

ENERGY

SECTOR REPORT

2023



VISION

To be the benchmark of excellence in energy regulation in Africa by 2026



MISSION STATEMENT

“Efficiently regulate the energy sector and be responsive to stakeholder needs to achieve sustainable, reliable, and quality energy products and services.”



CORE VALUES

In carrying out its mandate, ERB is guided by and adheres to the following core values:

Teamwork

We respect and support individual strengths and skills for the collective achievement of our goals.

Integrity

We always do the right thing, at the right time, in the right way.

Predictability

We are proficient, professional, consistent, fair and reliable.

Innovation

We continually pursue improved techniques to provide the best solutions.

Transparency

We are accountable, open and straightforward in our operations.

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ABBREVIATIONS

BESS	Battery Energy Storage System
BPS	Bulk Petroleum Supply
BSA	Bulk Supply Agreement
CBD	Central Business District
CEC	Copperbelt Energy Corporation Plc
COP28	28 th United Nations Climate Change Conference
DIZL	Dangote Industries Zambia Limited
DRC	Democratic Republic of Congo
EBITDA	Earnings Before Depreciation, Tax and Interest
EIA	Environmental Impact Assessment
EU	European Union
EUR	Euros
GDP	Gross Domestic Product
GEP	Grid Extension Project
GET FIT	Global Energy Transfer Feed-in Tariff
GIP	Grid Intensification Project
GrDP	Grid Development Project
HFO	Heavy Fuel Oil
HSD	High Sulphur Diesel
IEA	International Energy Agency
Ilute	Ilute Solar Project
IMF	International Monetary Fund
INDENI	Indeni Energy Company Limited
IPP (Electricity) ¹	Independent Power Producers
IPP (Petroleum) ²	Import Parity Pricing
IPS	Interconnected Power System
ITPC	Itezhi-Tezhi Power Corporation
ITPS	Itezhi-Tezhi Power Station
KfW	Development Bank of Germany
KGL	Kafue Gorge Lower Power Station
KGPS	Kafue Gorge Power Station
KNBPS	Kariba North Bank Power Station
KNBE	Kariba North Bank Extension Power Station
KPI	Key Performance Indicator
LHPC	Lunsemfwa Hydro Power Company Limited
LPG	Liquefied Petroleum Gas

LSMFEZ	Lusaka South Multi-Facility Economic Zone
Masdar	Abu Dhabi Future Energy Company
MCL	Maamba Collieries Limited
MoE	Ministry of Energy
NECL	Ndola Energy Company Limited
NFT	Ndola Fuel Terminal
NPCL	Ngonye Power Company Limited
NWEC	Northwestern Energy Corporation Limited
OECD	Organisation for Economic Co-operation and Development
OGP	Off-grid Renewable Energy Project
OPEC	Organization of the Petroleum Exporting Countries
PAP	Posted Airfield Prices
PPA	Power Purchase Agreement
PQR	Power Quality and Reliability
PSA	Power Supply Agreement
PV	Photovoltaic
REA	Rural Electrification Authority
SAPP	Southern African Power Pool
SAPP MTP	SAPP Market Trading Platform
SHS	Solar Home System
SMG	Solar Mini Grid
S.I.	Statutory Instrument
TAZAMA	TAZAMA Pipeline Limited
TPPL	TAZAMA Petroleum Products Limited
UAE	United Arab Emirates
USAID	United States Agency for International Development
USD	United States Dollar
VFPS	Victoria Falls Power Station
WB	World Bank
WTI	West Texas Intermediate
ZABS	Zambia Bureau of Standards
ZCCZ	Zambia-China Economic Corporation Zone
ZEMA	Zambia Environmental Management Agency
ZESCO	ZESCO Limited

UNITS OF MEASURE

Bbl	Barrels of oil
GWh	Gigawatt hour
K	Zambian Kwacha
Kg	Kilogram
Km	Kilometre
kV	Kilovolt
kVA	Kilovolt Amperes
kW	Kilowatt
kWh	Kilowatt hour
kWp	Kilowatt peak
L	Litre
m/bd	Million barrels per day
MW	Megawatt
MWh	Megawatt hour
MT	Metric Tonne
m ³	Cubic metre
US\$	United States Dollar

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Ndola Energy Company Limited
Northwestern Energy Corporation Limited
Oil Marketing Companies
Rural Electrification Authority
TAZAMA Pipelines Limited
TAZAMA Petroleum Products Limited
Zambia-China Economic & Trade Cooperation Zone Development Limited
Zambia Revenue Authority
ZESCO Limited

FOREWORD



The 2023 Energy Sector Report seeks to highlight the developments in, and the impact of various economic and social factors on, the energy sector. This issue introduces a chapter outlining the key legislative and regulatory changes directly impacting the players as well as the notable industry advancements as Zambia strives to develop a diverse and inclusive energy sector.

In line with projections of economic growth slowdowns world over due to the long-term consequences of the COVID-19 pandemic, geopolitical wars and contractionary monetary policy interventions to combat the impact of growing inflation, Zambia's economy was projected to grow by 2.7 percent in 2023 compared to 5.2 percent in 2022¹. Locally, the effects were expected to be exacerbated by the increased energy costs, among others.

The electricity sub-sector saw an increase in generation capacity as the 34MW expansion Riverside Solar project by the Copperbelt Energy Corporation (CEC) was commissioned, bringing the country's total installed electricity generation capacity to 3,811.3MW from 3,777.3MW in 2022. This development contributed to an increase in national generation sent out to 19,399.11GWh in 2023 from 19,372.92GWh in 2022.

The sub-sector also saw the implementation of the first multi-year electricity tariffs in Zambia. The Energy Regulation Board (ERB) approved two applications for multi-year tariffs covering the five year period of 2023 to 2027 from ZESCO Limited (ZESCO) and Northwestern Energy Corporation Limited (NWECL). The determination took into consideration the recommendations of the Electricity Cost-of-Service Study, which was concluded in 2022, ensuring that ZESCO achieves cost reflectivity by 2027. Further, the development of an Electricity Open Access Framework for Zambia reached an advanced stage during the period in review. It is expected that the development of a revised Market Structure and Design, Transmission and Distribution Pricing Methodology and Open Access Regulations will be concluded in the first quarter of 2024.

In the petroleum sub-sector, national consumption of petroleum products continued to rise with the total national consumption of petroleum products reaching 1,627,405.87MT in 2023 from 1,549,274.44MT in 2022. Kerosene recorded the highest growth rate at 370.4 percent followed by Jet A-1 at 41.7 percent and LPG at 13.3 percent. The ERB continued to review fuel prices every 30 days in the wake of fluctuating exchange rate and international oil prices. This was in line with Government policy interventions to ensure cost reflective pricing to guarantee security of supply. In addition, reviewing prices every 30 days also ensured that the prevailing pump prices were responsive to the changes in the exchange rate and international oil prices, being the major factors that influenced the prices.

Consistent with the pronounced reforms for the petroleum sub-sector, the state-owned TAZAMA Pipeline Limited (TAZAMA) pipeline was converted from a petroleum feedstock transporter to a Low Sulphur Gasoil (diesel) carrier. In this regard, Statutory Instrument No. 41 of 2023 was issued to allow third party open access to the pipeline to enhance competition among the market players and reduce the cost of transportation. Further, TAZAMA advanced its agenda to improve fuel distribution in northern Zambia by commencing a project to construct a pipeline that will connect Mpika Fuel Depot to the main TAZAMA pipeline. The connector pipeline is expected to be commissioned in the

¹ https://www.parliament.gov.zm/sites/default/files/images/publication_docs/2024%20BUDGET%20SPEECH_230929_174057.pdf

first quarter of 2024.

To enhance service delivery, the ERB established a Licensing Directorate and also developed an online Management Information System which enabled applicants to lodge licence applications, file annual returns and lodge consumer complaints online. The ERB further continued to implement its Communication Visibility Strategy in order to ensure that stakeholders were aware of their rights and obligations with regards to energy products and services.

It is envisaged that this report will successfully provide a clear insight on the accomplishments in the sector and the areas for potential growth as the ERB continues to provide an inclusive environment in which all stakeholders can positively contribute to the achievement of a robust and inclusive energy sector that safeguards the interests of all. The ERB welcomes comments and suggestions from members of the public on enhancing the quality and relevance of future publications.



Yohane Mukabe
Director General

March 2024

A photograph of a concrete spillway structure with water flowing through a narrow opening. The water is turbulent and white with foam. The concrete walls are weathered and show some discoloration. A yellow safety pole is visible on the right side of the structure. The word "INTRODUCTION" is overlaid in white, bold, sans-serif font across the center of the image.

INTRODUCTION

1.0 INTRODUCTION

1.1 OVERVIEW OF GLOBAL ECONOMIC PERFORMANCE

World Economic Outlook publications of 2023 reveal that economic growth declined in 2023 compared to 2022. According to the World Bank (WB), the global economy was projected to grow by 2.6 percent in 2023². Meanwhile, the International Monetary Fund³ (IMF) and the Organisation for Economic Co-operation and Development⁴ (OECD) projected a higher growth rate of 3 percent⁵. Despite the differences in the 2023 projections, the growth still fell short of 3.5 percent⁶ recorded in 2022 and its pre-pandemic levels of 3.8 percent. Several forces were cited as holding back the global economic recovery, including the long-term consequences of the COVID-19 pandemic, the war in Ukraine and increasing geo-economics fragmentation. Others were more cyclical in nature, including the effects of monetary policy tightening necessary to reduce inflation, the withdrawal of fiscal support amid high debt and extreme weather events⁷.

The global slowdown was more pronounced in advanced economies than in emerging and developing markets. Advanced economies were expected to slow from 2.6 percent in 2022 to 1.5 percent in 2023. Emerging market and developing economies were projected to have a modest decline in growth from 4.1 percent in 2022 to 4.0 percent in 2023. In Sub-Saharan Africa, growth was projected to decline to 2.5 percent in 2023, from 3.6 percent in 2022⁸. The continued slump of Sub-Saharan's largest economies namely Nigeria, South Africa and Angola dragged down the overall growth of the region. It was reported that South Africa was projected to grow at 0.5 percent in 2023 due to energy insufficiency. Meanwhile, Nigeria and Angola economic growth was forecasted at 2.9 percent and 1.3 percent, respectively⁹.

1.2 OVERVIEW OF DOMESTIC ECONOMIC PERFORMANCE

The Zambian economic growth was projected to decline to 2.7 percent in 2023 from 5.2 percent in 2022¹⁰. The forecasted decline in growth was mainly due to reduced production in the mining sector on account of operational challenges and flooding in some of the major mines. Copper production was expected to decline to a 14-year low of 682,431 tonnes in 2023¹¹. The impact of the decline in copper production was evident in the depreciation of the Zambia Kwacha against the United States Dollar (USD). According to Bloomberg, copper accounts for more than 70 percent of Zambia's export earnings. The kwacha came under pressure from sustained excess demand for foreign exchange, mostly by the energy and manufacturing sectors amid low supply and the strengthening of the USD on the international market¹². The retail exchange rate depreciated by 34.5 percent against the USD, from a monthly average of K18.49/US\$ in January 2023 to K24.87/US\$ in December 2023.

Annual inflation for December 2023 increased to 13.1 percent compared to 9.9 percent in December 2022¹³. The major drivers of inflation included higher food (mostly maize and its products) and retail fuel prices as well as the depreciation of the kwacha against the USD¹⁴. The high maize prices were attributed to constrained supply due to adverse weather conditions amid high regional demand. Meanwhile, fuel prices were driven by the increase in international oil prices and a weaker exchange rate being the two key factors¹⁵.

² <https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023>

³ <https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023>

⁴ <https://www.oecd.org/economic-outlook/september-2023/>

⁵ <https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023>

⁶ <https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023>

⁷ <https://www.imf.org/en/Publications/WEO/Issues/2023/10/10/world-economic-outlook-october-2023>

⁸ <https://www.worldbank.org/en/news/press-release/2023/10/04/to-avert-a-lost-decade-africa-must-urgently-achieve-stability-increase-growth-and-create-jobs>

⁹ <https://www.worldbank.org/en/news/press-release/2023/10/04/to-avert-a-lost-decade-africa-must-urgently-achieve-stability-increase-growth-and-create-jobs>

¹⁰ https://www.parliament.gov.zm/sites/default/files/images/publication_docs/2024%20BUDGET%20SPEECH_230929_174057.pdf

¹¹ <https://www.bloomberg.com/news/articles/2023-07-20/zambia-s-copper-production-seen-falling-to-14-year-low>

¹² <https://www.boz.zm/monitor-policy-decisions.htm>

¹³ <https://www.zamstats.gov.zm/publications/>

¹⁴ https://www.boz.zm/MPC_Statement_August_2023.pdf

¹⁵ https://www.boz.zm/MPC_Statement_August_2023.pdf

1.3 PERFORMANCE OF THE GLOBAL ENERGY SECTOR

The International Energy Agency (IEA) projected that global oil demand in 2023 would reach 101.7 million barrels per day (mb/d) in 2023. This was a revision of 400,000 barrels per day owing to the impact of the weakening worldwide macroeconomic environment. The impact of higher interest rates fed through the real economy while petrochemical activity shifted increasingly to China, undermining growth elsewhere. Europe was particularly soft amid the continent's broad manufacturing and industrial slump. In addition, tighter efficiency standards and an expanding electric vehicle fleet continued to curb oil use¹⁶. Despite the weakened global economic climate, a resurgent in China's demand accelerated from 1.8 million barrels per day in 2022 to 2.2m/bd in 2023¹⁷ drove the global demand.

According to IEA, crude oil prices fluctuated following the European Union (EU) import ban on Russia's crude oil and products in the first half of 2023. This was compounded by the several interest rate hikes among global central banks, inflation and recession concerns. Similarly, in the second half of the year, geopolitical tensions and concerns around crude oil demand resulted in more price fluctuations. Nevertheless, crude oil price fluctuations in 2023 were significantly less volatile than in 2022, when prices reached multi-year highs because of Russia's full-scale invasion of Ukraine. Global markets adjusted to new trade dynamics in 2023, with crude oil from Russia finding destinations outside the EU. Brent crude oil averaged US\$83/bbl in 2023, down from US\$101/bbl in 2022, a difference of US\$19/bbl¹⁸. Similarly, West Texas Intermediate (WTI) crude oil averaged US\$77.64/bbl in 2023 from US\$94.53/bbl in 2022¹⁹.

In the electricity sub-sector, global demand growth was projected to slightly decline by less than 2 percent in 2023 compared to 2.3 percent in 2022²⁰. The decline in growth in advanced economies also had a profound effect on electricity demand. The effects of global energy crisis and slow economic growth²¹ in advanced economies largely explained the slow growth in electricity demand. For instance, electricity demand in the EU fell by 3 percent to reach the lowest level recorded in two decades²². The decline was largely on account of energy intensive industries struggling with energy prices. Meanwhile, the decline was in contrast with the growth observed in emerging economies such as China and India. China's electricity demand was expected to increase by 5.3 percent in 2023²³.

In the renewable energy sub-sector, there was a significant increase in capacity with an addition of an estimated 507GW in 2023²⁴ which was almost 50 percent higher than in 2022. The global increase in the renewable energy sub-sector was driven by the continuous policy support in many countries worldwide that led to a significant change in the global growth trend²⁵. Solar Photovoltaic (PV) and wind accounted for the largest proportion of renewable capacity due to their lower generation than for both fossil and non-fossil alternatives²⁶. While China accounted for the largest proportion of renewable energy expansion in 2023, the Middle East and North Africa also accelerated expansion owing mostly to policy incentives that took advantage of cost competitiveness of solar PV and on-shore wind power²⁷.

¹⁶ <https://www.iea.org/reports/oil-market-report-december-2023>

¹⁷ <https://www.oil.com/general-interest/economics-markets/article/14278261/iea-2023-world-oil-demand-to-surpass-prepandemic-levels>

¹⁸ <https://www.eia.gov/todayinenergy/detail.php?id=61142>

¹⁹ <https://www.macrotrends.net/2516/wti-crude-oil-prices-10-year-daily-chart>

²⁰ <https://www.iea.org/reports/electricity-market-report-update-2023/executive-summary>

²¹ <https://www.iea.org/reports/electricity-market-report-update-2023/executive-summary>

²² <https://www.iea.org/reports/electricity-market-report-update-2023/executive-summary>

²³ <https://www.iea.org/reports/electricity-market-report-update-2023/executive-summary>

²⁴ <https://www.iea.org/reports/renewables-2023/electricity>

²⁵ <https://www.iea.org/reports/renewables-2023/electricity>

²⁶ <https://www.iea.org/reports/renewables-2023/electricity>

²⁷ <https://www.iea.org/reports/renewables-2023/electricity>

1.4 PERFORMANCE OF THE DOMESTIC ENERGY SECTOR

1.4.1 Electricity Sub-sector

Zambia's electricity generation capacity continued to be mostly attributed to hydro generation which is highly dependent on rainfall from October to April of each year. Overall, there was a marginal decrease in the total amount of electricity generated in 2023 compared to 2022. The national electricity generation stood at 19,399.11GWh, which slightly dropped by 0.1 percent to 19,372.92GWh in 2023. In spite of the overall decline, the mini hydro power stations recorded a significant increase of 27.3 percent in power generation in 2023 compared to 2022. ZESCO, in 2023 recorded a significant increase in electricity imports to 294GWh from 18GWh in 2022. Equally exports increased by 25.2 percent from 2,923GWh in 2022 to 3,661GWh in 2023.

The national electricity demand increased by 6.3 percent from 13,777.9 GWh in 2022 to 14,642.2 in 2023, with the notable demand increase emanating from the agriculture sector. In spite of this, the overall percentage share of the electricity supply sector in the first three quarters of 2023 averaged 1.3 percent, lower than the 1.7 percent attained during the same period in 2022, which may partially be attributed to the reduced electricity consumption in the mining and quarrying, manufacturing and construction economic sectors.

The quarterly trend analysis of the gross value addition of the electricity supply sector to GDP in 2023 showed a similar pattern as observed in 2022, a peak in quarter one and a low in quarter three as depicted in Figure 1-1.

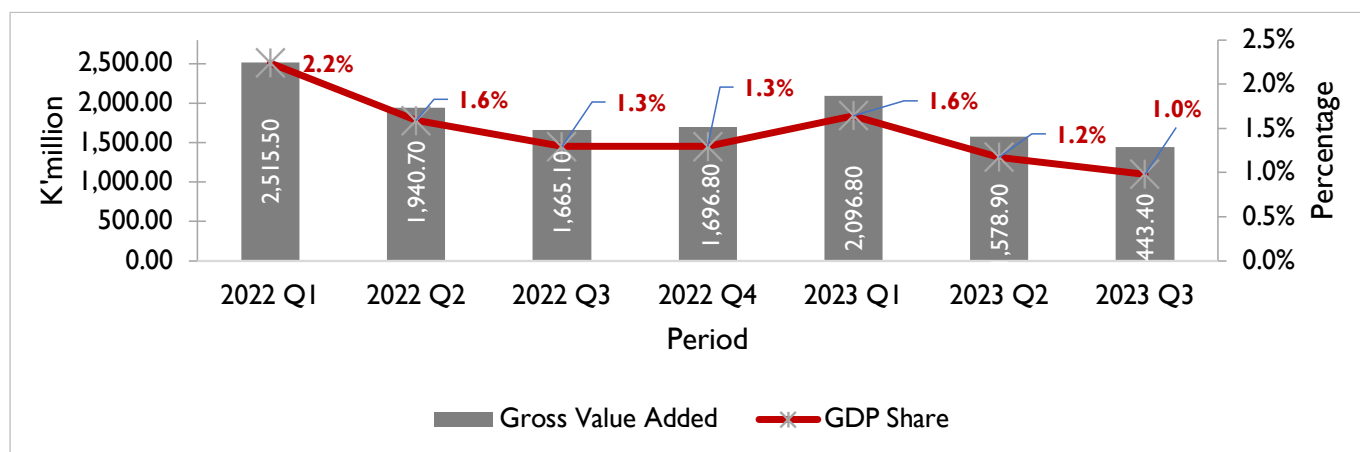


Figure 1-1: Gross value addition of the electricity supply sector to GDP, 2023

Source: Zambia Statistics Agency monthly bulletin – December 2023

During the period under review, the ERB approved ZESCO's multi-year tariff application for the period 2023 to 2027. The annual increase in tariffs was aimed at introducing cost reflective tariffs, which would positively impact ZESCO's sustainability. The company has historically been affected by increased power purchase costs and operating expenses against non-cost reflective tariffs.

1.4.2 Petroleum Sub-sector

In 2023, the national consumption of petroleum products continued to rise compared to 2022. The total national consumption of all petroleum products increased by 5.0 percent from 1,549,274.44MT in 2022 to 1,627,405.87MT in 2023.

During the same period specifically, the consumption of kerosene and Jet A-1 went up significantly by 370.4 percent and 41.7 percent, respectively. The increase in consumption of kerosene was mainly attributed to product availability on the market as INDENI Energy Company Limited (INDENI) processed the last consignment of petroleum feedstock transported via TAZAMA pipeline. The increase in consumption of Jet A-1 was associated with increased air travel as the aviation sector recovered

from the ravaging effects of the Covid-19 pandemic on global air transportation. Furthermore, new routes such as Lusaka to Maputo and Lusaka to Cape Town were opened-up and the Government lifted visa requirements in key tourist markets such as the United States of America, Canada, Austria and the European Union.

In the year 2023, the ERB continued to review fuel prices every 30 days in line with the pronounced reforms for the petroleum sub-sector. The wholesale and retail prices of petrol, diesel, and kerosene were revised using the Import Parity Pricing (IPP) model. Regarding Jet A-1, the model was used to determine both the wholesale price and the Posted Airfield Price (PAP) at the major international airports.

The price review period was to ensure that prices were cost reflective and that the importers were able to earn a reasonable return on their investments for security of supply. In addition, the price review period also ensured that the prevailing pump prices were responsive to the changes in the exchange rate and international oil prices, being the major factors that influence them.

1.5 ENERGY SECTOR OUTLOOK

Global energy consumption is expected to accelerate in 2024 with fossil fuels continuing to dominate, despite soaring demand for renewables. The Economist Intelligence Unit projects the global energy consumption to grow by 1.8 percent in 2024, supported by strong demand in Asia²⁸. While the momentum in renewable energy is expected to continue, high commodity prices will drive investment into oil and gas production.

At domestic level, the ERB working with key stakeholders drafted Open Access Regulations for both the petroleum and electricity sub-sectors. Specifically, the open access use of TAZAMA pipeline were developed and approved in 2023. It is envisaged that the open access rules and guidelines will be operationalised in 2024. Under these guidelines, the TAZAMA pipeline will be used to transport low sulphur diesel, by multiple Oil Marketing Companies (OMCs). This is expected to have a positive impact on the security of supply in the country. Furthermore in 2024, the Lusaka Fuel Depot is envisaged to be commissioned to enhance the government storage facilities for petroleum products.

In the electricity sub-sector, the ERB through stakeholder consultation developed draft regulations for electricity open access. The draft regulations together with the proposed open access market structure will be submitted for cabinet approval in 2024. Once implemented, the open access in the electricity sub-sector is expected to enhance intra and international energy trading.

The open access regime will strengthen the liberalisation of the power sector through non-discriminatory access to the electricity network. This is expected to attract private investment, create competition through fostering consumer sovereignty which will consequently lead to efficient service delivery.

1.6 STRUCTURE OF THE REPORT

This report is divided into seven sections. Section one presents the introduction. Section two discusses the developments in the energy sector, while section three covers the performance of the electricity subsector. Section four outlines the performance of the renewable subsector, while the performance of the petroleum subsector is highlighted in section five. Section six focuses on licensing in the energy subsector and section seven provides stakeholder engagements and complaints handling.

²⁸ [eiu.com/n/wp-content/uploads/2023/10/Energy-report-2023.pdf](https://www.eiu.com/n/wp-content/uploads/2023/10/Energy-report-2023.pdf)

An aerial photograph of a vast solar farm. The solar panels are arranged in long, parallel rows that stretch across a dark green field. The panels have a color gradient from light orange to deep blue. The perspective is from a high angle, looking down at the rows.

DEVELOPMENTS IN THE SECTOR

2.0 DEVELOPMENTS IN THE SECTOR

The energy sector in Zambia has been undergoing reforms in response to emerging developments. Consequently, the ERB developed rules and regulations to enhance regulatory tools and approvals in 2023. This section provides the details of various rules, regulations and guidelines that were developed within the year.

2.1 LEGISLATIVE AND REGULATORY CHANGES

The Electricity Act No. 11 of 2019 and Energy Regulation Act No. 12 of 2019 mandates the ERB to develop rules and regulations to effectively govern the energy sector. The rules and regulatory frameworks provide guidelines for the conduct and performance of licensees in order to protect the interests of consumers and stakeholders at large. The ERB carries out this mandate through consultation and collaboration with key stakeholders in the energy sector. Table 2-1 outlines the rules and regulations revised and developed during the period under review.

Table 2-1: Regulations and rules developed/amended, 2023

Regulation	Detail
Energy Regulation Act, 2019	
The Energy Regulation (General) Regulations, Statutory Instrument No. 41 of 2023	The Regulations replace the Energy Regulation (General) Regulations, Statutory Instrument No. 42 of 2021 in order to simplify the licence application process, exempt mini-grids from licensing and provide for open access to the TAZAMA Pipeline.
Tribunal Rules	The Rules facilitate the appeal of decisions of the ERB as provided for in Section 54 of the Act.

2.2 DEVELOPMENTS AND REVIEW OF STANDARDS AND GUIDELINES

Section 4(h) of the Energy Regulation Act of 2019 mandates the ERB to collaborate with the Zambia Bureau of Standards (ZABS) to develop or revise technical standards concerning the quality, safety, and reliability of energy products and services. Section 4(m) further assigns the formulation of the sector's codes and guidelines to the ERB. Appendix 1 details the guidelines, standards and frameworks developed during the period under review.

2.3 MULTI-YEAR TARIFF FRAMEWORK

The Multi-Year Tariff Framework (MYTF), which was developed in 2022 and implemented in 2023, aims to address the shortcomings of the previous tariff framework by ensuring cost-reflective tariffs, promoting operational efficiency, and providing regulatory certainty to utilities, investors, and consumers.

Key processes such as tariff true-up, reconciliation of regulatory clearing accounts, and automatic cost pass-through are integral to the effective management of the MYTF. These processes enable the comparison of projected costs with actual costs, ensuring fair and sustainable tariff adjustments.

The operationalization of a multi-year tariff framework is anchored on the reconciliation of the projected revenues and O&M costs through a Regulatory Clearing Account (RCA). Through this process the licensees, ZESCO and NWEK, are required to submit the self-true-up reports. The reports are expected to contain petitions on automatic cost pass-through if the projected costs for 2024 - 2027 are above 2 percent but below 10 percent of the allowed revenue requirement for the year.

The trigger for automatic cost pass-through is when the 2024 - 2027 Projected Revenue Requirement (pre-approved allowed costs) increase by more than 2 percent but less than 10 percent. In such a situation, the pre-approved tariffs for 2024 - 2027 will be adjusted automatically to avoid any erosion of the pre-approved revenue requirement. In summary, this implies altering tariffs that were pre-approved in 2023. It is worth noting that this process is undertaken without public dialogue.

The ERB will review the RCAs submissions made by the Utilities and make final determination on the pre-approved tariffs. This will involve awarding or varying the pre-approved tariffs.

Following the tariff decision of 2023 by the ERB it is envisaged that the sector will continue to transition to cost reflective tariffs.

2.4 ERB TARIFF DECISIONS FOR ZESCO AND NVEC IN 2023

In line with section 36 of the Electricity Act, the ERB approved multi-year tariffs for two utilities namely; ZESCO and North-Western Energy Corporation (NVEC). The details of the approved tariffs and the accompanying directives and orders are presented in the subsequent sections.

2.4.1 ZESCO Tariffs

The ERB awarded ZESCO a multi-year tariff adjustment with effect from 1st May 2023 to 30th April 2027. The ERB approved the 2023 tariff adjustment at 37 percent, while the adjustments from 2024 to 2027 were granted a conditional approval subject to the ERB's annual review of the Regulatory Clearing Account results which will be during March 2024. The ERB approved the 2023 to 2027 tariff adjustments as depicted in Figure 2-1.

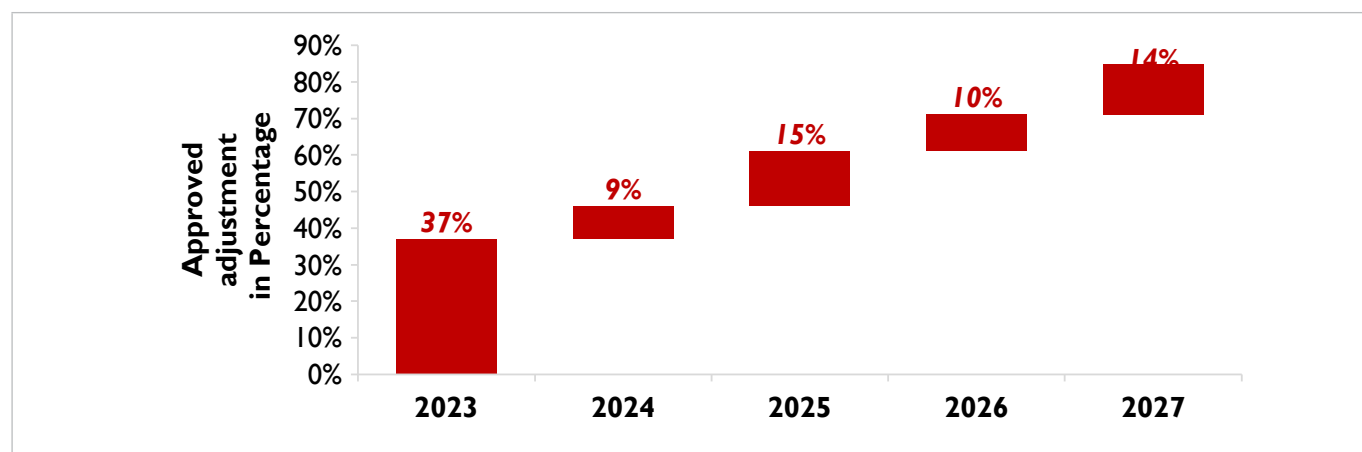


Figure 2-1: ZESCO approved Multi-year Tariffs

However, it is important to note that prior to the implementation of the pre-approved electricity tariffs, the ERB will undertake a true-up exercise which will involve a comparison of the projected expenditures and revenues against the actual results to determine the final tariff award to be granted to the utility.

The ERB also approved the following new tariff structures:

- i. Change in the structure of the social tariff category to restrict it to Government and Community Schools, Government Hospitals & Clinics, Municipal Street Lighting & Traffic Lights, Gazetted Places of Worship, Registered Orphanages and Registered Old People's Homes;
- ii. Reduce the threshold for Maximum Demand upper tariff band from 25,000kVA to 5,000KVA and consequently migrate all affected customers to Power Supply Agreement (PSA); and
- iii. Introduction of a water tariff for water pumping facilities operated by licensed water utilities. This measure was to improve access to clean and safe water as a necessity for national development.

The detailed approved electricity tariff schedule is presented in Appendix 2.

2.4.2 NWEC Tariffs

In June 2023, the ERB approved NWEC multi-year tariffs for the period 2023 – 2027. Further, the ERB approved NWEC's standard connection charges for new customer connections. These tariffs and connection charges were effective from 1st July 2023. In addition to the approval of the multi-year electricity tariffs and connection charges, the Board issued Directives to the utility to ensure that it enhances its service delivery and commercial performance.

As part of monitoring the utility's performance the ERB directed the utility to provide a formal update on the implementation of the Board directives specifically highlighting the following matters:

- i. Implementation of electronic (digital) vending platforms;
- ii. Compensation of customers that were affected by erroneous tax computations on their bills;
- iii. Implementation of the approved standard connection charges; and
- iv. Development and implementation of a staggered payment plan system for the approved standard connection charges.

As of December 2023, NWEC had operationalised electricity vending on MTN mobile money platform and was still in discussions with the other mobile network providers.

2.5 OPEN ACCESS

2.5.1 Electricity Open Access

The Ministry of Energy (MoE) and ERB, with technical support from the Development Bank of Germany (KfW) through the GET FiT programme developed an Electricity Open Access framework comprising the following:

- i. Open Access Regulations;
- ii. Market Rules and Guidelines;
- iii. Open Access Market Structure and Design; and
- iv. Transmission and Distribution Pricing Methodology.

It is envisaged that the framework will be implemented in 2024, once Government approval is granted.

2.6 UPDATE ON GET FIT

The Global Energy Transfer Feed-in Tariff (GET FiT) Programme was launched in 2018 and financial close of the six awarded GET FiT Zambia solar PV projects (combined capacity of 120 MW) was initially targeted for the first half of 2020. However, the programme was stalled on account of project lenders suspending their funding to all Independent Power Producer (IPP) projects in Zambia's electricity sector. This was as a result of financial sustainability concerns from ZESCO that was earmarked for offtake of the project. These concerns prompted lenders to pause financing until the Government addressed these issues comprehensively, including debt restructuring and finalisation of the Cost-of-Service Study.

During the period under review, Government undertook significant measures to tackle the highlighted concerns, including the Minister of Energy facilitating a meeting with the project lenders to provide an update on the Government interventions and the progress made in addressing lenders' requirements for reinitiating financing in Zambia. This demonstrated the Government of the Republic of Zambia's commitment to addressing the challenges, unlock the GET FiT Zambia projects, and ensure that the Zambian people benefit from the projects' favourable electricity tariffs. Through the intervention of

the Minister of Energy, the prospects to unlock financing for the GET FIT 120 MW Solar PV projects in the course of 2024 are positive.

With these commitments, three prospective project lenders agreed to move ahead with funding the 120MW Solar PV projects. The focus for 2024 will be to bring the solar PV projects to a financial close and ensure that construction starts soon after.

Further, guidance on the implementation and the issuance of a request for proposal (RfP) for the Small Hydro component of the GET FIT Program will be given once the financial close for the 120MW Solar PV projects has been achieved.

2.7 OPEN ACCESS USE OF TAZAMA PIPELINE

In line with the pronounced reforms to migrate to private sector led importation and procurement of petroleum products and the transformation of INDENI to an OMC and storage facility, TAZAMA was converted from a petroleum feedstock transporter to a diesel carrier. Further, guidelines were developed in the third quarter of the year, to open up the use of the pipeline by OMCs on a competitive basis. Government also published the Statutory Instrument No. 41 of 2023 to support the guidelines. This is expected to enhance competition and efficiency in the sector.

2.8 CONSTRUCTION OF INLAND FUEL PIPELINE

Within the year 2023, TAZAMA embarked on a project to construct a pipeline that will connect Mpika Fuel Depot to the main TAZAMA pipeline. This project is aimed at improving fuel distribution in northern Zambia. As at the end of 2023, construction works for the pipeline were completed and the pipeline is envisaged to be commissioned in 2024.

2.9 PETROLEUM MANAGEMENT BILL

During the period under review, the MoE reviewed the Petroleum Management Bill of the Laws of Zambia with the aim of enhancing operational efficiency in line with international best practices. It is expected to be enacted within 2024.



ELECTRICITY SUB-SECTOR

3.0 ELECTRICITY SUB-SECTOR

Zambia's electricity sub-sector comprises of the vertically integrated public utility company, ZESCO, IPPs and electricity distribution entities. These are the key players responsible for the generation, transmission, distribution and supply of electricity. This section highlights the performance and challenges for the electricity sub-sector in Zambia during 2023. The section also presents the outlook for this sector beyond 2023.

3.1 ZAMBIA'S INSTALLED ELECTRICITY GENERATION CAPACITY

In 2023, the national installed electricity generation capacity for on-grid and off-grid stood at 3,811.3 MW from 3,777.3 MW in 2022. The increase was mainly attributed to the addition of the 33MW expansion Riverside Solar project by Copperbelt Energy Corporation (CEC). The national installed capacity comprised of 3,164.14 MW of hydro electricity generation, representing 83.0 percent of the total national installed capacity. The proportion of installed thermal electricity generation was 8.7 percent (300 MW), while solar was 122.38 MW (3.2 percent). Heavy Fuel Oil (HFO) generation capacity stood at 110 MW representing 2.9 percent. The least was accounted for by diesel electricity generation at 2.2 percent (84.80 MW). The diesel installed capacity included CEC's standby emergency generators of 80MW. Figure 3-1 presents the installed electricity generation by technology in 2023.

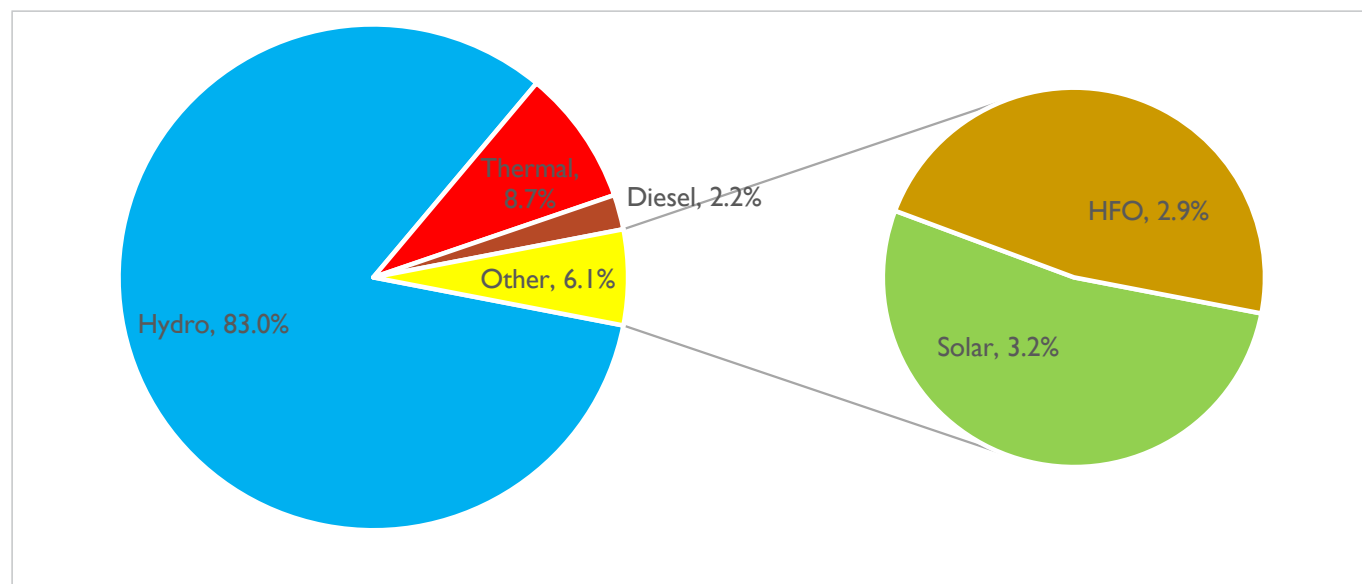


Figure 3-1: Installed electricity generation by technology – 2023

3.2 HYDROLOGICAL SITUATION IN ZAMBIA

Zambia's hydroelectricity generation water reservoirs are fed by the Zambezi and Kafue river basins. The water catchment basins feed into the water reservoirs of Zambia's five (5) major hydropower generation stations, namely: Kafue Gorge Power Station (KGPS), Kariba North Bank Power Station (KNBPS), Victoria Falls Power Station (VFPS), Itezhi-Tezhi Power Station (ITPS) and Kafue Gorge Lower (KGL). Table 3-1 presents the major hydropower generation stations and their water reservoirs and storage design characteristics.

Table 3-1: Major hydropower generation stations in Zambia

Hydro Station	Reservoir Type	Designed Maximum Water Level asl (m)	Designed Minimum Water Level asl (m)	Effective Water Height for Max. Generation (m)
KGPS	Dam	976.60	974.00	2.60
KNBS	Dam	487.71	475.50	12.21
VFS	Run-off-river	883.20	881.50	1.70
ITPS	Dam	1030.50	1006.00	24.50
KGL	Dam	579.75	530.00	49.75

Due to the annual rain patterns in Zambia, all major reservoirs are expected to reach peak capacity around April to June every year. In 2023, all the reservoirs, except the Kariba dam, reached 100 percent of their respective water capacities required for maximum power generation at their respective power stations during the peak water period. This was due to the improved rainfall over the 2022/23 rain season compared to the 2021/22 season. Figure 3-2 depicts the water availability trend in the major reservoirs in 2023, highlighting the positive impact of increased water levels and subsequent power generation capacity.

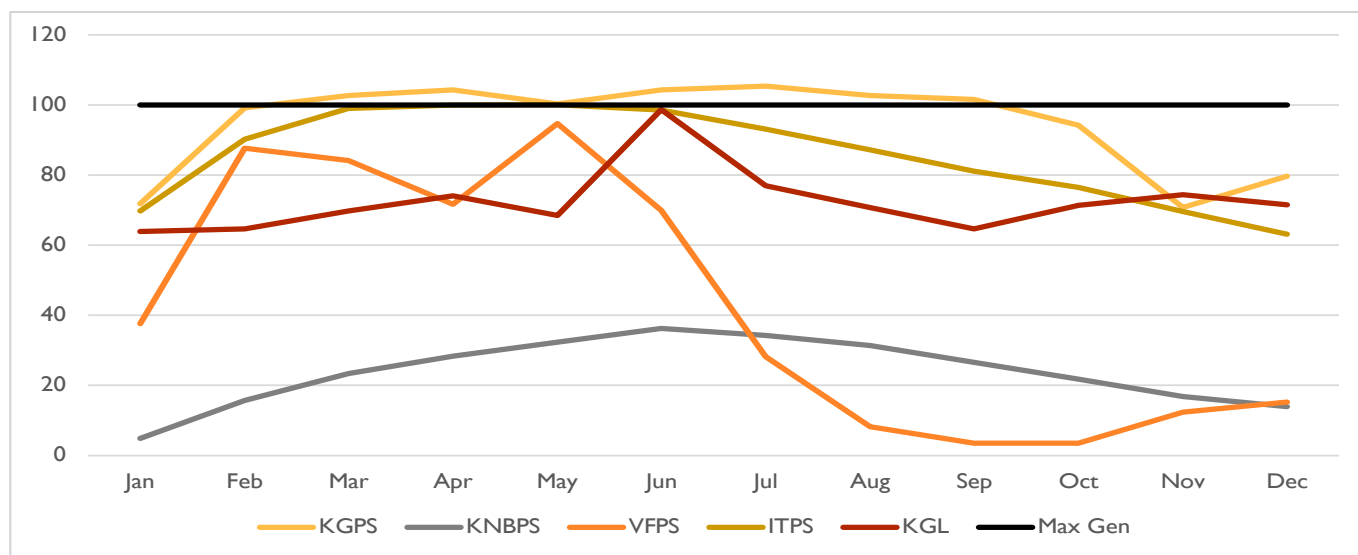


Figure 3-2: Water availability and generation trends in the major reservoirs in 2023

Of the total effective usable water required for generation from each reservoir, the actual instantaneous available water levels on selected days in each month are compared and presented in Appendix 3.

Kariba dam’s maximum water accumulation in both 2023 and 2022 was less than 40 percent of the designed capacity required for maximum power generation. This was mainly attributed to the relatively lower water inflows during the 2021/22 and 2022/23 rain seasons.

3.3 NATIONAL ELECTRICITY GENERATION

There was a marginal decrease in the total amount of electricity generated in 2023 compared to 2022. The national electricity generation stood at 19,372.92GWh in 2023, which was a slight drop of 0.1 percent from 19,399.112GWh recorded in 2022. ZESCO attributed the decline to reduced generation from KNBPS and KNBE that experienced reduced water flows in 2022/23. Meanwhile, the mini-hydro power plants generation was 27.3 percent higher in 2023 than in 2022 due to improved rainfall in the 2022/23 rain season. Appendix 4 shows the average projected and actual monthly river inflows to Zambia’s major run-off-river hydro power stations in 2023. Consequently, the IPPs also recorded an increase in electricity generation by 1.4 percent in 2023. Table 3-2 shows the percentage changes in generation in 2023 compared to 2022.

Table 3-2: Comparison of National Electricity Generation, 2022-2023

Source of Generation	Generation (GWh)		
	2022	2023	% Change
Diesel	2.47	2.05	(17.1)
Independent Power Producers	3,313.39	3,327.66	0.43
Major Stations	15,922.45	15,838.57	(0.53)
Mini-Hydro stations	160.82	204.65	27.3
Grand Total	19,399.11	19,372.92	(0.1)

3.3.1 Electricity Generation from Large Hydro Power Plants Owned by ZESCO

In 2023, Zambia's major power-generating stations experienced varying trends in electricity production. KGPS recorded a modest increase of 4.8 percent, generating 7,497.97GWh compared to 7,154.03GWh in 2022. However, due to the operations at KNBE, KNBPS experienced a significant decline of 18.3 percent, generating 2,955.17GWh in 2023 compared to 3,615.15GWh in 2022. Meanwhile, KNBE experienced a substantial drop of 64.9 percent, generating only 527.54GWh in 2023 compared to 1,501.20GWh in 2022.

In addition, VFPS saw a notable increase of 19.5 percent, producing 819.35GWh in 2023 compared to 685.42GWh in 2022. Despite these fluctuations, the overall electricity generation from Zambia's major power stations decreased marginally by 1.6 percent from 11,454.60GWh in 2022 to 11,272.48GWh in 2023. Table 3-3 presents electricity generation in 2022 and 2023 from large hydro power plants owned by ZESCO.

Table 3-3: Electricity generation from large hydro power plants, 2022-2023

Name of Station	Generation (GWh)		
	2022	2023	% Change
Kafue Gorge Power Station	7,154.03	7,497.97	4.8
Kariba North Bank Power Station	3,615.15	2,955.17	(18.3)
Victoria Falls Power Station	685.42	819.35	19.5
Kafue Gorge Lower	2,966.65	4,038.54	36.1
Kariba North Bank Extension	1,501.2	527.54	(64.9)
Grand Total	15,922.45	15,838.56	(0.53)

3.3.2 Electricity Generation from Mini-Hydro Power Plants Owned by ZESCO

In 2023 Zambia's mini-hydro power generating stations²⁹ demonstrated significant growth in electricity production. Chishimba Falls experienced a substantial increase of 47.5 percent, generating 16.00GWh compared to 10.85GWh in 2022. Similarly, Lunzua saw a notable rise of 28.9 percent, producing 53.04GWh in 2023 compared to 41.15GWh in 2022. Lusiwasi Upper exhibited an increase of 44.6 percent, generating 60.83GWh in 2023 compared to 42.08GWh in 2022. Furthermore, Musonda Falls and Shiwan'gandu also experienced growth, with increases of 25.1 percent and 5.0 percent, respectively. However, Lusiwasi Lower witnessed a decline of 16.3 percent, generating 17.38GWh in 2023 compared to 20.77GWh in 2022. Overall, the total electricity generation from ZESCO's small and mini-hydro power stations increased by 27.3 percent, from 160.82GWh in 2022 to 204.65GWh in 2023.

²⁹ Hydro Power plants with capacity of 20MW or below are classified as mini-hydros

Table 3-4 shows electricity generation from ZESCO-owned mini-hydro power plants in 2022 and 2023.

Table 3-4: Electricity Generation from mini-hydro power plants, 2022-2023

Name of Station	Generation (GWh)		
	2022	2023	% Change
Chishimba Falls	10.85	16.00	47.5
Lunzua	41.15	53.04	28.9
Lusiwasi Lower	20.77	17.38	(16.3)
Lusiwasi Upper	42.08	60.83	44.6
Musonda Falls	45.43	56.83	25.1
Shiwan'gandu	0.54	0.57	5.6
Grand Total	160.82	204.65	27.3

3.3.3 Electricity Generation from Diesel Power Plants Owned by ZESCO

Electricity generation from diesel power plants owned by ZESCO experienced varied trends in 2023. Chama and Lundazi witnessed significant declines in generation, with Chama experiencing a sharp decrease of 70.93 percent, producing only 0.08GWh compared to 0.28GWh in 2022, and Lundazi declining by 33.18 percent, generating 0.75GWh in 2023 compared to 1.12GWh in 2022. The decline was mainly attributed to the connection of Chama and Lundazi to the national electricity grid.

For Shang'ombo district, which was serviced by a diesel power station, there was an increase in generation of 14.01 percent, to 1.22GWh in 2023 from 1.07GWh in 2022. Overall electricity generation from diesel power plants owned by ZESCO declined by 17.12 percent from 2.47GWh in 2022 to 2.05GWh in 2023. Table 3-5 presents a summary of electricity generation from diesel power plants owned by ZESCO.

Table 3-5: Electricity power generation from diesel power plants, 2022-2023

Name of Station	Generation (GWh)		
	2022	2023	% Change
Chama	0.28	0.08	(71.43)
Lundazi	1.12	0.75	(33.04)
Shang'ombo	1.07	1.22	14.02
Grand Total	2.47	2.05	(17.00)

3.3.4 Electricity Generation from Independent Power Producers

In 2023, electricity generation from Zambia's IPPs showed a mixed pattern of growth and decline. In addition to the increased capacity at KGL, Itezhi-Tezhi Power Corporation (ITPC) experienced 9.4 percent increase in electricity generation from 757.80GWh in 2022 to 828.68GWh in 2023. Additionally, Bangweulu Power Company Limited (BPL) and Ngonye Power Company Limited (NPCL) recorded increases of 2.9 percent and 3.0 percent, respectively. However, Lunsemfwa Hydro Power Company Limited (LHPC) and Maamba Collieries Limited (MCL) also experienced decreases of 11.7 percent and 1.8 percent, respectively. Nevertheless, the overall electricity generation from Zambia's IPPs showed a slight increase of 0.43 percent, from 3,313.39GWh in 2022 to 3,327.66GWh in 2023. Table 3-6 shows the electricity volumes generated by IPPs in 2023 against 2022.

Table 3-6: Electricity power generation from Independent Power Producers, 2022-2023

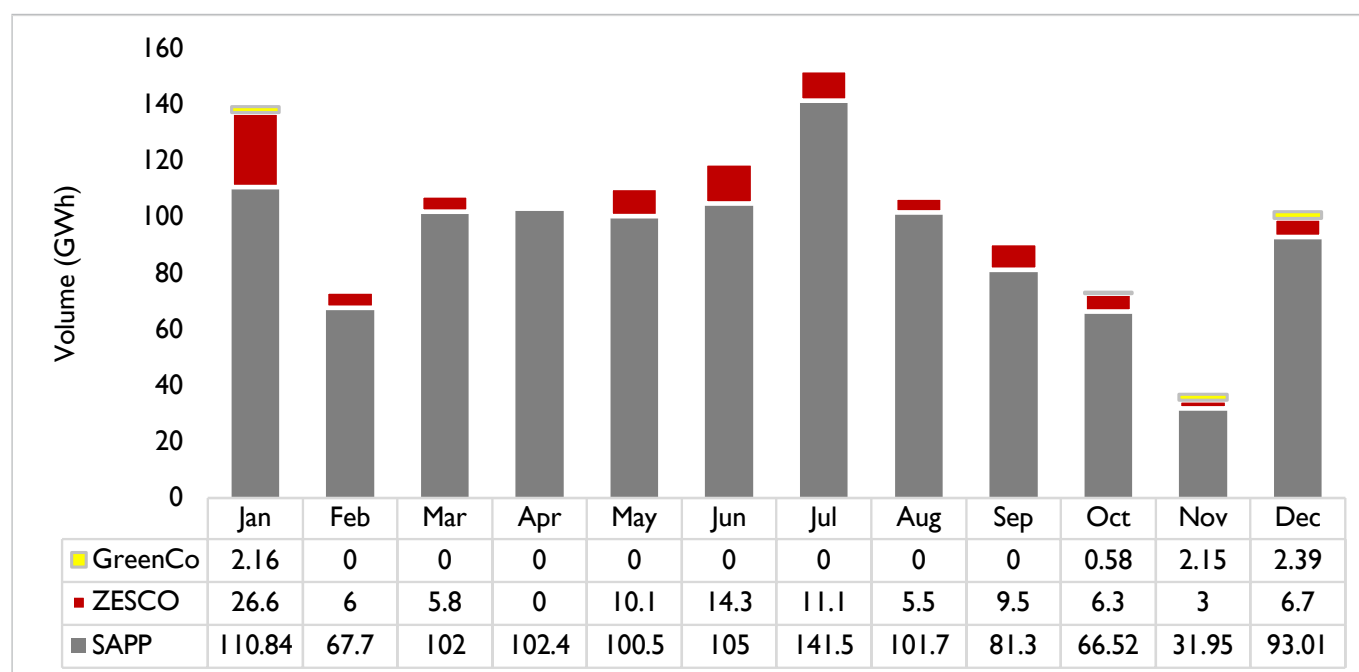
Name of Station	Generation (GWh)		
	2022	2023	%Change
Bangweulu Power Company Limited	84.54	86.97	2.9
Itezhi-Tezhi Power Corporation	757.80	828.68	9.4
Lunsemfwa Hydro Power Limited	247.78	218.71	(11.7)
Maamba Collieries Limited	2,164.70	2,126.33	(1.8)
Ndola Energy Corporation Limited	-	6.65	100.0
Ngonye Power Company Limited	58.57	60.32	3.0
Grand Total	3,313.38	3,327.66	0.43

3.4 DOMESTIC AND REGIONAL POWER TRADING

Licensees conduct domestic and regional power trading through a Southern African Power Pool (SAPP) market. The SAPP is a regional network which connects member utilities in the Southern African region and provides a platform for electricity trade. SAPP facilitates cross border trading allowing member utilities to both import and export electricity depending on the energy dynamics.

3.4.1 Electricity Exports and Imports by GreenCo

Figure 3-3 presents the volumes traded by ZESCO and GreenCo in proportion to the total trade volume on the SAPP network in 2023. The two licensees were the major traders on the SAPP market during the year 2023. GreenCo Power Services Limited (GreenCo) is an intermediary off-taker trading company mainly purchasing power from renewable IPPs to other utilities within Zambia and on the SAPP market. In 2023, GreenCo traded a total of 7,272.80 MWh on the SAPP market.

**Figure 3-3: Trades on the SAPP Market**

3.4.2 Power Purchase and Supply Agreements

Section 3 of the Electricity Act No. 11 of 2019 mandates the ERB to regulate agreements relating to the purchase or supply of power which are entered into by licensees in the electricity sub-sector. In line with the mandate, the ERB reviewed 48 Agreements. Table 3-7 presents a summary of the Agreements reviewed, while Appendix 5 gives details of the Agreements.

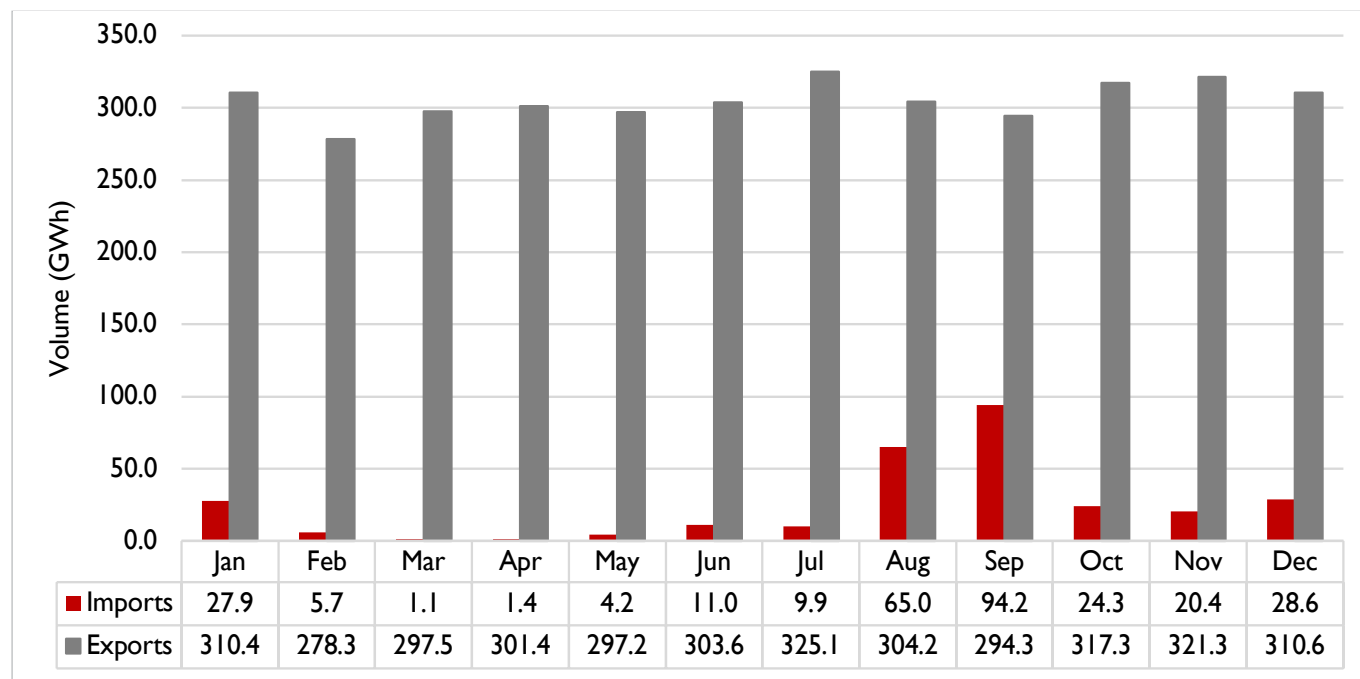
Table 3-7: Summary of Approved Agreements, 2023

No.	Power Agreements	Number
1.	Power Purchase Agreement	7
2.	Power Supply Agreement	32
3.	Wheeling Agreement	2
4.	Balancing Agreement	1
5.	System Operation Agreement	1
6.	Addendum to Transmission Agreement	1
7.	Addendum to Power Purchase Agreement	3
8.	Addendum to Bulk Supply Agreement	1
	Total	48

Following the approval of the 2023 to 2027 multi-year tariffs, ZESCO reduced the capping for its Maximum Demand customer category from 25,000kVA to 5,000kVA. The change resulted in an increase in approved power agreements from 9 in 2022 to 48 in 2023.

3.4.3 Electricity Exports and Imports by ZESCO

In addition to trading on the SAPP market, ZESCO has bilateral agreements for the sale and purchase of power with utilities within the Southern African region. Figure 3-4 presents ZESCO's regional trades for 2023.

**Figure 3-4: ZESCO's power imports and exports, 2023**

3.5 NATIONAL ELECTRICITY CONSUMPTION

3.5.1 National Electricity Consumption by Economic Sector

The total national electricity consumption increased by 6.3 percent from 13,777.9GWh in 2022 to 14,642.2GWh in 2023. There was a notable increase in consumption in the energy and water sector (11.9 percent) and agriculture sector (9 percent), while consumption by the mines and transport sectors increased by 5.2 percent each. The trade sector consumption increased by 3.7 percent. Meanwhile, the remaining sectors reported a decline in electricity consumption with manufacturing declining by 7.8 percent and mining (quarries) at 6.6 percent. The construction sub-sector also declined by 6.2, services (households) by 3.5 percent, and finance and property by 0.1 percent.

Table 3-8, shows the national consumption of electricity by economic sector for the periods 2022 and 2023.

Table 3-8: National consumption of electricity by economic sector, 2022 and 2023

Sector	Electricity Consumption (MWh)		
	2022	2023	% Change
Others	56,158.88	44,150.03	(21.4)
Agriculture	286,459.89	312,197.22	9.0
Mining (Quarries)	743,568.27	694,355.45	(6.6)
Manufacturing	384,636.59	354,541.95	(7.8)
Energy and Water	106,770.39	119,524.94	11.9
Construction	7,308.91	6,856.72	(6.2)
Trade	87,767.73	91,001.99	3.7
Transport	36,939.92	38,852.94	5.2
Finance and Property	908,275.38	907,374.82	(0.1)
Services (Households)	4,548,501.11	4,387,653.62	(3.5)
PPA	-	729,202.21	100.0
Mines (Total)	6,611,513.58	6,956,509.68	5.2
Total (National Demand less losses)	13,777,900.63	14,642,221.57	6.3

3.6 OPERATIONAL PERFORMANCE OF ELECTRICITY UTILITIES

3.6.1 Performance Monitoring

Section 4(c) of the Energy Regulation Act No. 12 of 2019 empowers the ERB to “*monitor the efficiency and performance of a licensee and an enterprise, having regard to the purposes for which the licensee and the enterprise were licensed or established.*” The ERB uses Key Performance Indicator (KPI) frameworks to monitor the efficiency and performance of licensed entities in the energy sector which comprises financial and technical KPIs. In 2023 the technical KPIs focused on electricity infrastructure which fell below the set target. The ERB adopted the baseline average compliance rate of 74 percent as the regulatory target for 2023.

In 2023, a total of 475 electricity distribution infrastructures were inspected by the ERB countrywide. This number was made up of facilities for four enterprises licensed for the distribution of electricity namely ZESCO, CEC, NWEK and Zambia-China Economic Corporation Zone (ZCCZ). Similarly, the ERB conducted a performance review of the financial KPIs for ZESCO.

The average technical compliance for the 475 infrastructure inspected was 77 percent, which was above the base year regulatory target of 74 percent.

3.6.1.1 ZESCO

In July 2023, the ERB and ZESCO signed a revised 3-year KPI framework to cover the period January 2023 to December 2025 which aimed at assessing the operational performance of the Utility, with specific focus on quality-of-service, financial management, and commercial and technical operations. The framework comprises 11 thematic areas which are summarised in Table 3-9.

Table 3-9: ZESCO's KPI framework January 2023 – December 2025

No.	Key Performance Indicator (KPI)	Assigned score (%)
1.	New customer connections	10.00
2.	Post-paid billing	Monitoring only
3.	Financial performance	10.00
4.	Efficiency	15.00
5.	System losses	5.00
6.	Safety	10.00
7.	Customer service	10.00
8.	Staff productivity	8.00
9.	Quality of service	20.00
10.	Power Generation	5.00
11.	Power Quality	8.00
	Total	100.00
	Minimum expected score	75.00

As depicted in Table 3-9, quality-of-service accounted for the largest percentage share, followed by efficiency at 15 percent. New customers, financial performance, safety and customer service each accounted for 10 percent. Power generation and system losses accounted for 5 percent each, while power quality was at 8 percent.

The ERB set 75 percent as the minimum benchmark score on the framework. The performance on this KPI framework is used as one of the parameters for tariff award to ZESCO following the approved multi-year tariff regime.

ZESCO is required to submit quarterly reports to the ERB detailing its performance on the agreed KPIs. Figure 3-5 shows ZESCO's performance on the KPIs framework during the year 2023.

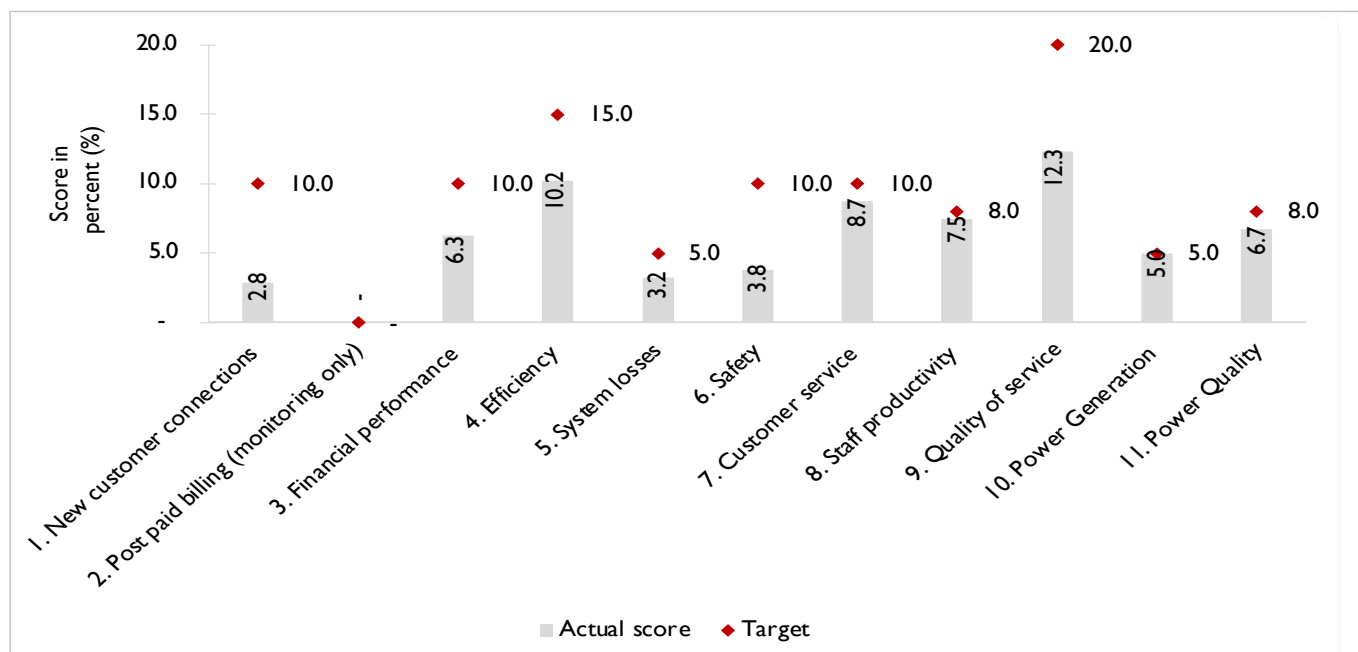


Figure 3-5: ZESCO's performance on the KPIs framework during the year 2023

As presented in figure 3-5, the ERB's annual assessment revealed that ZESCO did not meet most of the KPI targets. On average ZESCO attained a score of 66.4 percent which is below the benchmark target of 75 percent. ZESCO indicated that it was putting in place measures to improve its performance particularly in the new customer connections, quality-of-service, efficiency and system losses KPIs.

3.6.1.1.1 Key Developments

The Utility has continued to make investment in the generation, transmission and distribution segments of its business. These projects included upgrading of Chishimba Falls Power Station from 6MW to 15MW, grid extension to Lundazi & Chama, the Lusaka Transmission and Distribution Rehabilitation Project and the Sustainable Electricity Supply Southern Division which involves the rehabilitation and upgrade of distribution infrastructure in Lusaka Central, Kanyama, Chawama, Matero, Chilanga, and Kabwata.

3.6.1.1.2 Technical KPIs

During 2023, the ERB inspected a total of 415 of ZESCO's distribution infrastructure countrywide. The average compliance was 75.0 percent. Table 3-10 presents ZESCO's technical performance, for distribution infrastructure alone, for the period 2018 to 2023.

Table 3-10: ZESCO's electricity distribution infrastructure technical performance, 2018 to 2023

	2018	2019	2020	2021	2022	2023
Regulatory Target (%)	87	89	91	93	93	74
Average Compliance (%)	73	74	78	73	74	75

ZESCO's 2023 technical performance for its distribution infrastructure was one percentage point above target, which was consistent with the average annual performance of 74.5 percent for the period 2018 to 2023.

3.6.1.1.3 Financial KPIs

The ERB monitors ZESCO's financial performance by setting KPI targets that are meant to encourage ZESCO to maintain a healthy financial position in order to guarantee security of supply. The financial performance is monitored under three (3) indicators as follows:

- Liquidity – The liquidity indicator is measured by the current and quick ratios. ZESCO is required to maintain a current ratio above 1 and a quick ratio of 0.5;
- Solvency – The Solvency indicator is measured by the debt-to-equity and the interest coverage ratios. ZESCO is required to maintain a debt-to-equity ratio of 2 and interest coverage ratio of 1; and
- Profitability – The profitability is monitored using the Earnings Before Depreciation, Tax and Interest (EBITDA) margin. A minimum margin is not set as the sub-indicator is not scored but monitored only.

Table 3-11 shows ZESCO's performance on the financial indicators from Quarter 1 to Quarter 4 of 2023.

Table 3-11: ZESCO's financial performance January - December 2023

Sub indicator	Q1	Q2	Q3	Q4	Average
Liquidity					
Current ratio	0.25	0.23	0.25	0.41	0.29
Quick ratio	0.23	0.21	0.23	0.38	0.26
Solvency					
Debt - Equity ratio	5.47	5.32	7.61	6.06	6.115
Debt Ratio	0.85	0.85	0.88	0.86	0.86
Interest cover	3.34	2.44	3.0	10.70	19.48
Profitability					
EBITDA margin (%)	16.1	33.1	18.1	84	37.82

While ZESCO consistently performed well on the debt/equity ratio and debt ratio, the Utility continued to underperform on the liquidity ratios which continued to be negatively impacted by continued provisions of bad debt and outstanding trade payables. It was, however, noted that ZESCO continued to attend to its liquidity problem and there was an improvement on the quick ratio in quarter 4 which resulted in an increased KPI score by one percentage point from six percent to seven percent. Although the average annual performance on the liquidity ratios was below the target, it was above the performance of quarters one to three, demonstrating a significant improvement in the fourth quarter. While solvency ratios declined in the fourth quarter, they were higher than those recorded in the first two quarters and the EDITDA ratio was significantly higher than the previous 3 quarters giving an average margin of 21.72 percentage points higher than the quarter one margin. It is expected that the multi-year tariffs, KPIs frameworks and the utility’s 10-year rolling strategic plan will result in ZESCO’s improved performance going forward.

3.6.1.1.4 Challenges Faced

The Utility reported that it had faced several delays in implementation of most of its major projects in generation, transmission and distribution due to delays in funding as the country awaits finalization of the national debt restructuring programme. Other key challenges reported were related to vandalism of critical infrastructure such as transformers and service cables which negatively affected service delivery in most areas of Lusaka and Copperbelt provinces.

3.6.1.2 Copperbelt Energy Corporation Plc

CEC is one of the country’s oldest utilities and a major supplier of electricity to the mines on the Copperbelt of Zambia as well as the Democratic Republic of Congo (DRC). The Company purchases bulk electricity from ZESCO through a PPA for onward supply to the mines. CEC owns and operates over 1,087km of transmission and distribution lines in the Copperbelt Province. In addition, CEC owns standby diesel generation plants with a total installed capacity of 80MW for emergency supply to its customers.

During the period under review, the Company purchased 1.8GWh of electricity from its main suppliers, namely; ZESCO, LHPC, Dangote Industries Zambia Limited (DIZL) and CEC Renewables Limited broken down as presented in Figure 3-6.

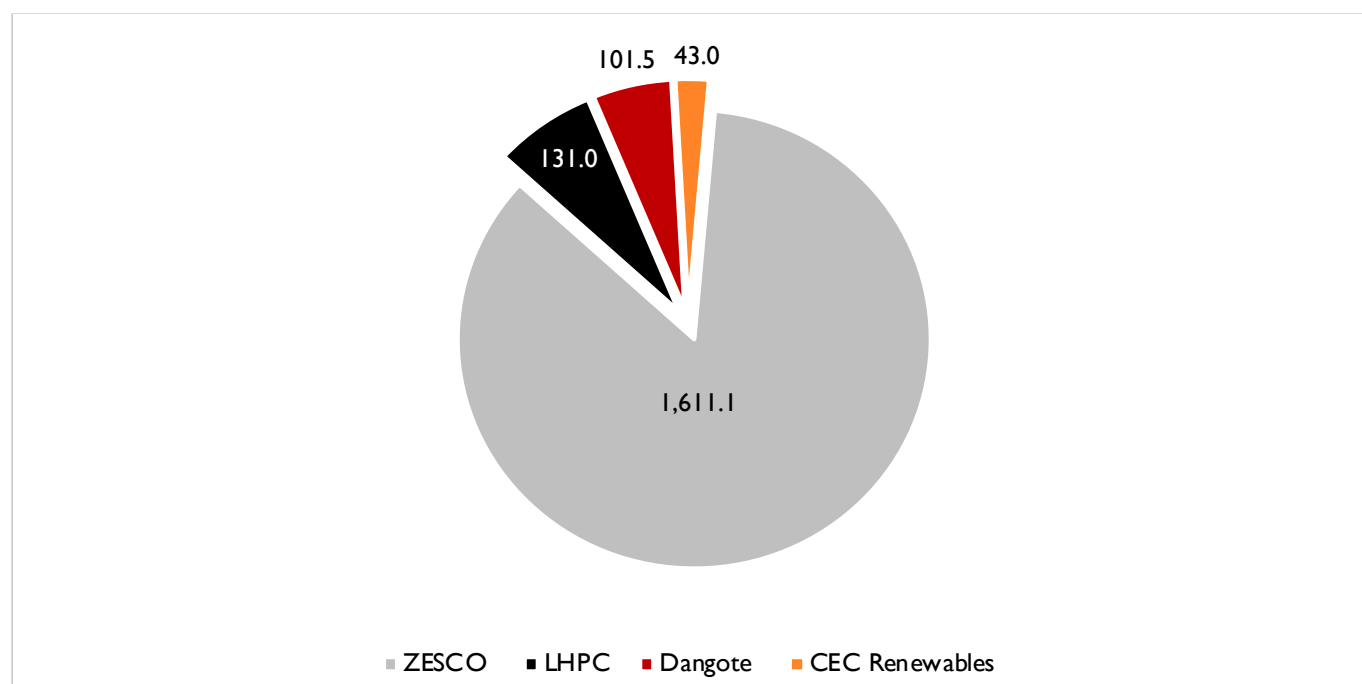


Figure 3-6: Power purchases by CEC in 2023, in GWh

3.6.1.2.1 Key Developments

In 2023, the Company connected Lonshi mine located in DRC to its 66kV line.

3.6.1.2.2 Technical Performance

In 2023, the ERB inspected a total of 37 distribution infrastructure belonging to CEC in the Copperbelt Province with an average compliance of 98 percent. Previously, inspection results for CEC distribution infrastructure were combined with transmission infrastructure. As presented in Table 3-12, CEC's distribution infrastructure compliance for 2023 was comparable, and marginally better than the 97 percent compliance achieved in 2022 and 2021.

Table 3-12: CEC's electricity distribution infrastructure technical performance, 2021 to 2023

	2021	2022	2023
Regulatory Target (%)	92	93	74
Average Compliance (%)	97	97	98

3.6.1.2.3 Challenges Faced

While the supply situation was generally stable, the Company recorded the following incidents on its electrical infrastructure:

- i. 18 cases of vandalism and theft of overhead copper conductors;
- ii. 30 cases of copper cable and earthing conductor theft; and
- iii. 77 cases of land encroachment.

3.6.1.2.4 Outlook

CEC projects moderate growth of approximately 10 percent, subject to completion of projects committed to by the Company's customers. A large proportion of the growth is expected to come from the CNMC Luanshya Copper Mine dewatering load at shaft 28, Mimbula Phase II project in Chingola, Lonshi Mine and Macrolink Resources Project ramping up. The upgrade of the DRC interconnectors through the installation of 255MVA and 220kV capacitors is earmarked for 2024.

3.6.1.3 North Western Energy Corporation Limited

North Western Energy Corporation Limited (NWECL) holds an electricity distribution licence with the ERB to supply mining townships of Kalumbila, Lumwana and Kabitaka in North-Western Province. The Company purchases power in bulk from ZESCO via a PPA at the approved distribution tariff as presented in Appendix 2. The Company has a total of 3,475 customers comprising 3,310 residential customers, 10 social, 69 commercial and one industrial customer.

The Company supplied 47.4GWh in 2023 which was an increase of 3.27 percent from the previous year's 45.9GWh.

3.6.1.3.1 Key Developments

NWECL's residential customer base stood at 3,395 at the end of 2023 which was an increase of 9.34 percent from 3,105 in 2022. However, the number of commercial customers metered changed from 78 to 69 due to the billing realignment of some commercial properties. The customer categories are broken down as presented in Table 3-13.

Table 3-13: Breakdown of customers for NWEC

Customer category	Number of Customers		Adjustment
	2023	2022	
Residential	3,395	3,105	290
Commercial	69	78	(9)
Social services	10	10	-
Industrial	1	1	-
Total	5,498	3,194	281

NWEC projects an increase in the demand for electricity in its territorial area due to the mining expansion at Lumwana and Kalumbila. In addition, the Company commenced the construction of the 33kV line from ZESCO sub-station to its switchyard to re-enforce its main connection line from the sub-station to the industrial park. This will ensure security of supply to the industrial customers. The project is scheduled to be completed and commissioned in 2024.

3.6.1.3.2 Technical Performance

In 2023, NWEC attained a technical compliance score of 70 percent based on the 13 distribution infrastructure in North-Western Province that were inspected by the ERB. Table 3-14 presents NWEC's performance for the period 2018 to 2023.

Table 3-14: NWEC's electricity distribution infrastructure technical performance, 2018 to 2023

	2018	2019	2020	2021	2022	2023
Regulatory Target (%)	87	89	91	93	93	74
Average Compliance (%)	86	88	84	98	88	70

As shown in Table 3-14, NWEC's 2023 performance of 70 percent was below the target of 74 percent.

3.6.1.3.3 Challenges Faced

NWEC submitted that the introduction of the new tariffs in 2023 resulted in an increase in power purchase costs against a comparatively lower increase in sales revenue. NWEC stated that it was particularly the case in sites not covered by PPAs.

It was noted that during the same period, NWEC had applied for the same tariff which was effected on 1st July 2023.

The company stated that the depreciation of the kwacha against the USD had a significant impact on its operations as most of the electrical equipment is imported.

Further, NWEC reported that transmission losses, particularly for sites that were not covered by PPAs, resulted in increased revenue losses for the company as it bore losses which it could not pass on to its customers.

3.6.1.3.4 Outlook

In order to mitigate the challenges faced, the company plans to undertake a system which will reduce energy losses and increase capacity, thereby improving delivery of the services.

3.6.1.4 Zambia China Economic and Trade Corporation Zone Development Limited

ZCCZ holds an electricity distribution license to distribute electricity in the Chambeshi Economic Zone. ZCCZ supplies this electricity via an 8.9km distribution line. The Company has a total of 16 customers and supplied 377.6GWh of electricity in 2023.

3.6.1.4.1 Technical Performance

The average compliance of ZCCZ's 10 distribution infrastructure in Chambeshi, Copperbelt Province for the year 2023, was 74 percent as shown in Table 3-15. This was a sharp drop in compliance compared to the compliance levels from 2020 to 2022.

Table 3-15: Compliance performance of ZCCZ's distribution infrastructure, 2020-2023

	2020	2021	2022	2023
Avg. compliance (%)	89	98	97	74
Regulatory target (%)	91	93	93	74

3.6.1.5 Rural Electrification Authority

The Rural Electrification Authority (REA) is a statutory body created through the Rural Electrification Act No. 5 of 2023. The mandate of REA is to facilitate increased access to electricity in rural areas to contribute to the improved productivity and quality of life of the rural population in Zambia. REA promotes the implementation of energy projects using various methods and technologies such as the extension of the national grids, solar home systems, solar mini-grids, mini-hydro and other renewable energy sources.

3.6.1.5.1 Beneficiaries for Rural Electrification Projects under the 2023 Work Plan and Budget

During the year 2023, REA implemented 103 rural electrification projects comprising 76 Grid Development Projects (GrDPs) and 27 Off-grid Renewable Energy Project (OGPs) distributed across all the 10 provinces of Zambia. The Authority connected a total of 19,331 beneficiaries comprising 182 rural schools, 170 rural health centres, 30 other public facilities, 18 markets, 98 palaces and 18,833 households. Table 3-16 provides a summary of the beneficiaries from the 103 projects.

Table 3-16: Beneficiaries for Rural Electrification Projects in 2023

Beneficiaries	Carryovers		2023 Projects		Totals
	GrDP	OGP	GrDP	OGP	
Schools	15	6	125	36	182
Rural Health Centres	7	2	51	110	170
Other Public Facilities	3	1	15	11	30
Markets	2	1	13	2	18
Palaces	0	79	15	6	98
Households	3,367	728	12,410	2,328	18,833
Totals	3,394	817	12,627	2,493	19,331

3.6.1.5.2 Projects under the Electricity Services Access Project

In 2023, the Authority undertook 66,207 total connections against a target of 57,000, representing an achievement rate of 116 percent. Of the 66,207 connections, 56,896 were metered residential and 9,311 were metered SMEs (commercial). Among the metered residential and metered SMEs, 17,134 were female-headed households and 1,921 were female owned businesses, respectively. Table 3-17 shows the summary of connections as of 31st December 2023.

Table 3-17: Summary of connections as of 31st December 2023

S/N	Electrification Category	No. of Connections	Female-headed/ Owned	Male-headed/ Owned
1.	Metered residential	56,896	17,134	39,762
2.	Metered commercial	9,311	1,921	7,390
Total		66,207	19,055	47,152

3.6.1.6 Lunsemfwa Hydro Power Company Limited



Lunsemfwa Power Station

Lunsemfwa Hydro Power Company (LHPC) is an IPP which owns and operates two hydro power stations namely; Lunsemfwa Power Station with a capacity of 24MW and Mulungushi Power Station with a capacity of 32MW. LHPC generated 218.71GWh of energy in 2023, reflecting a decline of 11.7 percent from 247.78GWh in 2022, which was attributed to low water levels. Consequently, on 16th December 2023, LHPC shut down power plants to save water in the reservoir and as part of its water harvesting strategy. Commitments of 40MW to customers were, therefore, met through power purchases from the SAPP Market.

The LHPC and GreenCo SAPP trading agreement was terminated in January 2023 which allowed LHPC to trade independently on the SAPP MTP. Additionally, a non-firm PSA was signed with Enterprise Power Trading Pty Limited of South Africa and was expected to become effective in 2024.

The Company continued to face challenges regarding the availability of water for generation due to the following reasons:

- i. Inadequate rainfall during the season and oversubscribed water permits in the Lunsemfwa catchment;
- ii. Lack of enforcement of Water Rights;
- iii. Lack of accurate forward information in terms of forecasts and anticipated runoffs from rivers; and
- iv. Deforestation in the catchment and growing mining activities which are water consumptive.

Going forward, in order to mitigate inadequate generation LHPC, intends to increase its trade on the SAPP market. Beyond 2024, the Company also intends to revive Muchinga Power Company and Mulungushi 2 (Lower) Power Station.

3.6.1.7 Maamba Collieries Limited

MCL has a long term PPA with ZESCO for the supply of 208MW of electricity from its 300MW Coal Powered Thermal plant in Maamba District of Southern Province. In 2023, MCL sent out 2,126.33GWh of electricity to ZESCO which was a decrease of 1.8 percent from the previous year's 2,164.70GWh.

The Company is in discussions with the Government on the development of Phase 2 of the Maamba Thermal Power Project. This remains the major capital investment for the Company in 2024.

3.6.1.8 Itezhi-Tezhi Power Corporation Limited



Itezhi-Tezhi Power Station

ITPC owns and operates a 120MW hydro power plant based on the Itezhi-Tezhi Dam. ITPC has a long term PPA with ZESCO for a contracted capacity of 116.40MW. In 2023, the Company generated a total of 828.68GWh which was an increase of 9.4 percent from the 757.8GWh of energy supplied in 2022.

3.6.1.9 Zengamina Power Limited

Zengamina Power Limited (ZPL) owns and operates a 0.75MW hydro power plant and a mini-grid facility in Ikelenge District of North-Western Province. ZPL's grid is 48km long for medium voltage lines and 58km long for low voltage lines. The Company has over 1,200 customers most of whom are residential households within the district.

During 2023, the Company generated 2.4GWh compared to 1.78GWh of energy sent out in 2022. ZPL reported technical and non-technical losses that averaged 20 percent during the year.

3.6.1.10 Dangote Industries Zambia Limited

Dangote Industries Zambia Limited (DIZL) owns a 30MW coal powered thermal power plant of which 22MW is for own use and cement production. DIZL entered into a 10 year PSA to supply CEC with the excess 8MW which is evacuated through the 66kV power lines. During the year, DIZL supplied 101.5GWh to CEC, which was an increase of 48.9 percent from the 68.2GWh that was supplied in 2022.

3.6.1.11 Ndola Energy Company Limited



Ndola Energy Company Limited (NECL) is an IPP which operates an HFO power plant with an installed capacity of 110MW and sells its power to ZESCO under a 15-year PPA. In 2023, NECL recorded electricity sales volume of 76.05GWh.

The Company's operations continued to be impacted negatively by non-availability of HFO from its main source of fuel (INDENI) which was converted from a refinery to an OMC following Government's pronounced reforms for the petroleum sub-sector.

3.6.1.12 GreenCo Power Services Limited

GreenCo has a 20 year power trading license and sold a total of 7,272.80MWh for 2023 which was a 13.5 percent increase compared to 6,404.00MWh in 2022. During the year, GreenCo signed a PSA with Enterprise Power Trading Pty limited of South Africa and a System Operations Agreement with ZESCO.

The company submitted that applicable fees on import of electricity via SAPP or through bilateral agreements posed a challenge to its operations as it significantly corroded the Company's gross margin.

GreenCo commenced a Battery Energy Storage System (BESS) Feasibility study following a US\$1 million grant from Zambia's cooperating Partners, United States Trade Development Agency, which may see the development of a utility-scale BESS project of up to 400MWh with a potential investment of up to US\$50 million that will be one of the largest in Africa.

Following the tender and subsequent PPA with Ilute Solar Project (Ilute), GreenCo expects to reach financial close on an indirect investment of US\$40 million, via Ilute, in Sesheke, Western Province in mid-2024.

3.7 OPERATIONAL PERFORMANCE OF THE INTERCONNECTED POWER SYSTEM

The performance of the IPS is reported in terms of four characteristics, namely; disturbances experienced, power quality and reliability, power balance, and system constraints.

3.7.1 System Disturbances

The system disturbances reported are those classified in the Zambia Standard for Power Quality and Reliability (ZS 387 Part 2) as "major supply interruptions", defined as:

- i. Any single event that leads to loss of supply to at least 1,000 customers, or large end-use

- consumer; or,
- ii. Forced interruption index greater than five system minutes, where:

$$\text{system minutes} = (\text{energy not supplied in MWh}) \div (\text{power at peak}).$$

A total of 51 disturbances were experienced on the IPS in 2023, as detected by the System Operator. 10 of these disturbances were a result of internal (in country) causes, while the remaining 41 were as a result of external factors emanating from power systems within SAPP, such as the Société Nationale d'Électricité system in the DRC. As shown in Table 3-18, 2023 saw a significant drop in the number of system disturbances on the IPS, compared to 2022 where 167 system disturbances were recorded.

Table 3-18: Number of system disturbances recorded on the IPS, 2022 and 2023

	Number of disturbances	
	2023	2022
Quarter 1	13	85
Quarter 2	9	25
Quarter 3	14	27
Quarter 4	8	30
Total	44	167

3.7.2 Network Constraints

In 2023, the following salient constraints were experienced on the IPS:

i. **Kabwe Step Down Sub-station**

The terminal equipment at this sub-station limits the 3 x 330kV Leopards Hill – Kabwe Step Down corridor to 1,200 amps or approximately 685MVA per line or a total of 2055MVA for the corridor and 1370MVA firm capacity under N-1 contingency. With this constraint, the increasing load at Pensulo sub-station and the overall increase in system load resulted in the depletion of this firm capacity affecting South to North power flows.

ii. **132kV Lusaka network**

The transmission capacity of the 132kV Lusaka network was momentarily reduced for some months when the 132kV Leopards Hill–Water Works line was taken out to facilitate the installation of the second 150MVA 330/132kV transformer at the Lusaka South Multi Facility Economic Zone (LSMFEZ). However, the constraint was resolved after the second transformer was successfully installed.

3.7.3 Power Balance

As presented in Table 3-19 it is projected that there will be a total energy deficit of 245,853MWh for 2024, after load management. Appendix 8 provides a detailed summary of the total energy demand against supply.

Table 3-19: Projected Power Balance, 2024

	Average (MW)	Energy (MWh)
ZESCO Generation	1,129	9,892,218
IPP Generation	929	8,135,606
Total Generation	2,058	18,027,823
Local Demand	(1,916)	(16,781,835)
Bilateral Agreements	(523)	(4,577,684)
Total Demand	(2,439)	(21,359,519)
Load Management	30	262,800
Export Reduction	110	963,600
EDM Imports	154	1,348,443
EDM Non-Firm	4	36,500
SAPP Imports	54	474,500
Surplus/Deficit	(29)	(245,852)

3.7.4 Power Quality Management System

3.7.4.1 Progress of Installation of Power Quality and Reliability Monitoring Meters

In line with the Zambian Power Quality Management Framework read in conjunction with ERB Directive 1 and Directive 7, of 2015, the current Zambian IPS should have a combined minimum total of 353 sites monitored for power quality and reliability (PQR). However, as shown in Table 3-20, only 316 sites across the IPS were monitored as of 31st December 2023.

Table 3-20: Progress of Installation of PQ Recorders as of 31st December 2023

	ZESCO	CEC	NECL	MCL	LHPC	ITPC	BPC	IPS
No. of sites required to be installed with PQR meters	161	172	4	2	11	2	1	353
No. of sites installed with PQR meters	151	172	4	2	11	2	1	343
Of sites installed with PQR meters, no. monitored	130	172	4	2	5	2	1	316
% sites monitored	81	100	100	100	45	100	100	90

31 of the sites not monitored belong to ZESCO and six belong to LHPC. It is worth noting that during quarter four of 2023, ZESCO had 151 sites installed with PQR meters. However, PQR meters from seven sites were not able to produce sufficient data for analysis or inclusion in the report, while the remaining 14 were offline due to absence of remote communication infrastructure. Thus, a total of 21 ZESCO sites installed with PQR meters on the ZESCO network were not reported for PQR monitoring as of 31st December 2023.

3.7.4.2 Power Quality Performance

The compliance of the IPS to PQR standards during 2023 for the monitored sites was 76 percent. The comparison of this performance to the 2022 performance as well as with the regulatory targets is presented in Table 3-21.

Table 3-21: Summary of Power Quality Performance of the IPS, 2022 and 2023

	No. of datasets monitored		Average score (%)	
	2022	2023	2022	2023
Quarter 1	1357	1405	75	77
Quarter 2	1397	1492	75	74
Quarter 3	1421	1497	75	79
Quarter 4	1245	1558	75	77
Total/Average	5420	5952	75	76
Regulatory target	-	-	73	75

Despite the above-target performance during 2023, the following three parameters on the IPS performed below regulatory target:

- i. Voltage dips – whose compliance rate was 47 percent;
- ii. Voltage Regulation – whose compliance rate was 61 percent; and
- iii. Frequency – whose compliance rate was 73 percent.

The detailed performance per applicable PQR parameter, and per reporting licensee during 2023, is provided in Appendices 9 to 14 where it can be noticed that all the licensees' respective average compliance rate was on or above the 75 percent regulatory target for 2023.

3.8 OUTLOOK FOR THE SUB-SECTOR

3.8.1 Power Balance

Zambia is expected to experience a drought in the 2023/2024 rainy season due to significantly reduced rainfall during January to March of 2024 in the wake of the El Niño climate phenomenon³⁰. This is expected to adversely affect water levels in Zambia's main reservoirs and consequently result in reduced hydroelectricity generation, which the country is heavily dependent on. Subsequently, Zambia is expected to experience high levels of load management for most of 2024.

3.8.2 Open Access framework

In the long run, through equal access to the electrical grid, the open access regime is expected to bolster the liberalisation of the power sector. It is anticipated that this will draw in private capital and stimulate competition by promoting consumer sovereignty, which will ultimately result in effective service delivery. Ultimately, it is expected that there will be increased investment in alternative forms of electricity generation and eventually a diverse electricity generation portfolio for the country.


3.8.3 Multi-year Tariff Framework

Following the tariff decision of 2023 by the ERB, it is envisaged that the sector will continue to transition to cost reflective tariffs. This is expected to ensure a financially sustainable sub-sector.

3.8.4 Investments

Zambia continues to rely on hydro-power sources. With the continued challenge of climate change, it is envisaged that more investments will be undertaken in the renewable energy space specifically solar and wind power in order to diversify the energy mix and mitigate this challenge. The open access regime, tariff migration and the conducive policy environment are expected to act as catalysts to accelerate investments in the sub-sector.

³⁰ Zambia Meteorological Department Rainfall Forecast 2023/2024 Season



**RENEWABLE
ENERGY
SUB-SECTOR**

4.0 RENEWABLE ENERGY SUB-SECTOR

As Zambia strides towards a sustainable and diversified energy mix, the Renewable Energy Sub-Sector remains pivotal. The sector witnessed an increase of 37.4 percent in installed solar generation from 89.06MW in 2022 to 122.38MW in 2023. This follows the addition of the CEC's 34MW solar expansion Riverside Project. Further, the ERB approved seven PPAs for solar and biomass. This shows Zambia's commitment to transitioning towards reliable, sustainable and affordable energy sources. In addition, steady progress was made in the integration of bioenergy in the energy mix, with the launch of the biofuels blending pilot program.

Furthermore, in 2023, Cabinet approved the ratification of the International Solar Alliance Framework Agreement as part of Zambia's commitment to the Paris Declaration. The Alliance supports advocacy and financing for solar energy deployment.

4.1 OPERATIONAL PERFORMANCE OF GRID CONNECTED ENTITIES

The Zambian ESI includes the solar PV power plants owned by IPPs. During the period under review, the number of grid-connected solar IPPs increased to 3 with the commissioning of the new CEC Renewables Limited (CECRL) in February 2023.

4.1.1 Copperbelt Energy Corporation Renewables Limited

During the period under review the ERB issued a licence to CECRL for the generation of electricity from renewable energy. CECRL has installed capacity of 34MW and has PSA with CEC. In the first year of operation, CECRL generated 43GWh of power.

4.1.2 Bangweulu Power Company Limited

Bangweulu Power Company Limited (BPC) located in the LSMFEZ is an IPP with an installed capacity of 54.3MWp and has a PSA with ZESCO. In 2023 BPC delivered a total of 86.97GWh compared to 84.54GWh in 2022, representing 2.9 percent increase in electricity sales volumes. In terms of technical operations, a total of 911 modules and 13 inverters were replaced. However, the Company reported facing the following challenges during the year:

- i. Lower than forecast irradiation;
- ii. Low water supply to the power plant - an alternative supply from the LSMFEZ was therefore installed.
- iii. The insurance market continued to harden as evidenced by increasing premiums;
- iv. Low Power factor surcharge imposed by ZESCO; and
- v. Retrospective Land Rates charges imposed by Kafue Council.

4.1.3 Ngonye Power Company Limited

Ngonye Power Company Ltd (NPC) located in the LSMFEZ is an IPP with installed capacity of 34MWp and has a PSA with ZESCO. In 2023, the NPC delivered a total net energy of 60,321.90MWh representing an increase of 3 percent from the 58,548.5MWh delivered in the year 2022. As regards technical performance, the Company replaced a total of 44 Inverter IGBTs. No solar modules were replaced and there were no other operational challenges reported in the year under review.

4.2 OPERATIONAL PERFORMANCE OF MINI-GRIDS

In the year 2023, the ERB continued its oversight of the efficiency and performance of renewable energy mini-grid infrastructure. The objective of these compliance audits was to determine mini-grid adherence to license conditions, codes of practice and the pertinent Zambian technical standards, ensuring the delivery of safe, reliable, and affordable energy products and services.

Solera Power Vending Machine (SPVM), Engie Power Corner (EPC), and Kafue Gorge Regional Training Centre (KGRTC) were audited for technical compliance. The following subsections present the results of the audits.

4.2.1 Compliance Ratings for 2023 Audit

A total of nine facilities were audited in 2023, similar to 2022. Seven of the facilities maintained consistent operational performance from 2022 to 2023. However, there was a concern for the Kapasa and Ken Solar Mini Grids, which failed to operate in 2023 despite passing in 2022. Table 4-1 shows a summary of the compliance ratings for the audited mini-grid infrastructure.

Table 4-1: Summary of Compliance Ratings for audited mini-grid infrastructure

Licensee	Site Name	2022	2023
Solera Power Vending Machine	Chikomeni, 15kWp, Lumezi	Pass	Pass
Solera Power Vending Machine	Chanyalubwe, 25kWp, Lumezi	Pass	Pass
Solera Power Vending Machine	Madzi-A-Tuwa, 25kWp, Lumezi	Pass	Pass
Solera Power Vending Machine	Kapasa, 25kWp, Chipangali	Pass	Fail
Solera Power Vending Machine	Taferansoni, 25kWp, Chadiza	Pass	Pass
Solera Power Vending Machine	Ken, 25kWp, Katete	Pass	Fail
Solera Power Vending Machine	Kacholola, 20kWp, Nyimba	Pass	Pass
Engie Power Corner Zambia	Chitandika, 28.35kWp, Chipangali	Pass	Pass
Kafue Gorge Regional Training Centre	Kabamba, 40kWp, Serenje	Pass	Pass

4.2.2 Audited Mini-Grid Sites in 2023

4.2.2.1 Chikomeni Mini-Grid

The Chikomeni Mini-Grid is situated in the Lumezi district. The site has a capacity of 15kWp, with 12.7kW available during the audit. During 2023, 19 customers were connected to the mini-grid. The mini-grid attained a compliance rating of “Pass” to operate in 2023.

4.2.2.2 Chanyalubwe Mini-Grid

The site is situated in Lumezi District, 19 km from Chanyalubwe Day School. The installed capacity of the site is 25kWp, with 21.25kW presently available for the 25 connected customers. The mini-grid attained a compliance rating of “Pass” to operate in 2023.

4.2.2.3 Madzi-A-Tuwa Mini-Grid

The site is situated approximately 70 km from Lundazi Central Business District (CBD) and 34km from the Madzi-A-Tuwa Primary School turn-off with an installed capacity of 25kWp. During the period under review, 17 customers were connected. It was observed that all customers were receiving free electricity due to a system malfunction. The mini-grid attained a compliance rating of “Pass” to operate during 2023

4.2.2.4 Kapasa Mini-Grid

The site is situated in Chipangali District, 55km from Chipata CBD with installed capacity of 25kWp. However, no power has been available since May 2023 due to a main breaker fault. The mini-grid attained a compliance rating of “Fail” to operate during 2023.

4.2.2.5 Taferansoni Mini-Grid

The Taferansoni Mini-Grid has an installed capacity of 25kWp, with 21.25kW available for its 18 connected customers. The site is located 17km from Chadiza CBD. The mini-grid attained a compliance rating of “Pass” to operate.

4.2.2.6 Ken Mini-Grid

The site is situated 18km from Katete CBD. The site’s installed capacity is 25kWp and serves 17 connected customers. The mini-grid attained a compliance rating of “Fail” to operate.

4.2.2.7 Kacholola Mini-Grid

The site is situated in Kacholola, along the Great East Road in Nyimba District, near the Kacholola Trading Centre. The site has an installed capacity of 20kWp, but only 8kW was in use during the audit because of damaged inverters. The Kacholola Mini-Grid served a total of 24 connected customers. The mini-grid attained a compliance rating of “Pass” to operate in 2023.

4.2.2.8 Chitandika Mini-Grid

The Chitandika Mini-Grid is situated in Chipangali. The site has an installed capacity of 28.35kWp and is supported by a backup diesel generator rated at 40kVA. The mini-grid served a total of 207 connected customers. For the 2023 compliance audit, the mini-grid attained a compliance rating of “Pass” to operate.

4.2.2.9 Kabamba Solar Mini-Grid

The Kabamba Solar Mini-Grid has an installed capacity of 40kWp located in Serenje District, specifically, Chief Kabamba’s area in Central Province. The mini-grid attained a compliance rating of “Pass” to operate, during 2023.

4.3 OUTLOOK FOR THE SUB-SECTOR

The renewable energy sub-sector in Zambia is poised for a transformative leap forward, following the strategic partnership forged between Zambia and the United Arab Emirates (UAE), through ZESCO and Abu Dhabi Future Energy Company (Masdar), the UAE’s principal renewable energy investment funding entity. ZESCO and Masdar signed a Memorandum of Understanding and Joint Development Agreement valued at US\$2 billion in January 2023, with the aim to catalyse substantial investments in renewable energy projects within Zambia.

This development was a significant milestone for the country, marking the beginning of a prosperous era for Zambia’s energy sector as the collaboration is set to initiate the development and deployment of large-scale solar projects across the country. Unlike conventional financial aid or loans, this partnership is based on a capital injection model, offering the Zambian populace a stake in the ensuing ventures. The phased execution of this ambitious project will commence with the installation of 500MW of solar power capacity. This is merely the initial step towards augmenting Zambia’s electricity grid with an additional 2,000MW over the coming years. Such a substantial increase in clean energy capacity is expected to significantly contribute to Zambia’s energy independence, reduce carbon emissions and facilitate the nation’s transition to sustainable energy sources.

Zambia further participated in the 28th United Nations Climate Change Conference (COP28) whose key outcome was to develop an impactful Global Goal for Adaptation as part of the Paris Agreement of 2015. In the aftermath of COP28, key agreements were reached that promised to reshape the global approach to climate change and energy sustainability. Notably, the conference led to the adoption of the Emirates Framework for Global Climate Resilience. Moreover, there was a unanimous call for a shift away from fossil fuels, with a strategic emphasis on tripling renewable energy investments and doubling global energy efficiency by 2030. This ambitious path was aimed at achieving a net-zero carbon footprint by 2050.

Outside the COP28 negotiations, Zambia also had bilateral and other engagements and the following key achievements were recorded:

- i. Announcement of the registration of a Green Bond - the green loans framework issued by the Bank of Zambia in 2023. It is through these instruments that the CEC announced the registration of the US\$200 million green bond at COP28, structured as a program, whose proceeds will accelerate the actualization of the company's ambitions to generate at least 200MW of renewable energy, specifically solar energy with possible storage implementation; and
- ii. Mini-grids by the Rockefeller Foundation: At COP28, the Zambian Government signed an MOU with the Rockefeller Foundation for the development and implementation of 1,500 mini-grids throughout the country. The mini-grids are a confirmation of Government's commitment to ensuring the attainment of universal access to electricity by all Zambians by the year 2030.

Additionally, CECRL plans to expand by constructing a 60MWac solar plant in Garnerton, Kitwe and commencing Phase II of the Itimpi Solar Plant Project with a capacity of 126MWp.

With the support of international partners and the strategic direction set by Government, Zambia is on the cusp of an energy revolution that promises not only to meet its current and future energy needs, but also to position the country as a model for sustainable energy development in Africa.

Looking ahead, as a result of Government interventions and the ERB's regulatory oversight, projects like CEC's 34 MW solar PV plant are expected to significantly contribute to Zambia's energy diversification. This outlook is anchored on a vision that sees renewable energy not just as a component of Zambia's energy mix, but as the cornerstone of its economic and environmental resilience. The future for the renewable energy sub-sector is exceptionally bright and is poised for transformative growth.

A photograph of a large industrial facility, likely a petroleum refinery. The image features two prominent, tall, cylindrical distillation columns with multiple horizontal bands. The columns are surrounded by a complex network of pipes, metal walkways, and ladders. In the foreground, there are two large, white, corrugated metal structures. The sky is a clear, bright blue. The text "PETROLEUM SUB-SECTOR" is overlaid in the center of the image in a bold, white, sans-serif font.

PETROLEUM SUB-SECTOR

5.0 PETROLEUM SUB-SECTOR

The petroleum value chain includes players such as INDENI, TAZAMA, and TPPL in the upstream sub-sector. Meanwhile, downstream players consist of OMCs, Retailers (Dealers), Transporters and consumers. This section presents the performance of the petroleum sub-sector in Zambia in 2023. The section also highlights activities undertaken by the ERB in the sub-sector. Finally, the section highlights challenges faced and concludes with an outlook of the petroleum sub-sector in 2024 and beyond.

5.1 IMPORTATION OF FUEL

Zambia imports all its fuel consumption. The importation of refined petroleum products exhibited some shifts between 2022 and 2023. Diesel imports remained relatively steady with a slight increase of 0.8 percent, indicating consistent demand across various sectors. Conversely, there was a significant decrease in the importation of HFO by 14.1 percent. Jet A-1 imports saw a substantial surge, increasing by 64.5 percent. However, kerosene imports experienced a sharp decline by 62.2 percent and petrol imports declined by 3.6 percent. The decrease was attributed to the availability of HFO at INDENI as the last feedstock in the pipeline was refined. Table 5-1 presents the total finished petroleum product imports for 2023 against imports for 2022.

Table 5-1: Imports of finished petroleum products, 2022-2023

Product	Petroleum Product Imports (MT)		
	2022	2023	%Change
Diesel	1,119,290.37	1,128,719.09	0.8
HFO	14,831.60	12,745.65	(14.1)
JetA-1	31,700.21	52,145.29	64.5
Kerosene	5,753.46	2,174.96	(62.2)
Petrol	433,772.50	418,163.33	(3.6)

NATIONAL CONSUMPTION OF PETROLEUM PRODUCTS

The overall national petroleum consumption increased to 1,627,405.87 MT from 1,549,274.44 MT in 2022 reflecting an increase of 5.0 percent. Kerosene recorded the highest growth rate at 370.4 percent followed by Jet A-1 at 41.7 percent and LPG at 13.3 percent. The consumption in diesel and petrol increased by 4 percent and 4.5 percent, respectively. Meanwhile a decline was recorded for HFO (2.7 percent) and Avgas (36.4 percent). Table 5-2 outlines the national consumption of petroleum products in 2023 and 2022.

Table 5-2: National Consumption of petroleum products, 2022-2023

Product	Consumption (MT)		
	2022	2023	%Change
Avgas	1,188.44	756.10	(36.4)
Diesel	1064,414.36	1,107,067.22	4.0
HFO	17,454.85	16,983.03	(2.7)
Jet A-1	31,159.66	44,146.91	41.7
kerosene	833.04	3,918.72	370.4
LPG	8,374.17	9,489.32	13.3
Petrol	425,849.93	445,044.58	4.5
Grand Total	1,549,274.44	1,627,405.87	5.0

As presented, the consumption of kerosene skyrocketed by 370.4 percent in 2023. Historically, the availability and consumption pattern of kerosene in Zambia was mainly influenced by INDENI's production. Following the placement of INDENI in 2021 under care and maintenance, kerosene demand declined to 833.04 MT in 2022. However, consumption of kerosene increased in 2023 due to INDENI production and importation.

Jet A-1 consumption surged impressively by 41.7 percent, indicating a substantial increase in aviation activities. This growth may reflect expanded air travel, increased freight transportation, or enhancements in the aviation infrastructure, all of which signify positive developments in the aviation sector. LPG consumption showed a notable rise of 13.3 percent, signalling a growing preference for cleaner and more efficient cooking fuels among households. The consumption of petrol increased by 4.5 percent, reflecting sustained demand for petrol likely driven by both personal and commercial transportation needs. Diesel consumption experienced a modest increase of 4.0 percent, from 1,064,414.36MT in 2022 to 1,107,067.22MT in 2023, indicating steady demand for diesel fuel. The consumption of Avgas in Zambia witnessed a significant decline of 36.4 percent from 1,188.44MT in 2022 to 756.10MT in 2023. HFO consumption decreased slightly by 2.7 percent. In 2022, the country consumed 17,454.85MT of HFO, while in 2023 it was recorded at 16,983.03MT.

5.2.1 Daily National Average Consumption of Petroleum Products

The daily national average consumption of petroleum products is presented in Table 5-3.

Table 5-3: Daily average consumption of petroleum products, 2022-2023

Product	2022	2023	%Change
Avgas (L)	3,255.99	2,071.51	(36.4)
Diesel (L)	3,471,671.10	3,610,786.76	4.0
HFO (Kg)	47,821.50	46,528.85	(2.7)
JetA-1 (L)	107,382.31	151,188.04	40.8
Kerosene (L)	2,852.88	13,420.27	370.4
LPG (Kg)	22,942.93	25,998.13	13.3
Petrol (L)	1,555,616.18	1,625,733.62	4.5

The most significant change occurred in the consumption of kerosene, with an increase of 370.4 percent. This substantial rise might be attributed to various factors, including shifts in consumer preferences, changes in government policies, or fluctuations in fuel prices.

5.2.1.1 Jet A-1 Consumption Growth

Jet A-1 consumption saw a substantial increase of 40.8 percent. This could indicate a rise in aviation activity or an expansion of the aviation sector within Zambia, possibly due to increased travel demand or investments in infrastructure.

5.2.1.2 Decrease in Avgas Consumption

Conversely, Avgas consumption experienced a notable decline of 36.4 percent. This reduction may suggest a decrease in demand for aviation gasoline, possibly reflecting changes in air transportation patterns or technological advancements in aircraft engines.

5.2.1.3 Stable Consumption of Diesel and Petrol

Diesel and Petrol consumption remained relatively stable, with modest increases of 4.0 percent and 4.5 percent, respectively. These products are commonly used for transportation and industrial purposes, indicating consistent demand within these sectors.

5.2.1.4 Minor Changes in Heavy Fuel Oil and LPG Consumption

Consumption of Heavy Fuel Oil and LPG witnessed marginal changes, with decreases of 2.7 percent and increases of 13.3 percent, respectively. These fluctuations may be influenced by factors such as economic conditions, energy policies, and technological advancements in alternative energy sources.

5.2.2 National Consumption by Province

The national consumption by province is presented in Appendix 15.

5.2.2.1 Daily National Average Consumption by Province

The daily national average consumption by province is presented in Appendix 16.

5.2.3 Consumption by Economic Sector

Petroleum products, including petrol, diesel, kerosene, and others, play a crucial role in fuelling economic activities, powering transportation, and supporting household energy needs. Understanding the consumption patterns within different sectors provides valuable insights into the dynamics of energy usage, economic development, and environmental impact. Through a meticulous examination of data spanning the years 2022 to 2023, this section aims to elucidate the trends, shifts, and implications of petroleum consumption within key economic sectors, including mining, non-mining industries, and the retail sector. By shedding light on these consumption patterns, we aim to inform strategic decision-making processes, foster sustainable energy practices, and contribute to the overall energy resilience and development of Zambia.

5.2.3.1 Consumption of Diesel by Economic Sector

The consumption of diesel across different economic sectors in Zambia showed relatively stable patterns from 2022 to 2023, with minor fluctuations observed. In the mining sector, diesel consumption remained relatively steady, decreasing marginally from 33.2 percent to 32.8 percent. This slight decline may be attributed to various factors such as efficiency improvements in mining operations or changes in production levels within the sector. Diesel consumption in the non-mining sector experienced a slight decrease from 28.3 percent to 27.9 percent, indicating a modest reduction in diesel usage across industries outside of mining, which could be influenced by factors such as shifts in transportation modes or technological advancements.

Meanwhile, diesel consumption in the retail sector saw a slight increase from 38.5 percent to 39.4 percent, indicating a slight uptick in demand for diesel for retail-related activities such as transportation and power generation. Overall, while there were minor shifts in diesel consumption by economic sector, the general stability reflects the integral role of diesel in supporting various economic activities across Zambia. Figure 5-1 illustrates the consumption of diesel by economic sector.

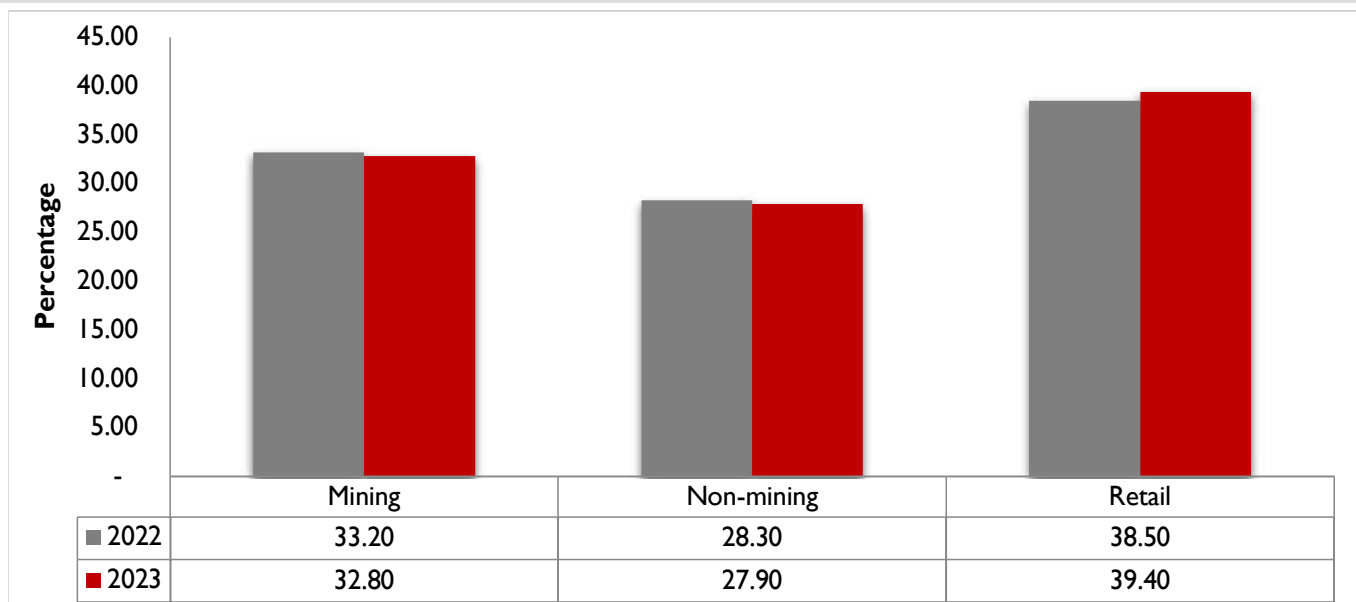


Figure 5-1: Diesel consumption by economic sector, 2022 and 2023

5.2.3.2 Consumption of Petrol by Economic Sector

The consumption of petrol across different economic sectors in Zambia remained relatively consistent from 2022 to 2023, with minor changes observed in the distribution among sectors. In the mining sector, petrol consumption saw a slight decrease from 0.17 percent to 0.14 percent, reflecting a marginal reduction in the usage of petrol within mining operations. This change could be attributed to factors such as efficiency improvements or adjustments in transportation modes within the sector. Similarly, petrol consumption in the non-mining sector remained stable at 3.97 percent, indicating consistent petrol usage across industries outside of mining. The retail sector continued to dominate petrol consumption, with a slight increase from 95.88 percent to 95.89 percent, emphasizing the sector's significant reliance on petrol for transportation and other retail-related activities. Overall, while there were minor fluctuations in petrol consumption by economic sector, the overall distribution remained largely unchanged, highlighting the consistent importance of petrol within Zambia's retail sector for transportation and other activities. Figure 5-2 illustrates the consumption of petrol by economic sector.

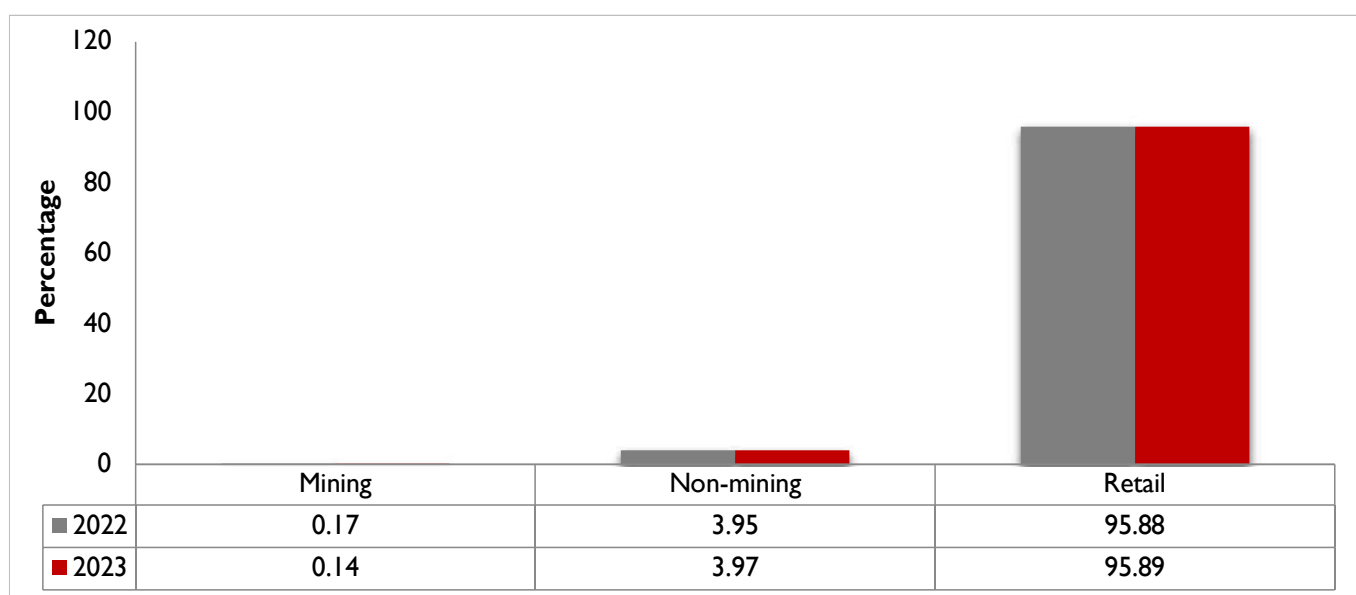


Figure 5-2: Petrol consumption by economic sector in 2022 and 2023

5.2.3.3 Consumption of Kerosene by Economic Sector

The consumption of kerosene across economic sectors in Zambia underwent significant shifts from 2022 to 2023, with notable changes observed in the distribution among sectors. In 2022, kerosene consumption was predominantly concentrated in the retail sector, accounting for 95.13 percent of total consumption, with a minor share in the non-mining sector at 4.87 percent. However, in 2023, there was a remarkable increase in kerosene consumption in the mining sector, rising to 3.47 percent, indicating a notable shift in usage patterns within this sector. Conversely, kerosene consumption in the retail sector declined to 91.94 percent, suggesting potential changes in household energy consumption patterns or shifts in energy subsidies impacting retail demand. The non-mining sector also saw a slight decrease in kerosene consumption to 4.59 percent, reflecting relatively stable usage patterns across industries outside of mining. Overall, the significant increase in kerosene consumption within the mining sector underscores the importance of understanding and adapting to evolving energy needs within specific sectors, while the shifts in consumption patterns emphasize the dynamic nature of energy demand across economic sectors in Zambia. Figure 5-3 illustrates the consumption of kerosene by economic sector.

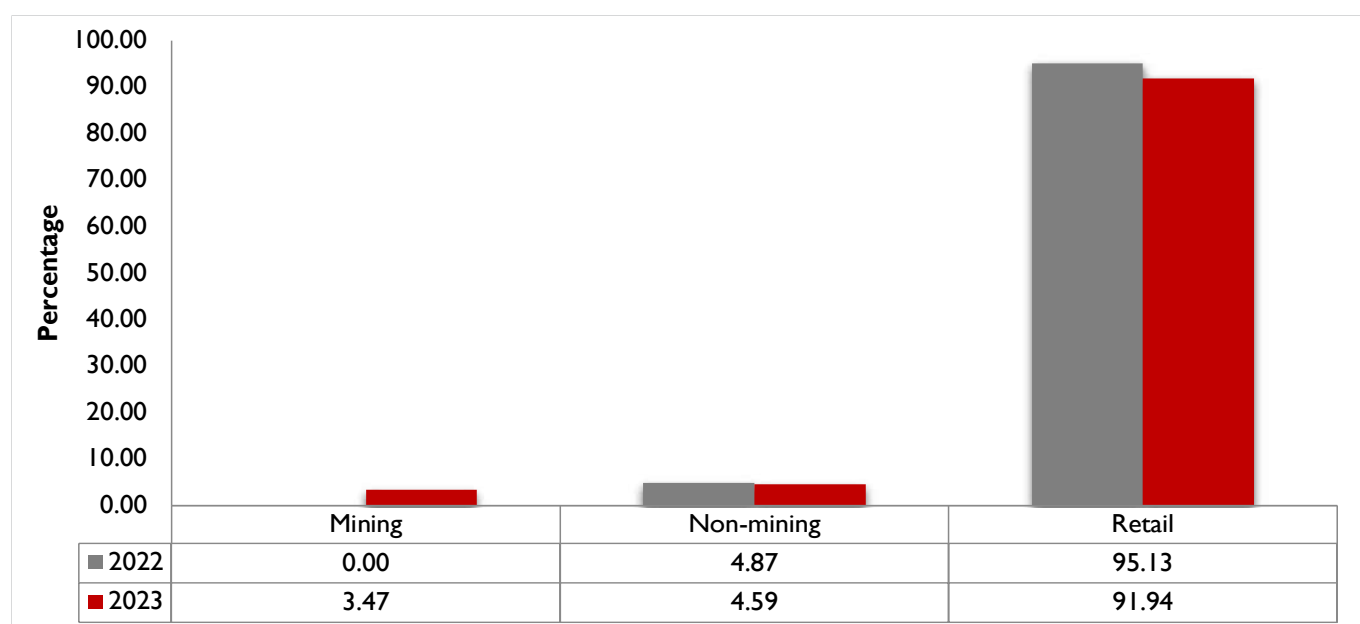


Figure 5-3: Kerosene consumption by economic sector in 2022 and 2023

5.3 MARKET SHARE OF OIL MARKETING COMPANIES

5.3.1 Market Share for White Products

Puma Energy Zambia Plc (Puma), Mount Meru Petroleum Zambia Limited and TotalEnergies Marketing Zambia Limited (TotalEnergies), collectively accounted for 54.23 percent of the market share for white products³¹ in 2023. In contrast to 2022, the three companies accounted for 55.5 percent market share representing a decline of 1.34 percentage points. Puma maintained its lead with a market share of 19.82 percent followed by Mount Meru at 19.13 percent and TotalEnergies at 15.28 percent.

There were 13 OMCs with a market share ranging between one percent and seven percent which collectively accounted for 36.48 percent of the market share in 2023. This reflected a marginal increase from 36.02 percent in 2022.

Meanwhile, 9.29 percent of the market share was accounted for by other categories. This refers to OMCs with a market share of less than one percent each. This was an increase from 8.41 percent in 2022. Table 5-4 presents market share of OMCs for white products in 2023 compared to 2022.

³¹ Refers to petrol, kerosene, and low sulphur diesel

Table 5-4: OMCs market share for white petroleum products, 2022-2023

OMC	Market Share (%)	
	2022	2023
Puma Energy Zambia Plc	19.06	19.82
Mount Meru Petroleum Zambia Limited	18.11	19.13
TotalEnergies Marketing Zambia Limited	18.40	15.28
Vivo Energy Zambia Limited (Trading as Engen)	6.89	6.60
Oryx Energies Zambia Limited	5.48	4.12
Rubis Energy Zambia Limited	4.59	4.03
Spectra Oil Corporation Limited	3.59	3.55
Karan Petroleum Zambia Limited	1.08	2.76
Lake Petroleum Limited	2.84	2.68
Petroda Zambia Limited	3.02	2.64
Oasis Oil Zambia Limited	1.66	2.44
Eco Petroleum Limited	1.84	1.94
Zamfuel Petroleum Limited (Trading as Uno Petroleum)	1.22	1.76
SGC Investments Limited	1.77	1.73
Hass Petroleum Zambia Limited	0.75	1.20
Surya Energy Limited	1.30	1.03
Others	8.41	9.29
Total	100.00	100.00

5.3.2 Retail Sites Network

The number of retail sites by OMCs in 2023 increased to 568 compared to 507 in 2022. Generally, the increase in the number of retail sites has been associated with ERB's regulatory and the Government's policy pronouncements, as well as the rise in economic activities in the country. For instance, the ERB undertook successive downward revisions of the distance between filling stations, from one kilometre apart prior to 2015, to the current 150 meters. Appendix 17 depicts the number of retail sites and the proportion of the total by OMCs in Zambia in 2023.

5.3.3 Market share for Jet A-1

In 2023, the market share for the supply of Jet A-1 was shared between Puma and TotalEnergies. Puma maintained its lead with a market share of 56.70 percent, while the remainder was accounted for by TotalEnergies. TotalEnergies saw an increase in its market share from 36.65 percent in 2022 to 43.30 percent in 2023. Meanwhile, Puma's market share declined by 6.65 percentage points. Table 5-5 shows the market share for Jet A-1 in 2023 compared to 2022.

Table 5-5: Market share for Jet A-1, 2022-2023

OMC	Market Share (%)	
	2022	2023
Puma Energy Zambia Plc	63.35	56.70
TotalEnergies Zambia Limited	36.65	43.30

5.3.4 Market share for Lubricants

The market share for lubricants was dominated by the three companies. Spectra had the largest market share at 33.61 percent, followed by Puma at 15.79 percent and TotalEnergies at 12.66 percent. The remaining companies had a market share that was less than 10 percent each as depicted in Figure 5-4.

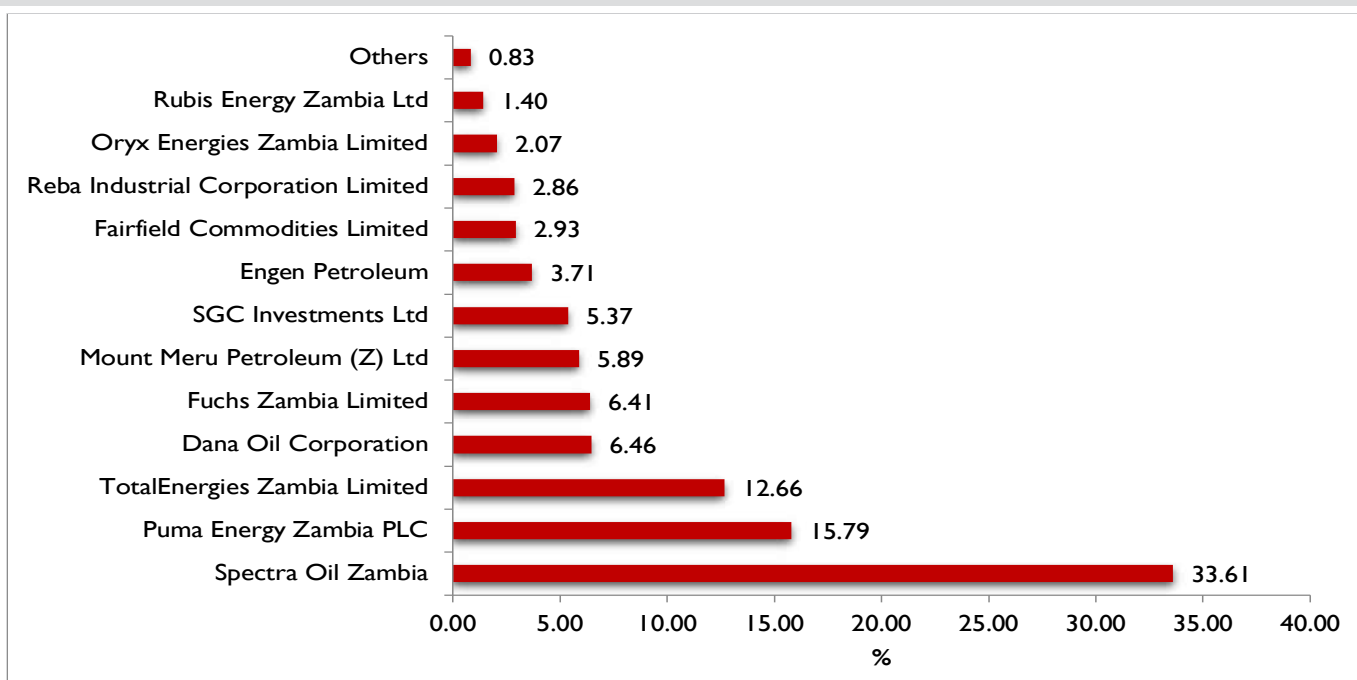


Figure 5-4: Market share for lubricants, 2023

5.3.5 Market share for Liquefied Petroleum Gas

The market share for Liquefied Petroleum Gas (LPG) in Zambia experienced a shift in 2023, with Mount Meru surpassing Afrox Zambia Limited as the market leader. Mount Meru increased its market share by 5.85 percentage points to 25.18 percent in 2023, from 19.33 percent in 2022. The increase was mainly attributed to the growth in retail sales by the company and increased availability of cylinders at service stations across the country. Afrox's market share declined by 7.65 percentage points falling from 21.01 percent in 2022 to 13.36 percent in 2023 due to the increased presence of competitors on the market who have outlets closer to the residential areas, consequently resulting in customers switching to use competitor cylinders.

Furthermore, notable gains in market share were recorded for Oryx Gas Limited, which increased to 15.24 percent from 13.92 percent in 2022, as well as Falcon Gas Zambia Limited increasing from 8.35 in 2022 to 13.24 percent in 2023. Ogaz's market share declined after the acquisition of its assets by Puma. Table 5-6 presents a summary of the LPG market share in 2023.

Table 5-6: Market Share for LPG, 2022-2023

OMC	Market Share (%)	
	2022	2023
Mount Meru Petroleum Zambia Limited	19.33	25.18
Oryx Gas Zambia Limited	13.92	15.24
Afrox Zambia Ltd	21.01	13.36
Falcon Gas Zambia Ltd	8.35	13.24
Ogaz Zambia Limited	14.80	10.36
Exclusive Brands Africa	6.25	6.73
Rubis Energy Zambia Limited	5.86	6.08
Minegases Company Limited	5.43	4.35
Chingases Company Limited	4.95	3.46
Puma Energy Zambia Plc	0.00	1.91
Oilbay Zambia Limited	0.09	0.06
Surya Energy Limited	0.01	0.03
Total	100.00	100.00

5.3.5.1 LPG Storage Facilities

The total national LPG storage capacity in 2023 was 2,436MT. INDENI had the largest storage capacity of 1,600 MT, followed by Meru Gas Zambia Limited with 132MT. The smallest capacity was Oxyzam Limited with 22MT.

In terms of location, Copperbelt Province had the largest storage capacity at 1,862MT followed by Lusaka with 357MT. Central Province had the least at 100MT. Table 5-7 shows the distribution of LPG bulk storage facilities by OMC in 2023.

Table 5-7: OMCs LPG Bulk Storage facilities, 2023

No.	Name	Capacity (MT)	Province
1	Indeni	1,600	Copperbelt
2	Meru Gas Zambia Limited	12	Central
		100	Copperbelt
3	Minegases Company Limited	125	Copperbelt
4	Afrox Zambia Limited	30	Copperbelt
		85	Lusaka
5	Puma Energy Zambia Plc	100	Lusaka
6	Exclusive Brands	90	Lusaka
7	Oryx Gas Limited	72	Copperbelt
8	Chingases Company Limited	55	Lusaka
9	Falcon Gas Zambia Limited ³²	50	Lusaka
10	Rubis Energy Zambia Limited	40	Lusaka
11	Lake Gas Limited	35	Copperbelt
12	Oxyzam Limited	22	Lusaka
Grand Total		2,416	

5.4 PRICING OF PETROLEUM PRODUCTS

Section 4 of the Energy Regulation Act No. 12 of 2019, mandates the ERB to determine, regulate and review charges and tariffs in the energy sector. For the petroleum sub-sector, the ERB determines the wholesale and retail prices of petrol, LSG and kerosene. Further, the ERB also determines the wholesale and the Posted Airfield Price (PAP) price of Jet A-1. The adopted pricing model, for determining these prices is aligned to the fuel supply chain in Zambia in order to ensure that the prices determined are efficient and cost reflective.

5.4.1 Zambia's Fuel Supply Chain

Zambia's fuel supply chain has transitioned from importation of both petroleum feedstock and finished petroleum products to the importation of finished petroleum products only. The importation of finished petroleum products was done by Government contracted suppliers and OMCs until 30th September 2022.

During 2023, all petroleum products were imported by private OMCs, of which 100 percent of the petrol was transported by road. Meanwhile, only about 20 percent LSG was transported by road and close to 80 percent was conveyed by pipeline. Most of the finished petroleum products were imported through Dar-es-salaam in Tanzania, Msasa in Zimbabwe and Beira in Mozambique. Several players were responsible for different roles in the supply chain. These players included the MoE, the

³² 2022 storage capacities for Falcon Gas Zambia and Meru Gas Zambia Limited have been adjusted after reconciliation.

ERB, TAZAMA, INDENI, TPPL, OMCs, Transporters and Dealers. Appendix 18 provides details of the specific roles played by each of these players before and after Government reforms.

5.4.2 Determinants of Petroleum Prices

Generally, the prices of oil on the international market are influenced by a complex interplay of factors related to supply, demand, geopolitics, environmental policies and conditions, technological advancements, and market dynamics. Understanding these determinants is essential for analysing and forecasting petroleum price movements.

Figure 5-5 illustrates the factors that influence oil prices on the global markets, and a detailed explanation on how these influences the prices of petroleum products is explained in the subsequent sections.

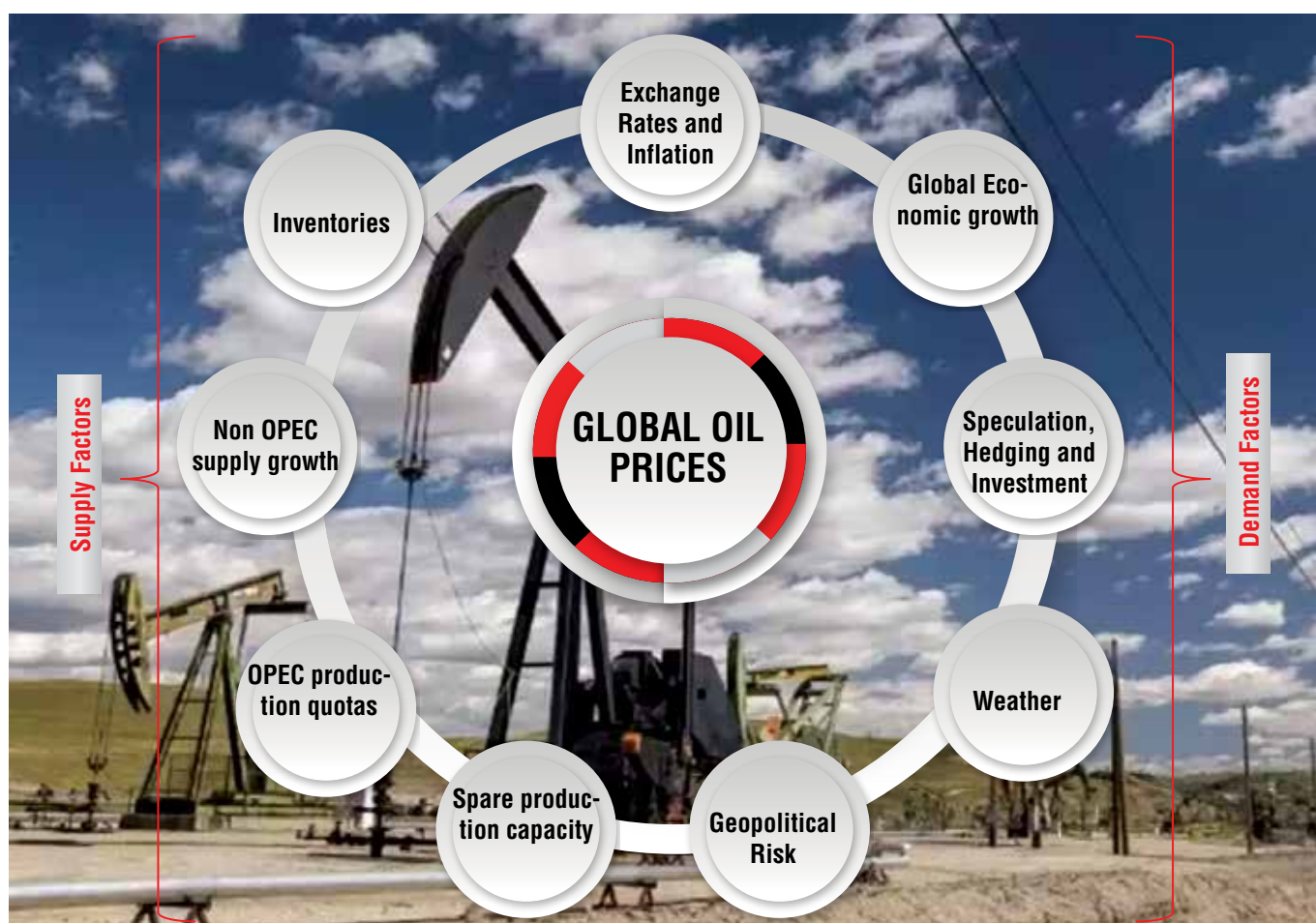


Figure 5-5: Global determinants of oil prices

- i. **Global supply and demand:** The fundamental principle of supply and demand dynamics heavily influences petroleum prices. Any increase or decrease in supply and demand levels, driven by factors such as economic growth, industrial activity and geopolitical events, directly impact prices.
- ii. **Economic growth and industrial activity:** Economic expansion typically correlates with higher energy consumption for transportation, manufacturing, and other industrial processes, increasing demand for petroleum products and driving prices upwards.
- iii. **Sector specific demand:** The transportation sector is a major consumer of petroleum products such as petrol and diesel. Fluctuations in transportation demand, influenced by factors like population growth, urbanization and travel patterns, can significantly affect petroleum prices.
- iv. **OPEC influence:** The Organization of the Petroleum Exporting Countries (OPEC) being an

official cartel, plays a crucial role in petroleum price determination by setting production targets or quotas for its member countries. OPEC decisions and their adherence to production quotas influence global supply levels, consequently affecting prices.

- v. **Geopolitical events:** Political instability, conflicts, trade disputes and sanctions in oil-producing regions can disrupt global supply chains, leading to uncertainty and price volatility in petroleum markets.
- vi. **Weather disruptions:** Natural disasters such as hurricanes, storms, or earthquakes can damage oil production, refining and transportation infrastructure, leading to temporary supply disruptions and price spikes.
- vii. **Technology and innovation:** Advances in extraction technologies, renewable energy development and energy efficiency measures can influence long-term demand for petroleum products, consequently affecting their prices.
- viii. **Regulatory policies:** Environmental regulations, fuel quality standards and taxation policies imposed by governments can impact the demand for petroleum products and affect their prices.
- ix. **Market speculation:** Speculative trading activities in commodity markets can also contribute to short-term fluctuations in petroleum prices, as traders respond to perceived supply and demand imbalances, geopolitical developments or economic indicators.

In the case of Zambia, which has no known crude oil reserves and relies entirely on imports of petroleum products, fuel prices are primarily influenced by global oil prices and exchange rates.

The fluctuations in international oil prices and the changes in the exchange rate between the kwacha and the USD directly impacted the cost of importing petroleum products into Zambia during 2023. Further, cost components such as Levies, duties, fees, local distribution costs, margins for petroleum downstream players, and Government policy in terms of taxation also influenced the final prices of petroleum products in 2023.

5.4.3 Trends in International Oil Prices

Figure 5-6 shows the trend in the international crude oil prices, namely WTI, Brent and Murban Crude during the period January to December 2023.

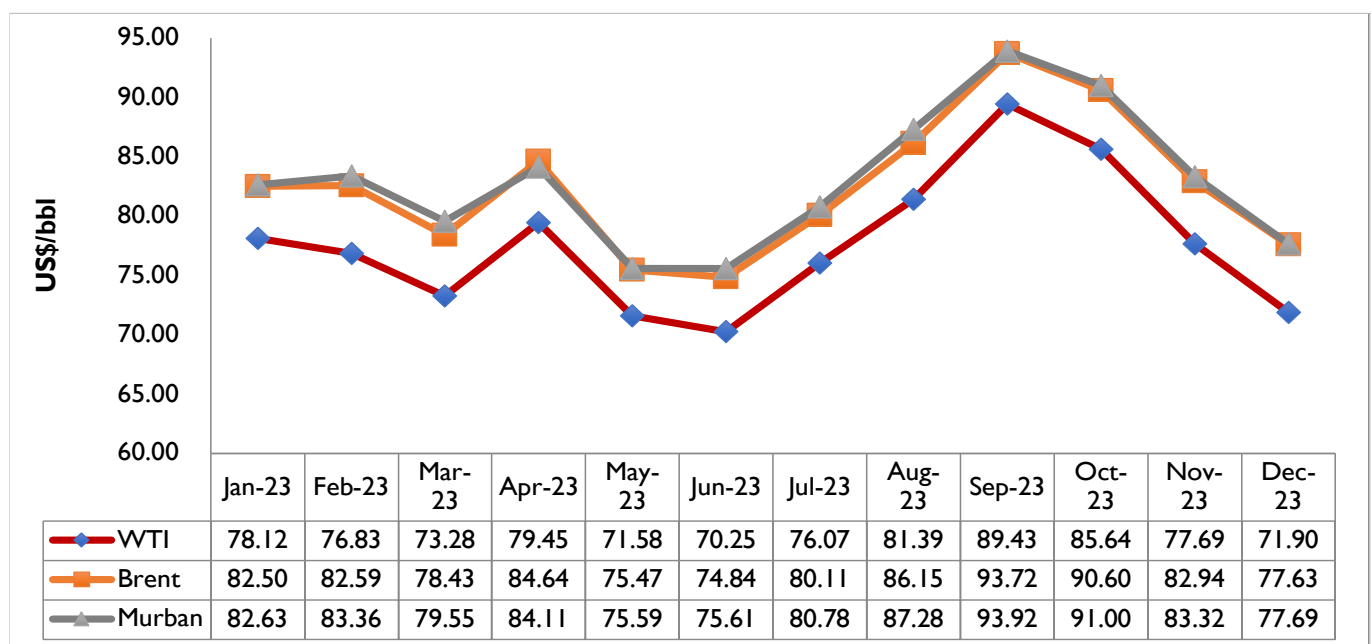


Figure 5-6: Trend in international crude oil prices, January to December 2023

During the first half of 2023 crude oil prices were generally on a downward trend starting at US\$78.12/bbl, US\$82.50/bbl, US\$82.63/bbl for WTI, Brent and Murban respectively with a fluctuation at the beginning of the second quarter in April 2023. The lowest price was recorded in June 2023 at US\$70.25/bbl, US\$74.84/bbl, US\$75.61/bbl for WTI, Brent and Murban respectively.

During the second half of 2023 oil prices adversely fluctuated reaching their highest point of US\$89.43/bbl, US\$93.72/bbl and US\$93.92/bbl for WTI, Brent and Murban respectively during the end of the third quarter. As a result, major oil producers like Saudi Arabia and Russia extended output cuts, contributing to expectations of reduced supply. Forecasts from the IEA predicting a market deficit further fuelled optimism.

Additionally, updated forecasts from OPEC suggested solid demand and the potential for a supply deficit with continued production cuts. Further, geopolitical tensions, including actions by Russia and Saudi Arabia to limit supplies during peak demand, also boosted market sentiment. For the last quarter of 2023, oil prices reverted to a downwards trend finally settling at US\$71.90/bbl, US\$77.63/bbl, US\$77.69/bbl for WTI, Brent and Murban respectively.

5.4.4 Trend in the Exchange Rate

During the period under review, the kwacha depreciated against the USD from K18.54/US\$ in January 2023 to K24.78/US\$ in December 2023, as detailed in Figure 5-7.

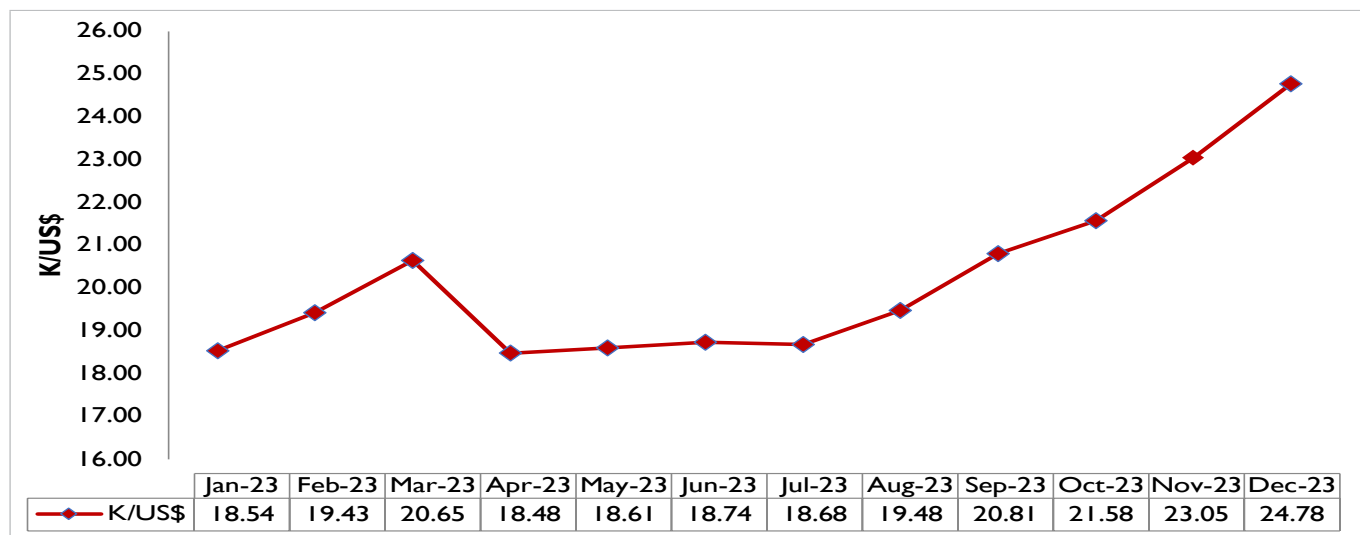


Figure 5-7: Trend in the kwacha/USD Exchange Rate, 2023

The depreciation of the kwacha in the major part of first quarter of the year was attributed to low foreign exchange supply, particularly from the mining sector, amidst high demand for the procurement of petroleum products, medicines, and agricultural inputs³³. Further, the depreciation was worsened by adverse market sentiments associated with protracted external debt restructuring negotiations and tighter global financial markets conditions.

However, towards the end of the first quarter, the kwacha recorded a significant appreciation that was mostly caused by improved supply of foreign exchange mainly from quarterly corporate tax obligations. Additionally, the reaching of the Staff-Level Agreement on the first review of the IMF Extended Credit Facility positively changed market sentiments as it created expectations that external debt restructuring would be concluded, leading to the appreciation of the kwacha³⁴.

Nevertheless, the kwacha depreciated steeply against the USD beyond April 2023 due to the persistent low supply of foreign exchange amid rising demand by key market players and the strengthening of the USD on the international market³⁵.

³³ Bank of Zambia – Monetary Policy Committee Statement February 2023

³⁴ Bank of Zambia – Monetary Policy Committee Statement May 2023

³⁵ Bank of Zambia – Monetary Policy Committee Statement November, 2023

5.4.5 Trend in International Oil Prices and the Exchange Rate

Generally, the international oil prices and the exchange rate moved in the same direction from June to September 2023 and thereafter, in opposite directions. From June to September 2023, the international oil prices rose from US\$75.61/bbl to US\$93.92/bbl. During the same period the exchange rate depreciated from K18.74/\$ to K20.81/\$. Thereafter, the international oil prices started declining to a low of US\$77.69/bbl in December, while the kwacha continued on an upward trajectory, depreciating to a high of K24.78/US\$ in December 2023. Figure 5-8 shows the trends in the international oil prices and the exchange rate.

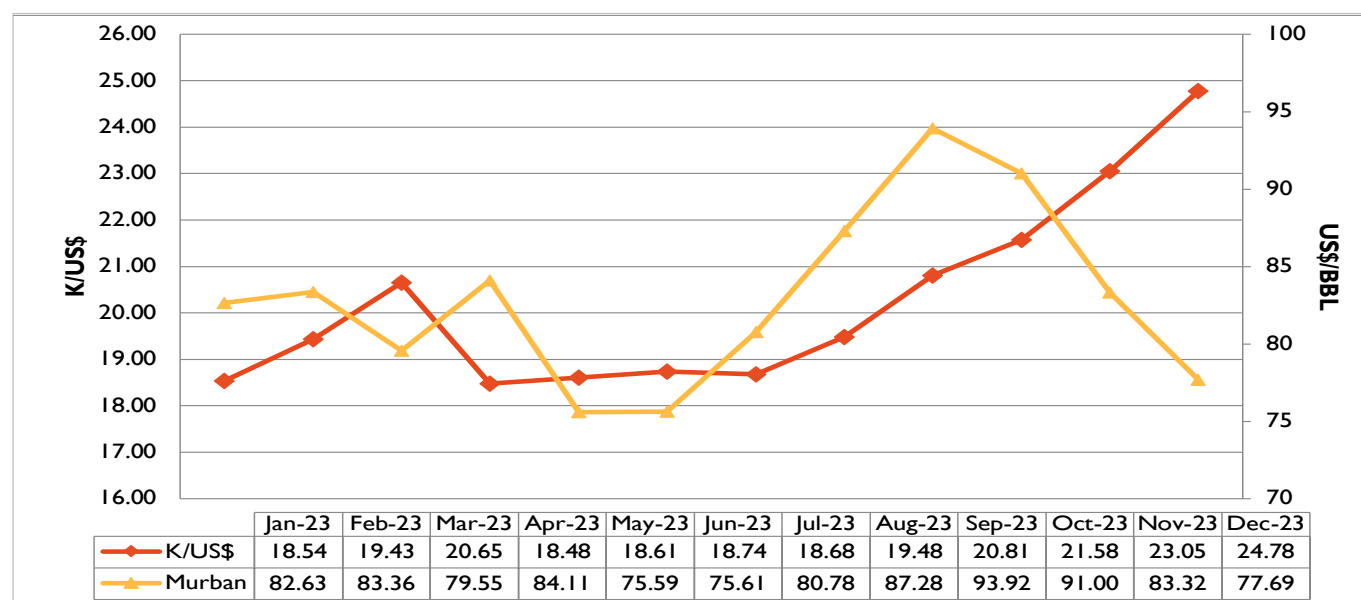


Figure 5-8: Trend in international oil prices and the exchange rate

As depicted in Figure 5-8, the noted movements of the two fundamentals that influence the price of fuel in Zambia have a major role in the determination of domestic prices of fuel. In the event that the two fundamentals move in the same direction, either upward or downward, a similar pattern is expected to occur in the wholesale and retail prices on the domestic market. On the other hand, when these two variables move in opposite direction, the impact on the domestic price will depend on the net effect of the movements. This means that the variable with greater movement is what will determine the price variation.

5.4.6 Petroleum Pricing Mechanism in Zambia

The National Energy Policy 2019 provides for cost reflective pricing for all petroleum products. In line with this policy, the ERB uses the Import Parity Pricing (IPP) model to determine the prices for petrol, diesel, jet A-1 and kerosene. The IPP operates on the principle that the final price of petroleum products should be equal to the cost of the product at points of production plus the cost of transport to the point of sell plus other attendant costs. Meanwhile, the ERB applies a Light-Handed Regulatory Framework for regulating the price of LPG. Under this framework, the industry players are allowed to set their own prices whilst adhering to a capped margin determined by the ERB. This is done to protect the consumers from exploitation through excessive pricing.

During 2023, the ERB continued to review the prices of petroleum products every thirty days. In addition, the prices were determined using the IPP Model. The cost elements that constitute the IPP model are divided into two groups of elements:

- i. Wholesale price build up; and
- ii. Pump price build up.

These cost elements are explained in detail in subsequent sections.

5.4.6.1 Wholesale Price Build-up

The cost elements that constitute the wholesale price build-up are presented in Table 5-8 and a detailed exposition of these cost elements is provided in Appendix 19.

Table 5-8: Wholesale price build up

Cost Element	Unit Measure	Basis
Platts Arab Gulf	US\$/BBL	Platts Referencing
Conversion Factor		Industry Best Practice
FOB Price	US\$/MT	
Traders Margin	US\$/MT	Standard Cost
FOB & Traders margin	US\$/MT	
Ocean Freight	US\$/MT	Referenced to Worldscale Rates
C & F (Dar/Beira)		
Storage	\$/MT	Standard Cost
Ocean Insurance	0.15% of C & F	Standard Cost
Ocean losses	0.3% of C & F	Standard Cost
Wharfage	1.25% of C & F	Port Authority Charge
BPS Premium	\$/MT	BPS referencing
CIF (Dar/Beira)		
Transportation Fee	US\$/MT	standard cost
Transportation Losses	0.5% petrol & 0.3% diesel, 0.3% kerosene	Standard Cost
Importers Margin	US\$/MT	Standard cost
CIF (Lusaka)	\$/MT	
Storage losses	0.5% petrol & 0.3% diesel, 0.3% kerosene	Standard Cost
Wholesale Price to OMC	\$/MT	
Conversion factors		industry best practice
Wholesale Price to OMC	\$/M³	
Exchange Rate	K to \$	Bank of Zambia
New Wholesale Price to OMC	K/M³	

5.4.6.2 Pump Price Build-up

The cost lines that constitute the pump price build-up are depicted in Table 5-9.

Table 5-9: Pump price build up

No.	Details	Unit Costs	Workings
1.	Wholesale Price to OMC	K20.00, K21.40 & K18.25 per litre each for Petrol, Diesel and Kerosene, respectively.	a
2.	Terminal Fee	K0.063/litre	b
3.	Marking Fee	K0.20/litre	c
4.	Excise Duty (incl.) road levy	K2.07 for Petrol, K0.66 for Diesel and K0 for Kerosene	d
5.	Ex NFT Gate		E=(a+b+c+d)
6.	Transport Cost	K0.52 for Petrol, K0.52 for Diesel and K0.09 for Kerosene.	f
7.	OMC Margin	K1.58/litre	g
8.	TOTAL (Excl VAT)		h=(e+f+g)
9.	Dealer Margin	K1.07/litre	i
10.	PRICE TO DEALER		j= (h+i)
11.	ERB Fees	0.7%	k
12.	Strategic Reserves Fund	K0.15/litre for Petrol, Kerosene and Diesel	l
13.	Price before VAT		m=(j+k+l)
14.	VAT	16%	n
15.	Uniform Pump Price	K/litre	o=(m+n)

5.4.7 Annual Review of Petroleum Downstream Margins

In line with its mandate to review tariffs and charges for the energy sector, the ERB regulates the margins of petroleum downstream players (i.e. OMCs, Dealers and Transporters) annually. In March 2023, the ERB in consultation with the Margins Committee conducted a review of the margins for OMCs, dealers and transporters. The margins were reviewed in order to ensure that they were in line with the changes in the inflation and exchange rate. However, the margins remained unchanged as shown in Table 5-10.

Table 5-10: Petroleum Downstream Margins, 2023

Downstream Player	Margin (K)
OMC (K/litre)	1.58
Dealer (K/litre)	1.07
Transporter (0 - 50km) (K/litre/Km)	0.24
Transporter (beyond 50km) (K/m ³ /Km)	1.62

5.4.8 Pricing framework for Jet A-1

In the year 2023, the ERB continued to review the wholesale and PAP of Jet A-1 using the IPP model every 30 days. Figure 59 shows the trend in the PAP prices at various airports in the country during the period January to December 2023.

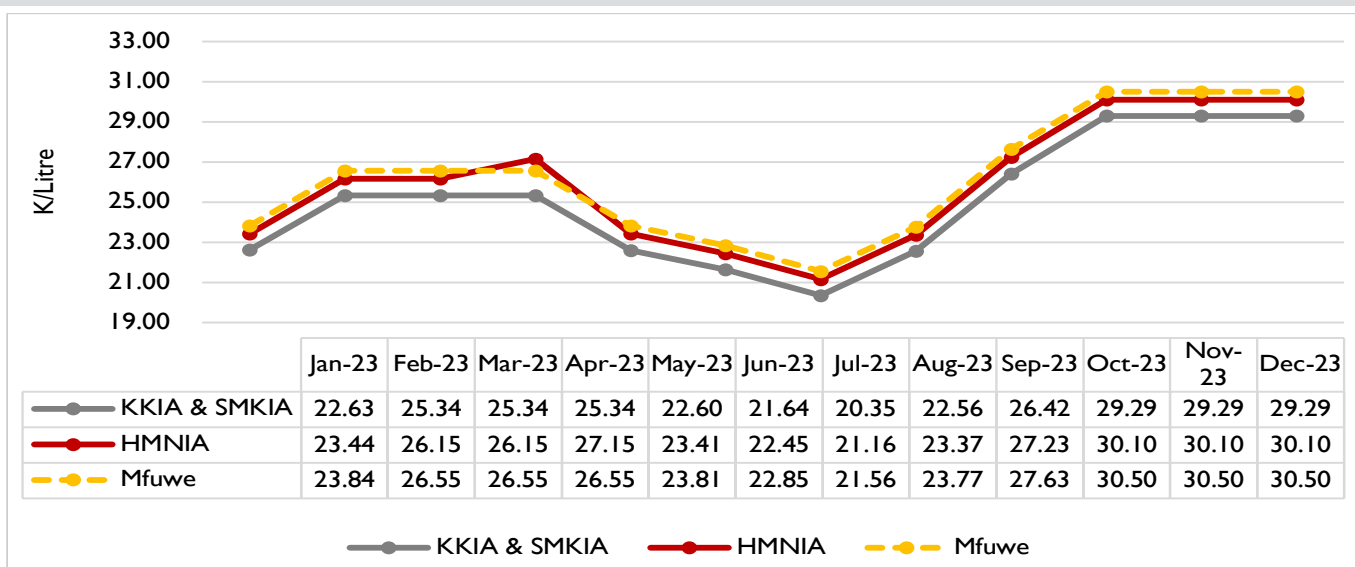


Figure 5-9: Jet A-1 PAP at KKIA, HMNIA and SMKIA, January to December 2023

5.4.9 Regulatory Framework for Biofuels

During the 2022 budget address, Government reforms were made in the energy sector and key among them, was a requirement to establish a regulatory framework for pricing of ethanol, biodiesel, blended petrol and blended diesel for Zambia. In this regard, the ERB developed a pricing framework for biofuels during 2023. The proposed model was set to be implemented within the first six months of 2024.

5.4.10 Domestic and Regional Fuel Pump Prices

5.4.10.1 Domestic Fuel Pump Prices

In line with the monthly fuel pricing cycle, the ERB generally adjusted fuel prices downwards in January, April, May, June and July. Similarly, fuel prices were adjusted upwards in February, March, August, September and October. Meanwhile, during the months of November and December, fuel prices remained constant. Figure 5-10 shows the trend in the domestic fuel prices during 2023.

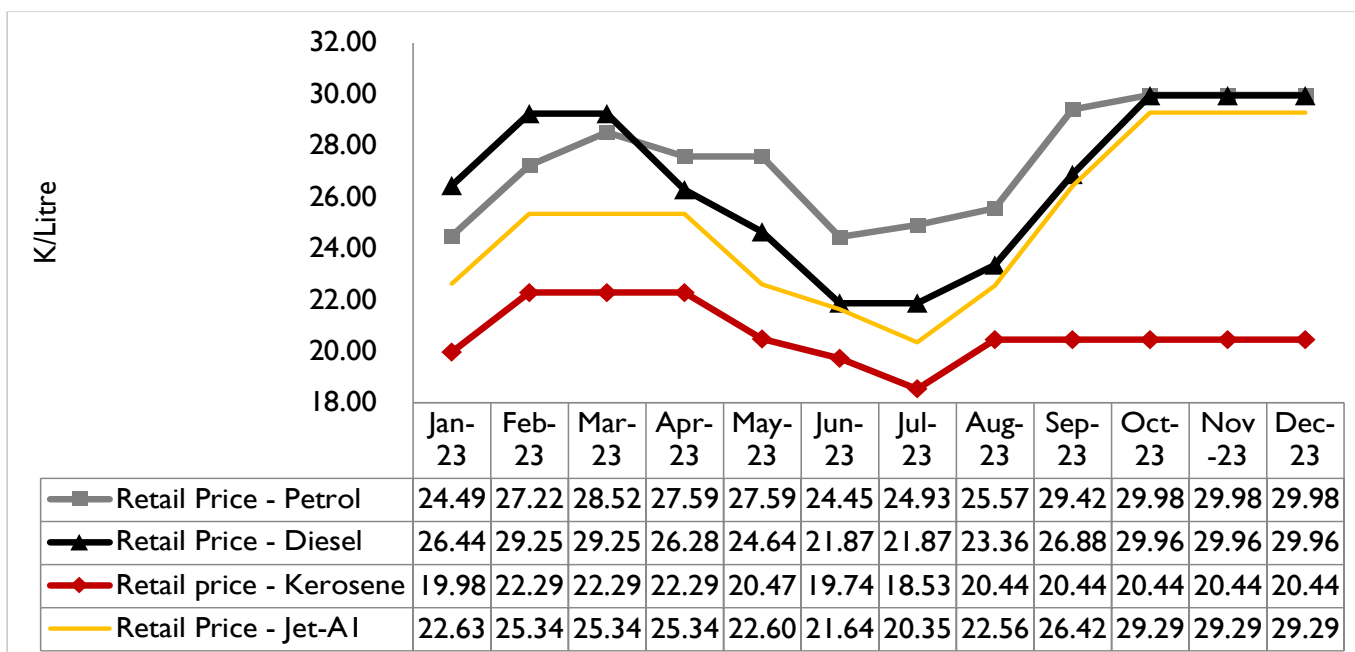


Figure 5-10: Fuel pump price adjustments, 2023

5.4.10.1.1 Trends in Domestic Fuel Pump Prices

Generally, the trend in domestic pump prices has been on an upward trajectory in period 2014 to 2023. However, the retail price for kerosene was relatively stable between 2022 and 2023. Furthermore, Kerosene continued to record a lower retail price as compared to that of petrol and diesel throughout the period under review. Figure 5-11 shows the trend in the average pump prices of petrol, diesel and kerosene from 2000 to 2023.

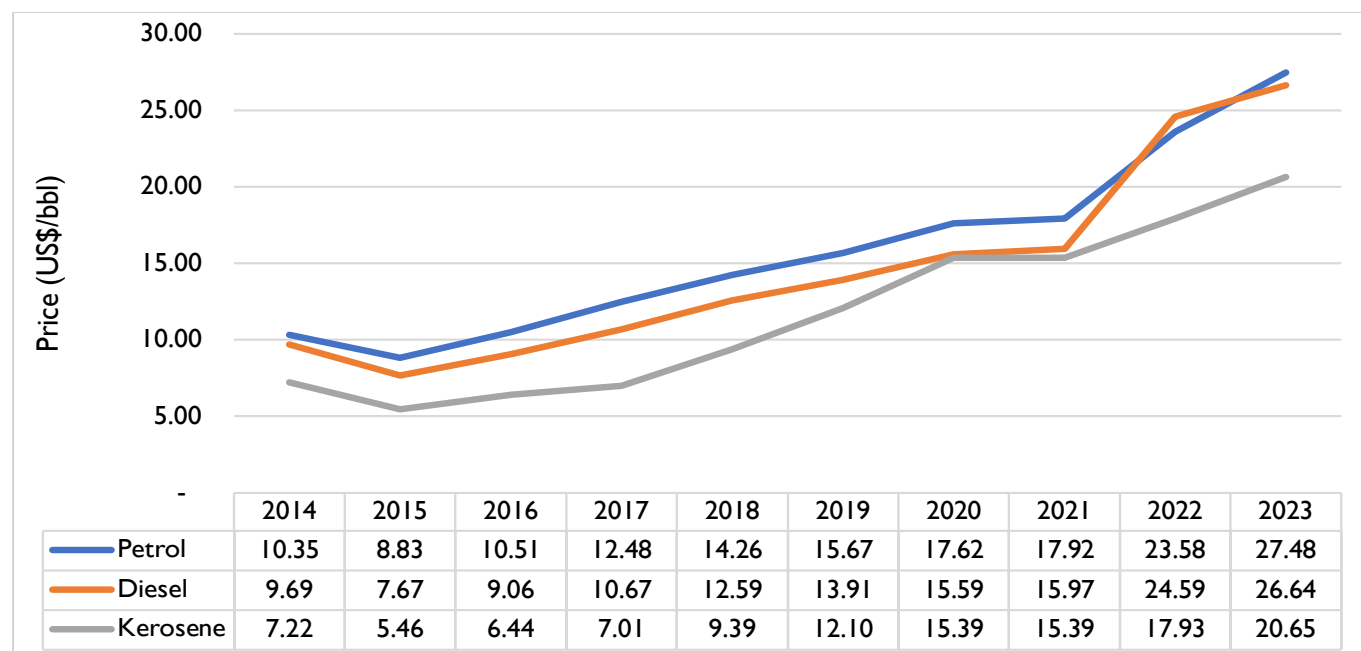


Figure 5-11: Trend in nominal pump prices, 2014 - 2023

5.4.10.1.2 Regional Fuel Prices

Prices of fuel tend to differ from one country to another. This is mainly influenced by the following key factors among others:

- i. Performance of the domestic economy of each country;
- ii. The Monetary policy in terms of exchange rate;
- iii. The fiscal regime in terms of taxes and levies;
- iv. Subsidies and other price support mechanisms;
- v. Fuel Procurement mode;
- vi. Proximity to sea port;
- vii. Investments in petroleum infrastructure such as strategic reserves depots; and
- viii. Existence or absence of a refinery.

During the year 2023, the price of petrol and diesel in the region was higher at the beginning of the year in most countries and began to drop as the year came to a close. Kenya, Malawi and Zimbabwe, recorded higher prices at the beginning and end of the year compared to the other countries in the region. Mozambique followed the same trajectory for diesel, while petrol prices indicated minimal variations.

Conversely, Botswana and South Africa recorded lower prices at the beginning and end of the year compared to the other countries in the region, whereas Tanzania and Zambia's prices were only lower for Petrol during the same periods. Table 5-11 shows the regional petrol and diesel prices for 2023.

Table 5-11: Regional petrol and diesel price ranges, 2023

Country	Product	Price (US\$/l)		
		Lowest	Highest	Variance
Botswana	Petrol	1.07	1.18	0.11
	Diesel	1.03	1.32	0.29
Kenya	Petrol	1.40	1.54	0.14
	Diesel	1.29	1.46	0.17
Malawi	Petrol	1.49	1.68	0.19
	Diesel	1.37	1.85	0.48
Mozambique	Petrol	1.34	1.37	0.03
	Diesel	1.36	1.41	0.05
South Africa	Petrol	1.19	1.34	0.15
	Diesel	1.05	1.32	0.27
Tanzania	Petrol	1.16	1.32	0.16
	Diesel	1.08	1.42	0.34
Zambia	Petrol	1.21	1.51	0.30
	Diesel	1.17	1.51	0.34
Zimbabwe	Petrol	0.82	1.62	0.80
	Diesel	0.85	1.86	1.01

Figure 5-12 and Figure 5-13 compare the regional petrol and diesel prices, in dollar terms, during the period under review³⁶.

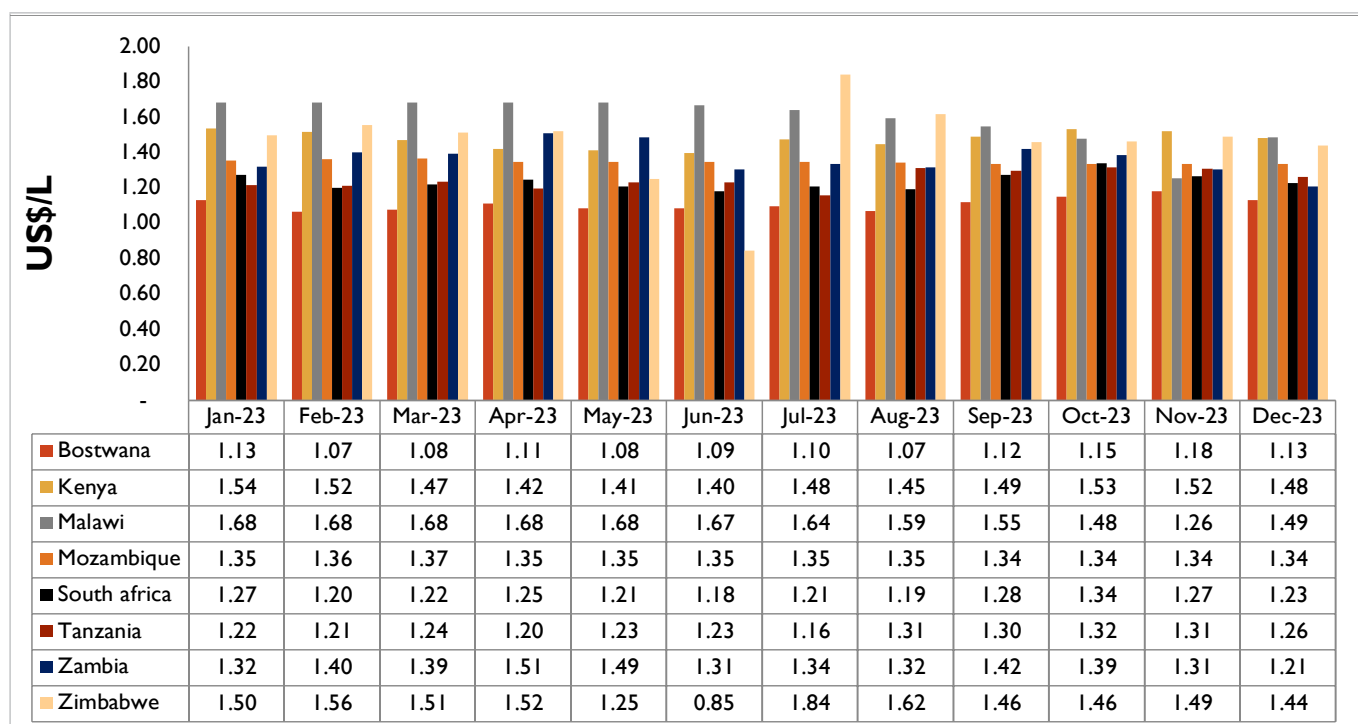


Figure 5-12: Regional fuel pump prices for the year 2023 - Petrol

³⁶The values indicated are weekly averages for each month

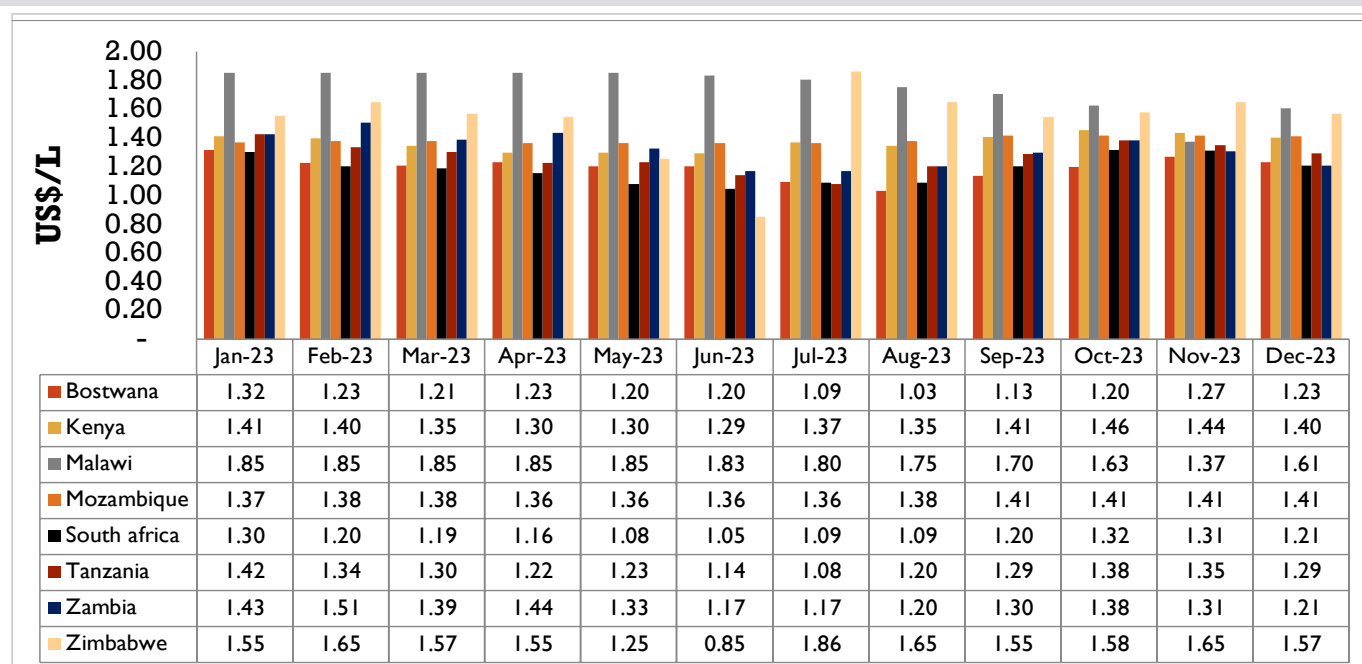


Figure 5-13: Regional fuel pump prices for the year 2023 - Diesel

5.5 COMPLIANCE OF LICENSEES IN THE PETROLEUM SUB-SECTOR

5.5.1 Petroleum Product Quality Monitoring

The ERB conducts routine sampling and testing of petroleum products from Government and OMC depots across the country. This is in line with the Quality Control and Monitoring Guidelines for the Zambian Petroleum Industry and the ERB's strategic objective of regulating the energy sector in order to ensure provision of quality, reliable and affordable products and services. Further, this is a requirement as per Clause 31 (a) of the Energy Regulation Act No. 12 of 2019, which compels all licensees in the energy sector to meet the minimum standards relating to quality of goods and services as may be specified or published by the ERB.

A total number of 266 samples were collected and taken for laboratory quality testing in the year 2023. 257 out of the 266 samples collected fully complied with the respective product quality specification standards. Nine samples failed to meet the requirements of which four were Diesel and five were Petrol samples. The overall results for the tests are shown in Table 5-12.

Table 5-12: Test results for petroleum product samples collected, 2023

Product	Collected Samples Compliance to Quality Standards (%)	
	2022	2023
Regulatory target	95.0	98.0
Petrol	97.4	94
Automotive Gasoil	-	100
Diesel	92.3	98
Kerosene	100.0	100.0
Jet A-1	100.0	100.0
Total/Average	97.0	97.0

The overall quality compliance rating was found to be 97 percent, which was below the set product quality target of 98 percent for the year 2023 for petroleum product quality compliance.

5.5.2 Petroleum Infrastructure Compliance

Section 4(v) of the Energy Regulation Act No. 12 of 2019 empowers the ERB to close energy facilities whose operations contravene with the Energy Regulation Act, with regards to the safety and health of persons or consumers. In this regard, the ERB undertakes compliance audits of petroleum infrastructure to assess compliance to the Zambian petroleum standards and regulations that guarantee sustainable operations.

The ERB inspected 482 retail service stations for compliance monitoring in 2023, the overall compliance rate was 89.2 percent with 220 out of 482 scoring above the regulatory target of 95 percent. The 29 white petroleum product depots inspected scored an average compliance rate of 93.5 percent, with 18 of the 29 scoring above the regulatory target threshold of 95 percent. The regulatory target threshold for LPG bulk storage facilities was 88 percent for 2023, a total of 13 LPG bulk storage facilities were inspected in the year 2023 with one failing to score above the minimum compliance threshold. INDENI was not inspected in 2023, as the facility was not operational during the period of audits. Table 5-13 shows the average compliance and regulatory targets for both 2022 and 2023.

Table 5-13: Results of petroleum infrastructure compliance monitoring

Facility	Regulatory Target		Average Compliance
	2023	2022	2023
Retail Service Stations	95.00	94.30	89.2
Fuel Depots	95.00	95.00	93.5
LPG Depot/Filling Plant	88.00	95.70	93.7
Refinery	95.00	-	-
Pipeline	95.00	94.50	96.0

5.6 PERFORMANCE OF STATE-OWNED ENTERPRISES

TAZAMA Petroleum Products Limited (TPPL) and TAZAMA were monitored against the agreed upon KPIs for 2023. INDENI changed the business model from refinery to oil marketing as the last batch of petroleum feedstock was refined in 2023. The ERB uses KPI frameworks as regulatory tools to monitor the efficiency of energy enterprises. The KPIs are used to assess the performance of enterprises and in informing the determination of their tariffs, fees, rates and other regulatory decisions.

5.6.1 TAZAMA Pipelines Limited

TAZAMA, a State-owned Enterprise owned by the Government of the Republic of Zambia and the United Republic of Tanzania. Zambia owns 66.7 percent of shares, while 33.3 percent is owned by Tanzania. TAZAMA owns and operates a 1,710km petroleum pipeline (TAZAMA Pipeline) that runs from Dar-es-salaam in Tanzania to Ndola in Zambia. The pipeline used to transport petroleum feedstock (crude oil) until the fourth quarter of 2021 when reforms were pronounced for the pipeline to transport LSG.

TAZAMA pipeline comprises 954km of eight-inch diameter and 798 kilometres of 12 inch diameter pipelines. TAZAMA also operates a tank farm facility situated at Kigamboni in Dar-es-Salaam which comprises of six tanks with a total holding capacity of 231,000m³. Pumping is achieved through seven pump stations, five of which are in Tanzania and two in Zambia. The Company also manages its subsidiary, TPPL.

As detailed in Chapter 2 of this report, key developments at TAZAMA included the following:

- i. The official commissioning of the pipeline to transport diesel on 16th March 2023;
- ii. The publication of an expression of interest for the supply and delivery of diesel; and
- iii. The commencement of a project to construct a pipeline that will connect the Mpika Fuel Depot to the main TAZAMA pipeline.

Other developments that happened at TAZAMA include, the installation of a Closed-Circuit Television (CCTV) cameras at all critical installations along the pipeline such as the tank farm, Pump stations and pig stations to enhance security.

5.6.1.1 Throughput

TAZAMA recorded a total throughput of 559,497MT in 2023 against the proposed set annual target of 800,000MT mainly due to ullage (available storage) constraints at Ndola Fuel Terminal (NFT) and spillage incidents that resulted in shutdown of the pipeline. There was no recorded throughput in 2022 as the pipeline was in a transition of being converted to transport LSG. Figure 5-14 shows TAZAMA's throughput for the period 2015 to 2023.

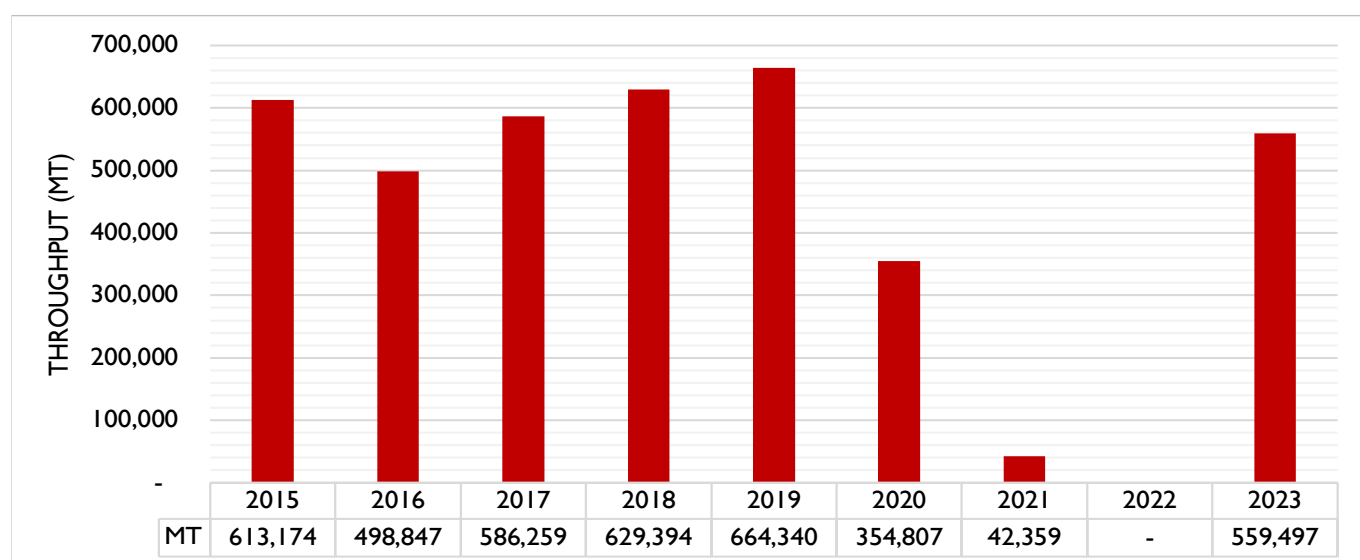


Figure 5-14: TAZAMA throughput – 2023

5.6.1.2 Technical KPIs

TAZAMA met only one out of five indicators as set by the ERB. Table 5-14 shows TAZAMA's performance against the KPIs in 2023.

Table 5-14: TAZAMA Performance against KPI targets

No.	Indicator	2022	2023	KPI Target	Remark
1	Throughput (MT)	-	557,446.30	800,000	Not Achieved
2	Operational days (%)	-	275 days (78.57)	350:15 (95.89)	Not Achieved
3	Pumping Rate (m ³ /h)	-	101.84	110	Not Achieved
4	Consumption and Loss (%)	-	0.92	1.2	Achieved
5	Product Quality (%)	-	One incident	100	Not achieved

5.6.1.3 Financial KPIs

In 2023, the ERB conducted financial KPIs audits for TAZAMA. The agreed financial KPIs for TAZAMA are trade debtor days and current ratio. Table 5-15 shows the financial KPI performance of TAZAMA, during the period under review.

Table 5-15: TAZAMA's performance against KPIs – 2023

Indicator	KPI Target	Actual Performance	Comment
Current ratio	≥1.0	3.14	Achieved
Debtor days	≤15	60.38	Not Achieved

The KPI audit results revealed that TAZAMA managed to achieve the KPI target for the current ratio but failed to achieve the target for trade debtor days.

5.6.1.4 Challenges Faced

The major challenge faced by TAZAMA in the year 2023 was the lack of ullage at the NFT due to reduced uplifts of High Sulphur Diesel (HSD), produced by INDENI. This resulted in the company experiencing unplanned shutdowns of 75 days cumulatively at the end of the year which resulted in a 22.5 percent deficit in throughput against the set throughput target.

5.6.1.5 Outlook

i. Implementation of Open Access Guidelines for use of TAZAMA Pipeline

The Open Access Guidelines for use of the pipeline are expected to be fully implemented in 2024. Therefore, OMCs will have access to the pipeline to transport LSG. This is expected to enhance security of supply for LSG.

ii. TAZAMA pipeline and storage tanks expansion project

In order to enhance efficiency and security in the transportation of finished petroleum products to Zambia, TAZAMA pipeline plans to upgrade the pipeline and storage tanks. The planned expansion project for the pipeline and storage tanks is aimed at increasing pipeline and storage capacity and thus, contributing towards meeting the national demand for fuel in the country.

iii. Mpika Fuel Depot interconnection Project

The construction of the TAZAMA Mpika pipeline was completed in 2023 and is expected to be commissioned in 2024. Once commissioned, the pipeline is expected to improve fuel distribution as OMCs delivering petroleum products to Luapula, Muchinga and Northern provinces will no longer need to collect fuel from Ndola. This is expected to streamline operations, reduce transportation costs and enhance the availability of fuel in the northern part of the country.

5.6.2 TAZAMA Petroleum Products Limited

TAZAMA Petroleum Products Limited (TPPL) is a subsidiary of TAZAMA and holds a licence for terminal storage of petroleum products from the ERB. In 2023, TPPL managed operations and maintenance of the NFT, Lusaka, Mpika, Solwezi, Mongu, Mansa and Chipata fuel depots.

The total quantity of finished petroleum products uplifted from all the operational depots during the year 2023 was 983,574.93m³. There were no uplifts of petroleum products from Mansa, Chipata and Mongu Fuel Depots during the year. Table 5-16 shows the quantity of petroleum products uplifted from each operational fuel depot during 2023.

Table 5-16: Petroleum products uplifts at TPPL's operational depots - 2023

Product (m ³)	Fuel Terminal/ Depot				Total
	Lusaka	Mpika	Ndola	Solwezi	
Domestic Kerosene	-	-	5,508.18	-	5,508.18
High Sulphur Diesel	-	-	66,489.28	-	66,489.28
HFO	-	-	-	-	-
Industrial Kerosene	-	-	421.74	-	421.74
Diesel	60,223.68	4,997.53	544,036.06	94,556.69	703,813.96
Petrol	84,260.55	4,308.43	117,556.95	1,215.84	207,341.77
Total	144,484.23	9,305.96	734,012.22	95,772.53	983,574.93

5.6.2.1 Technical KPIs

The ERB reviewed KPI reports for all seven fuel depots managed by TPPL in 2023 against the key indicators namely: throughput, unaccountable losses, number of petroleum product quality incidents and number of safety health and environmental incidents.

TPPL met most KPI targets, however, it was observed that TPPL continued to record high unaccountable losses, especially for petrol, recording 1.76 percent in 2023 against a set target of 0.5 percent, an increase of 0.32 percent compared to 1.44 percent in 2022. TPPL similarly recorded a quality incident in the third quarter of 2023. Table 5-17 presents TPPL's performance against the agreed KPI targets.

Table 5-17: TPPL's Performance against KPI targets

Indicator	Product	Target	Actual performance (Total/ Average)		Comment on 2023 performance
			2022	2023	
Throughput (m ³)	All	-	831,614.26	955,896.24	Monitoring purposes only
Unaccountable Losses (%)	Diesel	≤0.30	0.39	0.16	Achieved
	Petrol	≤0.50	1.44	1.76	Not achieved
	Kerosene	≤0.30	0.12	0.06	Achieved
No. of Petroleum Product Quality Incidents	-	0	0	1	Not achieved
No. of Safety Health and Environmental incidents	-	0	0	0	Achieved

5.6.2.2 Financial KPIs

The ERB undertook financial KPIs audits for TPPL during 2023. TPPL was assessed on four agreed ratios, namely, the current ratio, debtor days, asset turnover and the creditor days. Table 5-18 shows the financial KPI performance of TPPL, during the period under review.

Table 5-18: Financial KPI performance of TPPL

Indicator	KPI Target	Actual Performance	Comment
Current ratio	≥ 1.2	7.94	Achieved
Debtor days	≤ 15	2.71	Achieved
Asset Turnover	≥ 2.0	0.85	Not Achieved
Creditor days	≤ 90	45.24	Achieved

The KPI audit results revealed that TPPL achieved targets for current ratio, debtor days and creditor days but did not achieve the target for the asset turnover.

5.6.2.3 Challenges faced

The main challenge faced by TPPL during 2023 was the lack of ullage at the NFT due to reduced uplifts of HSD produced by INDENI.

5.6.2.4 Outlook

In 2024, TPPL is expected to commission the New Lusaka depot, this development is anticipated to enhance the revenue for TPPL once the depot is operational.

5.6.3 INDENI Energy Company Limited



Storage tanks at Indeni

INDENI was established in 1973 for the sole purpose of refining petroleum feedstock into finished petroleum products. In 2022, INDENI was transformed as INDENI Energy Company Limited making the company an operational OMC. This was in line with the change in Government policy.

5.6.3.1 INDENI Throughput

INDENI has a design throughput capacity of 1,100,000MT per annum and a processing rate of 165m³/hr. The company's throughput has over the years has deteriorated to 850, 000MT per annum due to wear and tear. INDENI's annual throughput per year is largely reliant on the volume of petroleum feedstock received from TAZAMA.

INDENI was non-operational from the year 2020 until 20th March 2023 due to lack of petroleum feedstock for processing. During 2023, the refinery was operational for an average of 39 days from 20th March to 24th July 2023 to process last consignment of feedstock that was in the pipeline. Figure 5-15 shows the petroleum feedstock processed by INDENI, during the period 2015 to 2023.

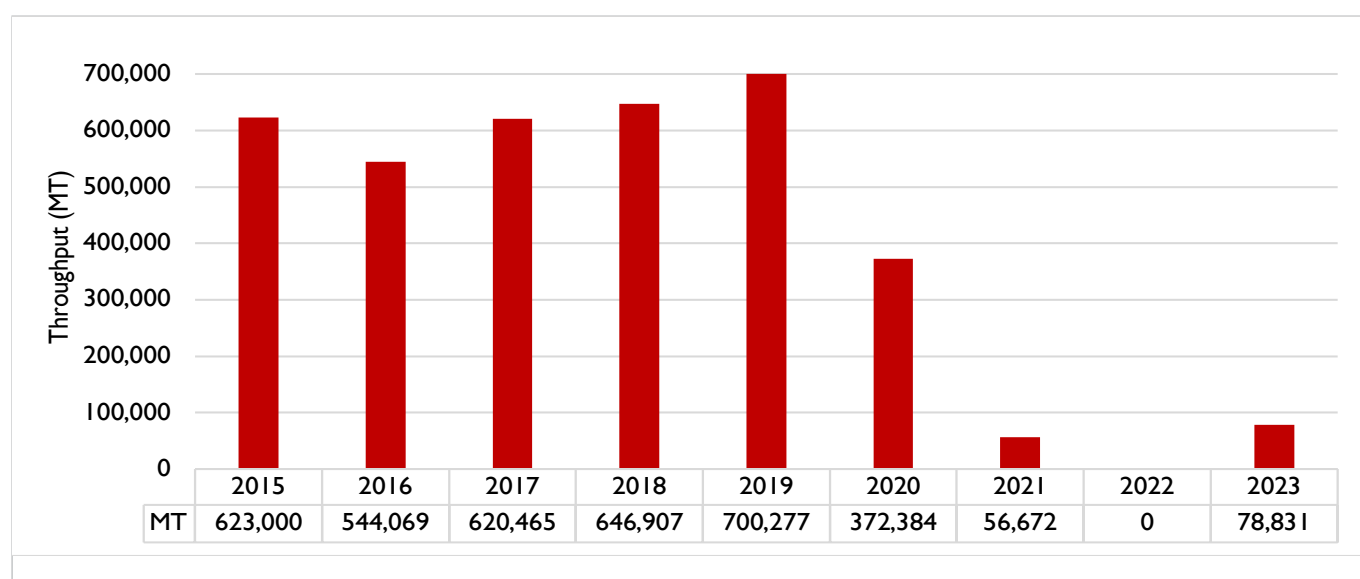


Figure 5-15: Petroleum feedstock processed by Indeni 2015 to 2023

5.6.3.2 INDENI Production of Petroleum Products

During 2023, INDENI processed 84,157MT of petroleum feedstock and 25,617MT of slops/kerosene. The total quantity of petroleum products that were refined are as indicated in Table 5-19.

Table 5-19: INDENI Refinery production of petroleum products 2023

No.	Product	Quantity (MT)
1.	Petrol	21,509.00
2.	High Sulphur Diesel	40,376.00
3.	Kerosene	6,324.00
4.	Jet A-1	-
5.	Liquefied Petroleum Gas	493.00
6.	Heavy Fuel Oil	15,455.00

5.6.3.3 INDENI OMC Operations

During 2023, INDENI became a fully operational OMC and sold a total of 1.83 million litres of High Sulphur Diesel (HSD) and 391MT of HFO. Further, INDENI delivered a total of 887,245 litres of Low Sulphur Diesel (diesel) to Kansenshi Mining Plc during the period October to December 2023.

5.6.3.4 Financial KPIs

The ERB conducted financial KPIs audits for INDENI on two key parameters namely the debtor days and current ratio, based on the agreed framework. Table 5-20 presents the financial KPI performance of INDENI, during the period under review.

Table 5-20: INDENI's financial KPIs performance, 2023

Indicator	KPI Target	Actual Performance	Comment
Current ratio	≥1.0	3.14	Achieved
Debtor days	≤15	60.38	Not Achieved

The KPI audit results revealed that INDENI achieved the target for current ratio but did not meet the target for trade debtor days.

5.6.3.5 Challenges faced

The following were the major challenges faced by INDENI during the period under review:

- i. High cost of inputs for care and maintenance of the plant; and
- ii. High capital cost for the new business model.

5.6.3.6 Outlook

Beyond 2023, the outlook on INDENI is as follows:

- i. The company is expected to commence offering hospitality services to would be customers; and
- ii. INDENI plans to expand its provision of laboratory services to OMCs for recertification of products.

5.7 PETROLEUM SUB-SECTOR DEVELOPMENTS

5.7.1 Government Owned Storage Depots for White Petroleum Products

In accordance with the Eighth National Development Plan Strategy, Government continued to construct fuel depots across the country. In 2023, construction works on the estimated US\$123.93 million New Lusaka Fuel Depot had reached 99.5 percent completion and the depot is expected to be commissioned in 2024. The depot will have a total capacity of 102 million litres with the following breakdown:

- i. 60 million litres diesel;
- ii. 40 million litres petrol; and
- iii. 2 million litres kerosene.

5.8 FUEL MARKING PROGRAMME

Fuel marking is a process by which a specific bio-chemical marker or dye is added to fuel for the purpose of identification and authentication. The marker is typically unique and easily detectable, allowing for, among others, verification and compliance of fuel throughout the supply chain. The benefits of fuel marking include promoting fair competition, combatting fuel fraud, consumer protection and contributes to a more transparent and accountable fuel industry. ERB contracts the services of an entity to provide proprietary technology for the marking program i.e. the marker solution and detection equipment.

Arising from the SI No. 69 of 2017 – The Energy Regulation (Petroleum Marking and Monitoring Regulations), the ERB established the Fuel Marking Program in 2018. The marking of fuel is undertaken at designated OMC facilities and the ERB monitors the marker throughout the supply chain in the country.

ERB contracts the services of an entity to provide proprietary technology for the marking program i.e. the marker solution and detection equipment. In 2023, a total of 1,278,370.63m³ of fuel was marked, representing a decrease from the 1,886,717.55m³ marked in 2022. Additionally, a total of 5,475 samples were collected and tested in 2023, compared to 5,904 samples in 2022. The decrease in quantities of fuel marked and samples collected was attributed to the 3-month suspension of the marking programme as a result of the expiry of the previous contract.

The temporary suspension of the programme in quarter three and quarter four of 2023 presented challenges but also provided an opportunity for the ERB to explore alternative monitoring and validation strategies. These initiatives included collaborating with Zambia Revenue Authority (ZRA) and the adoption of the Automated System for Customs Data (ASYCUDA) to strengthen and promote continuous improvement within the fuel marking programme.

The overall pass rate for samples collected in 2023 was 99 percent compared to 97 percent recorded in 2022 as depicted in Table 5-21.

Table 5-21: Results of the Fuel Marking exercise by Province

Province	2023 sampling and testing results ³⁷		2022 sampling and testing results	
	No. of samples collected	% Pass Rate	No. of samples collected	% Pass Rate
Central	522	99.67	461	98.92
Copperbelt	1,091	98.52	1,640	94.09
Eastern	367	99.33	303	99.01
Lusaka	2,370	99.19	2,090	98.47
North-western	220	96.43	352	95.74
Southern	392	99.81	454	98.02
Western	105	98.67	147	99.32
Northern	169	100	201	99.50
Muchinga	116	100	131	96.95
Luapula	123	98.85	125	99.20
Total	5,475	99	5,904	97³⁸

5.9 CHALLENGES IN THE PETROLEUM SUB-SECTOR

In 2023, the lack of adequate service stations in some rural areas continued to pose a challenge of illegal fuel vending and safety concerns.

5.10 OUTLOOK FOR THE SUB-SECTOR

5.10.1 Implementation of Open Access Guidelines for use of TAZAMA Pipeline

Beyond 2023, the Open Access Guidelines for the use of TAZAMA pipeline which shall allow multiple OMCs to import petroleum products is expected to be fully implemented. Therefore, several OMCs will have access to the pipeline to transport LSG and this will enhance security of supply for the LSG.

5.10.2 Enhanced National Petroleum Storage Capacity

The construction of the New Lusaka Fuel Depot is expected to be completed and commissioned in 2024. This development will bring the total number of Government storage depots to 8, thus enhancing storage capacity for petroleum reserves.

³⁷ The data for Quarter 4, 2023, is not included as the marking and monitoring of fuel were not undertaken for most of this quarter. As such, the pass rates for each province in 2023 are averaged from the first three quarters.

LICENSING



6.0 LICENSING IN THE ENERGY SECTOR

One of the key functions of the ERB is to issue licences to entities that wish to operate in the Energy Sector in Zambia. The licences issued by the ERB are categorized into three sub-sectors, namely, Electricity, Petroleum and Renewable Energy.

The ERB currently issues different types of licences and permits as outlined in Appendix 20, while Appendix 21 outlines the licensing process. The requirements for each type of licence can be accessed on the ERB website at www.erb.org.zm or any of the ERB offices located in Lusaka, Kasama, Kitwe and Livingstone.

This section highlights the number and types of licenses and permits that were issued by ERB during the period under review.

6.1 STANDARD LICENCES

During the year under review, the ERB issued a total of 382 standard licences against 361 issued in the previous reporting period which shows a marginal increase of 5.82 percent, as outlined in Table 6-1.

Table 6-1: Number of Standard Licences issued by subsector, 2023 and 2022

Sub-sector	Licences Issued	
	2023	2022
Petroleum	287	309
Renewable Energy	85	44
Electricity	10	8
Total	382	361

6.2 CONSTRUCTION PERMITS

The ERB issues Construction Permits as a gateway for entities to establish and operate the energy facilities in the energy sector. The purpose of a Construction Permit is to monitor regulatory compliance in the siting and development of energy infrastructure for which a Permit has been issued. A total of 101 Construction Permits were issued in 2023 as broken down in Table 6-2.

Table 6-2: Number of Construction Permits issued by sub sector, 2023 and 2022

Sub-sector	Construction Permits Issued	
	2023	2022
Petroleum	97	96
Renewable Energy	1	-
Electricity	3	2
Total	101	98

6.2.1 Environmental Impact Assessments

Section 4(i) of the Energy Regulation Act No. 12 of 2019 mandates the ERB, in collaboration with the Zambia Environmental Management Agency (ZEMA), to formulate measures to minimise the environmental impact of activities carried out in the energy sector.

An Environmental Impact Assessment (EIA) is a tool used to assess the significant effects of a project or development proposal on the environment. An EIA assesses the environmental consequences of

a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.

The ERB reviewed and conducted 172 EIAs on proposed energy projects in 2023. Table 6-3 shows the comparison of EIA inspections conducted in 2023 compared to 2022.

Table 6-3: Energy Project EIAs reviewed by the ERB, 2023

Sub-sector	No. of EIAs reviewed and commented by the ERB	
	2023	2022
Electricity	12	3
Fossil Fuels	159	197
Renewable	1	2
Total	172	202

6.3 KEY DEVELOPMENTS IN LICENSING

The ERB continued to make strides on improving the institution's licensing function. In this regard, achievements made during the period under review include the following:

- i. Establishment of the Licensing Department as a stand-alone directorate with a view to provide speedy services to all stakeholders in the Energy sector;
- ii. Development of an online Management Information System to enable the applicants lodge licence applications and file annual returns online; and
- iii. Promulgation of the Energy Regulation (General) Regulations Statutory Instrument (S.I.) No. 41 of 2023 which addressed regulatory challenges faced thus far such as the threshold on the importation of lubricants and solar equipment. The S.I. also addressed the issue of guidelines for the use of the TAZAMA pipeline.

CONSUMER AFFAIRS



7.0 STAKEHOLDER ENGAGEMENT AND COMPLAINT HANDLING

In today's dynamic business environment, stakeholder engagement and effective complaints handling are integral components of organisational success and sustainability. As such, organisations must proactively engage with stakeholders through timely information dissemination and addressing consumer complaints in an effective and proactive manner.

Therefore, the Energy Regulation Act No.12 of 2019 empowers the ERB to disseminate information and promote public participation in the provision of energy products and services. Further, the Act also mandates the ERB to receive, investigate and determine consumer complaints and protect consumers of energy products and services. Consequently, to foster positive relationships among stakeholders in the energy sector, the ERB undertook various sensitisation activities in a bid to raise awareness and protect consumer's interests.

The subsequent sections highlight the key stakeholder engagements and awareness activities undertaken by the ERB in the reporting period.

7.1 CONSUMER AWARENESS ACTIVITIES

During the year under review, the ERB carried out awareness activities through various platforms, which among them included townhall meetings, public hearings, industry/portfolio meetings, traditional ceremonies, exhibitions, workshops, radio, and television programmes. In addition, the Mobile Office was deployed in high human traffic areas such as traditional ceremonies, markets, bus stations and taxi ranks, schools, and shopping malls to undertake public sensitisations and obtain feedback from stakeholders on issues affecting the energy sector.

7.1.1 Stakeholder Engagements

In 2023, the ERB undertook 38 stakeholder engagements compared to 43 in 2022, representing a 13.1 percent decrease. On the other hand, the Mobile Office carried out 97 outreach programmes in 2023 while in 2022 only 48 were conducted, representing an increase of 50.5 percent. Table 7-1 presents the number of stakeholder engagements conducted in 2022 and 2023.

Table 7-1: Stakeholder engagements conducted, 2022 and 2023

Type of Awareness Activity	2023	2022
Awareness Meetings	38	43
Mobile Office Outreach Activities	97	48
Total	135	91

7.1.2 Media Engagements

The ERB recognises that media engagements remain an integral platform of information dissemination for organisations and it involves actively participating and interacting with both traditional media and digital platforms. The engagements provide platforms for effective communication and the dissemination of information to target audiences and allow for timely sharing of news, updates, and press releases. During the reporting period, 789 media engagements³⁹ were undertaken compared to 403 carried out in 2022, representing a 96 percent increase. This was attributed to sustained information dissemination programmes and adverts driven through traditional media channels such as print, television and radio.

³⁹ Media engagement includes press statement, press queries, physical and digital interactions of the public through the media, newspaper articles, press briefings

Table 7-2 highlights the breakdown of the 789 media interactions undertaken during 2023. Press queries, newspaper articles and statements accounted for 272, whereas 517 encompassed adverts, radio, and television programmes. The programmes were based on various energy-related matters such as pricing of fuel, review of electricity connection charges and consumer sensitisation.

To reach a wider audience, the ERB collaborated with media outlets by disseminating information in local languages.

Table 7-2: Media activities undertaken by the ERB, 2022 and 2023

Period	Media Engagements	No. of Activities	
		2023	2022
Quarter 1	TV/Radio Program	167	22
	Other Media Engagements	31	22
Quarter 2	TV/Radio Program	131	23
	Other Media Engagements	20	23
Quarter 3	TV/Radio Program	206	201
	Other Media Engagements	26	24
Quarter 4	TV/Radio Program	13	69
	Other Media Engagements	195	19
Total		789	403

7.1.3 Digital Platforms

As digital platforms continue to increase in popularity for sharing information within social and business environments, organisations are progressively creating a presence for themselves on these platforms. The ERB recognises the critical role digital platforms play in today's interconnected global space, providing real-time communication, dissemination of information, and provision of accessibility to a vast and diverse audience, beyond geographical boundaries. To that end, the ERB's Communication and Visibility Strategy provides for digital/social media platforms as a strategy for communicating with different stakeholders with specific and unique information requirements. In this respect, the ERB has a presence on Facebook, X (formerly Twitter), and LinkedIn. Table 7-3 provides a breakdown of the ERB's presence on social media platforms.

Table 7-3: The ERB's following on the digital platforms, 2023

Platform	Followers
Facebook	47,000
X (Twitter)	235
LinkedIn	1,624
Total	48,859

7.1.4 Annual Media Tours

In order to build capacity and provide journalists with an in-depth understanding of the operations of the energy sector, the ERB conducted four media tours in 2023. Specifically, the tours attracted a total of 55 journalists from both public and private media institutions. The energy facilities visited included LPG retail sites in Lusaka and a biogas facility in Chibombo.

7.2 PUBLICATIONS

As a tool for information dissemination, the ERB has a number of publications which are issued in different reporting periods. The publications include the Energy Sector Report, Annual Report, Newsletter and Statistical Bulletins. Further, newspaper articles that respond to topical issues and overall information sharing are published. These publications are distributed to key institutions such as Parliament, Government Ministries, Media Houses, Embassies and other public and private organisations.

7.3 CONSUMER COMPLAINTS

Consumer protection through the receipt, investigation, and resolution of complaints continues to be a primary responsibility of the ERB. Recognizing consumers' vulnerability, the ERB is mandated to safeguard their interests against possible unfair trading practices by licensees. In order to facilitate efficient and effective complaints handling, the ERB has established a streamlined complaints handling procedure.

To facilitate for complaints lodging, the ERB has put in place platforms which include, the Toll-Free Line 8484 on the Airtel and MTN networks, email – erb@erb.org.zm, letters and physical visits to the ERB offices countrywide. Further, the ERB deploys the Mobile Office in high human traffic areas to, among other activities, receive complaints from members of the public.

7.3.1 Complaint Handling

In 2023, the ERB handled 546 consumer complaints of which 344 were resolved, representing a 63.0 percent resolution rate. The number of consumer complaints handled in 2023 reflects an increase of 15.9 percent from 471 in 2022.

A total of 489 complaints handled were from the electricity sub-sector, 51 from the petroleum sub-sector and six were from the renewable energy sub-sector. Table 7-4 gives a summary of the complaints handled by sub-sector in 2023.

Table 7-4: Complaints received and Resolved by Sub-Sector, 2023

Sub-Sector	Received	Resolved	Pending	Resolution Rate (%)
Electricity	489	296	193	60.5
Petroleum	51	45	6	88.2
Renewable Energy	6	3	3	50
Total	546	344	202	63.0

7.3.2 Complaints handled by category – 2023

The highest category of complaints handled during the period were from the electricity sub-sector, regarding delayed service connections at 304, while the least in the sub-sector, at two, were regarding poor customer care. Table 7-5 illustrates a detailed summary of complaints handled in 2023 by category.

Table 7-5: Complaints received and resolved by type, 2023

Sub-Sector	Type of Complaint	Received	Resolved	Pending
Electricity	Delayed service connection	304	144	160
	Metering Complaints	30	26	4
	Power Outages	64	62	2
	Low Voltage	24	21	3
	Compensation Claims	10	0	10
	Location of electricity infrastructure	4	2	2
	Tariffs and Charges	13	11	2
	Poor Customer Service	2	0	2
	Other Electricity Complaints	38	30	8
Petroleum	Disputed Fuel Quantities	2	1	1
	Fuel Contamination	24	21	3
	Ancillary Services	2	2	0
	Hoarding of Product	4	4	0
	Lack of Air Pressure	5	5	0
	Location of Petroleum Infrastructure	3	3	0
	Other Petroleum Complaints	11	9	2
Renewable Energy	Faulty Equipment	1	1	0
	Poor After Sale Service	3	1	2
	Tariffs and Charges	2	1	1
TOTAL		546	344	202

7.3.3 Complaints Meetings

The ERB held Complaints Meetings to enhance the resolution of complaints that remained unresolved beyond stipulated timeframes. The process involved both parties making verbal and written submissions to the ERB's Complaints Committee.

During the period under review, the ERB held 37 Complaints Meetings, of which a total of 378 complaints were discussed and 179 were resolved, representing a 47.3 percent resolution rate. However, all the 378 complaints discussed were determined in line the ERB's mandate to receive, investigate and determine consumer complaints.

Of the 388 complaints discussed, 345 were from the electricity sub-sector, 30 from the petroleum sub-sector, while four were from the renewable energy sub-sector.

Table 7-6 highlights the complaints discussed, determined, and resolved during 2023.

Table 7-6: Complaints meetings/hearings - 2023

Sub-Sector	No. of Meetings	No. of Complaints Discussed	No. of Complaints Determined	No. of Complaints Resolved	No. of Complaints Pending
Quarter 1					
Electricity	5	69	68	56	13
Petroleum	4	8	8	7	1
Renewable Energy	-	-	-	-	-
Quarter 2					
Electricity	6	48	47	27	21
Petroleum	2	7	6	5	2
Renewable Energy	-	-	-	-	-
Quarter 3					
Electricity	4	74	74	41	33
Petroleum	2	8	7	7	1
Renewable Energy	1	1	1	1	0
Quarter 4					
Electricity	6	154	154	30	123
Petroleum	5	7	7	5	2
Renewable Energy	2	3	3	0	3
Total	37	378	375	179	199

7.4 OUTLOOK FOR THE SUB-SECTOR

The ERB is dedicated to actively addressing stakeholder needs by ensuring timely dissemination of information and resolving consumer complaints efficiently. Recognizing the importance of effective communication in meeting stakeholder requirements, the ERB is taking proactive steps to enhance its communication channels. As part of this initiative, the ERB plans to implement a chatbot in 2024.

The introduction of a chatbot is expected to transform stakeholder engagement by providing instant access to information and support. Stakeholders, including consumers, industry players, and other interested parties, will be able to interact with the chatbot to obtain relevant information, guidance, and assistance in real-time.



APPENDICES

Appendix 1: Development and Review of Technical Standards, Frameworks and Guidelines, 2023

Type of document developed and the subsector		Name of document	Status as of 31 st December 2023
Standards			
Electricity subsector	DZS 691: Safety in AC Substation Earthing	The draft standard was submitted to ZABS for consideration and publication.	
	DZS 690 - Design, Construction and Operation of Electric Power Substations for Community Acceptance and Environmental Compatibility	The draft standard was submitted to ZABS for consideration and publication.	
	DZS 397 2023: Electricity Supply – Quality of Consumer Service - Specification	The draft standard was submitted to ZABS for consideration and publication.	
	ZS 429: Liquefied Petroleum Gas Standards (Parts 1 to 4) (revision)	Finalised and published.	
	ZS 429: Liquefied Petroleum Gas Standards (Parts 5 and 6) (developed)	Finalised and published.	
Petroleum subsector	DZS 1261 : Petroleum Customer Quality of Service Standard	The draft standard was submitted to ZABS for consideration and publication.	
	DZS 749: Portable Metal Containers for Compressed, Dissolved and Liquefied Gases: Basic Design Criteria, Use and Maintenance - Code of Practice	The draft standard was submitted to ZABS for consideration and publication.	
Renewable energy subsector	DZS 702: Automotive Biodiesel (B100) – Specification	The revised draft standards were submitted to ZABS for consideration and publication.	
	DZS 706: Specification for Anhydrous Denatured Fuel Ethanol for Blending with Gasoline for use as Automotive Spark-Ignition Engine Fuel		
	DZS 867: Biodiesel Fuel Blends for Automotive Compression Ignition Engines – Specification		
	DZS 868: Anhydrous Ethanol Fuel Blends Quality Standard for Automotive Spark Ignition Engines – Specification		
	DZS 869: Blending and Handling of Biofuels – Code of Practice		
	DZS 1272 - 1: Biomass pellets specification		
	DZS 1272 - 2: Wood and Non-wood Pellets		
	DZS 1272 - 3: Gasifier cookstoves	The developed drafts (DZS 1272 part 1 to 3) were finalized in December 2023 and will be subjected to ZABS for consideration and publication in 2024.	

Type of document developed and the subsector	Name of document	Status as of 31 st December 2023
KPI Frameworks		
Electricity subsector	ZESCO Key Performance Indicators Framework for the Period January 2023 to December 2025	Approved and implemented.
	Key Performance Indicators Framework for Non-State-Owned Enterprises (North-western Energy Corporation Limited and Rural Electrification Authority) for the Period 2024 to 2026	Approved for implementation in 2024.
Guidelines		
Electricity subsector	Connection Charges Methodology	Approved and implemented.
	Power Purchase and Power Supply Agreements Review Guidelines	Reviewed for approval and implementation in 2024.
Petroleum subsector	Guidelines for Approval of Additives in Petroleum Products	Concept paper developed and Guidelines circulated for public comments

Appendix 2: Approved Tariff Schedule, 2023 to 2027

CUSTOMER CATEGORY	TARIFF	Current (K/kWh)	Approved Tariffs (K/kWh)				
			2023	2024	2025	2026	2027
1. METERED RESIDENTIAL TARIFFS (Capacity up to 15kVA)							
R1 - Consumption \leq 100kWh	Energy Charge/kWh	0.47	0.40	0.44	0.54	0.63	0.73
R2 - Consumption $>$ 100 \leq 200kWh	Energy Charge/kWh	0.85	0.95	1.05	1.28	1.50	1.76
R3 - Consumption $>$ 200 \leq 500kWh	Energy Charge/kWh	1.94	1.54	1.69	2.07	2.42	2.83
R4 - Consumption $>$ 500kWh	Energy Charge/kWh	N/A	2.22	2.44	3.23	3.45	4.04
2. COMMERCIAL TARIFFS (Capacity up to 15kVA)							
C1 - \leq 100kWh	Energy Charge/kWh	1.07	0.67	0.78	0.92	0.98	1.05
C2 - $>$ 100 \leq 300kWh	Energy Charge/kWh	1.85	1.15	1.35	1.58	1.69	1.81
C3 - $>$ 300 \leq 500kWh	Energy Charge/kWh	N/A	1.99	2.19	2.52	2.65	2.78
C4 - $>$ 500kWh	Energy Charge/kWh	N/A	2.26	2.28	2.39	2.51	2.63
3. SOCIAL SERVICES TARIFFS (Schools, Hospitals, street lighting)							
S1 - \leq 100kWh	Energy Charge/kWh	1.19	0.62	0.69	0.76	0.81	0.87
S2 - $>$ 100 \leq 300kWh	Energy Charge/kWh		0.94	1.04	1.15	1.23	1.32
S3 - $>$ 300 \leq 500kWh	Energy Charge/kWh		1.00	1.11	1.22	1.31	1.40
S4 - $>$ 500kWh	Energy Charge/kWh		1.13	1.25	1.38	1.48	1.59
	Fixed Monthly Charge	83.84	Abolished				
4. WATER PUMPING STATIONS							
W1 - \leq 12,000kWh	Energy Charge/kWh		0.50	0.56	0.60	0.65	0.70
W2 - $>$ 12,000 \leq 50,000kWh	Energy Charge/kWh		0.57	0.65	0.76	0.81	0.88

CUSTOMER CATEGORY	TARIFF	Current (K/kWh)	Approved Tariffs (K/kWh)				
			2023	2024	2025	2026	2027
W3 - > 50,000 ≤ 100,000kWh	Energy Charge/kWh		1.01	1.13	1.21	1.30	1.41
W4 - >100,000kWh	Energy Charge/kWh		1.53	1.72	1.84	1.97	2.15
5. DISTRIBUTION TARIFFS							
Purchasers of power for distribution to Retail customers. (Exchange rate: K16.50/US\$)	MD Charge/kVA/Month	218.73	250.8	254.8	258.2	261.7	268.5
	Energy Charge/kWh	0.54	0.62	0.63	0.64	0.65	0.66
6. MAXIMUM DEMAND TARIFFS							
MD1 - ≥ 16 ≤ 300kVA	MD Charge/kVA/Month	42.79	51.96	55.23	60.2	65.62	71.53
	Energy Charge/kWh	0.61	0.74	0.81	0.88	0.96	1.05
	Fixed Monthly Charge	419.02	508.82	548	597.32	651.07	709.67
	Off Peak MD Charge/KVA/Month	21.39	25.98	27.62	30.1	32.81	35.76
	Off Peak Energy Charge/kWh	0.46	0.56	0.61	0.66	0.72	0.79
	Peak MD Charge/KVA/Month	53.48	64.95	69.04	75.26	82.03	89.41
	Peak Energy Charge/kWh	0.77	0.93	1.01	1.10	1.20	1.31
MD2 - ≥ 301kVA ≤ 2,000kVA	MD Charge/kVA/Month	80.03	97.18	106.22	115.78	126.2	137.56
	Energy Charge/kWh	0.53	0.64	0.70	0.77	0.84	0.91
	Fixed Monthly Charge	837.97	1,017.55	1,112.18	1,212.28	1,312.38	1,440.31
	Off Peak MD Charge/KVA/Month	40.01	48.59	53.11	57.89	63.1	68.78
	Off Peak Energy Charge/kWh	0.39	0.48	0.53	0.58	0.63	0.68
	Peak MD Charge/KVA/Month	100.03	121.48	132.77	144.72	157.75	171.95
	Peak Energy Charge/kWh	0.66	0.80	0.88	0.96	1.04	1.14

CUSTOMER CATEGORY	TARIFF	Current (K/kWh)	Approved Tariffs (K/kWh)				
			2023	2024	2025	2026	2027
MD3 - $\geq 2,001\text{kVA} \leq 5,000\text{kVA}$	MID Charge/kVA/Month	126.39	295.33	319.84	364.62	390.15	429.16
	Energy Charge/kWh	0.43	1.00	1.09	1.24	1.33	1.46
	Fixed Monthly Charge	1,755.17	3,397.77	3,815.70	4,349.89	4,654.39	5,119.82
	Off Peak MD Charge/KVA/Month	63.2	147.67	159.92	182.31	195.07	214.58
	Off Peak Energy Charge/kWh	0.32	0.75	0.82	0.93	1.00	1.1
	Peak MD Charge/KVA/Month	157.99	369.16	399.8	455.78	487.68	536.45
	Peak Energy Charge/kWh	0.54	1.26	1.36	1.55	1.66	1.83
MD4 - $> 5000\text{kVA}$ This category has been migrated to Bulk Consumer	MID Charge/kVA/Month	127.10					
	Energy Charge/kWh	0.36					
	Fixed Monthly Charge	3,510.39					
	Off Peak MD Charge/KVA/Month	63.55					
	Off Peak Energy Charge/kWh	0.27					
	Peak MD Charge/KVA/Month	158.88					
	Peak Energy Charge/kWh	0.45					
Bulk (PPA) > 5,000kVA (Exchange rate: K16.50/US\$)	MID Charge/kVA/Month		329.75	366.02	403.36	416.27	471.21
	Energy Charge/kWh		0.93	1.04	1.14	1.18	1.33
NOTE:							
The above tariffs are:							
(a) Exclusive of 3% Government excise duty							
(b) Exclusive of 16% Value Added Tax (VAT)							

Abolished to Migrate to Power Supply Agreements

Appendix 3: Large Reservoir Water Levels, 2022 and 2023

Power Station and Hydrogeneration Characteristic	1 Jan	29 Jan	27 Feb	27 Mar	30 Apr	29 May	26 Jun	30 Jul	28 Aug	25 Sep	29 Oct	27 Nov	31 Dec
Kafue Gorge Power Station													
Water height for max. generation (m)	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Actual available water in 2023 (m)	0.27	1.87	2.58	2.67	2.71	2.61	2.71	2.74	2.67	2.64	2.45	1.84	2.07
Actual available water in 2022 (m)	2.24	2.63	2.67	2.79	2.68	2.60	2.27	2.20	1.96	1.85	1.35	0.91	0.32
Kafue North Bank Power Station													
Water height for max. generation (m)	12.21	12.21	12.21	12.21	12.21	12.21	12.21	12.21	12.21	12.21	12.21	12.21	12.21
Actual available water in 2023 (m)	0.11	0.60	1.93	2.85	3.47	3.96	4.43	4.18	3.83	3.25	2.67	2.05	1.71
Actual available water in 2022 (m)	2.85	3.17	3.22	3.20	4.01	4.62	4.69	4.21	3.49	2.67	1.51	0.46	0.10
Victoria Falls Power Station													
Water height for max. gen. (m)	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
Actual available water height in 2023 (m)	0.31	0.64	1.49	1.43	1.22	1.61	1.19	0.48	0.14	0.06	0.06	0.21	0.26
Actual available water height in 2022 (m)	0.36	0.67	0.94	1.37	1.61	1.70	1.22	0.61	0.24	0.06	0.03	0.30	0.33
Itezhi- Tezhi Power Station													
Water height for max. generation (m)	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.50	24.5	24.50	24.50	24.50
Actual available water in 2023 (m)	13.30	17.11	22.12	24.28	24.48	24.52	24.14	22.82	21.38	19.88	18.75	17.06	15.47
Actual available water in 2022 (m)	15.92	15.91	18.70	21.63	24.32	24.43	23.73	22.68	21.27	19.56	18.37	14.95	13.37
Kafue Gorge Lower Power Station													
Water height for max. generation (m)	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75	49.75
Actual available water in 2023 (m)	30.90	31.80	32.20	34.70	36.90	34.10	49.10	38.30	35.20	32.2	35.50	37.00	35.60
Actual available water in 2022 (m)	32.00	32.30	32.20	32.10	32.00	32.90	31.20	31.00	31.90	29.80	32.00	30.90	29.60

Appendix 4: Average Monthly River Inflows to Power Stations (m³/sec)

Power Station	Average Monthly River Inflows (m ³ /sec)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
VF	Projected	558	866	1,306	2,231	2,410	1,668	747	444	318	235	241	343
	Actual	641	1,551	2,483	2,018	2,385	2,096	1,032	533	370	284	297	387
	Difference	83	685	1,177	(213)	(25)	428	285	89	52	49	56	44
Lusiwasi	Projected	15	21	24	23	15	7	8	5	4	3	3	8
	Actual	23	23	25	25	13	11	9	10	8	6	5	4
	Difference	8	2	1	2	(2)	4	1	5	4	3	2	(4)
Chishimba	Projected	37	44	45	40	23	18	16	14	12	11	12	22
	Actual	40	35	28	41	19	14	12	11	9	7	11	26
	Difference	3	(9)	(17)	1	(4)	(4)	(4)	(3)	(3)	(4)	(1)	4
Musonda	Projected	34	43	51	50	29	19	14	12	9	8	11	20
	Actual	32	35	51	76	38	23	18	14	11	10	15	29
	Difference	(2)	(8)	-	26	9	4	4	2	2	2	4	9
Lunzua	Projected	3	4	6	6	4	3	3	2	3	2	2	3
	Actual	3	3	3	5	3	3	2	2	2	2	2	3
	Difference	-	(1)	3	(1)	(1)	-	(1)	-	(1)	-	-	-
Shiwan'gandu	Projected	7	10	13	17	21	16	11	8	7	5	4	3
	Actual	14	13	23	22	12	8	7	5	4	3	2	3
	Difference	7	3	10	5	(9)	(8)	(4)	(3)	(3)	2	(1)	-

Appendix 5: Approved Power Agreements

No.	Contracting Parties to the Agreement	Contracted Capacity	Duration (years)
1.	ZESCO & Botswana Power Corporation Limited PSA	200 MW non-firm	2
2.	ZESCO & Maamba Collieries Limited PPA – addendum	208.80 MW	20 (from 2016)
3.	ZESCO & Ultra Green Corporation Limited PPA	50 MW	25
4.	ZESCO & Integrated Clean Energy Power Company Limited PPA	600 MW	25 (from Commercial Operation Date)
5.	ZESCO & Zimbabwe Electricity Company PSA	10 MW	10
6.	Lunsemfwa Hydro Power Company Limited & Enterprise Power Trading (Pty) Limited PSA	10 MW	1.5
7.	ZESCO & Maamba Collieries Limited Transmission Agreement – addendum	208.8 MW	N/A
8.	ZESCO & Copperbelt Energy Corporation Plc BSA – addendum	380 MW	13 (from 2022)
9.	ZESCO & Maamba Collieries Limited Balancing Agreement.	N/A	N/A
10.	ZESCO & Itzhi Tezhi Power Corporation Limited PPA – addendum	116.40 MW	25 (from 2016)
11.	ZESCO & Lumwana Mining Company Limited PSA	65 MVA	10
12.	Copperbelt Energy Corporation Plc & Copperbelt Energy Corporation DRC SARL PSA	35 MW	15
13.	Copperbelt Energy Corporation Plc & African Power Coal Limited PSA	18 MW	15
14.	ZESCO & Western Power Company Limited PPA	180 MW	25
15.	ZESCO & Jiangxi United Industrial Investment Limited PSA	10 MVA	10
16.	ZESCO & ENPower Trading (Pty) Limited Wheeling Agreement	10 MW	1.5
17.	ZESCO & Good Time Steel Limited PSA	15 MVA	5
18.	ZESCO & Westland Power Company Limited PPA	500 MW	25
19.	Copperbelt Energy Corporation Plc & Nkana Alloy Smelting Company Limited PSA	80 kVA	6
20.	ZESCO & 19 Ferro Alloys Companies in Zambia PSA	277 MVA (combined)	5
21.	ZESCO & GreenCo Power Services Limited SOA	N/A	20
22.	ZESCO Limited and Electricidade de Moçambique, EP PSA	20 MW firm 200 MW non-firm	1
23.	ZESCO & Kansanshi Mining Plc PSA	165 MVA	5
24.	ZESCO & First Quantum Minerals Trident Limited PSA	190 MVA	10

No.	Contracting Parties to the Agreement	Contracted Capacity	Duration (years)
25.	ZESCO and Electricidade de Moçambique, EP PSA – LV export	200 KVA	5
26.	ZESCO Limited and SAF Energy SARL	50 MW	3
27.	ZESCO & Lunsemfwa Hydro Power Company Limited PSA	-	1
28.	ZESCO Limited and Zimbabwe Platinum Mines (Private) Limited PSA	50 MW	10
29.	ZESCO Limited and Eagle Eye Trans Limited PSA	8 MVA	5
30.	ZESCO Limited and Zambesi Portland Cement Limited PSA	15 MVA	5
31.	ZESCO & Universal Mining and Chemicals Industry Limited PSA	25 MVA	5
32.	ZESCO & Que Investments Limited Wheeling Agreement	50 MW	2
33.	ZESCO & ENPower Trading DRC SARL PSA	350 MW	10
34.	ZESCO & Kafue Gorge Lower Power Development Corporation Limited PPA – addendum	750 MW	25 (from 2023)
35.	ZESCO & Sanhe Zambia Limited PSA	10 MVA	5
36.	ZESCO & Consolidated Farming Limited PPA	40 MW	N/A
37.	ZESCO & Tanzania Electricity Supply Company Limited PSA	20 MVA	10 (from 2016)
38.	ZESCO & Africa Energy Investment SARL PSA	15 MW non-firm	5
39.	ZESCO & Zengamina Power Limited PSA	3 MW	10
40.	ZESCO & Namibia Power Corporation (Pty) Limited PSA	80 MW	5
41.	Kariba North Bank Extension Power Corporation Limited & ZESCO Limited PSA	200 MW	25
42.	ZESCO Limited & Chilanga Cement Plc (Ndola) PSA	3.6 MVA	5
43.	ZESCO Limited & Chilanga Cement Plc (Chilanga) PSA	17 MVA	5
44.	ZESCO Limited & Mpande Limestone Limited PSA	30 MW	11 (from 2017)
45.	ZESCO Limited & Metal Fabricators of Zambia Plc (ZAMEFA) PSA	7.5 MW	5
46.	ZESCO Limited & Solarcentury Trading (Pty) Limited PSA	5 MW	1
47.	ZESCO Limited & Zambia Sugar Plc PSA	30 MVA	5
48.	CEC Renewables & Copperbelt Energy Corporation Plc PPA	90.9 MW (combined)	25

Appendix 6: REA Projects Under Implementation as of 31st December 2023

No.	Project Name	Province	District
Grid Intensification (Turnkey)			
1.	Kanyama	North-Western	Mwinilunga
2.	Chipepo	Southern	Gweembe
3.	Changilo	Chibombo	Central
4.	Kandole	Lufwanyama	Copperbelt
5.	Mfulabunga	Mpongwe	Copperbelt
6.	Mkanda	Chipangali	Eastern
7.	Matonje	Petauke	Eastern
8.	Chieftainess Kawaza	Sinda	Eastern
9.	Kamulaseni	Chipata	Eastern
10.	Chikontha	Nyimba	Eastern
11.	Shabo	Chiengi	Luapula
12.	Mano/Chinwenshiba	Samfya	Luapula
13.	Kasanse	Samfya	Luapula
14.	Chieftainess Kanyembo	Nchelenge	Luapula
15.	Mufwaya	Kawambwa	Luapula
16.	Mutwe Walupwa	Kanchibiya	Muchinga
17.	Mutachi village	Nakonde	Muchinga
18.	Chilubula	Kasama	Northern
19.	Menga	Luwingu	Northern
20.	Isandulula	Luwingu	Northern
21.	Watopa	Kabompo	North-Western
22.	Kalundwana/Nakato	Mongu	Western
23.	Ikwichi/Makapaela	Limulunga	Western
24.	Shimano	Nkeyema	Western
Grid Intensification (Labour)			
1.	Nambala	Mumbwa	Central
2.	Shimbizhi	Mumbwa	Central
3.	Chilumba	Kapiri Mposhi	Central
4.	Kamabaya	Mpongwe	Copperbelt
5.	Nsobe-Chalubemba	Masaiti	Copperbelt
6.	Maguya	Chipata	Eastern
7.	Chieftainess Mwasemphangwe	Lumezi	Eastern
8.	Chief Bunda Bunda	Chongwe	Lusaka
9.	Janeiro	Luangwa	Lusaka
10.	Mukungule	Shiwangandu	Muchinga
11.	Musaka	Mushindamo	North-Western
12.	Lutende	Mongu	Western
13.	Mweeke	Mongu	Western
14.	Tapo	Limilunga	Western

No.	Project Name	Province	District
Grid Extension (Turnkey)			
1.	Nangweshi Hospital	Western	Sioma
2.	Kawama	Central	Shibuyunji
3.	Lumwana	Northern	Lufwanyama
4.	Liunga	Western	Mongu
5.	Kanyimba	Western	Mulobezi
6.	Chilonga	Muchinga	Nakonde
7.	Keezwa	Mumbwa	Central
8.	Kambilombilo	Lufwanyama	Copperbelt
9.	Mutaba	Masaiti	Copperbelt
10.	Shingwa/Nkumbo	Mpongwe	Copperbelt
11.	Kathumba	Sinda	Eastern
12.	Kamphande/Kalimeta	Katete	Eastern
13.	Chief Kambombo Kaozi Settlement	Chama	Eastern
14.	Mbozi	Vubwi	Eastern
15.	Matanda Chembe	Mansa	Luapula
16.	Kamwenge Farm Block		
17.	Kapete	Chongwe	Lusaka
18.	Mulopa	Shiwangandu	Muchinga
19.	Katongo Kapala	Lupososhi	Luwingu
20.	Masamba Lyanda	Senga Hills	Northern
21.	Matipa	Chilubi	Northern
22.	Nsama District	Nsama	Northern
23.	Pambashe – Phase I	Lupososhi	Northern
25.	Samuteba	Mwinilunga	North-Western
26.	Mwiniyilamba	Ikelenge	North-Western
27.	Chinyingi	Zambezi	North-Western
28.	Maheba – Phase I	Kalumbila	North-Western
29.	Banakaila	Monze	Southern
30.	Chiyobola-Chisuwo	Monze	Southern
31.	Chiefs in Itezhi Tezhi B	Itezhi-tezhi	Southern
32.	Simaubi – Phase I	Namwala	Southern
33.	Siakasipa	Kazungula	Southern
34.	Nyawa	Kazungula	Southern
35.	Mitete District	Mitete	Western
36.	Mbanyutu	Luampa	Western
Solar Mini Grid			
	Lunga Solar Min-Grid	Luapula	Lunga

Appendix 7: REA Projects Planned for 2024

No.	Project Name	Province	District
Grid Intensification (Turnkey)			
1.	Kawama	Shibuyunji	Central
2.	Chikupili	Luano	Central
3.	Kabile	Mumbwa	Central
4.	Munga	kabwe	central
5.	Luela	Kalulushi	Copperbelt
6.	Makungwa	Chipata	Eastern
7.	Chizenje	Kasenengwa	Eastern
8.	Mutono Chisheta Phase II	Mwense	Luapula
9.	Mushimba	Chipili	Luapula
10.	Chinyunyu	Rufunsa	Lusaka
11.	Mangelengele	Luangwa	Lusaka
12.	Maano	Chilanga	Lusaka
13.	Kaombe	Mpika	Muchinga
14.	Shimwamba	Lunte	Northern
15.	Kisasa	Kalumbila	North-Western
16.	Siamvwemu	Sinazongwe	Southern
17.	Namatinda_Buleya	Kalabo	Western
Grid Intensification (Labour)			
1.	Makafu	Kapiri Mposhi	Central
2.	Chilimina	Chililabombwe	Copperbelt
3.	Shimukunami	Lufwanyama	Copperbelt
4.	Mwachiyaba	Kafue	Lusaka
5.	Lambwe Chomba Phase-2	Kaputa	Northern
6.	Kangombe	Manyinga	North-Western
7.	Mapopo	Solwezi	North-Western
8.	Kakhoma	Chavuma	North-Western
9.	Siyowi	Mazabuka	Southern
10.	Hamubbwatu_Mandala	Choma	Southern
11.	Kasengo	Chikankata	Southern
12.	Masese	Mwandi	Western
Grid Extension (Turnkey)			
1.	Mulilima	Serenje	Central
2.	Muchenje	Chibombo	Central
3.	Fibanga/Katemo	Mkushi	Central
4.	Fipuya	Chingola	Copperbelt
5.	Kasamanda	Mambwe	Eastern
6.	Mchereka	Lundazi	Eastern

No.	Project Name	Province	District
7.	Naviruli	Chadiza	Eastern
8.	Sonkontwe	Milenge	Luapula
9.	Vitondo	Chinsali	Muchinga
10.	Lavushimanda CBD	Lavushimanda	Muchinga
11.	Ilendela	Nakonde	Muchinga
12.	Tungati	Luingu	Northern
13.	Muluwe	Mpulungu	Northern
14.	Chief Ishima	Zambezi	North-Western
15.	Bowwood	Kalomo	Southern
16.	Nachibanga	Pemba	Southern
17.	Sinafala	Gwembe	Southern
18.	Kaeya_Seyi	Senanga	Western
19.	Kashamu	Kaoma	Western
Solar Mini Grid			
1.	Chilubi Hospital Phase I	Chilubi	Northern

Appendix 8: Projected Power Balance, 2024

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average (MW)	Energy (MWh)
ZESCO Generation														
KGPS	888	895	930	930	870	850	870	865	798	694	800	810	850	7,446,000
KNBPS	119.5	205.5	201.5	180.0	100.0	130.0	140.0	150.0	200.0	270.0	130.0	112.0	161.5	1,415,105
VFPS	105	108	108	108	108	108	108	91	77	59	53	68	91.7	803,314
KNBE	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	52.5	459,900
KGL	434	438	441	426	408	408	407	390	383	333	444	444	413	3,618,145
Lunzua River	11.0	14.0	14.0	14.0	10.0	7.6	5.4	4.8	4.0	4.0	2.4	2.4	7.8	68,306
Lusiwasi	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	25,404
Lusiwasi Upper	10.0	15.5	15.5	15.5	7.5	5.7	5.7	4.6	2.4	2.4	2.0	2.0	7.4	64,830
Chishimba Falls	0.8	0.8	0.8	0.8	2.5	2.6	2.5	2.3	2.3	2.0	2.1	2.1	1.8	15,656
Musonda Falls	8.5	9.5	9.5	9.5	9.0	5.1	4.3	4.0	3.8	3.8	3.2	3.2	6.1	53,604
Small Hydros	33.2	42.7	42.7	42.7	31.9	23.9	20.8	18.6	15.4	15.1	12.6	12.6	26	227,799
Sub Total	1665.4	1784.4	1818.4	1781.9	1602.3	1596.3	1619.1	1585.7	1541.3	1438.7	1504.7	1511.7	1620.7	14,198,063
IPP Generation														
MCL G1	134.5	69	129	134	134	134	134	69	134	134	134	134	122	1,072,843
MCL G2	134.5	134	69	134	134	134	134	134	67	134	134	134	123	1,074,307
NECL	0	0	0	0	105	105	105	105	105	105	105	105	70	613,200
LHPC	30	30	45	45	45	45	45	45	30	30	30	30	38	328,500
ITPC	55	80	112	118	119	115	110	100	90	75	65	55	91	798,620
NPCL/BPC	9	16	16	16	16	16	16	16	16	16	16	16	15	135,050
New Generation	0	0	0	0	0	0	0	0	0	0	24	24	4	35,040
Sub Total	363	329	371	447	553	549	544	469	442	494	508	498	463	4,057,560
Grand Total	2,028	2,113	2,189	2,229	2,155	2,145	2,163	2,055	1,983	1,933	2,013	2,010	2,084	18,255,623

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average (MW)	Energy (MWh)
Demand														
Local Demand	-1,881	-1,902	-1,919	-1,933	-1,972	-1,976	-2,018	-1,961	-1,899	-1,860	-1,838	-1,829	-1,916	-16,781,835
New Projects	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NamPower Exports	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-150	-1,314,000
LV Exports	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-183,084
SNEL Exports	-30	0	0	0	0	0	0	0	0	0	0	0	-3	-21,900
Enpower	-50	-65	-65	-65	-65	-65	-65	-65	-65	-65	-65	-65	-64	-558,450
Kanona	-30	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45	-44	-383,250
PEDRODEX	0	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-28	-240,900
BB ENERGY	0	0	-50	-50	-50	-50	-50	-50	-85	-85	-85	-85	-53	-467,200
AFRICA ENERGY	0	0	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	-13	-109,500
ZIMPLATS Exports	-50	-70	-70	-70	-70	-70	-70	-70	-70	-70	-70	-70	-68	-598,600
BPC Exports	-80	-80	-80	-80	-80	-80	-80	-80	-80	-80	-80	-80	-80	-700,800
Grand Total	-2,292	-2,363	-2,445	-2,459	-2,498	-2,502	-2,544	-2,487	-2,460	-2,421	-2,399	-2,390	-2,438	-21,359,519
Net Supply	-297	-293	-298	-274	-375	-381	-403	-452	-493	-504	-400	-393	-380	-3,331,696
Load Management	120	0	0	0	0	0	0	0	0	0	120	120	30	262,800
Export Reduction	0	120	120	120	120	120	120	120	120	120	120	120	110	963,600
EDM Imports	24	24	25	24	225	225	225	225	225	225	200	200	154	1,348,443
EDM Non-Firm	50	0	0	0	0	0	0	0	0	0	0	0	4	36,500
DAM Imports	20	70	70	70	70	70	70	70	70	70	0	0	54	474,500
Surplus/Deficit	-83	-78	-82	-60	40	34	12	-37	-78	-89	40	47	-28	-245,853

Appendix 9: ZESCO PQR Performance, 2023

	Parameter	No. of datasets monitored	Average Score (%)
Quarter 1	Harmonics	99	92
	Unbalance	107	96
	Voltage Dips	99	58
	Interruptions	106	70
	Regulation	107	67
	Frequency	8	63
	Total/Average	526	76
Quarter 2	Harmonics	108	89
	Unbalance	119	90
	Voltage Dips	108	60
	Interruptions	119	52
	Regulation	119	62
	Frequency	11	55
	Total/Average	584	69
Quarter 3	Harmonics	109	93
	Unbalance	119	97
	Voltage Dips	109	68
	Interruptions	118	77
	Regulation	119	62
	Frequency	10	30
	Total/Average	584	78
Quarter 4	Harmonics	120	91
	Unbalance	130	96
	Voltage Dips	120	53
	Interruptions	130	72
	Regulation	130	65
	Frequency	10	60
	Total/Average	640	75
Annual (2023)	Harmonics	436	91
	Unbalance	475	95
	Voltage Dips	436	60
	Interruptions	473	68
	Regulation	475	64
	Frequency	39	36
	Total/Average	2334	75

Appendix 10: CEC PQR Performance, 2023

	Parameter	No. of datasets monitored	Average Score (%)
Quarter 1	Harmonics	163	95
	Unbalance	165	96
	Voltage Dips	163	34
	Interruptions	165	96
	Regulation	165	56
	Frequency	2	100
	Total/Average	823	76
Quarter 2	Harmonics	168	98
	Unbalance	170	96
	Voltage Dips	168	36
	Interruptions	170	92
	Regulation	170	59
	Frequency	2	100
	Total/Average	848	76
Quarter 3	Harmonics	170	99
	Unbalance	172	97
	Voltage Dips	170	40
	Interruptions	172	93
	Regulation	172	60
	Frequency	2	100
	Total/Average	858	78
Quarter 4	Harmonics	170	98
	Unbalance	172	97
	Voltage Dips	170	40
	Interruptions	172	95
	Regulation	172	53
	Frequency	2	100
	Total/Average	858	77
Annual (2023)	Harmonics	671	98
	Unbalance	679	96
	Voltage Dips	671	38
	Interruptions	679	94
	Regulation	679	57
	Frequency	8	75
	Total/Average	3387	77

Appendix 11: MCL PQR Performance, 2023

	Parameter	No. of datasets monitored	Average Score (%)
Quarter 1	Harmonics	-	-
	Unbalance	2	100
	Voltage Dips	-	-
	Interruptions	2	100
	Regulation	2	100
	Frequency	2	100
	Total/Average	8	100
Quarter 2	Harmonics	-	-
	Unbalance	2	100
	Voltage Dips	-	-
	Interruptions	2	0
	Regulation	2	100
	Frequency	2	0
	Total/Average	8	50
Quarter 3	Harmonics	-	-
	Unbalance	2	100
	Voltage Dips	-	-
	Interruptions	2	100
	Regulation	2	100
	Frequency	2	50
	Total/Average	8	88
Quarter 4	Harmonics	-	-
	Unbalance	2	100
	Voltage Dips	-	-
	Interruptions	2	100
	Regulation	2	100
	Frequency	2	100
	Total/Average	8	100
Annual (2023)	Harmonics	-	-
	Unbalance	8	100
	Voltage Dips	-	-
	Interruptions	8	75
	Regulation	8	100
	Frequency	8	63
	Total/Average	32	84

Appendix 12: LHPC PQR Performance, 2023

	Parameter	No. of datasets monitored	Average Score (%)
Quarter 1	Harmonics	3	100
	Unbalance	5	80
	Voltage Dips	3	67
	Interruptions	5	100
	Regulation	5	80
	Frequency	2	100
	Total/Average	23	87
Quarter 2	Harmonics	3	100
	Unbalance	5	80
	Voltage Dips	3	67
	Interruptions	5	20
	Regulation	5	80
	Frequency	2	100
	Total/Average	23	70
Quarter 3	Harmonics	3	100
	Unbalance	5	100
	Voltage Dips	3	67
	Interruptions	5	100
	Regulation	5	80
	Frequency	2	100
	Total/Average	23	91
Quarter 4	Harmonics	3	100
	Unbalance	5	100
	Voltage Dips	3	67
	Interruptions	5	100
	Regulation	5	80
	Frequency	2	100
	Total/Average	23	91
Annual (2023)	Harmonics	12	100
	Unbalance	20	90
	Voltage Dips	12	67
	Interruptions	20	80
	Regulation	20	80
	Frequency	8	100
	Total/Average	92	85

Appendix 13: ITPC PQR Performance, 2023

	Parameter	No. of datasets monitored	Average Score (%)
Quarter 1	Harmonics	1	100
	Unbalance	2	100
	Voltage Dips	1	100
	Interruptions	2	100
	Regulation	2	100
	Frequency	1	100
	Total/Average	9	100
Quarter 2	Harmonics	1	0
	Unbalance	2	50
	Voltage Dips	1	0
	Interruptions	2	0
	Regulation	2	50
	Frequency	1	100
	Total/Average	9	33
Quarter 3	Harmonics	-	-
	Unbalance	1	100
	Voltage Dips	-	-
	Interruptions	1	100
	Regulation	1	100
	Frequency	1	100
	Total/Average	4	100
Quarter 4	Harmonics	1	100
	Unbalance	2	100
	Voltage Dips	1	100
	Interruptions	2	100
	Regulation	2	100
	Frequency	1	100
	Total/Average	9	100
Annual (2023)	Harmonics	3	67
	Unbalance	7	86
	Voltage Dips	3	67
	Interruptions	7	71
	Regulation	7	86
	Frequency	4	100
	Total/Average	31	81

Appendix 14: BPC PQR Performance, 2023

	Parameter	No. of datasets monitored	Average Score (%)
Quarter 1	Harmonics	-	-
	Unbalance	1	100
	Voltage Dips	-	-
	Interruptions	1	100
	Regulation	1	100
	Frequency	1	100
	Total/Average	4	100
Quarter 2	Harmonics	-	-
	Unbalance	1	100
	Voltage Dips	-	-
	Interruptions	1	100
	Regulation	1	100
	Frequency	1	100
	Total/Average	4	100
Quarter 3	Harmonics	-	-
	Unbalance	1	100
	Voltage Dips	-	-
	Interruptions	1	100
	Regulation	1	100
	Frequency	1	0
	Total/Average	4	75
Quarter 4	Harmonics	-	-
	Unbalance	1	100
	Voltage Dips	-	-
	Interruptions	1	100
	Regulation	1	100
	Frequency	1	100
	Total/Average	4	100
Annual (2023)	Harmonics	-	-
	Unbalance	4	100
	Voltage Dips	-	-
	Interruptions	4	100
	Regulation	4	100
	Frequency	4	75
	Total/Average	16	94

Appendix 15: Annual National Consumption of Petroleum Products by province, 2022 – 2023

	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western	Zambia
Avgas (L)											
2022	140,200.00	33,680.00	-	-	911,153.00	-	4,551.00	4,343.00	94,511.00	-	1,188,438.00
2023	-	29750.00	-	-	613990.00	-	5908.00	12435.52	94017.00	-	756100.52
Diesel (L)											
2022	84990493.56	383336819.35	26747392.69	14740115.45	412431554.03	13323251.82	18014310.47	232823501.75	67558349.91	13194161.89	1267159950.92
2023	94538186.37	296984461.98	30947130.70	14063678.91	504115318.69	17034812.75	15646827.97	274023614.22	57838248.69	12744886.79	1317937167.06
Heavy Fuel Oil (Kg)											
2022	-	16423458.00	-	-	1031390.00	-	-	-	-	-	17454848.00
2023	-	15786548.96	-	-	1196480.00	-	-	-	-	-	16983028.96
Jet A-1 (L)											
2022	-	9522883.00	197026.00	-	28497357.00	-	261592.00	450128.00	265558.00	-	39194544.00
2023	-	13228109.00	194504.00	-	40871132.00	-	349009.00	221159.00	319723.00	-	55183636.00
Kerosene (L)											
2022	117038.00	124013.59	70596.90	88695.16	570898.72	-	24464.17	17692.00	27902.70	-	1041301.24
2023	287002.00	1085296.52	96410.96	1155823.34	1806313.55	43318.00	100000.00	178602.94	145631.20	-	4898398.51
LPG (Kg)											
2022	376007.73	1852758.32	69709.83	3823.00	5632102.60	3734.00	11826.60	164182.67	238230.99	21791.94	8374167.68
2023	164757.00	1852389.07	50854.00	4391.00	6992234.36	6837.00	14820.00	155705.00	221683.00	25648.00	9489318.43
Petrol (L)											
2022	43320358.22	108479620.18	30027793.58	11531952.94	282353167.58	6925059.26	14443072.62	21244114.54	39661845.87	9812919.69	567799904.49
2023	42547176.80	116223193.89	32000017.05	12210804.52	292798017.42	8795405.19	15477105.64	23433248.77	40741998.79	9165802.32	593392770.38

Appendix 16: Provincial Average Daily Consumption of Petroleum Products, 2022-2023

Products	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	Northwestern	Southern	Western	National
Avgas											
2022	384.11	92.27	-	-	2496.31	-	12.47	11.90	258.93	-	3255.99
2023	-	81.51	-	-	1682.16	-	16.19	34.07	257.58	-	2071.51
Diesel											
2022	232850.67	1050237.86	73280.53	40383.88	1129949.46	36502.06	49354.28	637872.61	185091.37	36148.39	3471671.10
2023	259008.73	813656.06	84786.66	38530.63	1381137.86	46670.72	42868.02	750749.63	158460.96	34917.50	3610786.76
Heavy Fuel Oil											
2022	-	44995.78	-	-	2825.73	-	-	-	-	-	47821.50
2023	-	43250.82	-	-	3278.03	-	-	-	-	-	46528.85
Jet A-1											
2022	-	26090.09	539.80	-	78074.95	-	716.69	1233.23	727.56	-	107382.31
2023	-	36241.39	532.89	-	111975.70	-	956.19	605.92	875.95	-	151188.04
Kerosene											
2022	320.65	339.76	193.42	243.00	1564.11	-	67.03	48.47	76.45	-	2852.88
2023	786.31	2973.42	264.14	3166.64	4948.80	118.68	273.97	489.32	398.99	-	13420.27
LPG											
2022	1030.16	5076.05	190.99	10.47	15430.42	10.23	32.40	449.82	652.69	59.70	22942.93
2023	451.39	5075.04	139.33	12.03	19156.81	18.73	40.60	426.59	607.35	70.27	25998.13
Petrol											
2022	118685.91	297204.44	82267.93	31594.39	773570.32	18972.77	39570.06	58203.05	108662.59	26884.71	1555616.18
2023	116567.61	318419.71	87671.28	33454.26	802186.35	24097.00	42403.03	64200.68	111621.91	25111.79	1625733.62

Appendix 17: Distribution of Retail Sites by OMC and Percentage Share, 2023

OMC	No. of Sites	% Share
Mount Meru Petroleum Zambia Limited	81	14.3
TotalEnergies Marketing Zambia Limited	65	11.4
Puma Energy Zambia Plc	64	11.3
Vivo Energy Zambia Limited	59	10.4
Rubis Energy Zambia Limited	41	7.2
Lake Petroleum Limited	36	6.3
Oryx Energies Zambia Limited	27	4.8
SGC Investments Limited	27	4.8
Petroda Zambia Limited	25	4.4
Zamfuel Petroleum Limited	18	3.2
Karan Petroleum Zambia Limited	15	2.6
Oasis Oil Zambia Limited	15	2.6
Eco Petroleum Limited	11	1.9
Harvest Group of Companies Limited	11	1.9
Surya Energy Limited	9	1.6
LBM Investments Limited	7	1.2
Hass Petroleum Zambia Limited	6	1.1
Spectra Oil Corporation Limited	5	0.9
Petrolink Limited	4	0.7
Simba Oil Company Limited	3	0.5
Zacks Hardware & Construction Limited	3	0.5
Boma Energy Limited	2	0.4
Endrone Petroleum Corporation Limited	2	0.4
Oil Bay Zambia Limited	2	0.4
Quality Petroleum Limited	2	0.4
Refuel Petroleum Corporation Limited	2	0.4
Tribute Investments Limited	2	0.4
ACM Petroleum Limited	1	0.2
Admire Energy Limited	1	0.2
Alfa Energy Limited	1	0.2
Apex Energies Limited	1	0.2
Asharami Energy Resources Zambia Limited	1	0.2
Benzol Petroleum Limited	1	0.2
Collum Lunm Tian Petroleum Limited	1	0.2

OMC	No. of Sites	% Share
Energy Belt Zambia Limited	1	0.2
Faraj Ali Fiuoll Limited(Fa Fuel)	1	0.2
Hamdi Investment & Trading Limited (Hitco Petroleum)	1	0.2
Japawa Filling Station	1	0.2
Luapula Oils Limited	1	0.2
Lushomo Filling Station Limited	1	0.2
Ngucha Energy Corporation Limited	1	0.2
Nyenyenzi Investment Limited	1	0.2
Ordod Oil Company Limited	1	0.2
Ravasia Petroleum Limited	1	0.2
Sino Petroleum Limited	1	0.2
Star Oil Company Limited	1	0.2
U-fuel Zambia Limited	1	0.2
United Metro Energy Limited	1	0.2
WWW Investments Limited	1	0.2
Zeekna Investment Company Limited	1	0.2
Zhongkuang Zambia Services Company Limited	1	0.2
Grand Total	568	100.0

Appendix 18: Roles of the Players in the Petroleum Supply Chain

Role (before reforms)	Role (after reforms)
MoE	
<ul style="list-style-type: none"> i. Give policy guidance to the petroleum sub sector. ii. Float import tenders based on requirements of Petroleum products. iii. Opening of tender, evaluation and awarding of supply Contract. iv. Coordinate the determination of quantity requirements/projection for a specified period. v. Ensure that the quantities from the supplier are delivered. vi. Monitor and manage strategic reserves. vii. To procure petroleum products to meet market demand. 	<ul style="list-style-type: none"> i. Give policy guidance to the petroleum sub sector. ii. Monitor and manage strategic reserves.
ERB	
<ul style="list-style-type: none"> i. Regulate the petroleum sub sector. ii. Determine, regulate and review tariffs and charges iii. Ensure compliance by Suppliers and OMCs to operational requirements as per licence conditions. iv. Facilitate fuel marking process and product quality monitoring. v. Project national demand of petroleum products in collaboration with MoE, OMCs and other stakeholders. 	<ul style="list-style-type: none"> i. Regulate the petroleum sub sector. ii. Determine, regulate and review tariffs and charges iii. Ensure compliance by Suppliers and OMCs to operational requirements as per licence conditions. iv. Facilitate fuel marking process and product quality monitoring. v. Project national demand of petroleum products in collaboration with MoE, OMCs and other stakeholders.
TAZAMA	
<ul style="list-style-type: none"> i. Transport petroleum feedstock via pipeline to INDENI from Dar-es-salaam. ii. Ensure receipt of imported products of Supplies in designated GRZ depots. iii. Participate in procurement of petroleum products. 	<ul style="list-style-type: none"> i. To be responsible for transporting LSG. ii. To continue offering hospitality for fuel importers at designated GRZ Depots.
Indeni	
<ul style="list-style-type: none"> i. Process petroleum feedstock to finished petroleum products. ii. Participate in procurement of petroleum feedstock in collaboration with TAZAMA. 	<ul style="list-style-type: none"> i. To Operationalise the company as an OMC. ii. To offer storage space to OMCs through hospitality.
TPPL	

Role (before reforms)	Role (after reforms)
<ul style="list-style-type: none"> i. Offer handling and storage facilities for petroleum products received in the country. ii. Offer storage services to OMCs. iii. Wholesale of petroleum products produced by INDENI from Ndola Fuel Terminal (NFT) and Government Depots to OMCs 	<ul style="list-style-type: none"> i. Offer handling and storage facilities for petroleum products received in the country. ii. Offer storage services to OMCs. iii. Wholesale of petroleum products for OMCs in the market who would wish to utilize TPPL's wholesaling licence. iii. To operationalize blending of biofuels iv. To operate as a biofuels blending centre.
OMCs	
<ul style="list-style-type: none"> i. Importation of petroleum products (OMCs with import waivers). ii. Distribute petroleum products to Consumers, Retailers (Dealers) and Government. 	<ul style="list-style-type: none"> i. Importation of petroleum products. ii. Distribute petroleum products to Consumers, Retailers (Dealers) and Government.
Petroleum Transporters	
Transport petroleum products to OMCs, Retailers (Dealers) and Government.	Transport petroleum products to OMCs, Retailers (Dealers) and Government.
Retailers (Dealers)	
Selling of petroleum products at filling stations to consumers.	Selling of petroleum products at filling stations to consumers.
Consumers	
Buy petroleum products at prices regulated by the ERB.	Buy petroleum products at prices regulated by the ERB.

Appendix 19: Detailed Exposition of Cost Elements in Wholesale Price Build Up

i. Platts FOB Average

Platts is the globally accepted publication for pricing of petroleum products. Supply contracts for petroleum products between oil companies are based on the Platts publication. The publication is proprietary and the petroleum price information is sent on a daily basis only to those who have subscribed. The Platts Free on Board price for petrol, diesel and kerosene/jet A-1 are derived from the monthly average Platts quotation on the Arabian Gulf Market. Platts Arab Gulf market is very liquid and representative of most sourcing areas. It is the reference used on most quotations for regional imports.

For monthly fuel price reviews using the IPP, the ERB covers a 30 day window using month minus 1 or M-1. Meaning the recommended prices for the current month are based on the prices that prevailed one month ago. The current Platts reference prices are for the period 25th day of the previous month to the 24th day of the month in which the price review is being carried out.

ii. Conversion factor

The conversion factors used to convert US\$/bbl to \$/MT for petrol, diesel and kerosene are 8.42, 7.50 and 7.56 respectively.

iii. Trader's Margin

The trader's margin is the margin that suppliers of OMCs in Dar-es-Salaam, Beira and other supply ports or sources charge the OMCs for supplying petroleum products to them.

iv. Storage

The storage cost is the cost for storing petroleum products in Dar-es-salaam, Beira and or other ports.

v. Wharfage

The Harbour Authority levies a statutory charge on the importation of petroleum products at various ports in countries with ocean fronts. The ERB adopted charge was at 1.25 percent of the CIF cost which was charged at ports of importation during 2022.

vi. BPS Premium (Cash Premiums)

The Bulk Petroleum Supply (BPS) premium is a cash premium that is charged by oil traders for the petroleum products at the various ports. The cash premiums are an additional cost for the products and have been moving in tandem with the supply and demand shift in the market.

Presently the BPS premiums used in the market is referenced to the Tanzanian BPS platform and this is the source adopted by the ERB. The BPS premium includes freight, insurance and ocean losses.

vii. Freight

Freight covers the amount paid by the supplier to the transporter of the petroleum products from the point of origin (Dubai/Oman) to Dar-es-salaam. The freight charge is calculated based on the mode of transportation and the distance between the pickup place and the destination.

The freight is normally based on Worldscale rates for the current year, from Arab Gulf to East Africa (i.e. Dar es Salaam and Beira). Just like Platts, the Worldscale publication is also proprietary and is the globally accepted standard publication for determination of freight charges for petroleum products.

viii. Insurance

Insurance covers the cost of insuring the finished petroleum products from the Middle East to the ports in Africa i.e. Dar-es-Salaam, Beira etc. The insurance rate adopted in the model is the standard cost in line with prevailing rates in petroleum insurance contracts.

ix. Ocean Loss

The 0.3 percent ocean loss is based on international best practice. This is the normally acceptable loss incurred in the loading and offloading of petroleum products from a vessel.

Transportation Fees

These are the transportation charges for delivering a volume of product from Ocean ports to inland fuel depots. The rate adopted in the pricing is a standard cost and is sufficient for covering the transport cost for each product.

Transportation Losses

These are transportation losses as prescribed by international norms. A loss level of 0.5 percent is allowed for petrol, 0.3 percent for diesel and 0.3 percent for kerosene.

Importers Margin

This is a margin set in for the importation of petroleum products into the country. This is a standard cost and offers reasonable return to companies providing a service of supplying petroleum products into the country.

Storage Losses

The storage losses cover the product losses for handling and storage and are set as prescribed by international norms. A loss level of 0.5% is allowed for petrol, 0.3% for diesel and 0.3% for kerosene.

Conversion factor

The conversion factors used to convert MT to m³ for petrol, diesel and kerosene are 0.74, 0.84 and 0.8 respectively.

Exchange Rate

The exchange rate applied in the formula is the monthly average Interbank Commercial Selling Rate as published by the Bank of Zambia. The applied rate is the monthly average rate within the month in which the price review is being carried out.

Appendix 20: Types of Licences and Permits Issued by the ERB

No	Description of Licence/Permit	Tenure (Years)
Petroleum Licences		
1.	Export of Liquefied Petroleum Gas (Butane)	5
2.	Import, Distribute & Export Petroleum Products (Oil Marketing Companies)	5
3.	Import, Distribute & Export of Liquefied Petroleum Gas	5
4.	Importation, Packaging & Blending, Distribution & Export of Lubricants	5
5.	Refining of Petroleum Products	15
6.	Retail of Liquefied Petroleum Gas	5
7.	Retail of Petroleum Products	5
8.	Terminal Storage of Petroleum Products	10
9.	Storage of Petroleum Products - Consumer Facility	3
10.	Transportation and Marketing of Coal ⁴⁰	3
11.	Transportation of Petroleum Products – Liquefied Petroleum Gas	3
12.	Transportation of Petroleum Products by Rail	3
13.	Transportation of Petroleum Products by Road	3
14.	Transportation of Petroleum Products by Pipeline	15
	Wholesale Marketing of Petroleum Products	1.5
Electricity Licences		
1.	Distribution of Electricity	15
2.	Embedded Generation of Electricity	25
3.	Embedded Generation of Electricity for Own Use	5
4.	Generation of Electricity	30
5.	Generation of Electricity for Own Use	5
6.	Generation, Distribution and Supply of Electricity to an Off-grid	20
7.	Supply of Electricity	5
8.	System Operator	5
9.	Trading of Electricity	20
10.	Transmission of Electricity	30
Renewable Energy Licences		
1.	Manufacture, Supply, Installation, & Maintenance of Renewable Energy Generating Equipment	5
2.	Production of Biofuels	15
3.	Storage and Blending of Biofuels	5
4.	Transportation of Biofuels	3
5.	Import, Distribution & Export of Biofuels	5
Construction Permits		
1.	Electricity	2
2.	Petroleum	2
3.	Renewable Energy	2

⁴⁰ Not a petroleum-based fuel but a fossil fuel

Appendix 21: Online Licence Application Process

Initial Licence Application	
Step 1 Registration	i. Access the portal using portal@erb.org.zm ii. Select the account type (personal or corporate account) and click continue iii. Complete application form
Step 2 Login	i. Log into ERB portal by entering your email and password, then, click the “sign in” button ii. Update your password (if need be) and click the reset password button
Step 3 Licence Application	i. Fill out the application by opening the tab section and by providing the information requested ii. Enter details in the applicant business information tab iii. Fill in the details for the business contact person iv. Select the business and licence type and provide the application details v. Select the relevant attachments tab and attach documents as per licence checklist vi. Select the general attachments tab and attach documents vii. Tick the check boxes and save in order to progress to the next viii. Once you save the progress, click on the tab to fill out financials. ix. Once financials have been filled in, save the changes and your application is ready for submission x. Complete the declaration by ticking the check boxes and click the submit licence application button at the top of the page.
Licence Renewal Application	
Step 1 Registration	i. Access the portal using portal@erb.org.zm ii. Select the account type (personal or corporate account) and click continue iii. Complete application form
Step 2 Login	i. Log into ERB portal by entering your email and password, then, click the “sign in” button ii. Update your password (if need be) and click the reset password button iii. Click on my licence tab, then iv. Click on the licence renewal button to access renewal application

Step 3 Licence Renewal Application	<ol style="list-style-type: none">i. Fill out the application by opening the tab section and by providing the information requestedii. Enter details in the applicant business information tabiii. Fill in the details for the business contact personiv. Select the business and licence type and provide the application detailsv. Select the relevant attachments tab and attach documents as per licence checklistvi. Select the general attachments tab and attach documentsvii. Tick the check boxes and save in order to progress to the nextviii. Once you save the progress, click on the tab to fill out financials.ix. Once financials have been filled in, save the changes and your application is ready for submissionx. Complete the declaration by ticking the check boxes and click the submit licence application button at the top of the page.
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