Energy & Petroleum Regulatory Authority

BIANNUAL

ENERGY & PETROLEUM STATISTICS REPORT

FINANCIAL YEAR **2024/2025**

ABOUT THIS REPORT

This report provides key statistics on the performance of the electricity, petroleum, and renewable energy subsectors during the first half of the financial year 2024/2025.

For further information or to provide feedback, please contact EPRA through statistics@epra.go.ke.

ACKNOWLEDGEMENTS

This report has been compiled by the EPRA Statistics Committee, comprised of the individuals listed below.

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This report has greatly benefited from the valuable insights and support of the Board of Directors, the Director General, the Director Economic Regulation & Strategy, the Senior Management team, and staff members.

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WHO WE ARE

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

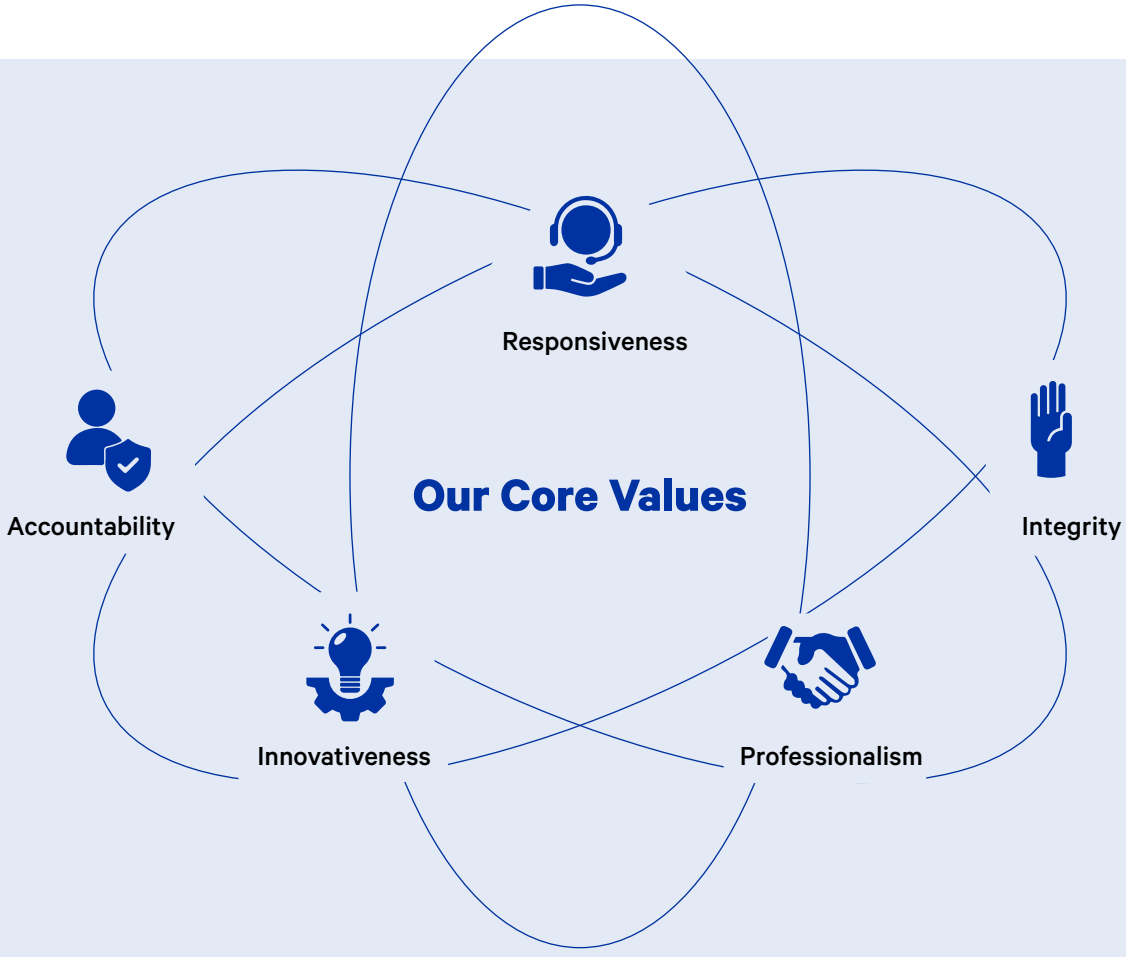
To facilitate sustainability in the energy and petroleum sectors through regulation for improved livelihoods.

Our Vision

A leading energy and petroleum regulator.

Our Rallying Call

Quality energy, quality life.



ABBREVIATIONS AND ACRONYMS

AGO	Automotive Gas Oil (Diesel)
AC	Air conditioner
EEP	Ethiopia Electricity Power
EPRA	Energy and Petroleum Regulatory Authority
FEC	Fuel Energy Cost
FERFA	Foreign Exchange Rate Fluctuation Adjustment
GDP	Gross Domestic Product
GWh	Giga-Watt hour
HHI	Herfidahl Hirschman Index
IK	Illuminating Kerosene
LPG	Liquefied Petroleum Gas
LTWP	Lake Turkana Wind Power
MWh	Mega-Watt hour
NDC	Nationally Determined Contributions
NGAO	National Government Administrative Officers
OMCs	Oil Marketing Companies
KETRACO	Kenya Electricity Transmission Company
KEMP	Kenya Electrification Modernization Project
KPC	Kenya Pipeline Company
KWp	Kilowatt peak
PMS	Premium Motor Spirit (Super petrol)
PPA	Power Purchase Agreement
PCC	Program Coordination Committee
SPV	Solar photovoltaic
WHRC	Waste Heat Recovery Cycle

DIRECTOR GENERAL'S MESSAGE

It is with great pleasure that I present this report, highlighting key developments and performance indicators in the energy sector over the past six months. We have seen the energy landscape continue to evolve, driven by growing demand, advancements in infrastructure, and the increasing adoption of sustainable energy solutions. As we navigate this dynamic environment, collaboration remains at the heart of our progress.

As economic activities expanded, energy utilization across the country saw a notable increase compared to a similar period in the previous financial year, with half-year consumption reaching 7,222.37 GWh. Peak demand remained above 2,200 MW, hitting a high of 2,288.35 MW on 29th October 2024.

Electricity imports accounted for 10.41% of total consumption in the current period, up from 6.16% in the previous financial year. This increase is primarily due to the full commercial operation of electricity imports from Ethiopia. Additionally, on 13th December 2024, energy exchange with Tanzania commenced, marking an important milestone in enhancing regional interconnectivity within the East African Community (EAC).

Beyond regional interconnectivity, our focus must also extend to the broader vision of the Africa Single Electricity Market (AfSEM). This initiative calls for increased collaboration among the continent's power pools, including the Eastern Africa Power Pool (EAPP), the Western Africa Power Pool (WAPP), the Southern Africa Power Pool (SAPP), the North Africa Power Pool (COMELEC), and the Central Africa Power Pool (CAPP). Strengthening these partnerships will be instrumental in achieving intra-African energy trade, ensuring a stable, affordable, and sustainable energy supply across the continent.

We have also witnessed encouraging trends in Liquefied Petroleum Gas (LPG) consumption, aligning with the government's commitment to implementing the LPG growth strategy. LPG demand increased by 13.38% during this period. The demand is expected to continue its upward trajectory as the government advances the LPG growth strategy, focusing on promoting its use in schools and hospitals.

At the same time, innovation continues to shape the sector's future. The increased adoption of e-mobility during this period has led to a corresponding rise in electricity consumption. E-mobility electricity consumption increased to 1.80 GWh, demonstrating a positive shift toward cleaner transport solutions. Additionally, the demand for autogas as an alternative transport fuel has gained traction, with 10 permits issued for the construction of autogas stations during the period under review.

As we move forward, it is imperative that we continue fostering innovation, sustainability, and collaboration. I encourage you to delve into this report, which provides comprehensive insights into our sector's key performance indicators and strategic direction. Your engagement and support are invaluable in driving the energy industry toward a more sustainable and resilient future.

Daniel Kiptoo Bargoria OGW, MBS

MESSAGE BY THE DIRECTOR, ECONOMIC REGULATION AND STRATEGY

During the review period, there was an overall increase in electricity and petroleum consumption—an indicator of the vibrant economic activities that the energy sector supports. One notable trend we continue to observe is the growing adoption of captive energy generation, particularly among industrial consumers. Solar photovoltaic (PV) systems account for the highest contribution to the country's captive generation capacity, making up 47.21% of the total.

In line with global energy transition trends, the Authority has been actively working with the e-mobility industry to drive adoption. In April 2023, we introduced a discounted e-mobility tariff category, and its impact has been significant. To ensure fair pricing for electric vehicle charging, the Authority is currently undertaking a study to establish an appropriate end-user tariff for public charging stations. This initiative aims to promote accessibility and affordability, ultimately encouraging more consumers to transition to cleaner transport solutions.

As we advance our energy agenda, we recognize the need to promote responsible energy consumption. Energy efficiency remains a key pillar of our strategy, and we have been advocating for its adoption both in homes and industrial facilities. This report highlights various initiatives aimed at enhancing energy efficiency, including the promotion of energy-efficient appliances and conducting energy audits to help consumers optimize their energy use.

Public education has also been a strategic priority. Our nationwide outreach programs have helped raise awareness on various energy matters, and we appreciate the invaluable support of our stakeholders in these efforts. The collective commitment to fostering energy literacy has played a vital role in shaping informed decision-making among consumers.

Each edition of this statistics report has continued to improve, thanks to your feedback and engagement. We encourage you to explore the insights presented and share your thoughts with us through our email address statistics@epra.go.ke.

Dr. John Mutua, PhD

BIANNUAL PERFORMANCE OVERVIEW

2,288.35MW
Peak Demand, on 29th October 2024

+6.13%
Increase in electricity generation

+13.38%
LPG consumption increase

+7.12%
Increase in local petroleum demand

81.16%
Renewable energy contribution to the energy mix

Ksh. 688.7m
Savings by the Time of Use Tariff beneficiaries

400kV
Kenya-Tanzania transmission line energized on 13th December 2024

CHAPTER 1

INTRODUCTION

Kenya's economic landscape during the review period was shaped by a mix of domestic and international factors, influencing specific sectors and overall economic growth. The country's Gross Domestic Product (GDP) growth remained steady, with projections indicating a rise of 5.4% for the entire year.

Inflation levels were kept relatively low, aided by increased food production and stable fuel prices. The average inflation rate for the last quarter of 2024 stood at 4.4%, well within the government's target range. In efforts to stimulate economic activity, the Central Bank of Kenya (CBK) implemented interest rate cuts, reducing the policy rate from 13.0% to 12.75% in August 2024. Throughout the review period, the mean exchange rate remained stable, with monthly rates fluctuating between Ksh. 128 and Ksh. 129 to the U.S. Dollar.

This period recorded a modest increase in global oil demand, though it was tempered by economic slowdowns in significant regions like China. Supply dynamics revealed a steady rise in production from non-OPEC+ countries, while OPEC+ maintained production levels through voluntary cuts. Price stability was observed in the market, influenced by balanced supply-demand factors alongside geopolitical developments.

The stable macroeconomic environment fostered growth in the demand for electricity and petroleum products. Specifically, electricity generation increased by 6.13%, while local demand for petroleum products rose by 7.12% compared to the same period in the previous financial year.

CHAPTER 2

ELECTRICITY SUBSECTOR

This section provides an overview of the performance across different segments of the electricity supply chain, focusing on generation, transmission, and distribution. It also examines key aspects such as electricity reliability indices, pricing systems, market analysis, and greenhouse gas emissions.

2.1 Electricity Demand and Supply

2.1.1 Installed capacity

Installed capacity refers to the combined maximum power generation capacity of a country's power plants. Table 2.1 shows the country's total installed capacity as of December 2024, which comprises grid connected, captive and off grid generation units.

Table 2.1: Installed, effective and captive power capacity as at 31st December 2024

Technology	Interconnected Capacity (MW)		Captive Capacity (MW)	Offgrid Capacity	Total Installed Capacity	% Total Installed
	Installed	Effective				
Hydro	839.5	809.7	33.0	0.1	872.5	24.16%
Geothermal	940.0	876.1	3.7		943.7	26.13%
Thermal	564.8	558.4	21.3	41.0	627.1	17.36%
Wind	435.5	425.5	-	0.6	436.1	12.07%
Solar	210.3	210.3	271.3	3.4	484.9	13.43%
Bioenergy	2.0	2.0	161.8		163.8	4.54%
Imports	200.0	200.0	-		200.0	
WHRC	-	-	83.5		83.5	2.31%
Total	**3,192.0**	**3,082.0**	**574.6**	**45.0**	**3,811.6**	**100.00%**

Geothermal energy accounts for the largest portion of Kenya's installed capacity, at 26.13%. Hydro and thermal power follow with 24.16% and 17.36% respectively. Solar photovoltaic systems and wind generation contribute 13.43% and 12.07% to the total installed capacity respectively.

During the review period, no new grid-connected power generation plants were commissioned.

As of December 2024, captive power capacity, which mainly comprises biomass, solar and hydro, stood at 574.6 MW, accounting for 15.04% of the country's total installed capacity. Captive power generation continues to attract commercial and industrial consumers due to its cost-effectiveness, ease of setup, and supportive government policies. Notably, captive solar PV generation increased to 271.3 MW during the period under review.

2.1.2 Electrical Energy Generated

Electrical energy generated refers to the electrical energy supplied to the national grid and public offgrid networks at the respective designated points of delivery. It represents the total output from power producers with power purchase agreements, excluding their auxiliary consumption.

During the review period, a total of 7,222.37 GWh of electrical energy was generated, marking a 6.13% increase (417.09 GWh) from the 6,805.28 GWh recorded in the first half of the previous financial year. This growth was driven by rising demand from organic load growth and an expanding customer base.

Figure 2.1 shows the trend in energy generated during the period under review.

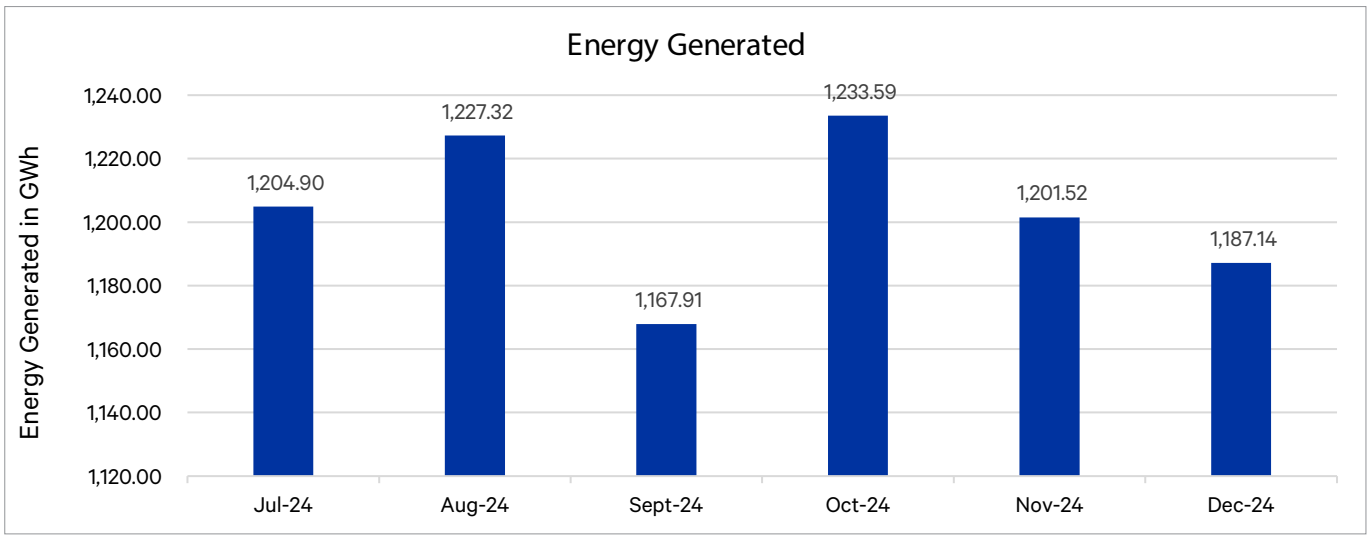


Figure 2.1: A trend in the energy generated from July to December 2024

As illustrated in figure 2.1, the highest monthly energy generation during the review period was recorded in October at 1,233.6 GWh, while September had the lowest output.

Figure 2.2 presents the energy mix as at 31st December 2024.

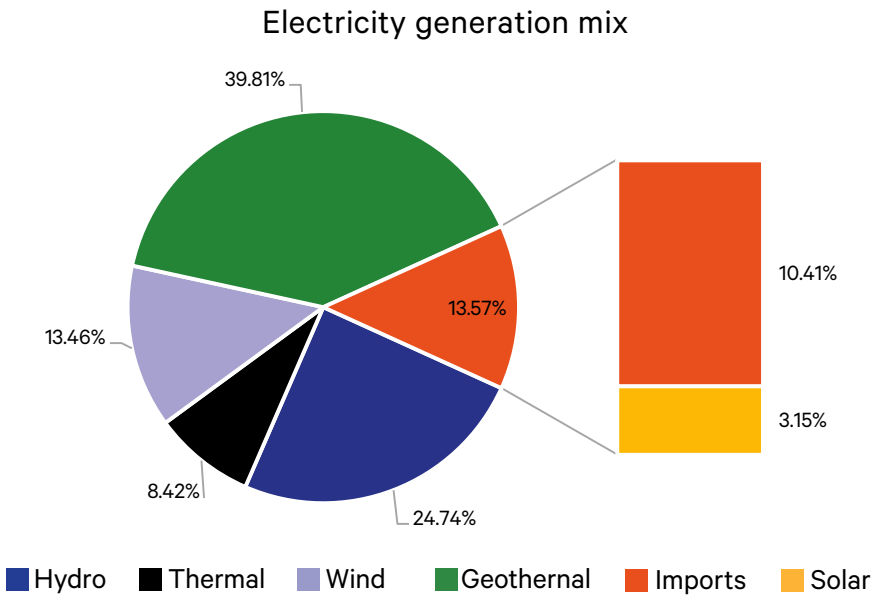


Figure 2.2: Electricity generation mix by source during as at 31st December 2024

Geothermal remains the leading source of electrical energy in the country generating 2,875.33 GWh of energy. Geothermal sources accounted for 39.81% of total generation in the review period, down from 44.55% in a similar period last year. This can be attributed to the shutdown of the 45MW Olkaria I power plant for rehabilitation and an increase in electricity imports from Ethiopia.

Hydro generation ranked as the second largest source of electrical energy, producing 1,786.90 GWh. Its share of the total energy mix grew from 22.54% in the first half of the previous financial year to 24.74% in the review period, driven by improved hydrology.

Wind generation contributed 13.46% of the total energy generated, delivering 971.9 GWh to the national grid. In the first half of the previous financial year, wind generation stood at 972.82 GWh, accounting for 14.3% of the energy mix during that period.

Electricity imports rose significantly from 419.13 GWh in the first half of the financial year 2023/24 to 751.95 GWh in the first half of the financial year 2024/2025. As a result, imports accounted for 10.41% of the total electrical energy in the current period, up from 6.16% in a similar period in the previous financial year. This increase is attributed to the full commercial

operations of electricity imports from Ethiopia during the review period. Additionally, energy exchange with Tanzania commenced on 13th December 2024, to support the commissioning of the Isinya-Arusha-Singida 400kV line. However, full commercial operation under the exchange agreement is yet to begin.

Thermal generation increased slightly producing 608.46GWh of electrical energy during the review period representing 8.42% of the energy mix. This compares to 606.09 GWh generated in the same period of the previous financial year, which accounted for 8.91% of the energy mix. Thermal generation remains crucial for voltage stability, particularly along the coast, and provides essential peak support.

2.1.3 Peak Demand

Peak demand represents the highest load on the electricity grid over the year, typically occurring between 19:30 and 20:30 hours nationwide. During the review period, the peak demand reached 2,288.35 MW on 29th October 2024, marking an increase of 117.79 MW from the 2,170.56 MW recorded in the same period of the previous financial year. Notably, the period under review sustained peak demand levels above 2,200 MW. This growth is attributed to organic load increases, a rise in new connections, and improvements in transmission infrastructure.

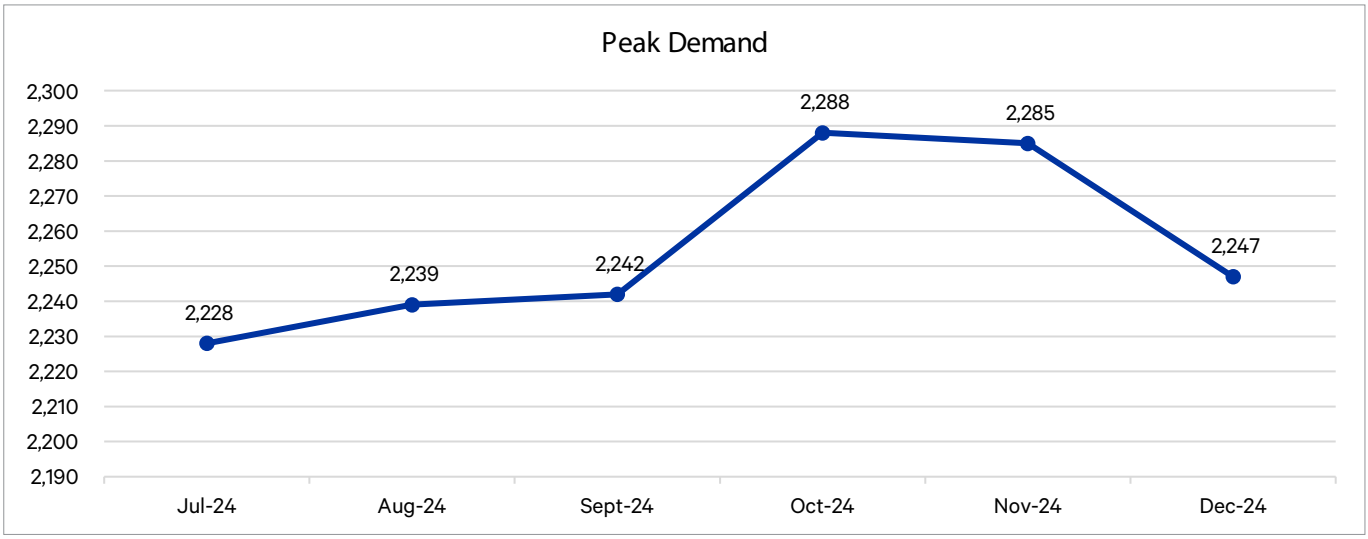


Figure 2.3: A trend in peak demand from July to December 2024

The trend in peak demand from July 2022 to December 2024 is presented in figure 2.4.

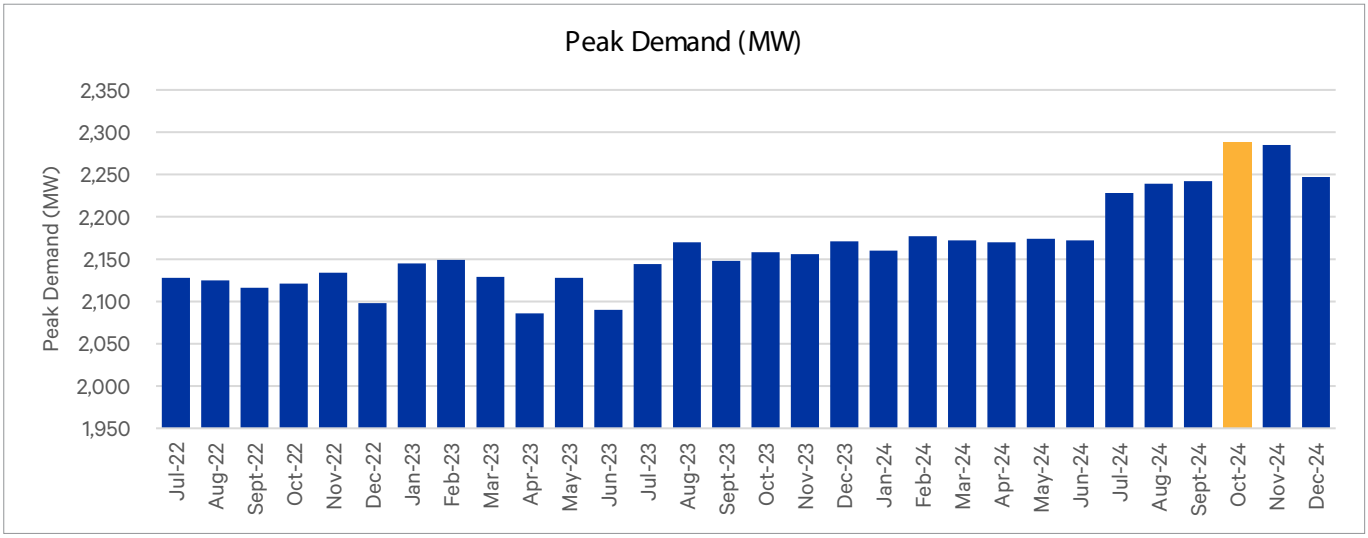


Figure 2.4: A trend in peak demand from July 2022 to December 2024

2.1.4 Electricity Access

A total of 194,654 new customers were connected between July and December 2024 bringing the cumulative grid connected customers to 9,852,423. This was a decline in new customer connections compared to the same period in the previous financial year which recorded a total of 260,257 new connections. Figure 2.5 presents a trend of the cumulative connections in the period under review.

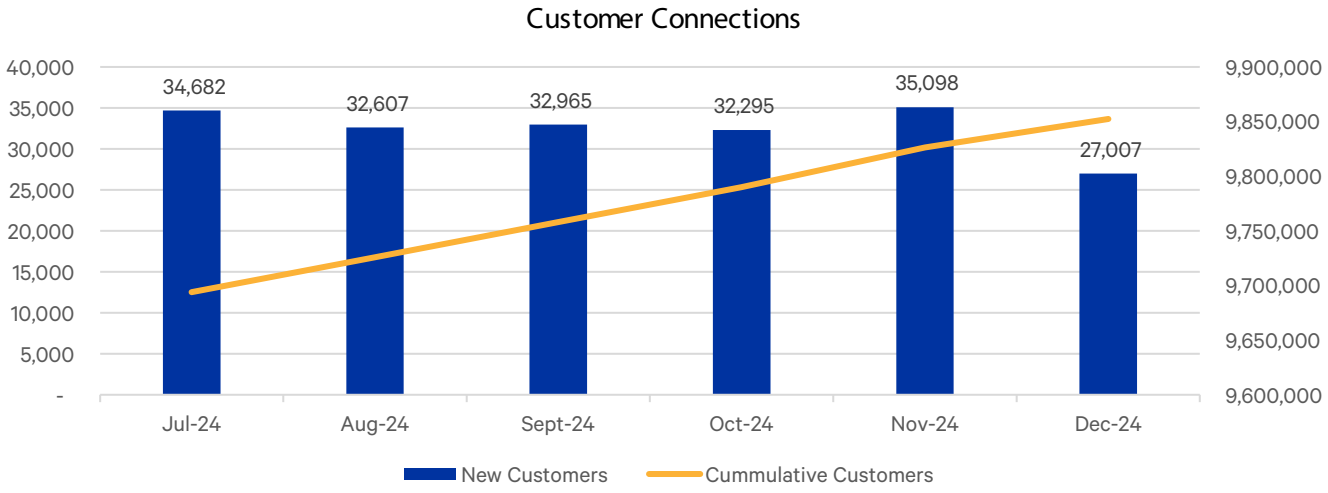


Figure 2.5: A trend in customer connections from July – December 2024

2.1.5 Energy Consumption by Region

There was a general increase in energy utilization in all regions compared to a similar period in the previous financial year. The country's half year consumption grew from 5,205.79GWh to 5,484.54 GWh. Nairobi region maintained its place as the leading consumer of electrical energy, utilizing 2,415.44 GWh. The region accounted for 44.04% of total electrical energy utilization in the country. This was an improvement from 2,293.95GWh of electrical energy utilized in a similar period in the previous financial year. Nairobi region encompasses Nairobi, Kiambu, Kajiado, Machakos and Makueni counties which have a high concentration of industrial, SME, financial and service sectors as well as real estate and construction activities.

The Coast region ranked second in energy consumption, utilizing 988.21 GWh, which constituted 18.02% of the country's total energy consumption. This is also an improvement from 930.05 GWh of electrical energy utilized in the first half of the previous financial year.

The Rift Valley region utilized 759.42 GWh of electrical energy as compared to 705.48 GWh of electrical energy utilized in a similar period in the previous financial year. The region accounted for 13.85% of the total consumption.

North-Eastern and Mt. Kenya regions accounted for 10.69% and 6.45% of the overall consumption utilizing 586.09GWh and 353.90GWh respectively. The North Eastern region clusters Garissa, Wajir, Mandera, Marsabit, Kitui, Thika and parts of Machakos. The West Kenya and South Nyanza regions recorded the lowest electricity consumption at 280.78 GWh and 110.69 GWh, accounting for 5.12% and 1.84% of total consumption, respectively.

Figure 2.6 illustrates the energy consumption in all the regions.

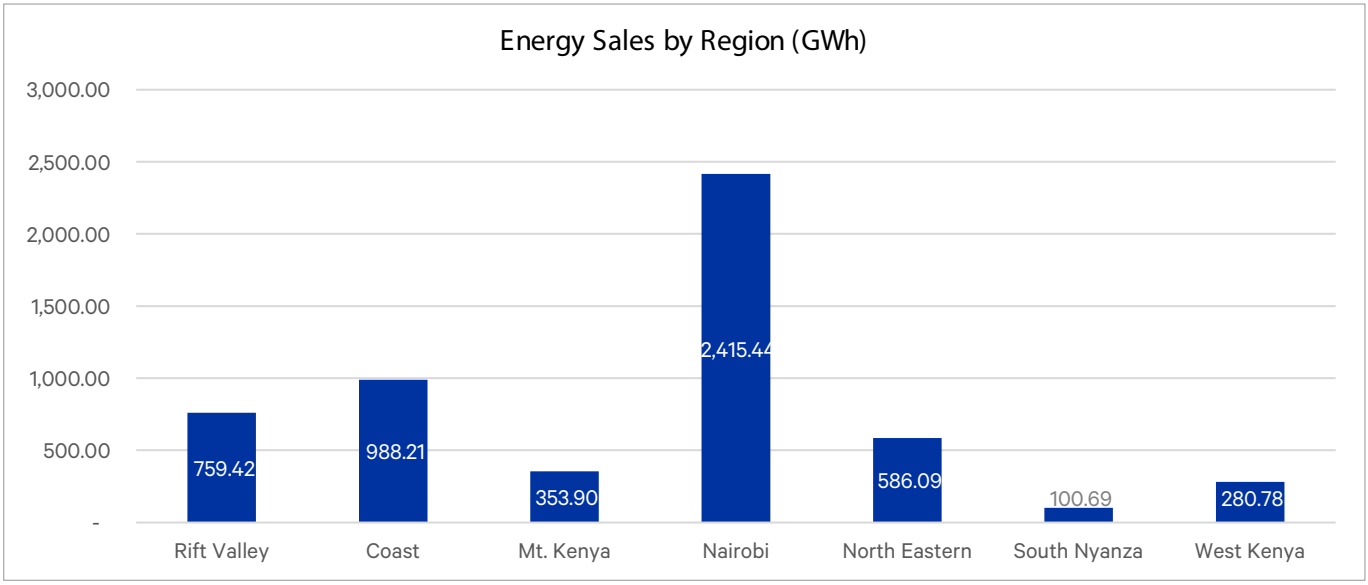


Figure 2.6: Energy Consumption based on KPLC regional categorisation for first half of the financial year 2024/25

2.1.6 Electricity Consumption by Category

Industrial consumers are the primary consumers of electrical energy in Kenya. Customers in this category comprise of large and medium industries, factories, high-rise buildings, warehouses and public infrastructure such as airports, ports, and railway stations. In the half year under review, this category consumed 2,807.10 GWh, accounting for 51.18% of the country's total consumption. This is a 101.0GWh increase in consumption compared to 2,706.10GWh of electrical energy consumed in a similar period last year signaling an increase in industrial activities.

Industrial consumers are supplied at medium and high voltages and when supplied at low voltage their monthly usage exceeds 15,000 kWh per month and are categorized under the CI1 tariff band. Industries in the CI1 tariff band consumed 924.11 GWh making it the highest energy consuming tariff band in all categories.

Domestic consumers were second highest category consuming 1,728.19 GWh up from 1,599.33GWh in a similar period last year. This represents 31.51% of total energy consumption and increase from 30.76% in a similar period in the previous financial year. Customers in the DC3 tariff band (consuming over 100kWh per month) accounted for 47.2% of domestic consumption utilizing 816.50MWh of electrical energy in the period under review.

Small commercial enterprises consumed 902.94 GWh, accounting for 16.46% of overall electrical consumption. This is an improvement from 843.04 GWh of energy used in a similar period last year.

Street lighting is the only category that registered a decline in consumption by 12.0 GWh. Consumption reduced to 44.48 GWh from 56.48 GWh in a similar period last financial year. Street lighting accounted for 0.81% of total energy consumption.

Consumption in the electric mobility category, which includes electric vehicles and motorcycles, increased by 1.49 GWh, reaching 1.81 GWh during the review period, up from 0.32 GWh in a similar period in the last financial year. This growth highlights the increasing adoption of electric vehicles and motorcycles. The category accounted for 0.03% of total energy consumption. Table 2.2 and Figure 2.7 summarize energy consumption across customer categories.

Table 2.2: A summary of energy consumption by each customer category during the first half of the financial year 2024/25

Customer category	Energy consumption (GWh)	Percentage
Industrial	2,807.10	51.18%
Domestic	1,728.19	31.51%
Small Commercial	902.94	16.46%
Street lighting	44.48	0.81%
E-Mobility	1.81	0.03%
Total	**5,484.52**	**100.00%**

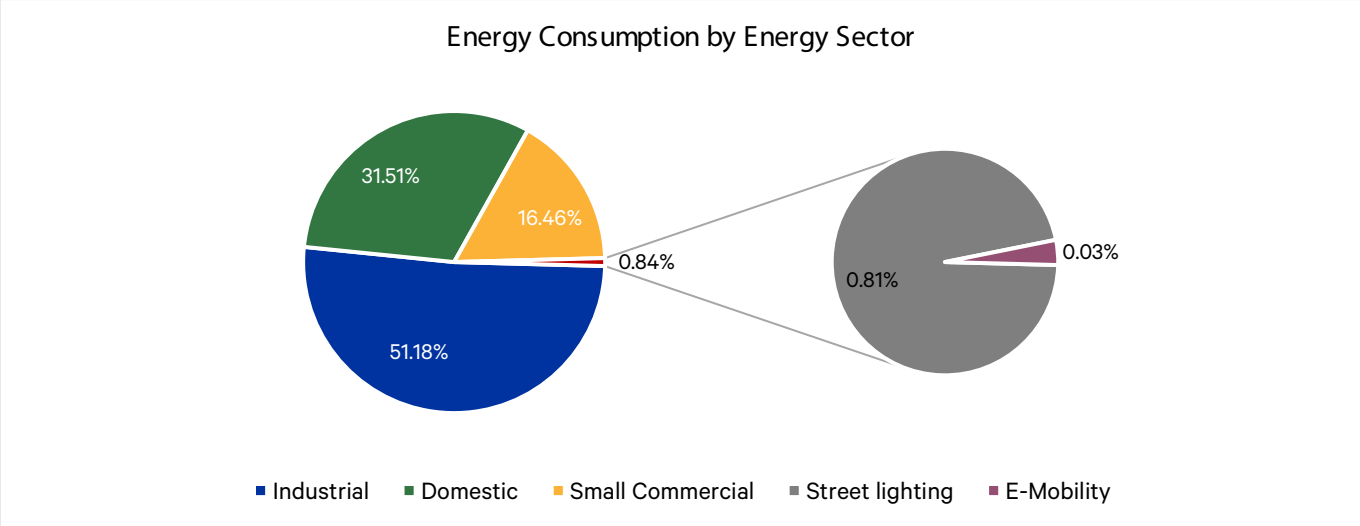


Figure 2.7: A visual representation of energy consumption by each customer category during the first half of the financial year 2024/25

2.1.7 Energy Curtailment

Energy curtailment refers to the deliberate reduction of the output of a power plant that would otherwise operate at its optimal capacity, due to decreased electricity demand. This typically occurs between 0000 – 0430 hours when the demand is at its lowest. Curtailment is necessary to maintain the stability of the power system during low demand periods and mostly affects geothermal and wind power plants.

During the review period, 511.72 GWh of geothermal energy was curtailed, representing 7.1% of the total energy generated. This is a significant increase by 116.3% from the 236.21 GWh curtailed in a similar period last financial year. The increase in curtailment can be largely attributed to increased energy imports during the period. However, curtailment is expected to decrease as night time demand rises.

Notably, less geothermal energy was curtailed in the second quarter of the review period due to maintenance activities at several geothermal plants. Figure 2.8 presents the trend in energy curtailed.

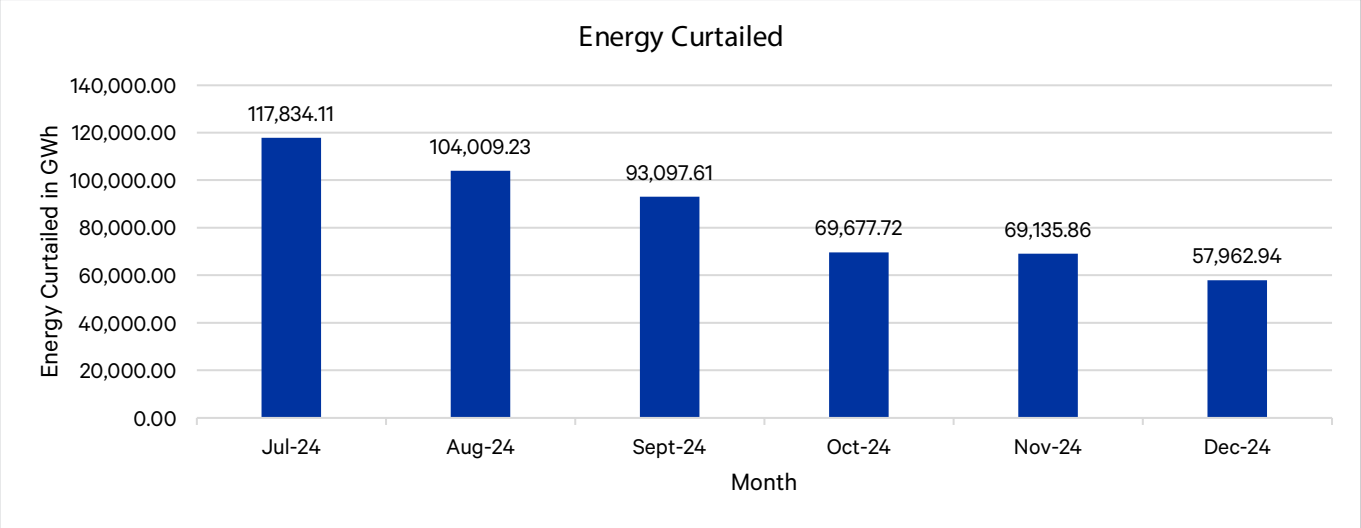


Figure 2.8: A trend of energy curtailed from July to December 2024

July 2024 recorded the highest monthly curtailment at 117.83 GWh, while December recorded the lowest at 57.96 GWh.

No wind energy was curtailed during the period under review, as none of the wind plants met the Deemed Generated Energy (DGE) thresholds, largely due to low wind speeds.

2.1.8 Electricity Transmission Infrastructure

Electricity transmission refers to the transfer of power in bulk from its point of generation to receiving substations. This function is undertaken by KETRACO and KPLC using high voltage transmission lines operating at voltages of 132kV, 220kV, 400kV and 500kV.

In the period under review, KETRACO commissioned the 120km Sultan Hamud - Oloitoktok 132kV transmission line aimed at providing stable power supply to parts of Kajiado County. and In addition, KETRACO and Tanzania Electricity Supply Company Limited (TANESCO) completed and energized the 510km Kenya-Tanzania 400kV transmission interconnector. The Kenya-Tanzania transmission line runs from Isinya in Kajiado County to Singida in Tanzania through Arusha. This interconnector is a major milestone in regional interconnectivity in the EAC region and enables electricity trade between the member states. The line was energized on 13th December 2024.

2.1.9 Mini Grids

Mini-grids play a crucial role in expanding electricity access in off-grid and underserved regions of Kenya, contributing towards the goal of achieving universal electricity access. The Kenya National Electrification Strategy (KNES), 2018, recognizes mini-grids as a key solution for providing electricity to areas where grid extension is not economically viable. With an installed capacity of 4.5MW, Wajir town is the largest off grid distribution undertaking operated by KPLC. Other towns with significant capacities are Mandera, Marsabit, Moyale and Habaswein. These 5 towns account for 46.02% of total off-grid installed capacity. Additionally, most of the new mini-grids utilize renewable energy sources, reducing reliance on diesel and supporting Kenya's clean energy transition.

a) Public Mini Grids

Public mini-grids in Kenya have been developed primarily by the Kenya Power and Lighting Company (KPLC) and the Rural Electrification and Renewable Energy Corporation (REREC). KPLC operates these public off-grid power stations, which are powered by diesel generators, solar, or hybrid systems, serving customers within a 30 km radius of the respective plants. Table 2.3 shows installed capacities of KPLC operated off-grid sites in the country.

Table 2.3: Installed capacity in KPLC operated offgrid sites

Station	Installed Capacity (MW)	Station	Installed Capacity (MW)
Wajir	4.5	North Horr	0.584
Mandera	2.1	Lokori	0.56
Marsabit	2.9	Daadab	0.784
Lodwar	0.46	Faza island	1.508
Merti	0.25	Lokitaung	0.584
Elwak	0.965	Kiunga	0.184
Habaswein	1.88	Banisa	0.184
Baragoi	0.62	Kakuma	1.2
Mfangano	0.65	Kotulo	0.396
Eldas	0.76	Karmorliban	0.184
Takaba	0.78	Khorondile	0.37
Rhamu	0.68	Sololo	0.7
Lokichoggio	1.06	Maikona	0.32
Laisamis	0.64	Lokiriama	0.4
Moyale	1.452	Hulugo	0.212
TOTAL 27.867			

REREC, on the other hand, continues to expand mini-grid development with support from development partners. Through the Kenya Electrification Modernization Project (KEMP) funded by World Bank, REREC completed development of 4 mini grids at Wasini, Mageta, Ngodhe and Takawiri while 3 mini grids are under construction in Dabel in Moyale, Marsabit County, Kaeris and Kerio in Turkana County. The combined installed capacity of REREC developed mini-grids for both solar hybrid and diesel stands at 13.382MWp. These systems have significantly improved rural livelihoods by powering businesses, enhancing healthcare services, and facilitating educational development. Table 2.4 presents the solar hybrid mini grids while the table 2.5 shows the isolated diesel mini grids developed by REREC.

Table 2.4: Solar hybrid mini grids operated by REREC

Site	County	Constituency	Installed Capacity (KWp)
Sangailu	Garissa	Ijara	60
Liboi		Dadaab	60
Eldera		Lagdera	60
Garsweino		Fafi	60
Ashabito	Mandera	Mandera North	60
Arabia		Mandera East	60
Kilihiweri		Banisa	60
Burduras		Mandera West	60
Gari		Lafey	60
Shimbir Fatuma		Mandera South	60

Site	County	Constituency	Installed Capacity (KWp)
Illie Springs	Turkana	Turkana Central	60
Lowarengak		Turkana North	60
Letea		Turkana West	60
Lopeduru		Turkana East	60
Kangangipur		Turkana South	60
Napelilim		Turkana	60
Hadado	Wajir	Wajir West	60
Sarif		Wajir South	60
Basir		Eldas	60
Riba		Wajir East	60
Sarman		Tarbaj	60
Biyamadhow		Wajir South	60
Gurar		Wajir North	60
Takawiri Island	Homa-bay	Mbita	204
Ngodhe Island		Suba-South	146
Mageta Island	Siaya	Bondo	800
Wasinii Island	Kilifi	Lunga Lunga	732

Table 2.5: Isolated diesel mini grid stations sites operated by REREC

SITE	COUNTY	CONSTITUENCY	INSTALLED CAPACITY (KWp)
Hulugho	Garissa	Ijara	275
Dadaab		Dadaab	275
Faza Island	Lamu	Lamu East	275
Kiunga		Lamu East	275
Takaba	Mandera	Mandera West	230
Rhamu		Mandera North	230
Banisa		Banisa	230
Kamoliriban		Mandera North	450
Laisamis	Marsabit	Laisamis	730
North Horr		North Horr	730
Maikona		Maikona	800
Sololo		Moyale	800
Lokichogio	Turkana	Turkana West	730
Lokitaung		Turkana North	730
Lokori		Turkana East	730
Lokiriama		Loima	600
Kakuma		Turkana West	600
Eldas	Wajir	Eldas	490
Korondile		Wajir North	490
Kotulo		Tarbaj	450

b) Private Mini grids

Private sector investment has played a complementary role in expanding access to electricity in Kenya. The private sector has developed several mini-grids, contributing a cumulative installed capacity of approximately 7.143MWp from solar PV and hydro sources. Notable developers include Renewvia Energy Kenya Limited, Kudura Power East Africa, Power Hive East Africa, Strauss Energy, Nirav Agencies, Dream Green Power, Magiro Power and institutions such as the University of Southampton Energy4Development program, and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH- ProSolar program.

Private mini-grids have introduced innovative financing models and technology-driven solutions that have accelerated rural electrification. During the review period, the Authority granted tariff approvals for four mini grid sites operated by Renewvia Energy Kenya Limited. In total, private sector mini-grids have significantly increased clean energy access across counties such as Turkana, Marsabit, Busia, Kisii, and Homa Bay.

2.1.10 System Losses

System losses comprise of technical and commercial losses. Technical losses are inherent to a power system and are brought about by losses in transmission and distribution lines due to impedance of the lines, transformers and switchgear connected to that system. Commercial losses refer to unbilled electrical energy delivered to consumers. They include losses due to power supplied to illegal connections, unmetered connections, unread meters and meter tampering. While commercial losses are avoidable, technical losses cannot be avoided in totality but can be reduced.

In the period under review, 24.2% of the total energy purchased by the national utility was lost. This is an increase of one percentage point from the 23.2% recorded in a similar period in the last financial year. This was 6.7% above the 17.5% threshold allowed by the Authority for the financial year 2024/2025 in the approved tariff. July recorded the highest system losses at 24.9% while the least losses were recorded in December at 23.7% as illustrated in figure 2.9.

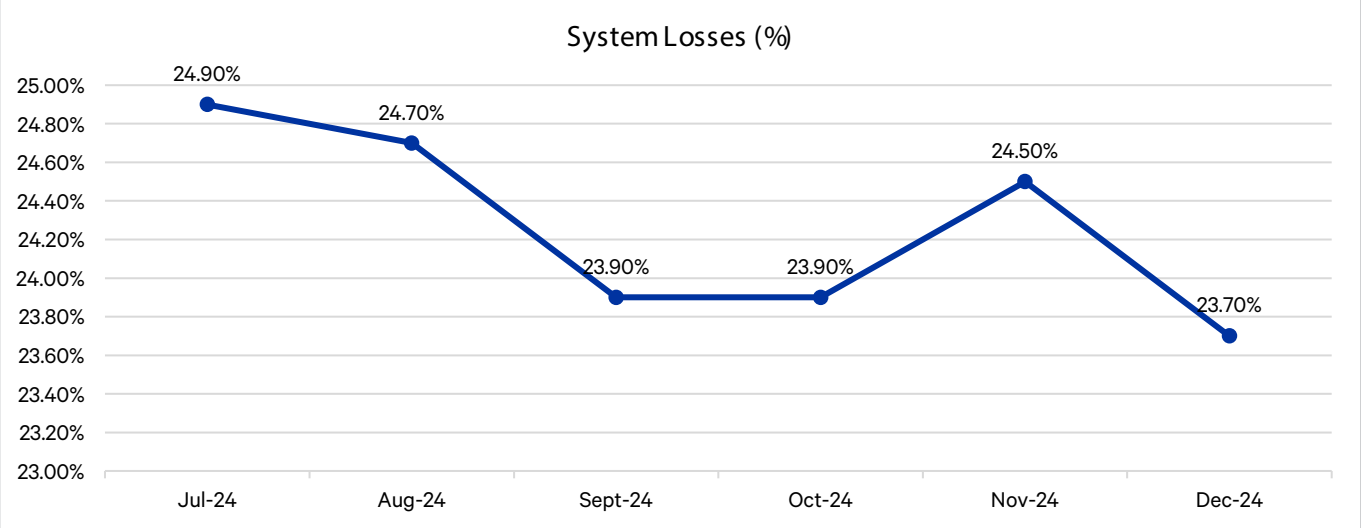


Figure 2.9: A trend in system loses from July to December 2024

2.1.11 Electricity Reliability Indices

Reliability indices are a numerical way of expressing the quality of service from a customer's perspective. The indices measure how frequently power interruptions occur, how long they last and how long it takes to restore supply. There are three indices used to quantify how reliable a power supply system is namely: CAIDI, SAIDI and SAIFI. Table 2.6 shows the reliability indices for the first half of the financial year 2024/2025.

Table 2.6: A summary of electricity reliability indices from July to December 2024

	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Average	EPRA target (FY24/25)
CAIDI	2.519	2.456	2.493	2.422	2.79	2.67	2.558	2.45
SAIDI	8.768	7.438	9.301	8.862	10.624	9.922	9.153	3.25
SAIFI	3.480	3.029	3.730	3.659	3.808	3.716	3.570	1.63

a) Customer Average Interruption Duration Index (CAIDI)

This index measures the average outage duration that any given customer would experience. It gives an indicator of how long it takes for power to be restored after a sustained interruption.

In the period under review, the average outage duration increased to 2.56 hours compared to 2.28 hours in the same period in the previous financial year, exceeding EPRA's target of 2.45 hours. October had the shortest restoration time while November recorded the longest restoration time.

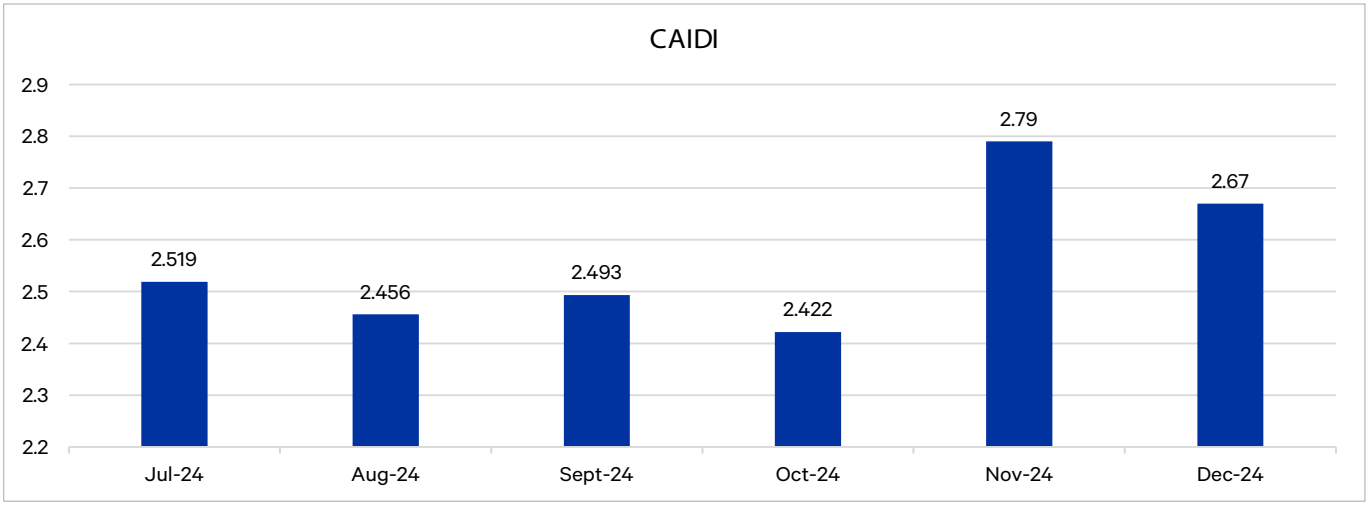


Figure 2.10: CAIDI trend from July to December 2024

b) System Average Interruption Duration Index (SAIDI)

SAIDI is a measure of the total duration of interruptions a customer would experience in a given period and is measured in units of time (minutes, hours) per month or year.

In the period under review, customers experienced outages lasting an average of 9.15 hours per month. This is an increase in the duration of interruptions per month compared to an index of 8.84 hours per month in the same period in the last financial year. This was longer than the required duration of 3.25 hours prescribed by the Authority for the current tariff control period.

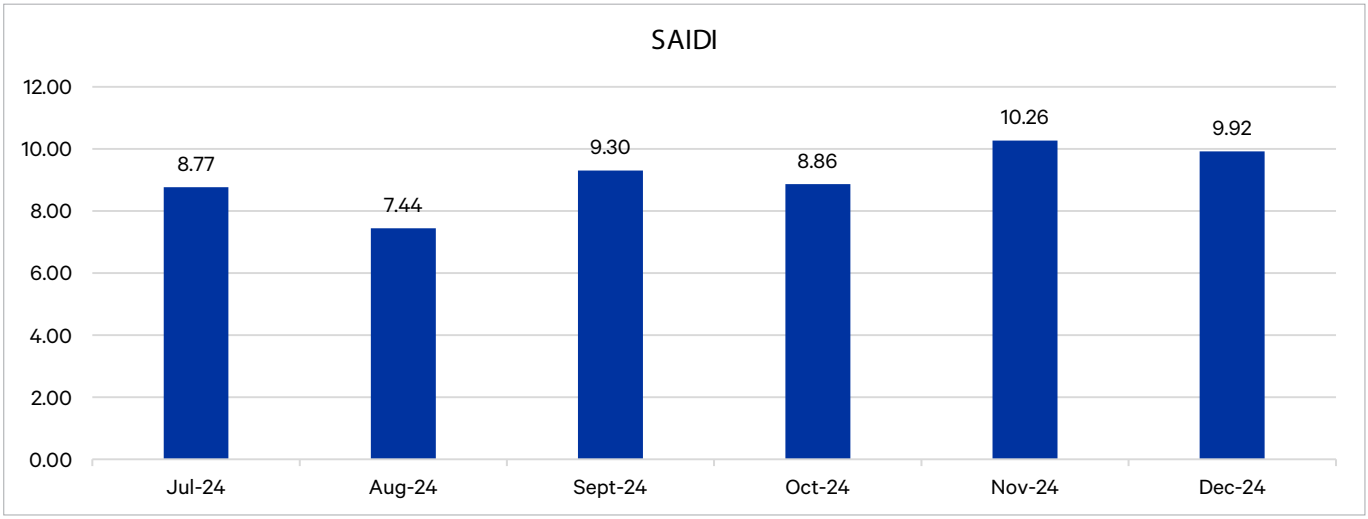


Figure 2.11: SAIDI trend from July to December 2024

c) System Average Interruption Frequency Index (SAIFI)

SAIFI measures the average number of interruptions that any given customer experiences. SAIFI is measured in units of interruptions per customer.

Customers experienced an average of 3.57 interruptions per month in the period under review. This is an improvement from the 3.87 interruptions per month registered in a similar period in the last financial year. However, it was above the 1.63 interruptions threshold per month set by the Authority.

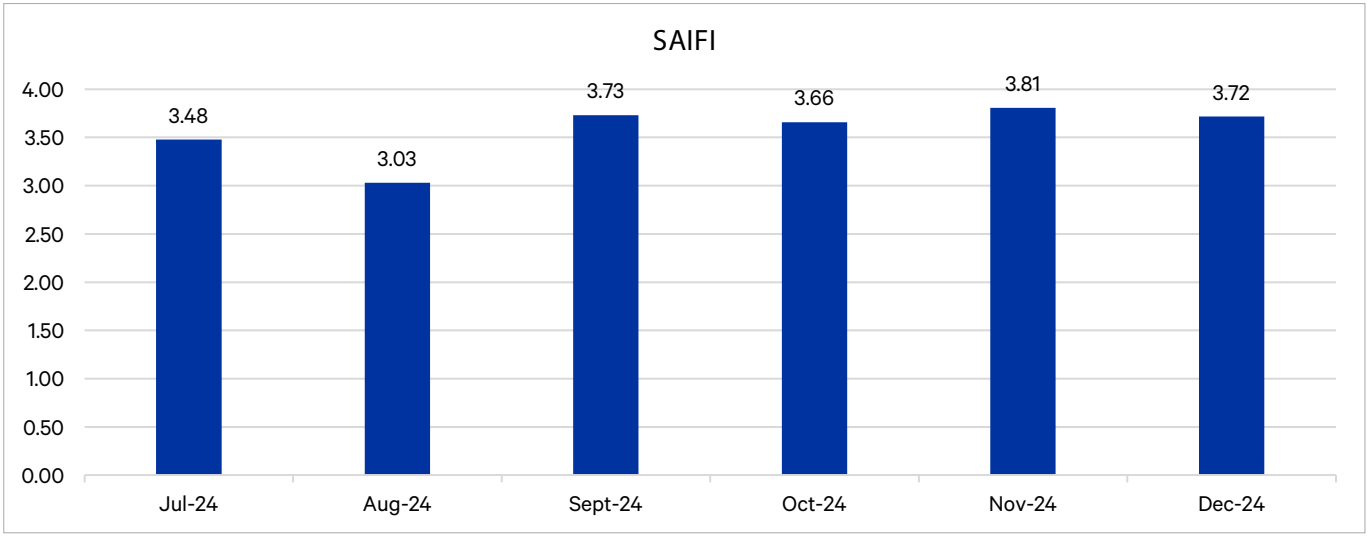


Figure 2.12: The monthly SAIFI trend for the first half of the financial year 2024/25

During the review period, supply was most reliable in August and least reliable in November as shown in figure 2:13.

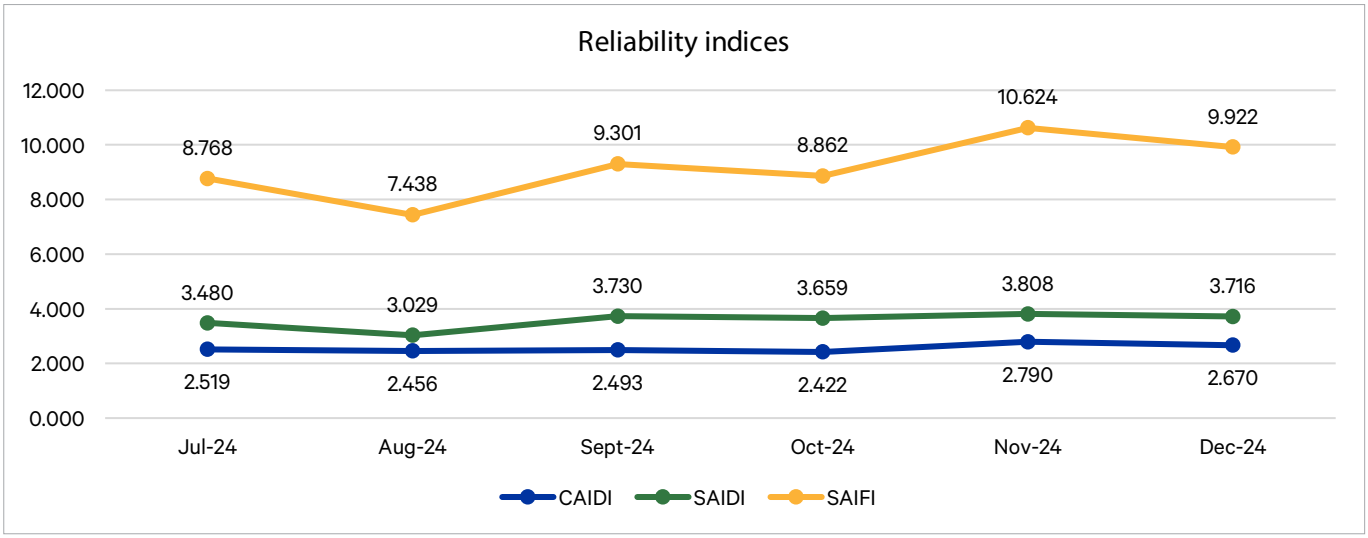


Figure 2:13: A comparative trend of the reliability indices from July to December 2024

The duration of outages has increased over the past three years, as shown in figure 2.14.

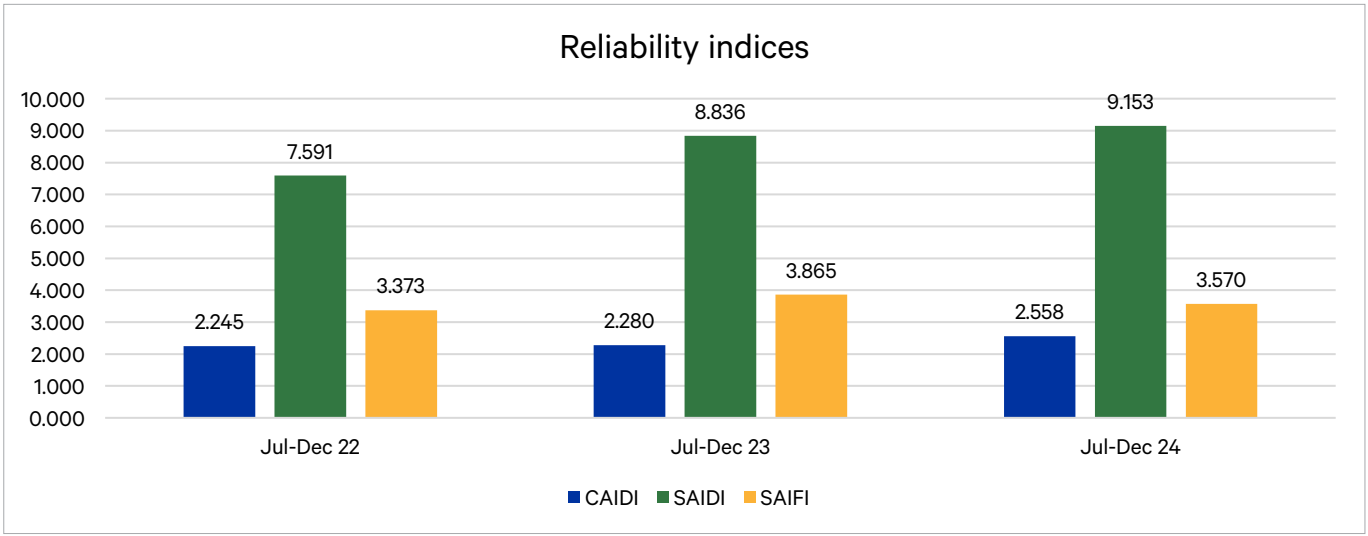


Figure 2:14: A comparative summary of reliability indices for the first half of the 2022/23 to 2024/25 financial years.

2.2 Electricity Pricing

The electricity pricing structure takes into account various factors, including the cost of generating, transmitting and distributing electricity, pass through costs, allowable energy losses, as well as government taxes and levies.

2.2.1 Power Purchase Agreement

A Power Purchase Agreement (PPA) is a contractual arrangement between power generators and utility companies, outlining the terms for the sale of electricity. These terms encompass the quantity of power to be sold and the associated costs. PPAs play a crucial role in ensuring a long-term price stability by establishing a fixed electricity price throughout the contract term. This stability is beneficial to both generators and consumers, as it helps mitigate the risks associated with fluctuating market conditions. The following agreements between power producers and KPLC were approved in the period under review.

1. The energy exchange agreement between KPLC and Tanzania Electric Supply Company (TANESCO)
2. A power purchase agreement between KPLC and Orpower Twenty-Two Limited.
3. The 3rd Supplemental Agreement to the PPA between KPLC and Kenya Electricity Generating Company PLC (KenGen) for the isolated thermal, small hydro and wind power generating plants.
4. The Energy Exchange Agreement (EEA) between KPLC and Uganda Electricity Transmission Company Limited (UETCL).
5. The PPA between Chania Power Company (Seller) and KTDA Power Company Limited (Sponsor) and KPLC (Buyer).
6. The PPA between Metumi Power Company (Seller) and KTDA Power Company Limited (Sponsor) and KPLC (Buyer).
7. The PPA between Nyakwana Power Company (Seller) and KTDA Power Company Limited (Sponsor) and KPLC (Buyer).

2.2.2 Base Electricity Tariff

The base electricity tariff consists of multiple components that encompass the costs related to electricity generation, transmission, distribution, operational expenses, and return on equity for the utility company. The Authority approved the base tariff for the tariff control period spanning 2022/23 to 2025/26 in March 2023. Table 2.7 provides details of the applicable base tariff for the various customer categories during the review period.

Table 2.7: The base tariff for the financial year 2024/25

Customer Category	Voltage at connection	Energy Limit (kWh/month)	Energy Charge (Ksh./kWh)		Demand Charge (Ksh.)
			As at June 2024	As at December 2024	
Domestic	240 Volts/415 Volts	0-30	12.24	12.23	0
		30-100	16.58	16.54	0
		>100	20.58	19.08	0
Small Commercial	240 Volts/415 Volts	<30	12.24	12.23	0
		30-100	16.36	16.34	0
		>100	20	19.4	0

Customer Category	Voltage at connection	Energy Limit (kWh/month)	Energy Charge (Ksh./kWh)		Demand Charge (Ksh.)
			As at June 2024	As at December 2024	
Electric Mobility	240 Volts/415 Volts	200-15,000	16	16	0
Commercial Industrial	415 Volts	>15,000	14.5	13.74	1,100
	11,000 Volts	No Limit	13.08	12.44	700
	33,000 Volts	No Limit	12.52	11.92	370
	66,000 Volts	No Limit	12.26	11.68	300
	132,000 Volts	No Limit	11.98	11.4	300
	220,000 Volts	No Limit	10	10	200
Special Economic Zones	132kV	No Limit	10	10	200
Street Lighting		No Limit	9.24	9.23	0

2.2.3 Pass-through charges

Pass-through charges are implemented to cover additional expenses incurred in the provision of generation, transmission and distribution of electricity which are not included in the base tariff. These include Fuel Energy Charge (FEC), Foreign Exchange Rates Fluctuations Adjustments (FERFA), Water Resource Authority (WRA) levy, Inflation Adjustments, and taxes and levies.

The Fuel Energy Charge (FEC) exhibited fluctuations during the review period with the lowest at Ksh. 3.25/kWh in July and highest at Ksh. 3.72/kWh in November 2024. These fluctuations are attributed to varying quanta of thermal power dispatch because of poor hydrology, varying wind output, and to compensate for unavailable geothermal generation.

The WRA levy contributes to the maintenance and operation of the WRA infrastructure, ensuring sustainable water resource management. During the review period, the WRA levy was highest at Ksh. 0.0178/kWh in August and lowest at Ksh 0.0134/kWh in November. The rate is prescribed in Water Resources Management Rules, 2007 at 5 Cents/kWh for generation derived from hydro sources of 1MW and above.

The FERFA is designed to offset the impact of foreign exchange rate fluctuations on power purchase costs and KPLC/ KenGen forex losses on foreign currencies denominated loans. During the review period, FERFA recorded a high of Ksh. 1.171/kWh in August and a low of Ksh. 0.6904/kWh in November 2024.

Inflation adjustment is implemented to account for changes in the general price level of goods and services, ensuring that electricity tariffs align with prevailing economic conditions. The actual inflation adjustment on end-user tariffs, done biannually, was Ksh. 0.38/kWh throughout the review period. Table 2.8 illustrates the trend in pass-through costs.

Table 2.8: A summary of the pass-through costs between July to December 2024

Pass Through Costs(Kshs/kWh)	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24
FEC	3.25	3.48	3.43	3.39	3.72	3.57
FERFA	0.9833	1.171	1.0332	1.1489	0.6904	1.014
INFLATION ADJ.	0.38	0.38	0.38	0.38	0.38	0.38
WRA LEVY	0.0169	0.0178	0.0156	0.0139	0.0134	0.0135

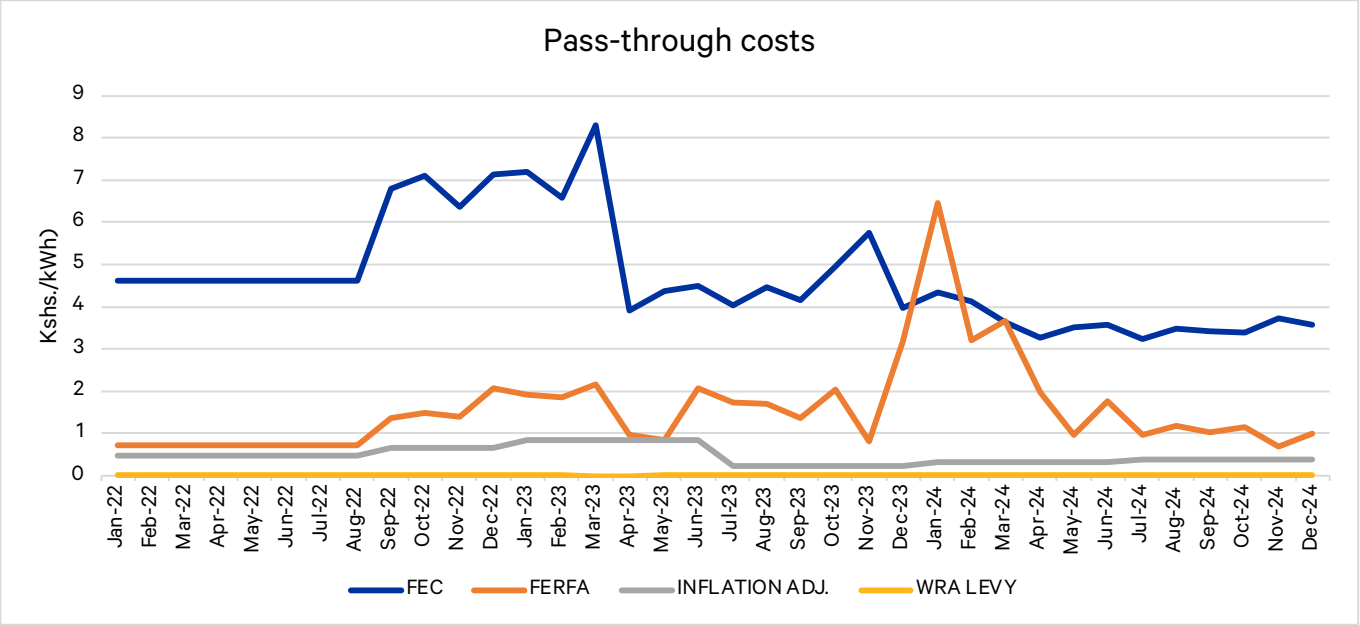


Figure 2.15: A comparative trend in pass-through costs from July 2022 to December 2024.

2.2.4 Evolution of the overall electricity Tariff

The overall electricity tariff covers both the cost of producing energy, the pass-through costs, taxes and levies. The fluctuations in the overall tariff is attributed to the fluctuations in the pass through costs and the review of the base tariff. Table 2.9 provides a summary of the trend in the overall tariff for the various customer categories.

Table 2.9: A summary of the overall electricity retail tariff for the various customer categories

Customer Category	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24
DC 1 Lifeline (0-30 kWh)	20.03	20.48	20.29	20.35	20.28	20.43
DC 2 Ordinary (30-100 kWh)	25.24	25.7	25.5	25.57	25.49	25.64
DC 3 Ordinary (100-15000 kWh)	28.32	28.77	28.57	28.64	28.57	28.72
Small Commercial 1 (0-30 kWh)	20.03	20.48	20.29	20.35	20.28	20.43
Small Commercial 2 (30kWh-100kWh)	25	25.46	25.26	25.33	25.25	25.4
Small Commercial 3 (100kWh-1500kWh)	28.7	29.16	28.96	29.03	28.95	29.1
SC Bulk Supply (1000kWh-1500kWh)	28.7	29.16	28.96	29.03	28.95	29.1
Commercial Industrial 1 - 415 V (> 15,000 kWh)	25.31	25.77	25.57	25.64	25.56	25.71
Commercial Industrial 2 - 11,000 V	21.17	21.63	21.43	21.5	21.42	21.57
Commercial Industrial 3 - 33,000 V	21.31	21.77	21.57	21.64	21.56	21.71
Commercial Industrial 4 - 66,000 V	20.38	20.83	20.64	20.7	20.63	20.78
Commercial Industrial 5 - 132,000 V	19.45	19.9	19.7	19.77	19.69	19.84
Commercial Industrial 6 - 220,000 V	17.37	17.82	17.62	17.69	17.61	17.76
Commercial Industrial 7 (SEZs)	17.37	17.82	17.62	17.69	17.61	17.76
E-Mobility	24.59	25.05	24.85	24.92	24.84	24.99
Street Lighting	16.4	16.85	16.66	16.72	16.65	16.8

Figure 2.16 presents a comparative trend in retail tariff for domestic, small commercial, e-mobility and street lighting.

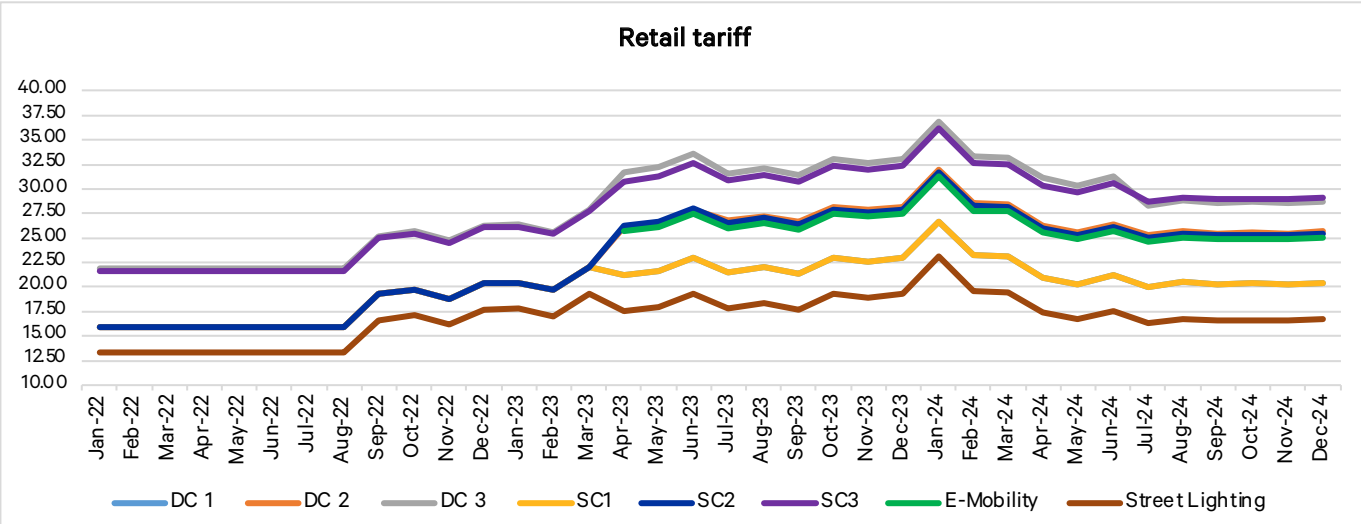


Figure 2.16: A comparative trend in retail tariff for domestic, small commercial, e-mobility and street lighting customer categories

The tariff evolution trend for Commercial Industrial Customers is illustrated in figure 2.17.

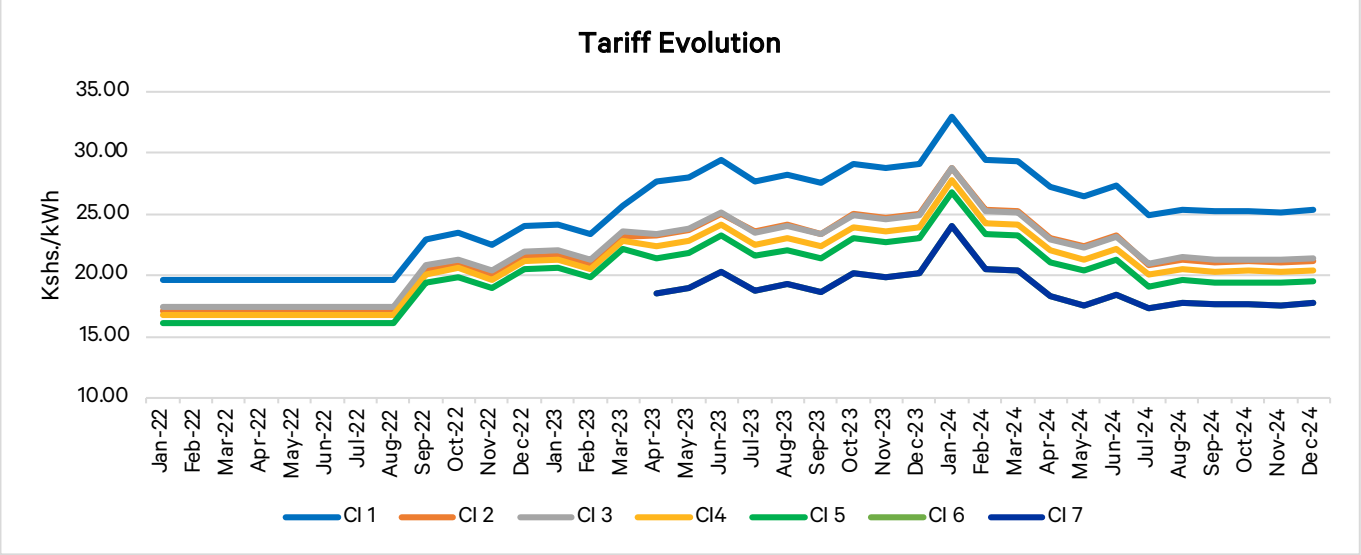


Figure 2.17: A trend retail tariff for the commercial industrial customers

Table 2.10 provides a breakdown of the overall retail tariff for the DC3 category, the largest consumer group under the domestic category, with monthly consumption exceeding 100 kWh.

Table 2.10: A breakdown of the retail tariff for DC 3(>100kWh)

Component(Kshs./kWh)	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24
Base Tariff	19.08	19.08	19.08	19.08	19.08	19.08
Pass Through Costs	4.61	5.03	4.84	4.92	4.79	4.96
Taxes and Levies	4.62	4.66	4.65	4.64	4.70	4.67
Total	28.31	28.77	28.57	28.64	28.57	28.71

Figure 2.18 Illustrates the cost component proportions in the December 2024 retail tariff for the domestic customer category (DC3).

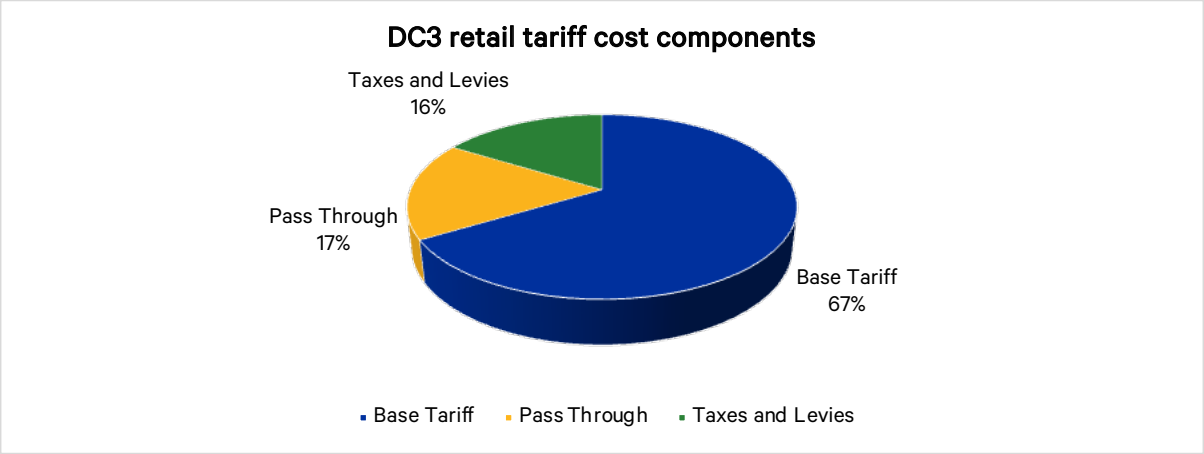


Figure 2.18: Proportions of cost components in the DC3 retail tariff for December 2024.

2.2.5 Time of Use (ToU) Tariff

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

The ToU beneficiaries cumulatively saved Ksh. 688.7 million during the review period. The savings achieved in this period decreased by Ksh. 201.9 million compared to the first half of the previous financial year. During the review period, 84.9 GWh of energy was sold under the ToU tariff, down from 107.5 GWh in the same period of the previous year.

Table 2.11: Monthly savings by the ToU customers

Month	No. of Customers Who Benefited	Customer Savings (Ksh. Mill)	Total Increase In Sales (Low Rate) GWh
Jul-24	2,446	149.7	19.0
Aug-24	2,296	98.5	11.5
Sep-24	2,263	88.2	10.8
Oct-24	2,437	100.6	12.0
Nov-24	2,452	117.1	14.2
Dec-24	2,405	134.6	17.5

Source: Kenya Power

Figure 2.19 presents the trend in customers' savings from the TOU tariff from January 2022 to December 2024.

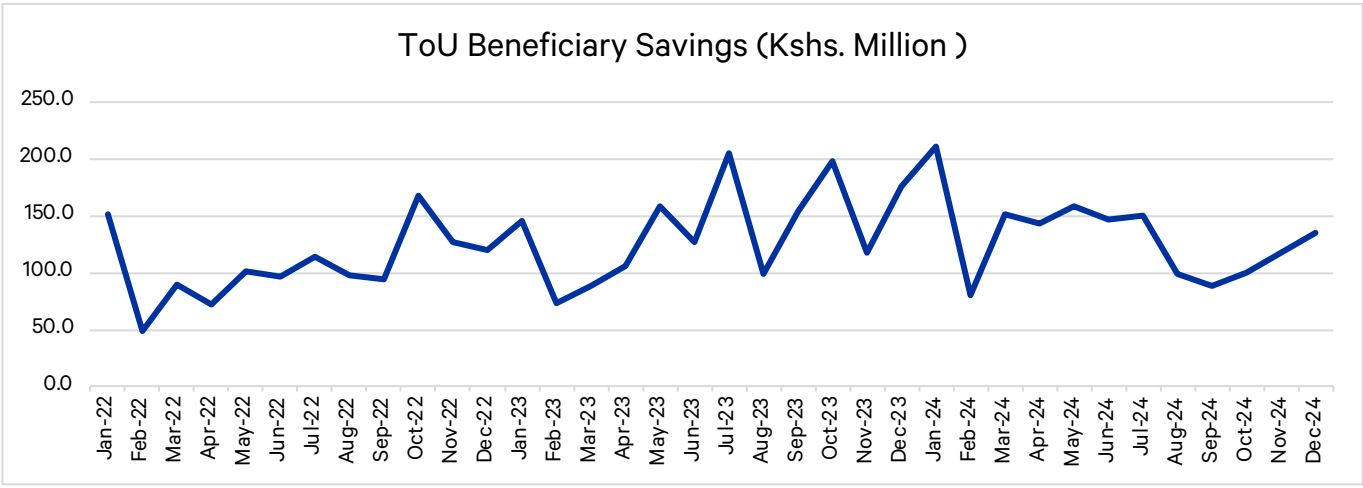


Figure 2.19: A trend in TOU savings from 2022 to 2024

2.3 Market share

The electricity subsector market share is determined by the proportion of energy purchased from power producers by the off taker (Kenya Power). KenGen maintained its dominant position in the energy market, with a market share of 59.94%. This dominance underscores KenGen's significant role as a major player in the energy generation landscape, attributed to its extensive infrastructure and diverse portfolio of power generation assets. Additionally, most of KenGen's plants, particularly geothermal ones, operate as baseload power sources and have a high availability factor.

Imports held the second largest market share of 10.48% followed by Lake Turkana Wind Power (LTWP) plant at 10.24%. Other generators with notable market shares include Orpower, Rabai Power, Kipeto Energy and Sossian. Table 2.12 shows the market shares of the electricity sector based on energy purchased for the period under review.

Table 2.12: A biannual comparative summary of market shares

Company	Energy Generated (GWh)	Market Share	
	July-December 2024	July-December 2023	July -December 2024
KenGen	4,302.19	62.24%	59.94%
Imports	751.953	6.19%	10.48%
Lake Turkana Wind Power	734.86	10.25%	10.24%
Orpower	414.635	6.26%	5.78%
Rabai Power	230.266	3.18%	3.21%
Kipeto Energy PLC	215.887	3.45%	3.01%
Sosia Geothermal	160.092	1.90%	2.23%
Others	367.73	6.53%	5.12%
Total	**7,177.61**	**100%**	**100%**

2.4 Greenhouse Gas Emissions

Kenya is a signatory to the Paris Agreement and has committed, through its Nationally Determined Contributions (NDCs), to reducing greenhouse gas (GHG) emissions by 32% by 2030, compared to a business-as-usual scenario of 143 $MtCO_2eq$. The NDCs encompass various sectors, including energy, industrial processes, product use, agriculture, land use, forestry, and waste. They target key greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). This section presents an analysis of Greenhouse Gas Emissions from electricity supplied from the grid.

These commitments have resulted in initiatives that have contributed to emission reductions in the electricity subsector. In the period under review, the CO_2 emissions were estimated at 353,646.78 tCO2 from the total half year grid electricity generation of 7,177,614.50 MWh. This translates to a grid emission factor of 0.04927tCO2/MWh. This is a reduction of 6.18% from a similar period in the previous financial year which recorded a grid emission factor 0.05252tCO2/MWh.

Overall, the CO2 emissions reduced by 0.5% from 355,418.46tCO2 to 353,646.78 tCO_2. This is attributed to a 0.58% decline in grid thermal generation from 567,114 MWh to 563,831 MWh during the period under review.

CHAPTER 3

RENEWABLE ENERGY

This section outlines the status of the renewable energy subsector, highlighting the installed capacity and performance of each renewable energy resource during the review period.

3.1 Installed capacity

The installed capacity of renewable energy sources as at December 2024 was 2,901.0 MW, which accounts for 80.32 % of Kenya's total installed capacity. This comprises 2,427.2 MW of interconnected renewable energy capacity and 469.8 MW of captive renewable energy capacity. The period under review saw additions in captive solar PV plants to an installed captive capacity of 271.3 MW. Table 3.1 shows the country's installed renewable energy capacity by technology as at December 2024.

Table 3.1: Installed renewable energy capacity by technology as at December 2024

Technology	Interconnected Capacity (MW)		Captive Capacity (MW)	Offgrid Capacity	Total Installed Capacity	% Total Installed
	Installed	Effective				
Hydro	839.5	809.7	33.0	0.1	872.5	24.16%
Geothermal	940.0	876.1	3.7	0.0	943.7	26.13%
Wind	435.5	425.5	-	0.6	436.1	12.07%
Solar	210.3	210.3	271.3	3.4	484.9	13.43%
Bioenergy	2.0	2.0	161.8	0.0	163.8	4.54%
Total	**2,427.2**	**2,323.6**	**469.8**	**4.0**	**2,901.0**	**80.32%**

In the period under review, 81.16% of the energy supplied to Kenya's national grid was obtained from renewable energy sources. Thermal plants accounted for 8.42% while 10.41 % was imported. For the renewable energy sources, geothermal energy generation continues to supply the majority of Kenya's electric energy demand accounting for 39.81% of the total energy generation. Hydro and Wind generation were second and third accounting for 24.74 % and 13.46 % respectively. Utility scale solar generation contributed 3.15 % of the country's energy needs. The renewable energy contribution to the generation mix illustrated in figure 3.1.

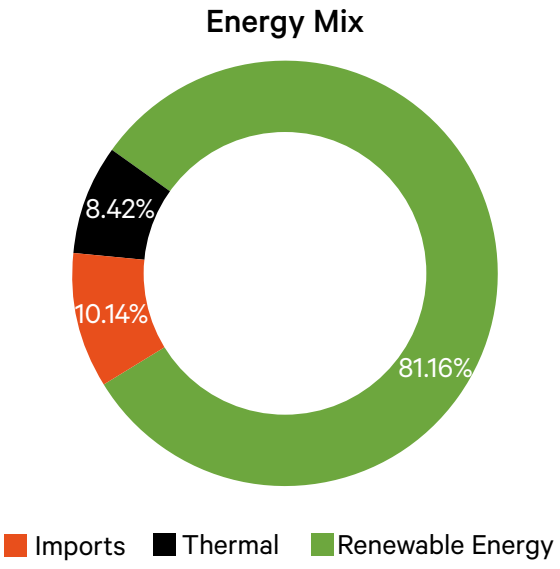


Figure 3.1: Renewable energy contribution to Kenya's energy mix from July – December 2024

3.1.1 Geothermal

Kenya's installed geothermal capacity as at December 2024 was 943.7 MW. In the period under review 2,875.33 GWh of energy was generated from geothermal energy resources accounting for 39.81% of energy supplied to the interconnected grid. The monthly energy generation during the review period is illustrated in figure 3.2. The highest geothermal energy generation occurred in November, reaching 495.31 GWh, while the lowest was recorded in September at 455.23 GWh.

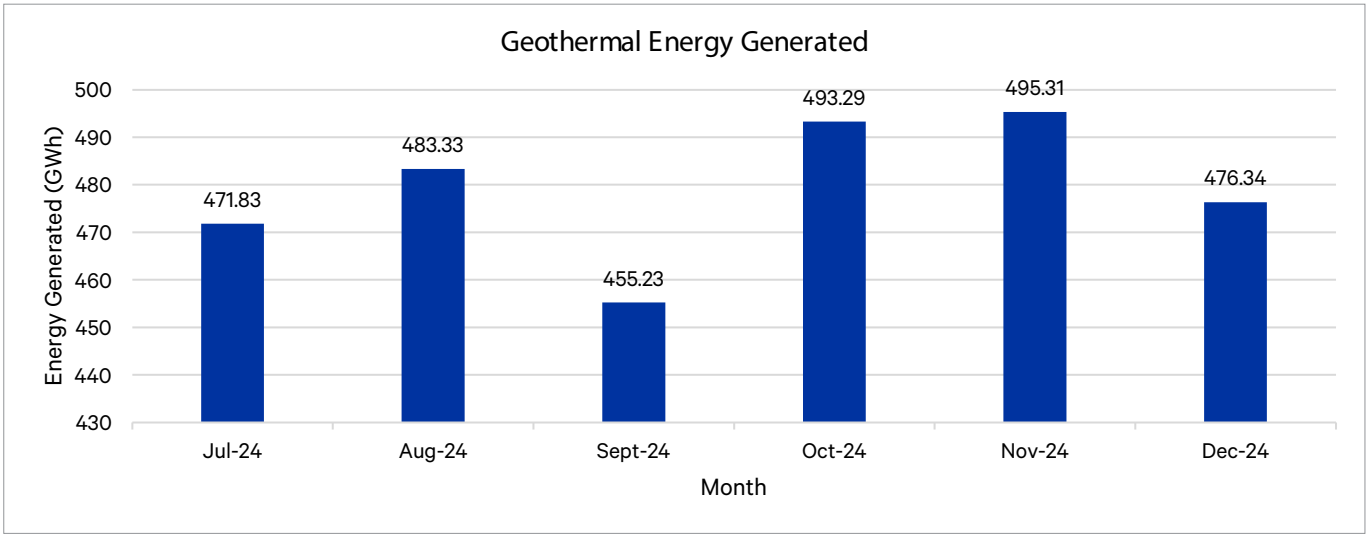


Figure 3.2: Geothermal energy generated from July to December 2024

The geothermal energy generation in the period under review decreased by 5.17% from 3,032.03 GWh in a similar period in the previous financial year. The decrease is attributed to increased electricity imports. The geothermal energy generated between 2022 and 2024 is illustrated in figure 3.3.

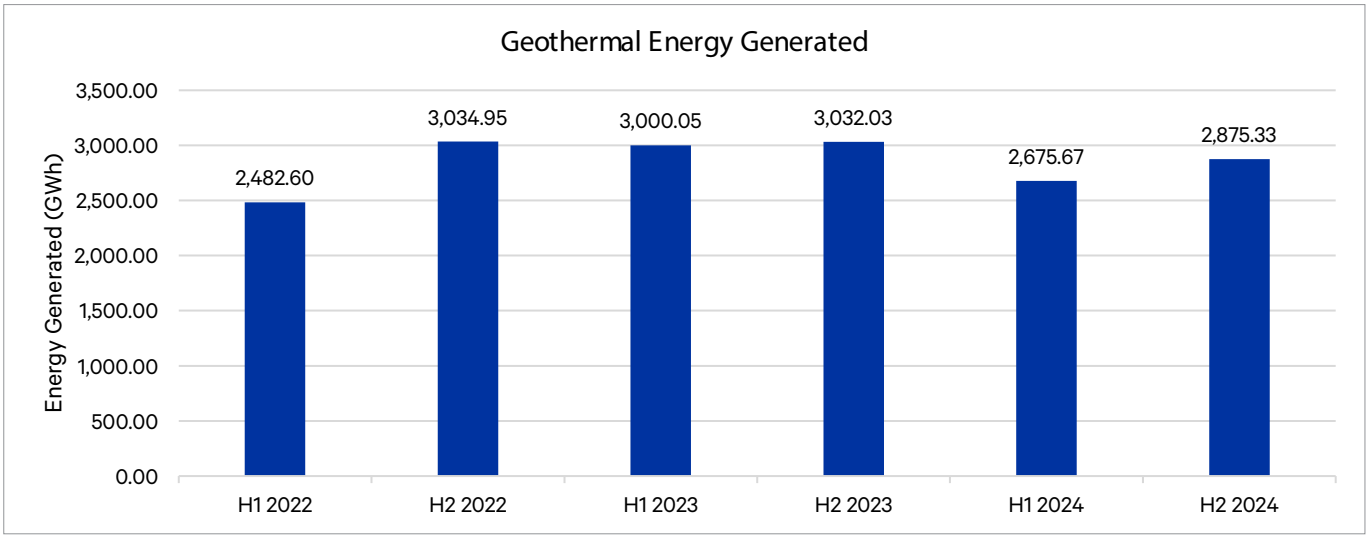


Figure 3.3: A trend of the geothermal energy generated from Jan 2022 to Dec 2024

3.1.2 Hydro Power

As of December 2024, the installed capacity of Kenya's hydro plants was 872.5 MW, comprising 839.5MW of interconnected capacity and 33MW of captive capacity.

During the period under review, interconnected hydropower plants generated 1,786.90 GWh, accounting for 24.79% of the total energy generated. Figure 3.4 provides a visual representation of the monthly energy generation from hydropower plants throughout the review period. July recorded the highest hydro energy generation at 358.23 GWh, while September had the lowest at 270.96 GWh.

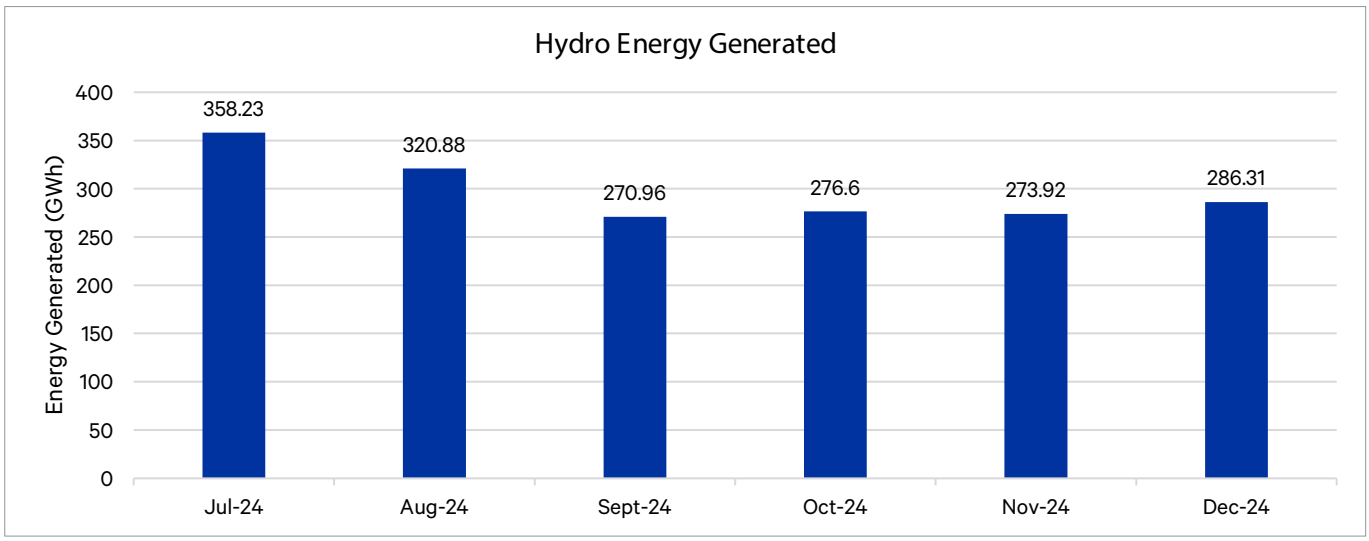


Figure 3.4: A trend of the energy generation from hydropower plants from July to December 2024

In the period under review, there was an increase in hydro energy generation, by 16.49 % compared to a similar period in the previous financial year. This is attributed to improved hydrology in the review period. Figure 3.5 illustrates the hydro energy generation from 2022 to 2024.

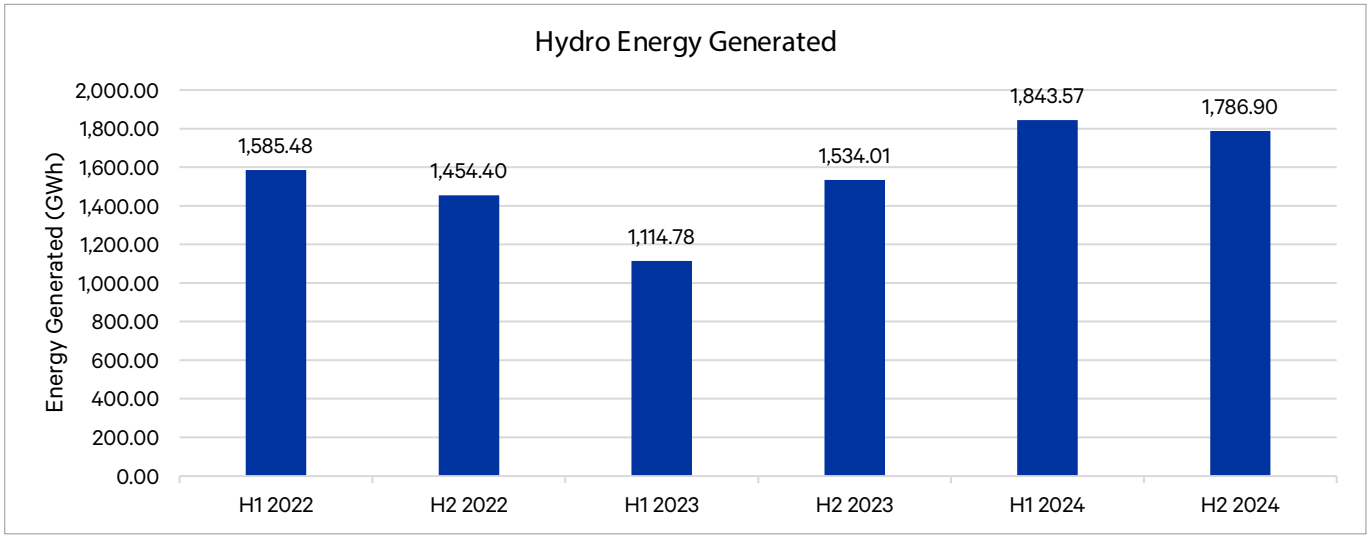


Figure 3.5: A trend of hydro energy generation from 2022 to 2024

3.1.3 Wind

Kenya's installed wind capacity as at December 2024 was 436.1 MW. Figure 3.6 shows the monthly wind energy generation during the review period. The highest wind energy generation occurred in September at 190.61 GWh, while the lowest was recorded in July at 134.71 GWh.

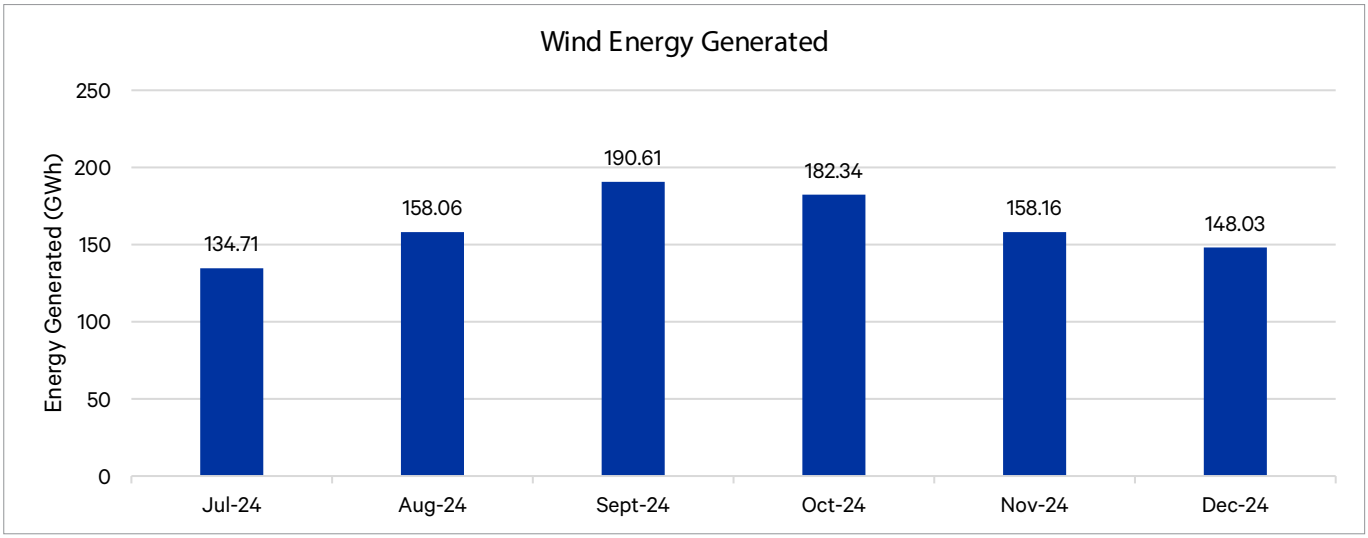


Figure 3.6: A trend of the wind energy generated from July to December 2024

Wind energy contributed 971.90 GWh to the interconnected grid during the period under review, accounting for 13.46% of the country's total electricity mix. The wind energy generated decreased marginally by 0.09% from 972.82 GWh in a similar period in the previous financial year. The wind energy generation trend between 2022 and 2024 is provided in figure 3.7.

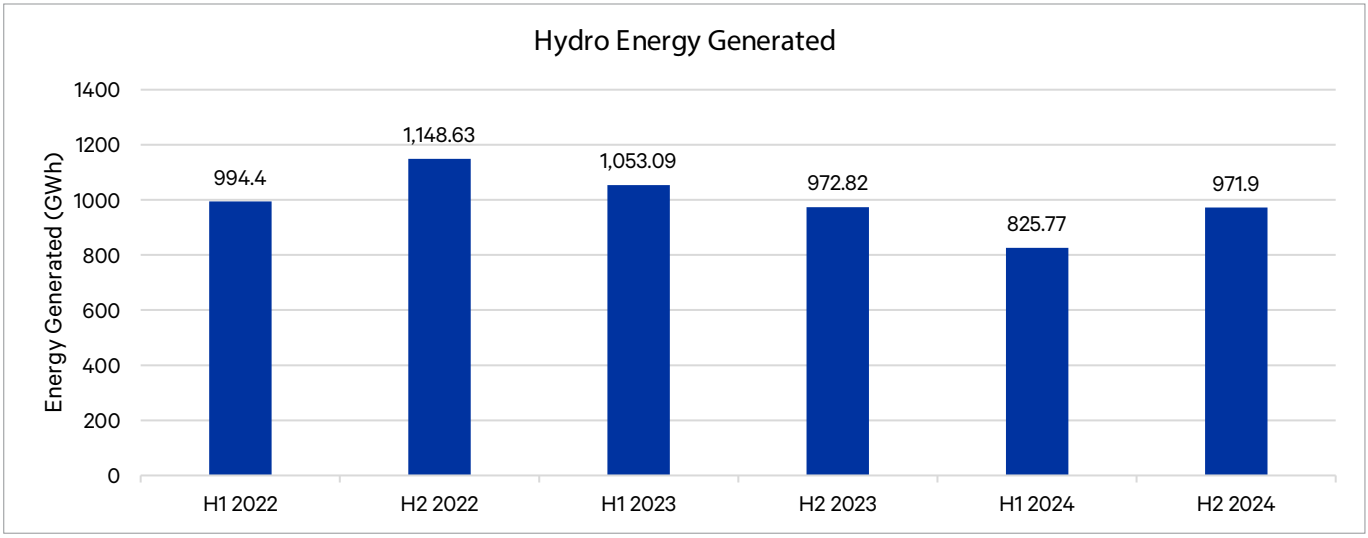


Figure 3.7: A trend of the wind energy generated between 2022 and 2024

3.1.4 Solar

As of December 2024, Kenya's solar installed capacity was 485.0 MW, comprising 210.3 MW of grid-interconnected capacity and 271.3 MW of captive capacity.

The monthly energy generation from interconnected solar photovoltaic plants is displayed in Figure 3.8. The highest solar energy generation occurred in December, at 44.88 GWh, while the lowest was recorded in July, at 31.34 GWh. The fluctuations in energy generation are attributed to variations in solar insolation.

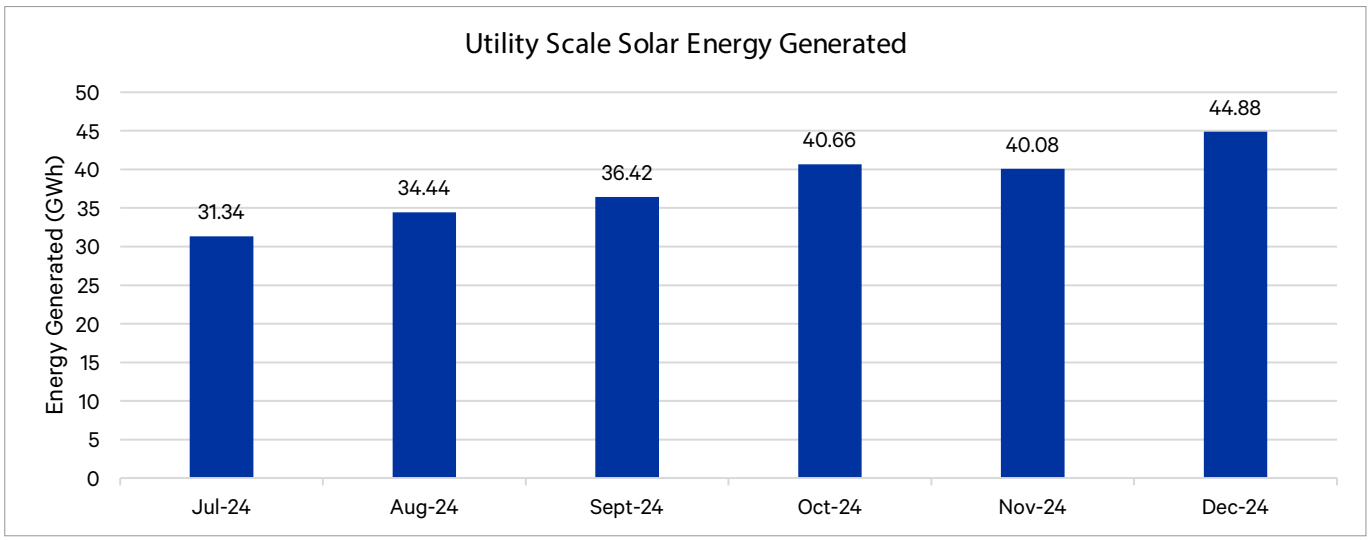


Figure 3.8: A trend of the solar energy generated from July to December 2024

The energy generated from interconnected solar PV systems decreased by 5.47% from 240.99 GWh in a similar period in the previous financial year. A trend in the annual solar energy generation between 2022 and 2024 is provided in figure 3.9.

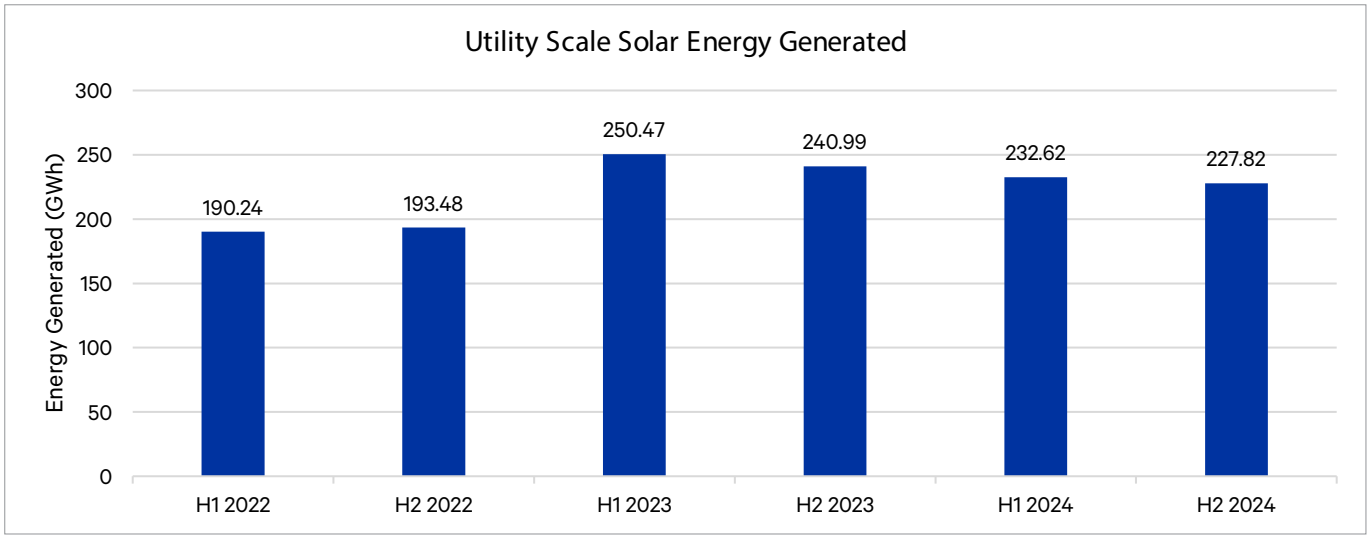


Figure 3.9: A trend in the solar energy generation between 2022 and 2024

Solar photovoltaic systems continue to have the highest contribution to the country's captive generation capacity at 271.3 MW, which accounts for 47.21 % of the total captive capacity. The preference for this technology can be attributed to several factors, including the ease of setup, advantageous solar insolation levels in many regions of Kenya, cost-effectiveness in terms of energy production, and supportive government policies.

3.1.5 Bioenergy

Bioenergy refers to sustainable energy derived from organic matter and can take various forms such as firewood, biochar, briquettes, bagasse, biogas, syngas, bioethanol, and biodiesel. In Kenya, these diverse forms of bioenergy find applications in open-fire cooking, improved cook stoves, industrial biomass boilers, furnaces, internal combustion engines, lighting lamps, and electricity generation. Notably, bioenergy constitutes a substantial portion of final energy consumption in Kenya.

As of December 2024, the installed capacity for bioenergy was 163.8 MW, comprising 161.8 MW of captive capacity and 2MW of grid-interconnected capacity.

CHAPTER 4

OTHER ENERGY SOURCES

These energy sources play a crucial role in stabilizing the grid by providing auxiliary support to the primarily renewable main energy sources.

4.1 Imports

Kenya imports 200 MW of electricity from Ethiopia Electricity Power (EEP) company and has energy exchange contracts with Uganda Electricity Transmission Company Limited (UETCL) and Tanzania Electricity Supply Company Limited (TANESCO). These energy exchange contracts allow Kenya to obtain competitively priced renewable energy from its neighbors while increasing the interconnected grid reliability and promoting regional power trade. In the period under review, Kenya imported 751.95 GWh of electricity accounting for 10.41 % of the country's energy mix. Figure 4.1 shows the monthly energy imports during the review period. The highest energy imports were recorded in November at 134.18 GWh, while the lowest occurred in July at 106.11 GWh.

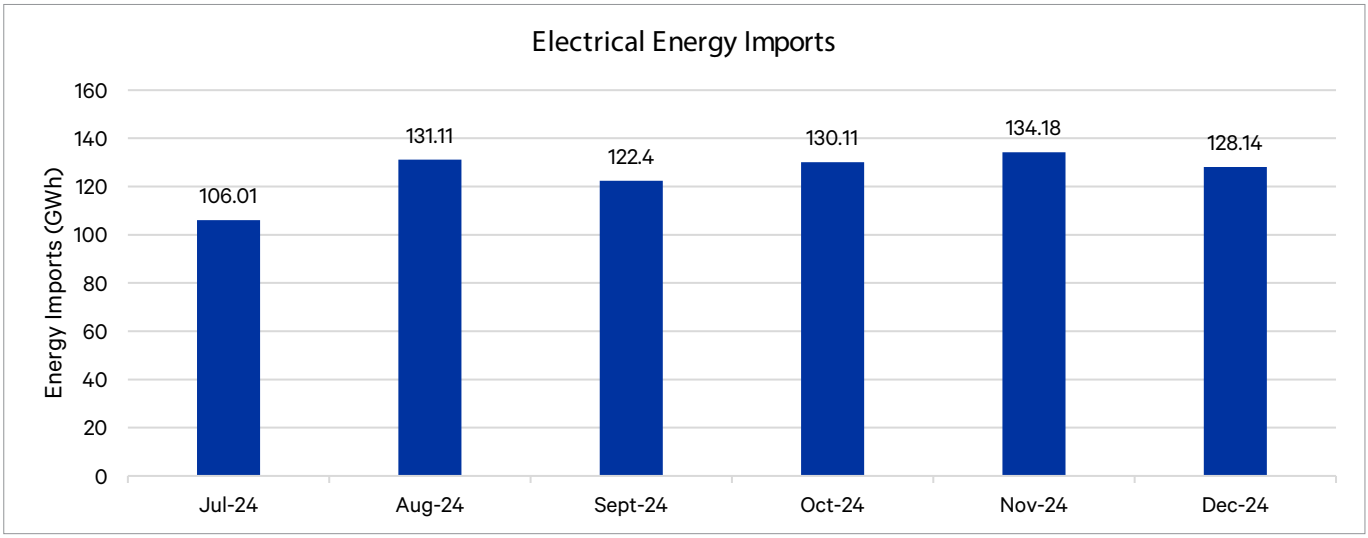


Figure 4.1: A trend in the energy imports from July to December 2024

Electricity imports increased by 79.41%, from 419.13 GWh in a similar period in the previous financial year to 751.95 GWh during the review period. This increase is attributed to the full commercial operation of the Ethiopia Electricity Power (EEP) contract, which began in December 2023.

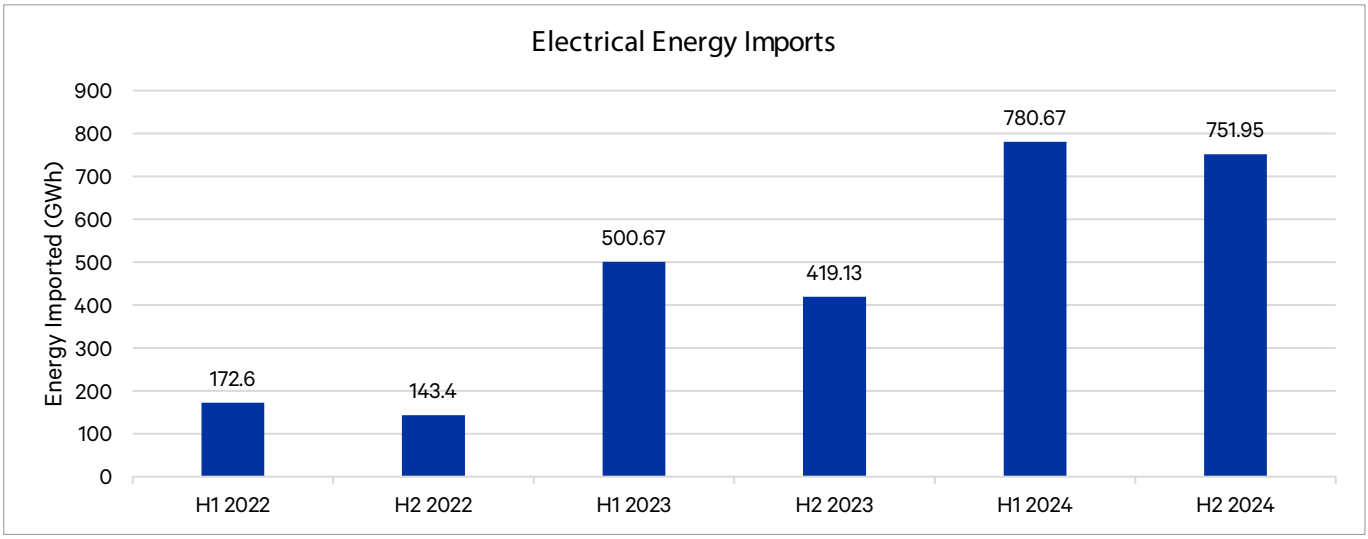


Figure 4.2: A trend in the electrical energy imports between 2022 and 2024

4.2 Thermal energy

Kenya has an installed thermal capacity of 627.1 MW comprising 512.8 MW of medium speed diesel and 52 MW of gas turbines. Thermal energy resources are utilized to meet peak demand, for voltage support and to counter the intermittence of renewable energy resources. In the period under review, 608.46 GWh of energy was sourced from thermal energy sources. The highest thermal energy was generated in October at 110.59 GWh while the least was generated in September at 92.30 GWh.

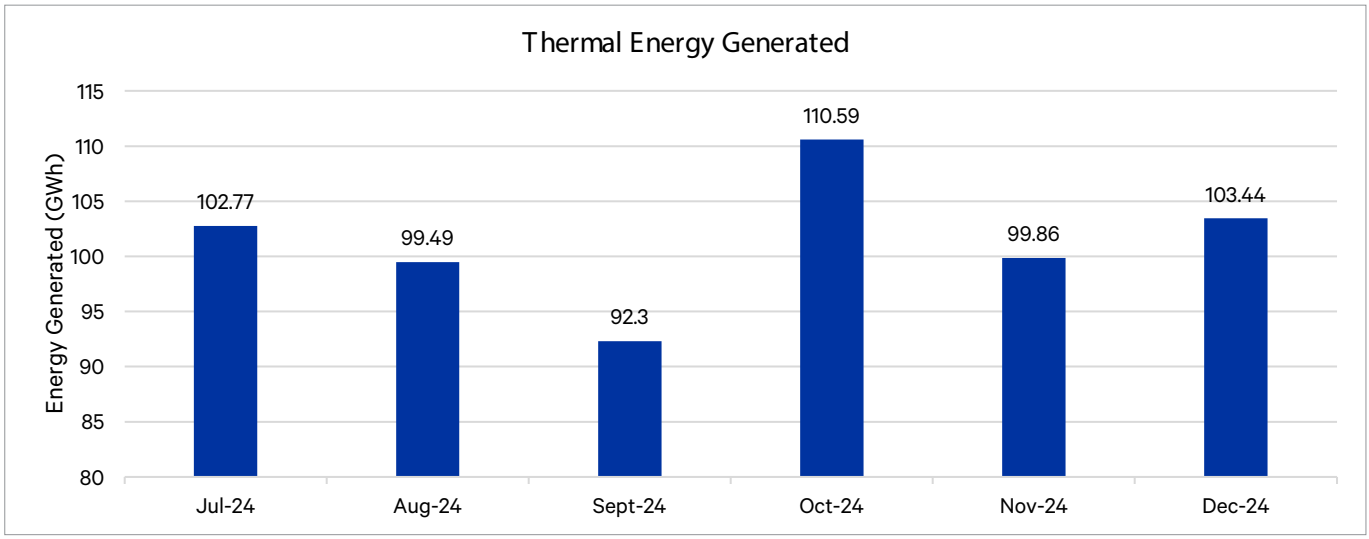


Figure 4.3: A trend of the thermal energy generated from July to December 2024

Thermal generation has declined significantly since 2022, as shown in figure 4.4. However, during the review period, it increased slightly by 0.39%, from 606.09 GWh in the same period of the previous financial year.

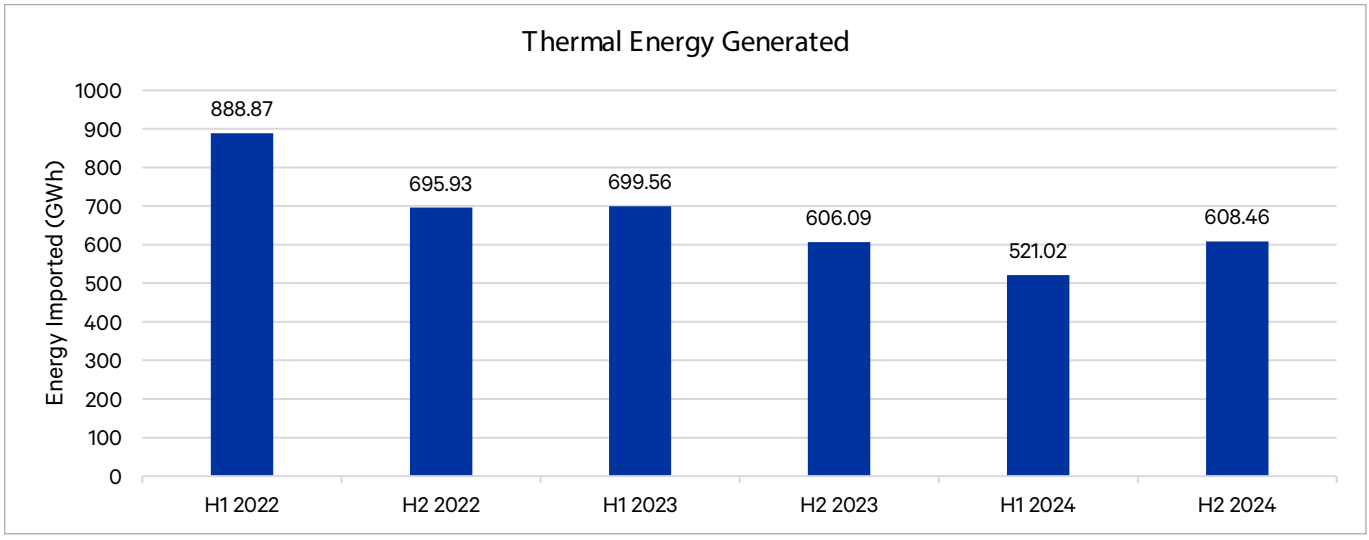


Figure 4.4: A trend in the thermal energy generated from 2022 to 2024

CHAPTER 5

ENERGY EFFICIENCY

The Authority has instituted two key regulations to promote energy efficiency: The Energy (Energy Management) Regulations, 2012 and the Energy (Appliances' Energy Performance and Labelling) Regulations, 2016.

The Energy (Energy Management) Regulations primarily target industrial, commercial and institutional facilities with an energy consumption threshold of at least 180,000 kWh. These regulations require designated facilities to conduct energy audits and implement the recommended energy conservation measures arising from these audits with an aim of achieving at least 50% of the projected energy savings.

Based on their energy consumption, facilities are classified into three categories: small facilities, which consume less than 180,000 kWh; medium facilities, which consume between 180,001 kWh and 1,200,000 kWh; and large facilities, which consume more than 1,200,000 kWh. In the period under review, 142 facilities comprising 25 small, 77 medium and 40 large energy consumers conducted energy audits. These audits identified estimated annual energy savings amounting to 79.082 GWh through the implementation of recommended energy conservation measures.

The Energy (Appliances' Energy Performance and Labelling) Regulations, on the other hand, aim to ensure that the regulated electric appliances manufactured or imported into the country meet Kenya's Minimum Energy Performance Standards (MEPS). The regulated appliances are: household refrigerators, non-ducted air conditioners, motors and lamps. During the period under review, 134 appliance models were registered comprising 80 household refrigerators, 53 air conditioners and 1 motor.

The Authority issues energy efficiency labels for the registered appliances based on a star rating system, ranging from 1 to 5 in the ascending order of energy efficiency, with 5 stars for the most efficient appliances. Figure 5.1 shows the distribution, by star rating, of the household refrigerators models registered during the period under review.

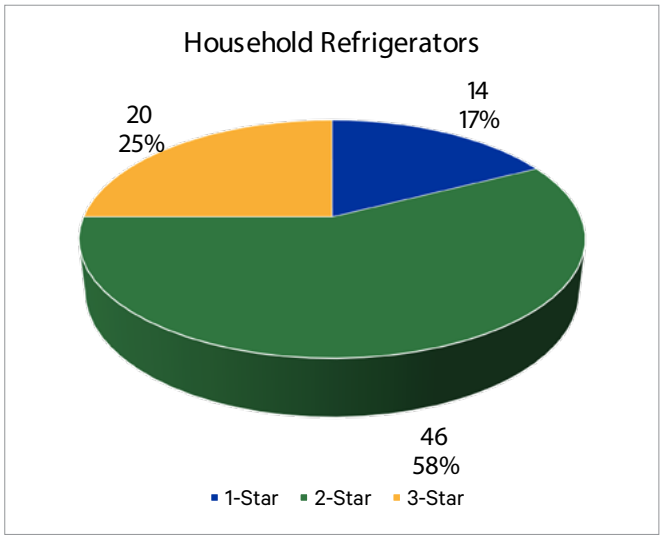


Figure 5.1: Distribution, by Star rating, of the registered household refrigerators models

As illustrated in figure 5.1, there were fourteen 1-Star rated, forty-six 2-Star rated and twenty 3-Star rated refrigerator models registered. The 2-Star rated refrigerator models accounted for more than half of the household refrigerators models registered during this period.

Figure 5.2 shows the distribution, by star rating, of non-ducted air conditioners (AC) models registered during the period under review.

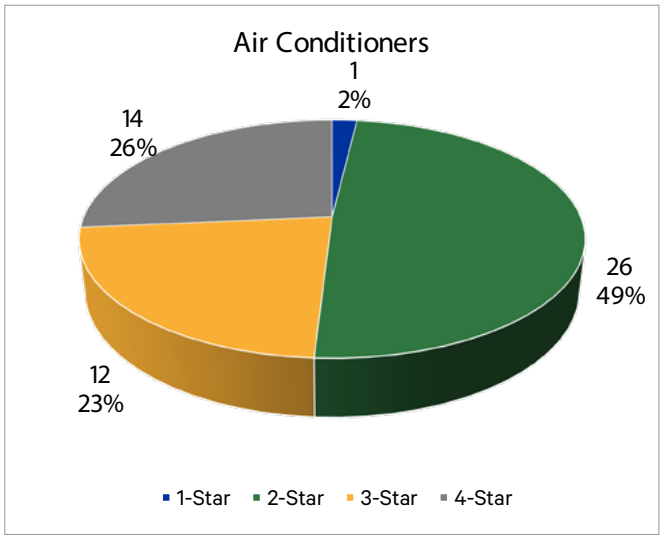


Figure 5.2: Distribution, by Star rating, of the registered non-ducted AC models

As shown in figure 5.2, a total of twenty-six 1-Star rated AC models, accounting for 49%, were registered during this period. In addition, twelve 2-Star and 14 3-Star rated AC models were registered, accounting for 23% and 26% respectively. Only one 4-Star rated AC model was registered.

CHAPTER 6

PETROLEUM SUBSECTOR

The petroleum subsector comprises the upstream, midstream, and downstream segments.

6.1 Upstream Subsector

Upstream petroleum operations encompass all activities related to the exploration, development, production, separation and treatment, storage, and transportation of petroleum up to the agreed delivery point. In Kenya, exploration activities are ongoing both onshore and offshore.

To date, ninety-four (94) exploration wells have been drilled by various oil exploration companies across four sedimentary basins. These basins cover a total surface area of 485,000 km² and are divided as follows:

- Lamu Basin: 261,000 km²
- Anza Basin: 81,000 km²
- Mandera Basin: 43,000 km²
- Tertiary Rift Basin: 100,000 km²

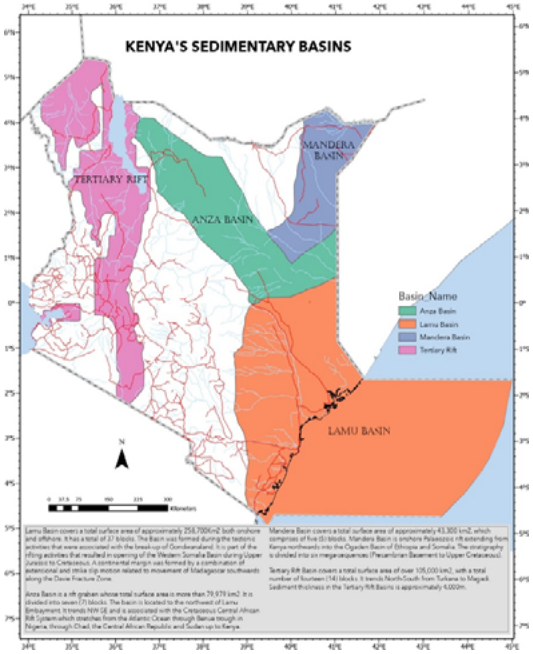


Figure 6.1: A map of sedimentary basins in Kenya

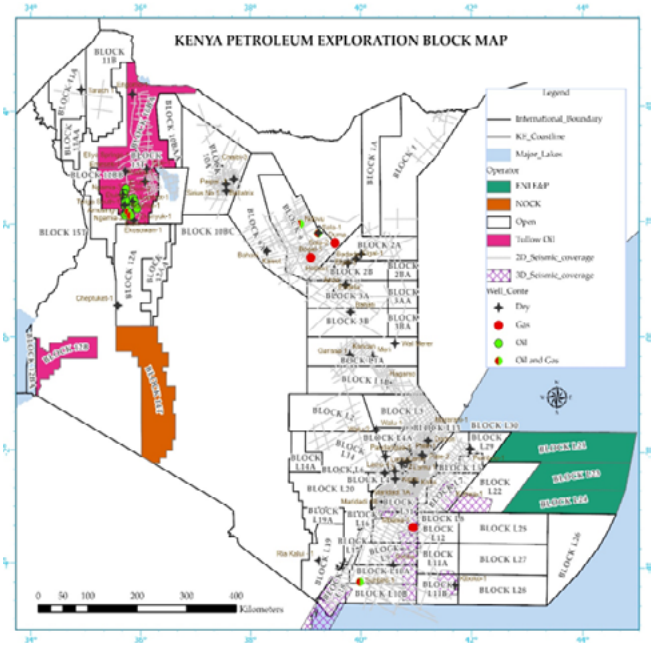


Figure 6.2: Map of petroleum exploration blocks in Kenya

The government is working on marketing some of the open petroleum blocks and is preparing data packages, block atlases and ranking of the blocks in readiness for bidding rounds and licensing as envisaged under Section 18 of the Petroleum Act, 2019.

6.2 Midstream and Downstream subsectors

This section presents a summary of the performance of the mid and downstream subsector entailing supply, domestic consumption, pipeline transportation, pricing and competition.

6.2.1 Petroleum supply

During the period under review, 4,786,813.71 m^3 were imported into the country for local consumption and export to neighboring countries; Uganda, South Sudan, DRC, Rwanda and Burundi. Figure 6.3 shows the biannual imports trend from 2022 to 2024.

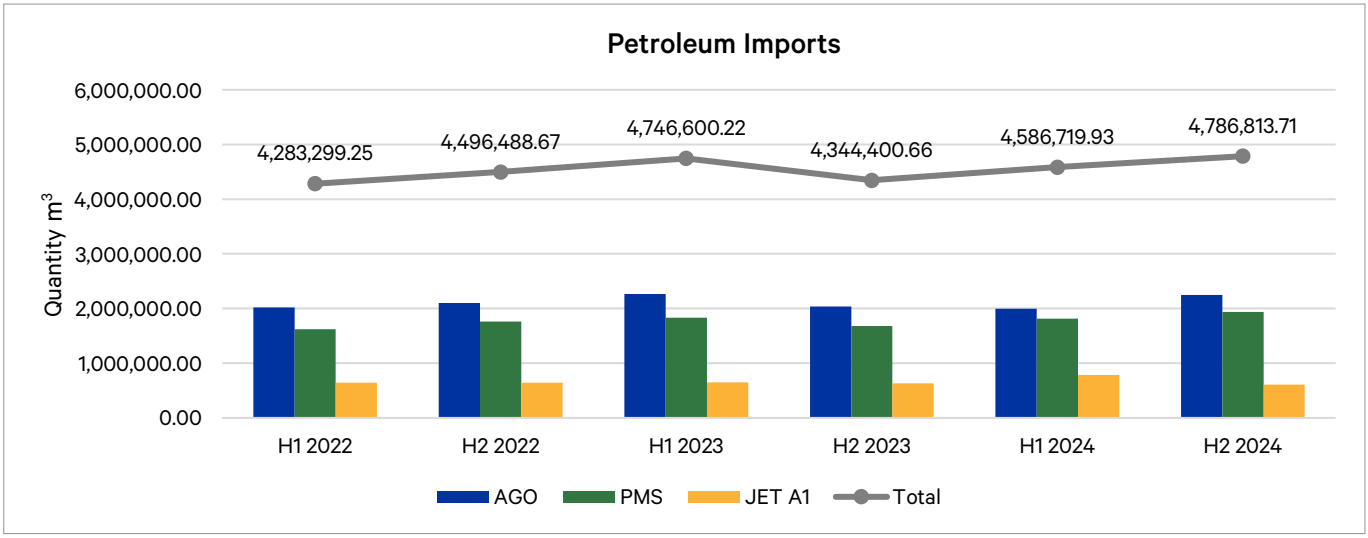


Figure 6.3: A biannual trend of petroleum imports from 2022 to 2024

Overall, the share of volumes designated for the local market accounted for 54.16% of the total import volume.

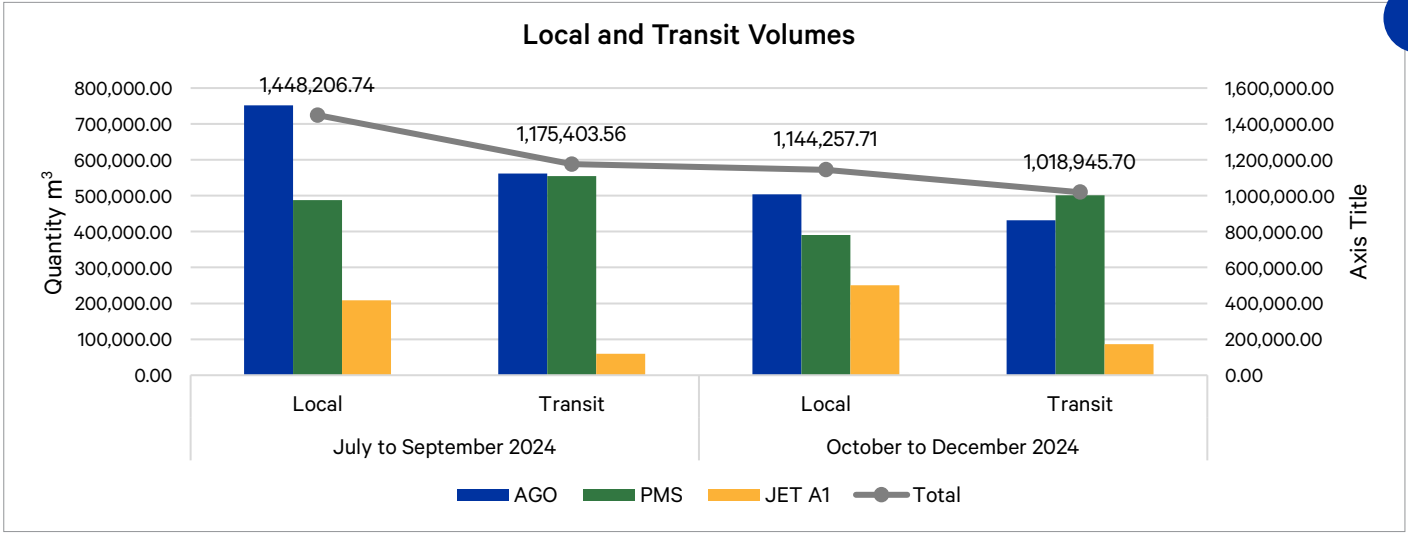


Figure 6.4: A trend of local and transit imports volumes from July to December 2024

6.2.2 Petroleum Demand

6.2.2.1 Domestic Petroleum Consumption

The overall domestic demand for petroleum products increased by 7.12% to 2,911,214.12 m3 compared to a corresponding period in the previous financial year. Figure 6.5 illustrates the trend in demand over biannual periods.

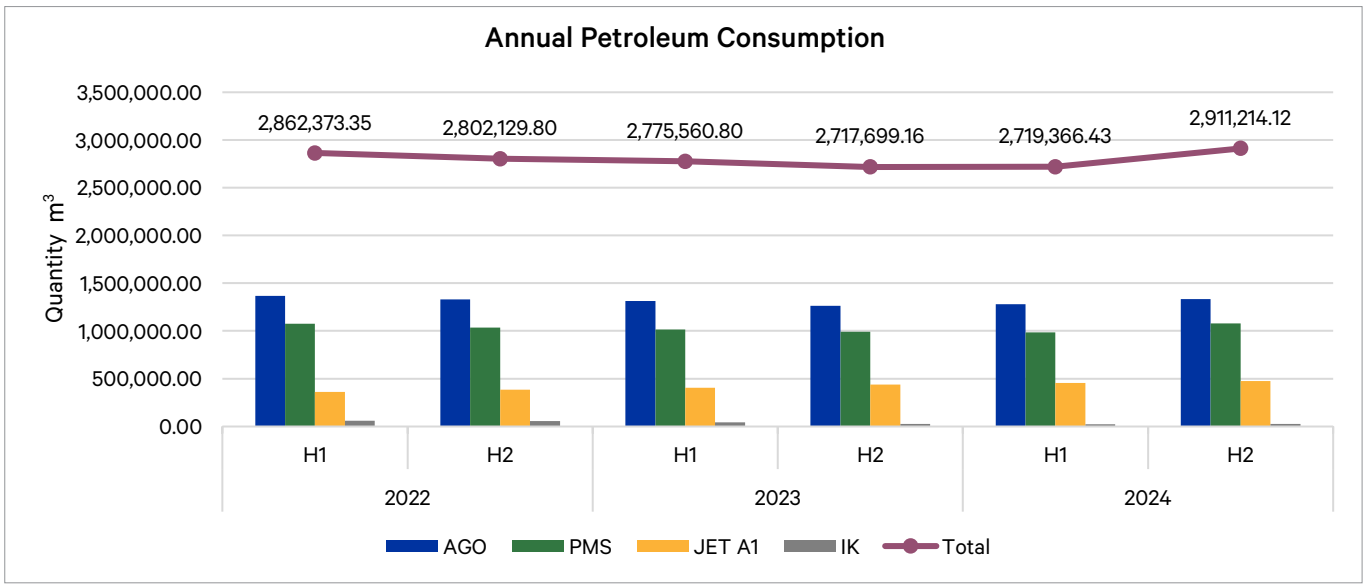


Figure 6.5: A trend in domestic petroleum consumption from 2022 to 2024

The demand for petroleum products through the period under review was steady with the highest consumption level recorded in October. This notably coincides with the highest demand for AGO. The highest demand for PMS was recorded in December and can be attributed to increased travel during the festive season. Figure 6.6 shows the trend in consumption of petroleum products across the six months.

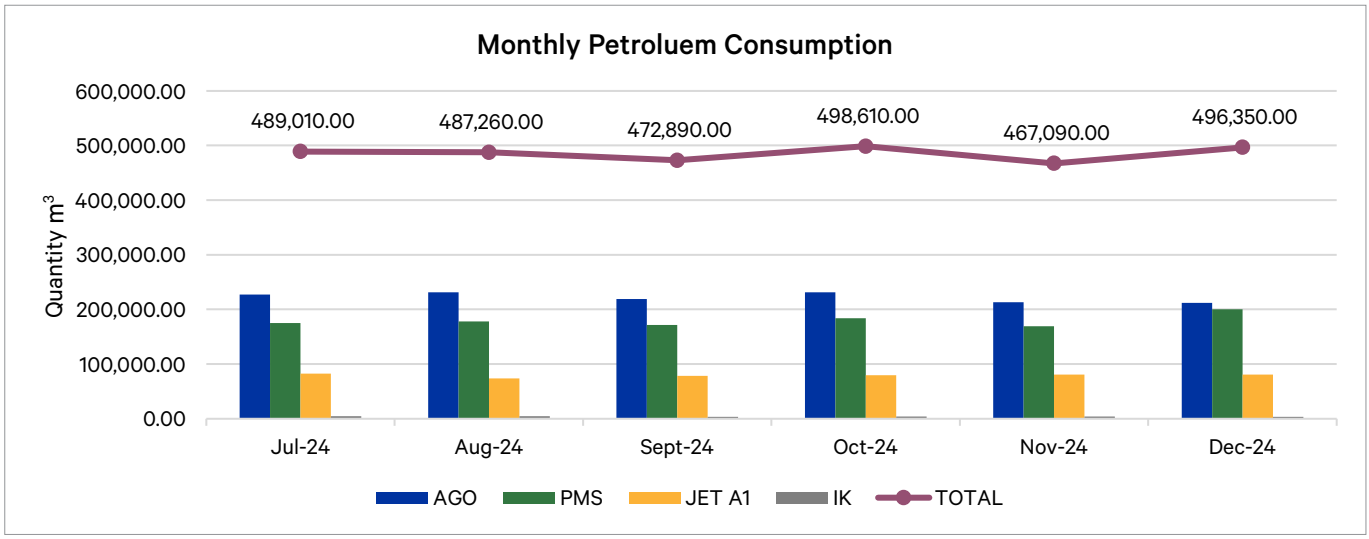


Figure 6.6: A monthly trend in the consumption of petroleum products

6.2.2.2 Pipeline Throughput

The Kenya Pipeline Company (KPC) primarily handles petroleum products imported into the country. This represents about 95% of petroleum products imported during the period under review.

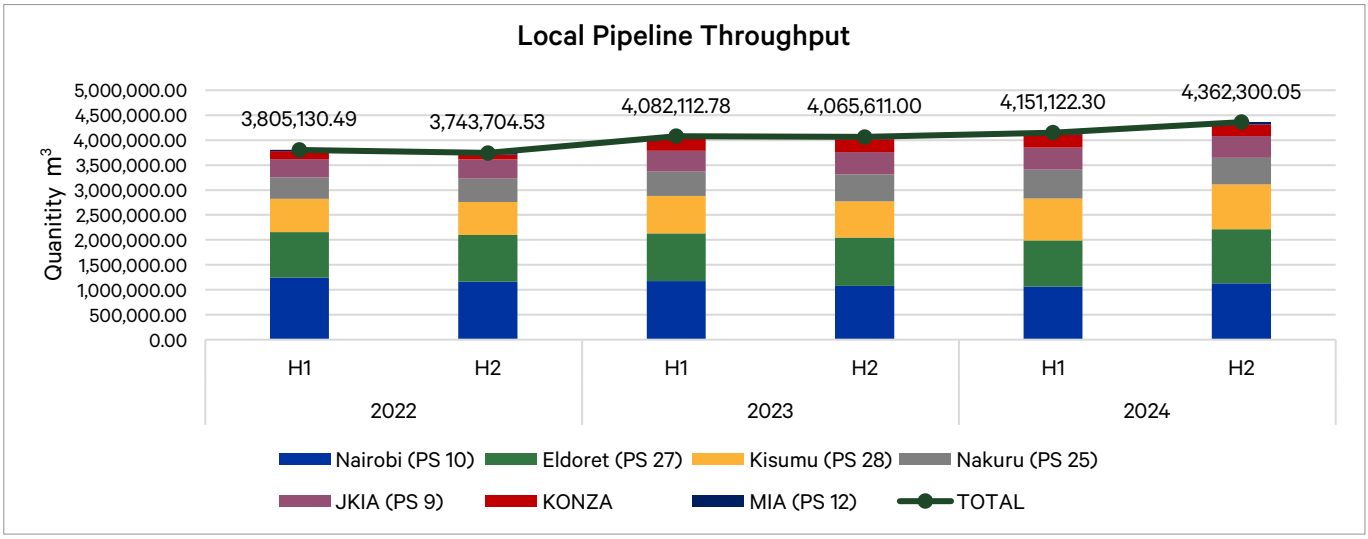


Figure 6.7: A trend in the local pipeline throughput from 2022 to 2024

Pipeline throughput increased by 7.30% during the review period compared to the same period in the previous financial year. This growth is attributed to higher volumes in both the transit and local markets. The local market accounted for 54.98% of the total throughput. Figure 6.8 shows a comparison of the local and transit throughput during the period under review.

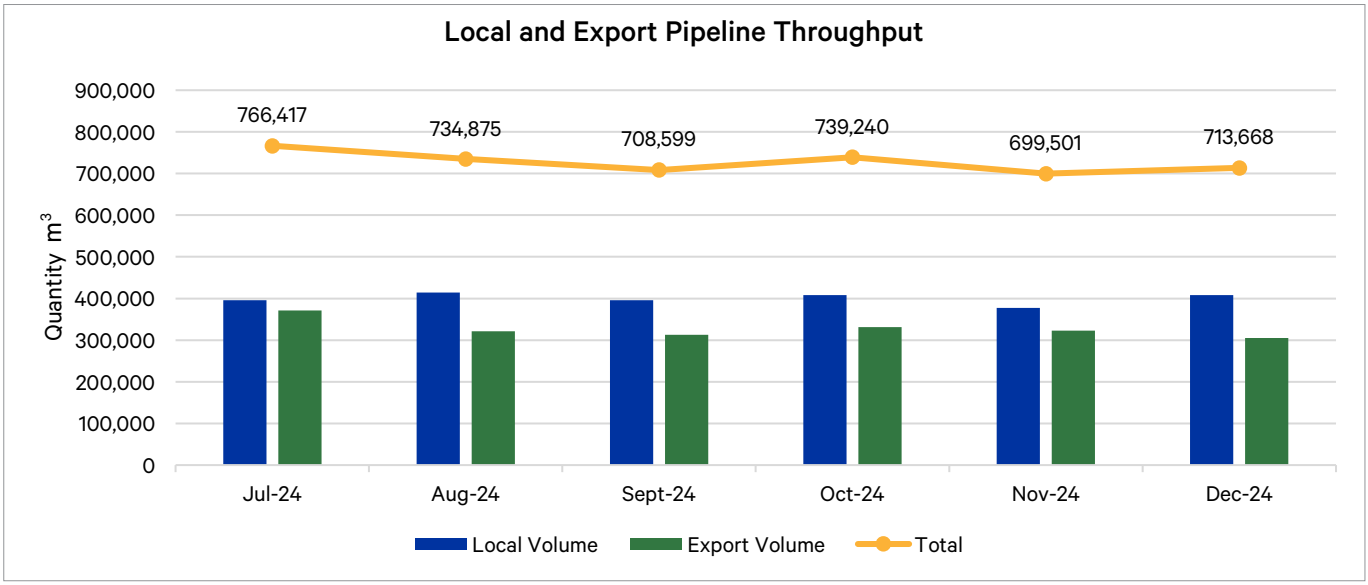


Figure 6.8: A trend of the local and export pipeline throughput from July to December 2024

6.2.3 Petroleum Prices

6.2.3.1 Evolution of International Crude Oil prices

During the period under review, Murban Crude Oil recorded a peak price of $89.14/bbl in July and a minimum price of $73.41/bbl in November. There was a general downward progression in international crude oil prices during the review period largely due slowed global economic growth and reduced fuel demand in China.

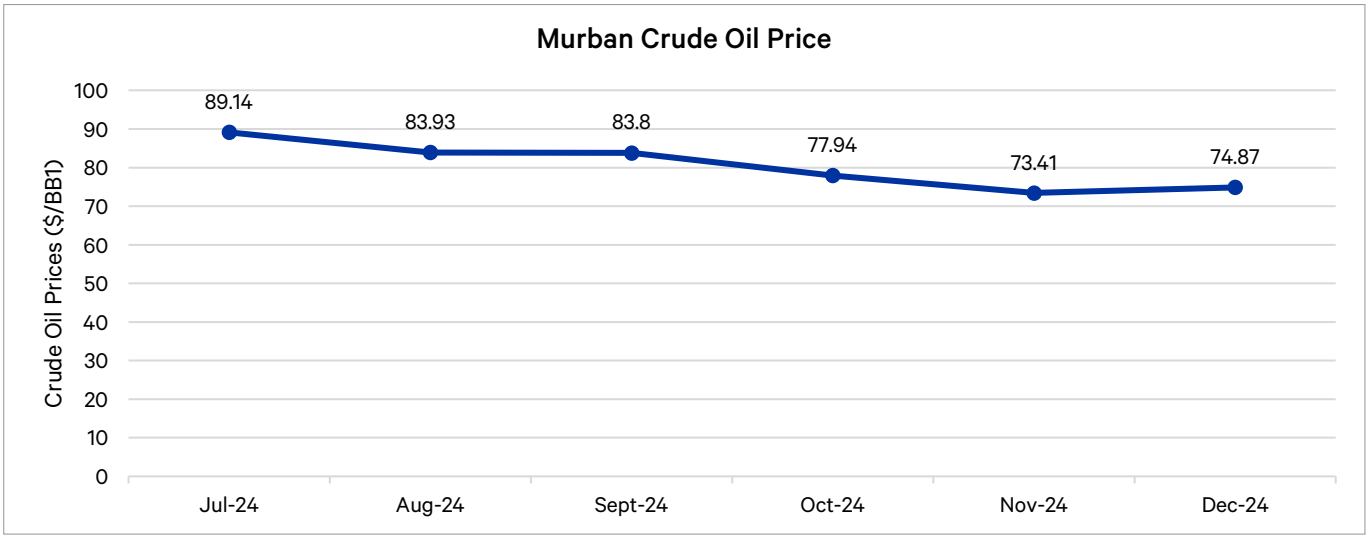


Figure 6.9: Trend in Murban Crude oil prices from July to December 2024

6.2.3.2 Local Retail Petroleum Prices

Fuel prices in Kenya are determined by landed costs, distribution costs, taxes and levies, demurrage costs and margins accrued by Oil Marketing Companies (OMCs). The Authority computes these costs and publishes monthly prices for PMS, AGO and IK on the 14th day of every month.

There was steady decline in fuel prices during the review period which reflected the trend in international oil prices. Figure 6.10 shows the trend of the Nairobi pump prices.

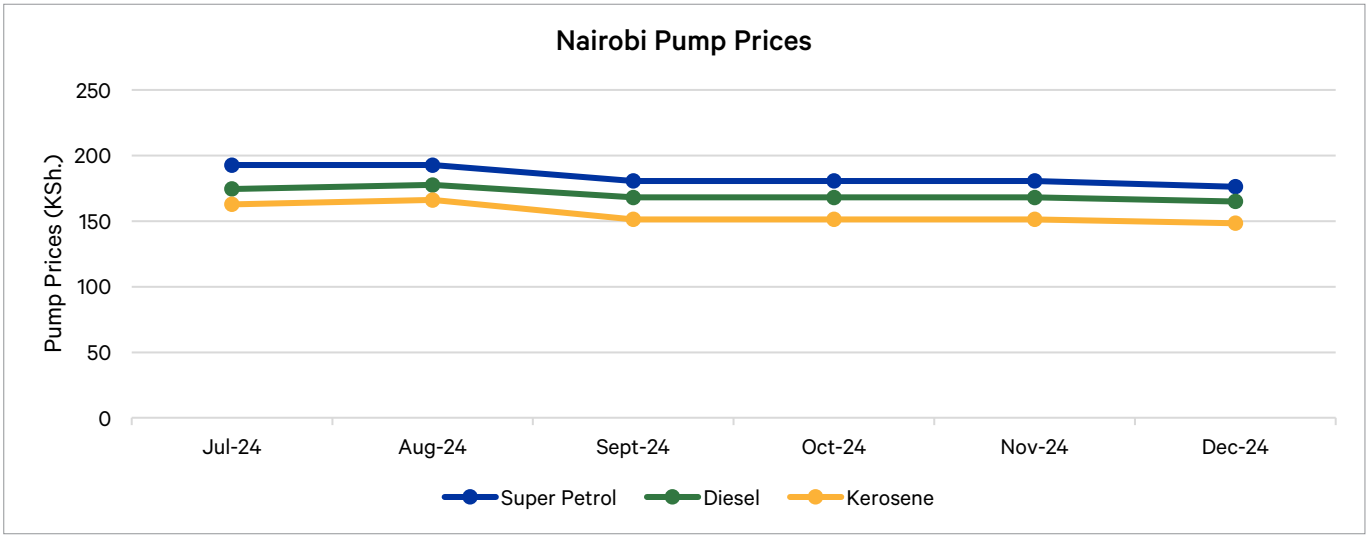


Figure 6.10: Trend in Nairobi pump prices from July to December 2024

6.3 Liquefied Petroleum Gas (LPG)

6.3.1 LPG supply

LPG is imported into the country through the Mombasa port and various border points. During the review period 93% of LPG was imported through the port, 6% through the Namanga border while Loitoktok and Lungalunga accounted for the remaining 1%.

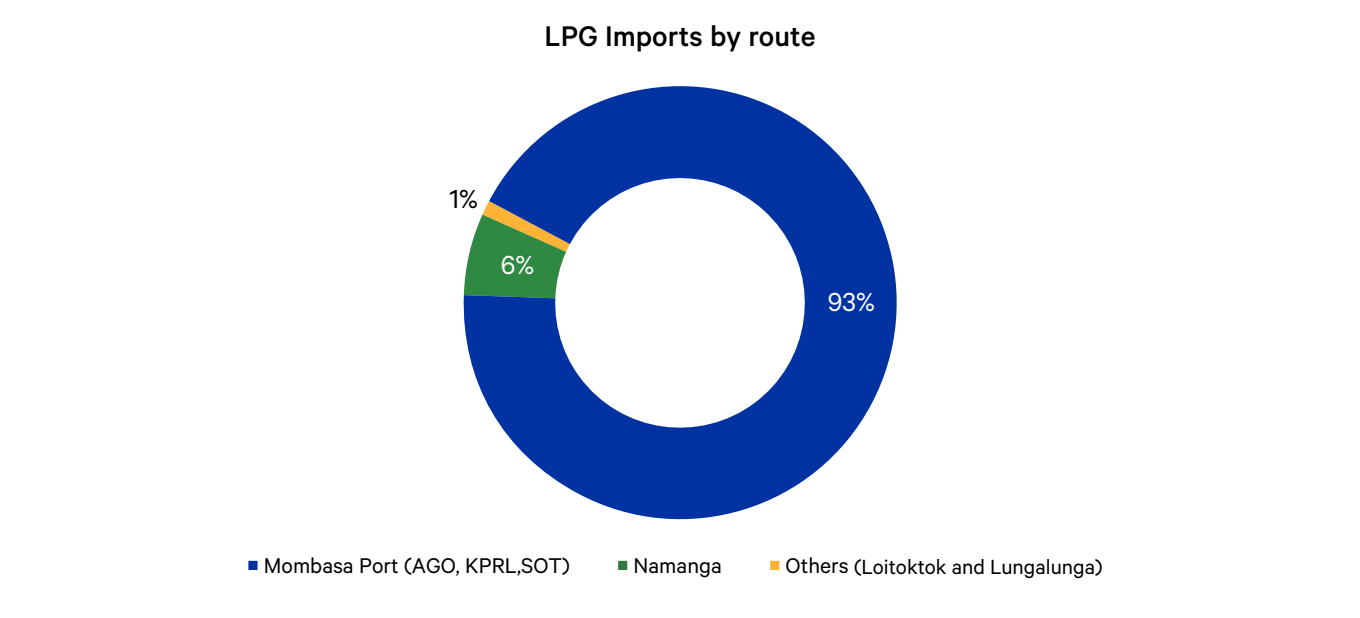


Figure 6.11: Share of LPG imports by route

6.3.2 LPG Demand

Demand for Liquefied Petroleum Gas (LPG) increased by 13.38% to 219,416 metric tonnes in comparison to a similar period in the previous financial year. The increase is attributed to initiatives such as the promotion of clean cooking and the government led LPG growth strategy that has spurred the demand for LPG.

The trend in consumption by biannual periods is summarized in the figure 6.12.

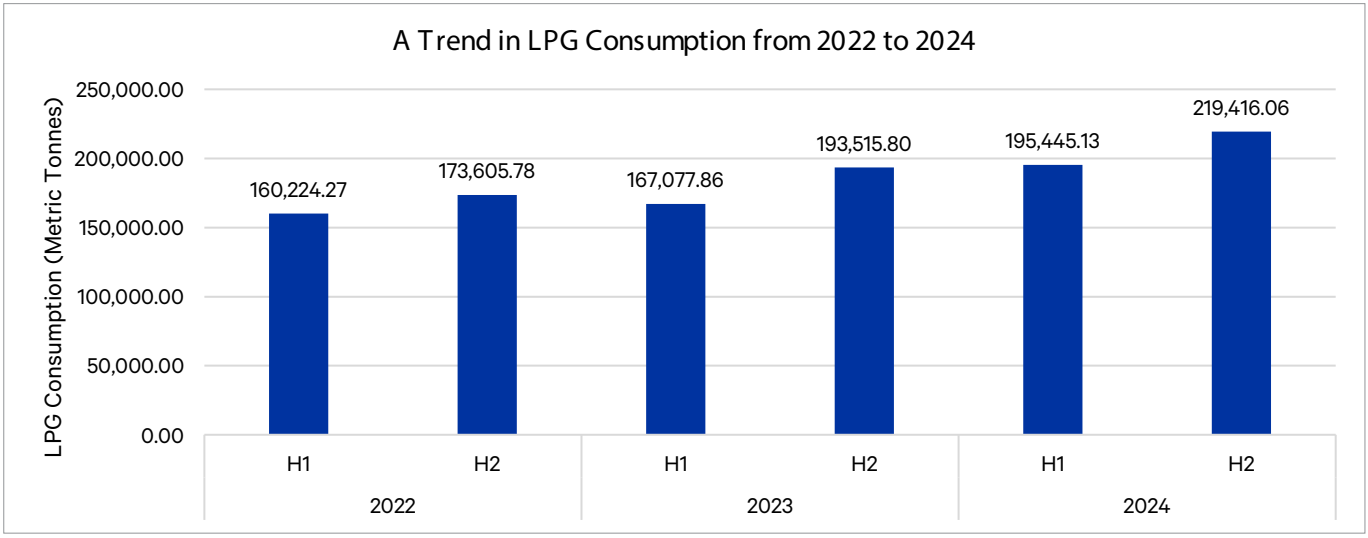


Figure 6.12: A trend in LPG consumption from 2022 to 2024

Figure 6.13 shows the monthly trend in LPG consumption.

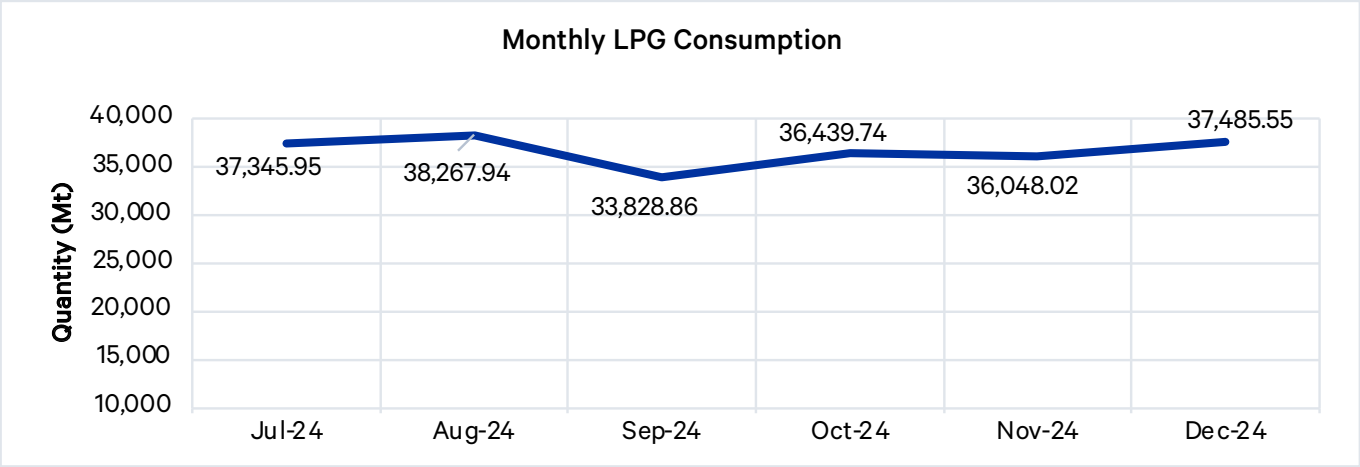


Figure 6.13: A trend in LPG consumption from July to December 2024

6.5 Competition Analysis and Market Share

There were 144 registered Oil-Marketing Companies (OMCs) as of December 2024. These companies market AGO, IK, PMS, JET A1, lubricants, and LPG. Table 6.1 presents the market share of the OMCs during the review period.

Company	Total Sales - PMS, AGO, IK and JET A1 (m^3)	% Share
Vivo Energy Kenya Limited	621,226.91	21.34%
Rubis Energy Kenya Plc	464,539.40	15.96%
TotalEnergies Marketing Kenya Plc	422,882.76	14.53%
Ola Energy Kenya Limited	128,721.00	4.42%
Be Energy Limited	108,365.86	3.72%
Hass Petroleum Kenya Limited	92,105.00	3.16%
Galana Energies Limited	90,698.06	3.12%
Stabex International Ltd	66,693.53	2.29%
Lake Oil Limited	56,823.21	1.95%
Petro Oil Kenya Limited	55,455.00	1.90%
Tosha Petroleum (Kenya) Limited	55,376.94	1.90%
Dalbit Petroleum Limited	52,814.21	1.81%
Oryx Energies Kenya Limited	45,104.67	1.55%
Towba Petroleum Company Limited	40,453.16	1.39%
Aftah Petroleum(K)Ltd	37,180.89	1.28%
Zacosia Trading Limited	36,665.19	1.26%
Gapco Kenya Limited	34,555.00	1.19%
Astrol Petroleum Company Limited	34,406.08	1.18%
Sahara Energy Limited	31,127.44	1.07%
Others	436,019.81	14.98%

Table 6.1: Market share of OMCs as of December 2024

The Herfindahl–Hirschman Index (HHI) for the downstream petroleum subsector in 2024 was 0.1050 which was slightly above the Authority's benchmark of 0.1. This is an indicator of competition in the sector since none of the OMCs have significant market dominance.

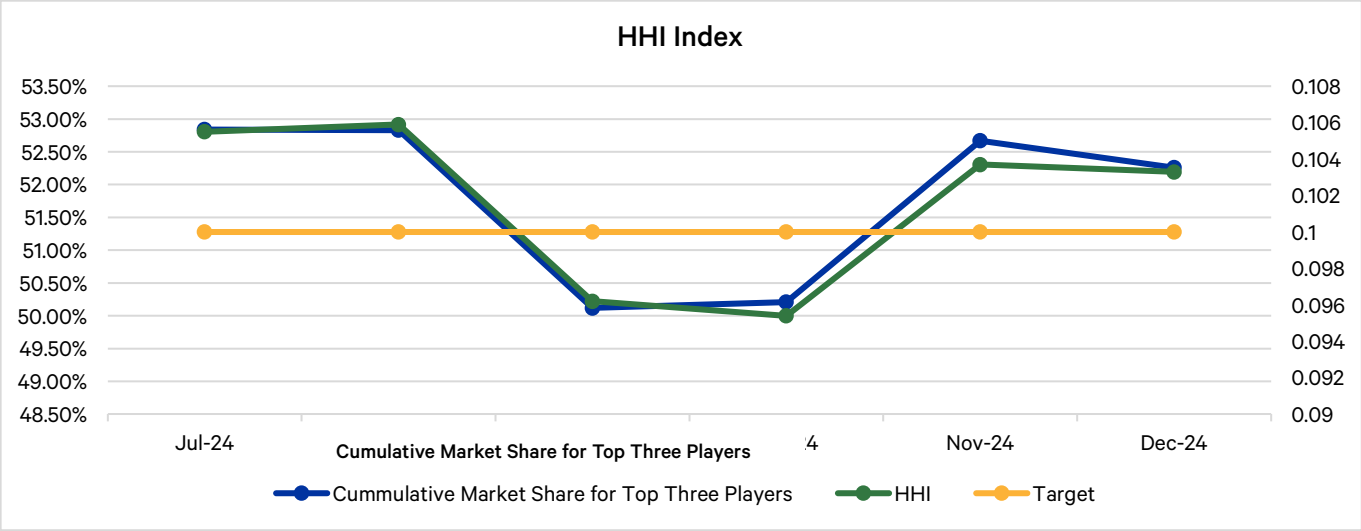


Figure 6.14: HHI index for downstream petroleum from July to December 2024

CHAPTER 7

CONSUMER PROTECTION

The Authority plays a vital role in protecting consumer interests within the energy and petroleum sectors. The consumer protection functions include licensing, monitoring the quality of energy and petroleum products, addressing complaints and disputes, investigating accidents and incidents and conducting public education and advocacy. This section, in particular, delves into aspects related to licensing, fuel quality, LPG compliance and public education.

7.1 Licensing

7.1.1 Petroleum and LPG operations

The Authority grants licenses, permits or certificates to any persons intending to undertake the importation, exportation, bulk storage or transportation of petroleum products. Table 7.1 summarizes the various categories of petroleum and LPG licenses issued from July to December 2024.

Table 7.1: Summary of licenses issued between July and December 2024

Type of licence	Licences issued
Transport of petroleum products(Except LPG) by Road	1,069
Export and Wholesale of Petroleum Products(Except LPG)	585
Retail of LPG in Cylinders	465
Retail of Petroleum Products (except LPG)	314
Transport of LPG in Cylinders	161
Storage & Wholesale of LPG in cylinders	120
Transport of LPG in bulk by Road	113
Transport of Jet-A1	94
Import, Export and Wholesale of Petroleum Products (Except LPG)	76
Storage & Filling of LPG in Cylinders	51
Export and Wholesale of LPG in bulk	28
Import, Export and Wholesale of LPG in bulk	22
Storage of petroleum products(Except LPG)	21
Export & wholesale of Jet-A1	16
Import, Export and Wholesale of Bitumen	15
Retail of LPG at Autogas Dispensing Station	9
Import, Export and Wholesale of Fuel Oil	8
Import of Lubricants	5
Bunkering of Petroleum Products (Except LPG)	4
Storage & Filling of LPG in Bulk	2
Storage of LPG in Bulk	2
Storage of Crude Oil	1
Retail of LPG in Cylinders Via Smart Meters	1
Total	**3,182**

Additionally, the Authority issues construction permits to ensure that proposed petroleum and LPG facilities are developed in accordance with the applicable standards. The permits issued in the period under review are shown in table 7.2.

Table 7.2: Construction permits issued from July to December 2024

Permit Category	Permits issued
Petroleum Retail Dispensing Station	46
Autogas Dispensing Station	10
Liquefied Petroleum Gas (LPG) Storage And Filling Facility	3
Liquefied Petroleum Gas (LPG) Consumer Site	1
LPG consumer site for Public Institutions	1
Fuel Consumer Site	1
Total	**62**

7.1.2 Electricity and Renewable Operations

The Authority approved the following generation and retail supply licences during the review period.

Table 7.3: A list of generation and retail supply licences approved from July and December 2024

No	Licensee	Technology	Capacity	County
1	Ecoligo Limited (SPV Plant at Abbysinia Steel)	Solar PV	3.3MW	Kwale
2	Capwell Industries Limited	Solar PV	1.23MW	Kiambu

Additionally, the Authority licensed 342 electrical workers and 356 electrical contractors. Table 7.4 presents the number of licenses issued for each category.

Table 7.4: Electrical worker and contractor licences issued from July and December 2024

Licence category	Number of Issued Certificates/Licences					
	C2	C1	B	A2	A1	Total
Electrical Workers	148	124	39	6	25	342
Electrical Contractors	168	117	32	3	36	356

The Energy (Solar Photovoltaic Systems) Regulations, 2012 provides for licensing of solar PV firms and technicians. A total of 217 licenses were issued to solar PV firms and 86 to solar PV technicians as summarized in table 7.5.

Table 7.5: Solar PV licences issued from July and December 2024

Category	Class	Number of licences issued
Solar PV Contractor/ Vendor/ Manufacturer	C1	85
	V1	66
	V2	66
Solar PV Technicians	T3	72
	T2	14

7.1.3 Energy auditors, firms and appliances

The Energy (Energy Management) Regulations 2012 provides for promotion of energy efficiency in designated industrial, institutional and commercial facilities. The Authority licenses energy auditors and energy audit firms who undertake energy audits in these facilities. During the review period, the Authority licensed 3 energy audit firms and 1 energy auditor.

The Energy (Appliances' Energy Performance and Labelling) Regulations, 2016, promote energy efficiency in electrical appliances. These regulations mandate that imported and locally manufactured refrigerators, non-ducted air conditioners, lamps, and motors undergo testing to ensure compliance with the applicable Kenya Standards.Importers and manufacturers of these regulated appliances are eligible for a registration certificate upon demonstrating compliance with the regulations.

During the review period, the Authority issued registration certificates for 134 appliance models, comprising 80 refrigerator models, 53 air conditioner models, and 1 motor.

7.2 Fuel Quality Monitoring

This process involves adding small amounts of a distinct identifier, commonly a bio-chemical liquid referred to as the marker, to fuel products. This helps identify the presence of fuel adulterants or fuels intended for export. During the review period, the Authority marked 2,006,609,441 litres of export volumes and 23,587,163 litres of local kerosene. A summary of volumes marked per month is provided in table 7.6.

Table 7.6: Export fuels and local kerosene marked from July to December 2024.

Month	Export Volume Marked (Litres)	Local Kerosene Volume Marked (Litres)
July	353,484,951	3,818,558
August	320,777,417	3,800,607
September	322,140,761	3,601,641
October	303,099,035	3,308,092
November	323,201,986	3,949,401
December	383,905,291	5,108,864
Total	**2,006,609,441**	**23,587,163**

In addition to marking fuels at the source, the Authority monitors petroleum products at retail stations across the country to ensure fuel quality. Site selection for sampling considers several factors, including nationwide coverage, intelligence from surveillance efforts, and public feedback.

During the period under review, the Authority conducted 11,950 sample tests at 2,649 petroleum outlets across the country. Out of the tests carried out, 2,622 stations equivalent to 98.98%, were found to be compliant. However, 27 stations were non-compliant, and appropriate penalties were imposed as per the relevant legislation.

7.3 LPG Compliance

The Authority conducts technical and environmental, health and safety audits of licensed LPG storage and filling facilities, to assess their adherence to regulatory requirements, operational safety standards, maintenance of plant and equipment, emergency preparedness, and risk management practices.

These audits assess compliance with national legislation and standards including: the Energy Act No. 1 of 2019; the Petroleum Act No.2 of 2019; the Environmental Management and Co-ordination Act, 2015; the Occupational Safety and Health Act, 2007; Kenya Standards relevant to petroleum sub-sector; and international standards, sector best practices and maritime guidelines.

During the review period, 23 audits were conducted across Central, Coast, Nairobi and North Eastern regions. Arising from the audits conducted, facilities prepare corrective action plans in the event of non-compliance and follow-up audits are planned to verify the implementation of corrective actions.

7.4 Public Education and Advocacy

The Authority undertakes public education and advocacy initiatives nationally to increase awareness and bridge knowledge gaps in the energy and petroleum sector. These initiatives are primarily focused on fostering attitude and behavior change related to safety, compliance, consumer rights and the adoption of sustainable clean energy solutions. Table 7.7 provides a breakdown of the public education and advocacy programs implemented during the period.

Table 7.7: Public education and advocacy programs undertaken from July to December 2024

No	Type of Forum	Number of grassroots forums	Region
1	Bodaboda riders engagement forums	3	Kisumu, Eldoret and Kitengela
2	Electricity and Solar PV contractors and licensees	2	Uasin Gishu and West Pokot
3	Petroleum and LPG licensees and public sensitizations on safety, compliance and consumer rights	9	Kajaido, Uasin Gishu, Nairobi and West Pokot
4	National Government Administration Officers (NGAO) and Security & Intelligence Committees	3	Uasin Gishu, Nairobi and West Pokot
5	County government trade, fire and enforcement staff capacity building and sensitization forums	3	Uasin Ngishu, Nairobi and West Pokot
6	Institutions of higher learning energy and petroleum sensitizations	4	Kiambu, Nairobi and West Pokot
7	LPG and Petroleum marketers and tanker drivers safety and compliance engagements	3	Online and Eldoret service stations and Petroleum Pipeline Depot

The Authority conducted 27 forums across six counties, along with two national online forums. These engagements targeted key strategic stakeholders, including petroleum tanker drivers, licensees, bodaboda riders, National Government Administration Officers (NGAO) and security committees, county government staff, students from institutions of higher learning, and the general public.

CHAPTER 8

EMERGING TRENDS

8.1. Electric Mobility

Electric mobility is gaining prominence in Kenya as a strategy for decarbonizing the transport sector. The Ministry of Energy and Petroleum has put in place various policies to promote electric mobility. These include the Kenya National Energy Efficiency and Conservation Strategy (2020) which has a target of achieving 5% electric imported vehicles annually. Kenya also signed the COP26 declaration on acceleration of the transition to 100% zero-emission cars. The government, through the Fourth Medium Term Plan (2023-2027) of the Vision 2030 has put in place various strategies to develop e-mobility. They include the development and implementation of e-mobility policy, establishment of e-mobility charging infrastructure and promotion of electric motorcycles manufacturing.

To encourage the uptake of electric mobility, the Authority is implementing a special tariff for e-mobility effective 1st April 2023. In addition, the Authority is currently undertaking a study to establish the end user tariff for public charging stations. This will ensure that customers get charged fair tariffs thereby encouraging consumption.

Figure 8.1 presents a trend of the electricity consumption by the electric mobility tariff category.

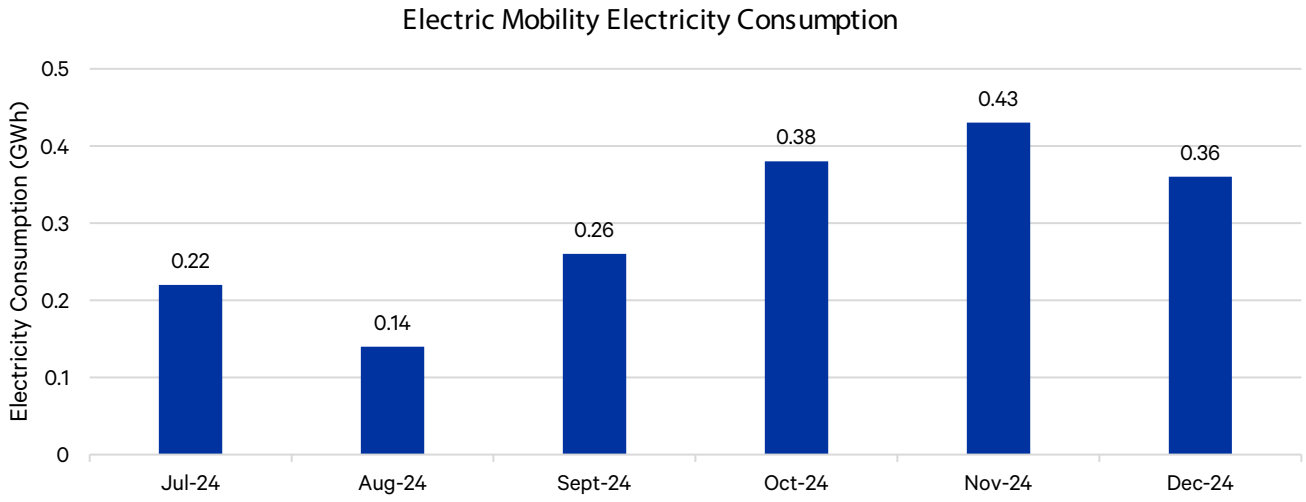


Figure 8.1: A trend in electric mobility electricity consumption from July to December 2024

Total electricity consumption under the electric mobility tariff category during the review period reached 1.80 GWh, marking a 480.65% increase compared to the same period in the previous financial year. As of December 2024, the cumulative number of registered electric vehicles (EVs), including two-wheelers, three-wheelers, and four-wheelers, stood at 5,294, reflecting a 41.06% rise from 3,753 EVs registered in 2023. This growth can be attributed to government initiatives such as the introduction of the special electric mobility tariff, a reduction in excise duty on electric vehicles from 20% to 10%, the exemption of fully electric cars from Value Added Tax (VAT), and the expansion of charging infrastructure.

8.2. Green Hydrogen

Green hydrogen is emerging as a promising solution for decarbonizing the transport, agriculture, and energy sectors. In September 2023, Kenya launched its Green Hydrogen Strategy and Roadmap during the Africa Climate Summit. This initiative aims to leverage the country's abundant renewable energy resources to drive demand for green hydrogen across various applications.

The strategy is anchored on four key pillars: enhancing the balance of payments, strengthening food security and resilience, promoting green industrialization and decarbonization, and attracting investments. It sets ambitious impact targets, including securing at least $1 billion in direct investments by 2030, creating at least 25,000 direct jobs between 2028 and 2032, avoiding at least 250,000 tonnes of CO_2 emissions annually by 2030, and producing green shipping fuels by 2030.

In May 2024, the Authority published the Kenya Green Hydrogen and Its Derivatives Guidelines, establishing a regulatory framework for the sector. These guidelines define sustainability criteria for green hydrogen, regulate land and water use, and outline procedures for approving expressions of interest and feasibility studies.

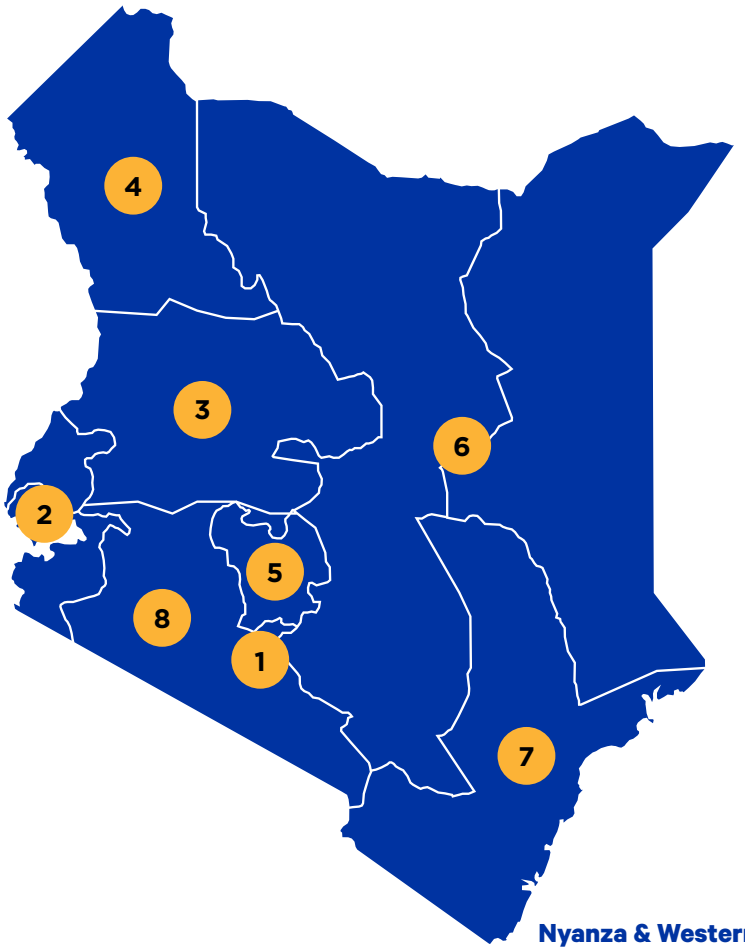
To implement the Green Hydrogen Strategy and Roadmap, the Ministry of Energy and Petroleum has established a secretariat and the Program Coordination Committee (PCC). These entities will oversee the advancement of Kenya's green hydrogen program by reviewing and approving expressions of interest and spearheading awareness and capacity-building initiatives. Several expressions of interest for green hydrogen development have already been received and are at various stages of review.

8.3. Auto gas

Growing demand for sustainable transportation, supported by government incentives such as the zero-rating of taxes on LPG, continues to drive the growth of the autogas market. During the review period, the Authority issued 10 Autogas construction permits.

Additionally, the Authority proposed amendments to the Petroleum (Liquefied Petroleum Gas) Regulations, 2019 to introduce licensing provisions aimed at enhancing safety in Autogas operations.

TALK TO US



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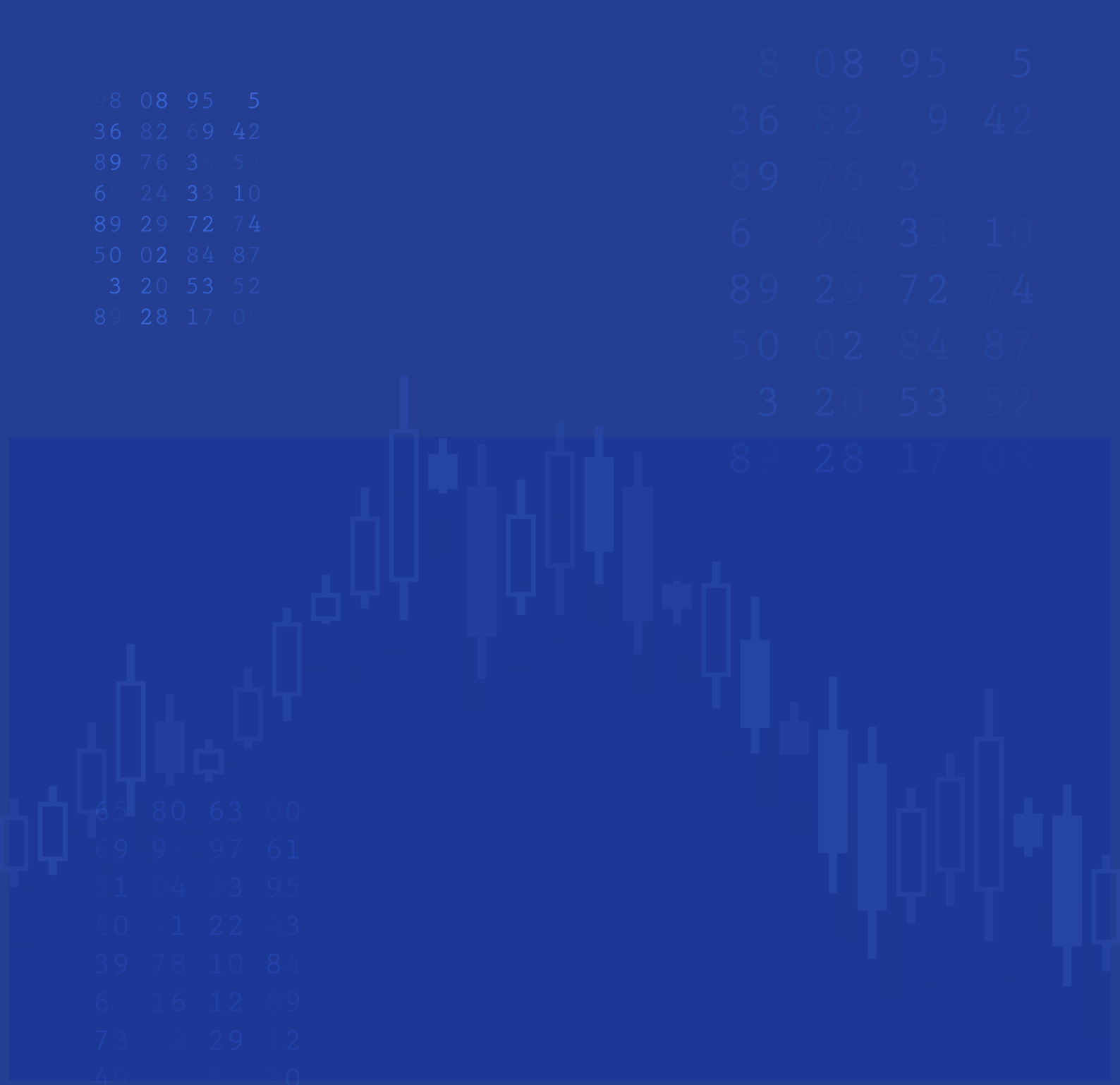

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