LPG in bulk	21
Import, Export and Wholesale of Bitumen	10
Import, Export and Wholesale of Fuel Oil	9
Bunkering of Petroleum Products (Except LPG)	4
Storage of LPG in Bulk	3
Storage & Filling of LPG in Bulk	2
Import of Lubricants	2
Reticulation of LPG	1
Total	7,358

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BIANNUAL ENERGY AND PETROLEUM STATISTICS REPORT

FINANCIAL YEAR 2022/2023

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