VISION
A proactive, firm and fair Energy Regulator

MISSION STATEMENT
To regulate the energy sector in order to ensure efficient provision of reliable and quality energy services and products

THEME
To ensure cost recovery, diversification, investment, efficiency and compliance in the energy sector
## Editorial Team

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<tr>
<td>Alfred M. Mwila</td>
<td>Director - Economic Regulation</td>
</tr>
<tr>
<td>Fred Hang’andu</td>
<td>Senior Manager - Consumer and Public Affairs</td>
</tr>
<tr>
<td>Simweemba Buumba</td>
<td>Senior Manager - Economic Regulation-Pricing and Research</td>
</tr>
<tr>
<td>Rodgers K. Muyangwa</td>
<td>Manager - Economic Regulation - Electricity</td>
</tr>
<tr>
<td>Lungowe Lutangu</td>
<td>Manager - Economic Regulation - Fossil Fuels</td>
</tr>
<tr>
<td>Besa Chimbaka</td>
<td>Economic Analyst - Electricity</td>
</tr>
<tr>
<td>Benny Kangwa Bwalya</td>
<td>Financial Analyst - Electricity</td>
</tr>
<tr>
<td>Zephania Mwanza</td>
<td>Financial Analyst - Fossil Fuels</td>
</tr>
<tr>
<td>Mundu Mwila</td>
<td>Economic Analyst - Fossil Fuels</td>
</tr>
<tr>
<td>Namakando Mukelabai</td>
<td>Statistician</td>
</tr>
<tr>
<td>Cletus Sikwanda</td>
<td>Economist - Research</td>
</tr>
<tr>
<td>Silomba Nkusuwila</td>
<td>Engineer - Renewable Energy</td>
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<tbody>
<tr>
<td>Bbl</td>
<td>Barrels</td>
</tr>
<tr>
<td>BSA</td>
<td>Bulk Supply Agreement</td>
</tr>
<tr>
<td>CEC</td>
<td>Copperbelt Energy Corporation Plc</td>
</tr>
<tr>
<td>CSO</td>
<td>Central Statistical Office</td>
</tr>
<tr>
<td>ERB</td>
<td>Energy Regulation Board</td>
</tr>
<tr>
<td>ESI</td>
<td>Electricity Supply Industry</td>
</tr>
<tr>
<td>GRZ</td>
<td>Government of the Republic of Zambia</td>
</tr>
<tr>
<td>GWh</td>
<td>Giga-Watt hour (1,000 MWh)</td>
</tr>
<tr>
<td>HFO</td>
<td>Heavy Fuel Oil</td>
</tr>
<tr>
<td>IPP</td>
<td>Independent Power Producer</td>
</tr>
<tr>
<td>KNB</td>
<td>Kariba North Bank</td>
</tr>
<tr>
<td>KNBEPC</td>
<td>Kariba North Bank Extension Power Corporation</td>
</tr>
<tr>
<td>Km</td>
<td>Kilometre</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>kV</td>
<td>Kilo Volt</td>
</tr>
<tr>
<td>kVA</td>
<td>Kilo Volt Amperes (1,000 amps)</td>
</tr>
<tr>
<td>kW</td>
<td>Kilo Watt</td>
</tr>
<tr>
<td>kWh</td>
<td>Kilo Watt hour</td>
</tr>
<tr>
<td>LHPC</td>
<td>Lunsemfwa Hydropower Company Limited</td>
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<tr>
<td>LPG</td>
<td>Liquefied Petroleum Gas</td>
</tr>
<tr>
<td>MD</td>
<td>Maximum Demand</td>
</tr>
<tr>
<td>MMEWD</td>
<td>Ministry of Mines, Energy and Water Development</td>
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<tr>
<td>MT</td>
<td>Metric Tonne</td>
</tr>
<tr>
<td>MW</td>
<td>Mega Watt</td>
</tr>
<tr>
<td>MWh</td>
<td>Mega Watt hour (1,000 kWh)</td>
</tr>
<tr>
<td>M³</td>
<td>Cubic Meters</td>
</tr>
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<td>NWEC</td>
<td>North Western Energy Corporation Limited</td>
</tr>
<tr>
<td>NECL</td>
<td>Ndola Energy Company Limited</td>
</tr>
<tr>
<td>NFT</td>
<td>Ndola Fuel Terminal</td>
</tr>
<tr>
<td>GWh</td>
<td>Giga-Watt hour (1,000 MWh)</td>
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## Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>OMC</td>
<td>Oil Marketing Company</td>
</tr>
<tr>
<td>PCP</td>
<td>Public Consultation Paper</td>
</tr>
<tr>
<td>PQD</td>
<td>Power Quality Directives</td>
</tr>
<tr>
<td>PQMS</td>
<td>Power Quality Management System</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>PSA</td>
<td>Power Supply Agreement</td>
</tr>
<tr>
<td>REA</td>
<td>Rural Electrification Authority</td>
</tr>
<tr>
<td>SAPP</td>
<td>Southern Africa Power Pool</td>
</tr>
<tr>
<td>TFG</td>
<td>Tariff Filling Guidelines</td>
</tr>
<tr>
<td>UPP</td>
<td>Uniform Pump Pricing</td>
</tr>
<tr>
<td>ZESCO</td>
<td>ZESCO Limited</td>
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- Bank of Zambia
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- Ndola Energy Company Limited
- North Western Energy Corporation Limited
- Office for Promotion of Private Power Investment
- Oil Marketing Companies
- Road Transport and Safety Agency
- Rural Electrification Authority
- Southern African Power Pool
- TAZAMA Pipelines Limited
- TAZAMA Petroleum Products Limited
- Zengamina Power Limited
- ZESCO Limited
Foreword

Security of supply in the provision of quality energy services and products is key to economic growth and development. In 2014, a lot of progress was made in improving our country’s power supply and petroleum infrastructure. However, as a sector, we still faced a few challenges in supplying energy products and services. In our quest to overcome the challenges, the Energy Regulation Board (ERB), together with key stakeholders, implemented various programmes and projects to ensure that efficient, reliable and quality energy services and products are provided by the industry.

This report therefore, continues to provide data and information and also highlight the various interventions implemented in the energy sector in 2014. The report also highlights the challenges experienced and the opportunities that exist going forward.

In the electricity sub-sector, the Kariba North Bank Extension Hydropower station was commissioned in 2014. The project contributed 360MW to the national electricity grid. Further, commitment towards moving to cost reflective electricity tariffs was demonstrated through the implementation of new tariffs effective July 2014. In order to diversify the electricity generation mix and promote investment in renewable energy, the Government drafted a policy on Renewable Energy Feed-in-Tariff (REFiT). With the draft policy in place, the ERB is now geared to develop an appropriate renewable energy regulatory and pricing framework by 2015. The framework is expected to promote investments in this area.

Similarly, in the petroleum sub-sector, new margins for downstream players were implemented with a view to spur investment. Additionally, in order to promote security of supply for petroleum products, the Government continued to construct petroleum storage depots in provincial centres. In 2014, Mpika Petroleum Storage Depot was commissioned.

Compliance to technical standards in the petroleum retail sector has posed some challenges that ERB is geared to address. The ERB, therefore, will continue to conduct enforcement inspections to ensure that there is adherence to licence conditions.

Going forward, the ERB has proposed and submitted legislative changes that are aimed at improving our efficiency. These include: multi-year tariff framework and automatic cost pass through; enforcement mechanisms; and fuel marking to curb adulteration and illegal fuel vending.
Foreword

It is our hope that the report will inform Government; other energy regulators; utilities; non-governmental organisations; academia; investors; energy consumers and other stakeholders on the developments that took place in 2014 and that this information will be used as a tool to advance the development of the Energy Sector. With the programmes and projects that have taken place in 2014, the Energy Sector is positioned to create a firm foundation for future developments within the sector.

Langiwe Hope Lungu (Ms.)
Executive Director
June 2015
1.0 Introduction

In 2014, the global energy sector continued to face a number of challenges that affected the sustainable supply of energy products and services. In the petroleum sub-sector, political despondence in parts of the oil rich Middle East, which is the major source of low-cost crude oil, continued to affect the global energy security of supply. Further, the conflict between Russia and Ukraine raised concerns about gas security in Europe (International Energy Agency, 2014). In the electricity sub-sector, electricity remained scarce and inaccessible to a large segment of the global population especially in Sub-Saharan Africa.

Meanwhile, technological advancement and efficiency provide good reasons for optimism. However, sustained political will is essential to change energy trends for the better. The strong growth of renewable energy in many countries has raised their share in the global power generation. However, adequate price signals will be needed to ensure timely investments in the new power generation capacity, which is necessary, alongside investment in renewable energy, to maintain the reliability of electricity supply. This will require reforms to market design or electricity pricing in some cases.

According to the International Energy Agency (Africa Energy Outlook, 2014), Africa's energy sector is crucial to its future development because it remains one of the most poorly underdeveloped regions within the global energy industry. Though Africa is endowed with energy resources which are more than sufficient to meet domestic needs, more than two-thirds of its population does not have access to modern energy. Those that do have access to modern energy very often experience high prices for supply that is of poor quality and rely on an under-developed system that is not able to meet their needs. Therefore, effective development of Africa’s energy resources, and of the energy sector as a whole, could unlock huge gains across the economy.

Further, presently in Africa, a severe shortage of essential electricity infrastructure is undermining efforts to achieve more rapid social and economic development. For the minority that have a grid connection today, supply is often unreliable, necessitating widespread and costly private use of back-up generators running on diesel or gasoline. Electricity tariffs are, in many cases, among the highest in the world and, outside South Africa, losses in poorly maintained transmission and distribution networks are double the world average.

Notably, reform programmes have started to improve efficiency and to bring in new capital, including from private investors, and off-grid-based generation. Urban areas have experienced the largest improvement in the coverage and reliability of centralised electricity supply. Elsewhere in Africa, mini-grid and off-grid systems provide electricity to 70% of those with access in rural areas.

Zambia’s energy sources include electricity, petroleum, coal, biomass and other renewable energy. The country imports all its petroleum products as commingled petroleum feedstock or as finished products while electricity and other sources are mainly generated locally. According to the Ministry of Finance, the economy has been growing at an average of 5 percent per annum over the past 10 years and demand for energy has also been rising. In particular, over the last decade, electricity demand has been growing at an average of about 3 percent per annum mainly due to the increased economic activities in the country especially in the agriculture, manufacturing and mining sectors. The country’s rapid economic growth has consequently led to a rising demand for energy products and services including alternative sources of energy such as solar.
During the year 2014, the energy sector recorded various improvements. Particularly, in the electricity sub-sector, there was significant investment recorded especially in generation and transmission infrastructure as well as moving towards cost reflective pricing. However, the sector continued to suffer from problems associated with aged infrastructure which hampered the sector’s efforts in providing a quality service to the customers. The electricity sub-sector still remains wholly dependent on rainfall which has impacted negatively on performance during periods of poor rain patterns. A case in point was when Lunsemfwa Hydropower Company (LHPC) in Kabwe had to shut down two of its generators due to low water levels.

Equally, the petroleum sub-sector has also continued to record significant investments in the national petroleum supply and storage infrastructure. Between June and December 2014, international oil prices reduced considerably leading to a reduction in local pump prices. Despite infrastructure improvements and the global petroleum price outlook, the sub-sector faced some challenges such as inadequate product throughput at the refinery infrastructure, inadequate retail sites in rural areas and insufficient margins in the supply chain.

This report is arranged in two key sections as follows: Section two discusses the electricity sub-sector while section three discusses the petroleum sub-sector.
2.1 Electricity Generation

Zambia’s electricity generation mix is dominated by hydro generation which accounts for more than 95 percent. The electricity generation mix is comprised of hydro, diesel, thermal, solar and Heavy Fuel Oil (HFO). The hydro generation mix comprises major and mini power stations. ZESCO owns the bulk of the generation stations while the rest are owned by Independent Power Producers (IPPs).

In 2014, the total installed capacity in Zambia was 2,396MW disaggregated as follows: hydro 2,255MW; thermal 80MW; diesel 11MW; HFO 50MW and solar 0.06MW. This was in comparison to a total of 2,038MW in 2013. The increase in total installed capacity was attributed to the commissioning of the 360MW Kariba North Bank Extension (KNBE) power station.

Total electricity generation in 2014 was 14,453GWh, compared to 13,299GWh in 2013, representing an increase of 8.7 percent.

During the year under review (as was the case in 2013), there were three (3) operational private IPPs, namely LHPC; Ndola Energy Company Limited (NECL); and Zengamina Power Limited (ZPL).

2.2 Generation from Major Hydropower Stations

ZESCO owns four (4) major hydropower stations and these are: Kafue Gorge; Kariba North Bank; Kariba North Bank Extension; and Victoria Falls. The installed capacities are 990MW, 720MW, 360MW and 108MW, for Kafue Gorge; Kariba North Bank; Kariba North Bank Extension; and Victoria Falls, respectively.

Total generation output from ZESCO’s major hydropower stations increased by 6.7 percent, from 12,780GWh in 2013 to 13,638GWh in 2014. The increase in generation was boosted by the commissioning of Kariba North Bank Extension power station with a rated capacity of 360MW. Figure 1 shows the generation trend from ZESCO’s major hydropower plants from 2010 to 2014.

---

1 For this report, major power stations have a generating capacity of over 20 megawatts while mini power stations have a generating capacity of less than or equal to 20 megawatts.
During the year under review, of the four (4) major hydropower stations, the highest power generator was Kafue Gorge followed by Kariba North Bank and Kariba North Bank Extension. The least generator was Victoria Falls. As reflected in figure 1, Kariba North Bank Power Station recorded the highest increment of 10.9 percent, moving from 4,507GWh in 2013 to 4,999GWh in 2014. However, Kafue Gorge Power Station recorded a decline of 10.7 percent, from 7,463GWh in 2013 to 6,666GWh in 2014. During the same period, Victoria Falls Power Station recorded a marginal increment of less than 0.1 percent. Generally, in the last five (5) years, total generation from major power stations has consistently increased mainly as a result of the Power Rehabilitation Programme (PRP). The PRP was a Government initiative whose objective was to rehabilitate and uprate the major power stations.

### 2.3 Generation from Mini Hydropower Stations

In 2014, the total number of mini hydropower stations were five (5). These were Lusiwasi; Musonda Falls; Chishimba Falls; Shiwan’gandu; and Lunzua power stations. The installed capacities of these plants were: 12MW; 5MW; 6MW; 1MW; and 0.75MW for Lusiwasi; Musonda Falls; Chishimba Falls; Shiwan’gandu; and Lunzua, respectively. Figure 2 reflects the generation trends from mini hydropower stations for the period 2010 - 2014.
For the year 2014, generation sent out from mini hydropower stations increased by 5 percent, from 102.7GWh recorded in 2013 to 107.1GWh in 2014. Both Lusiwasi and Chishimba Falls mini hydropower stations recorded increases in generation of 5.4 percent and 6.8 percent, respectively. However, Musonda Falls and Lunzua mini hydropower stations recorded declines in generation of 2.9 percent and 6.9 percent, respectively.

### 2.4 Generation from Diesel Power Stations

Diesel power stations comprise Chavuma; Zambezi; Kabompo; Mufumbwe; Mwinilunga; Lukulu; Shang’ombo; and Luangwa. The total installed capacity for diesel power stations was 11.3MW in 2014 compared to 10.6MW in 2013. The increase in installed capacity was mainly on account of additional capacity from Shang’ombo diesel power station. The installed capacities were as follows: 1MW; 2.35MW; 1.55MW; 0.9MW; 1.5MW; 1.5MW; 1MW and 1.5MW for Chavuma; Zambezi; Kabompo; Mufumbwe; Mwinilunga; Lukulu; Shangombo; and Luangwa, respectively.

Total generation sent out from ZESCO’s diesel power stations reduced by 6.5 percent between 2013 and 2014. As shown in figure 3, during this period, generation declined from 18.6GWh to 17.3GWh.

Figure 3 shows electricity generated from diesel power stations for the years 2010 to 2014.
Figure 3: Electricity generation from diesel power stations, 2010-2014

The reduction in generation was mainly on account of the decommissioning of Kaputa diesel power station in 2013.

2.5 Generation from Independent Power Producers

During the year under review, there were three (3) operational Independent Power Producers (IPPs), namely: LHPC; NECL; and ZPL. LHPC owns Mulungushi and Lunsemfwa power stations. In 2014, the total installed capacity from these IPPs was 106.8MW compared to 105MW in 2013. The installed capacity for the power stations was as follows; LHPC (56MW); NECL (50MW); and ZPL (0.75MW). Figure 4 illustrates independent power generation for the years 2012; 2013; and 2014.
During the year under review, Mulungushi and Lunsemfwa power stations experienced declines in production mainly on account of low water levels. Generally, electricity generation from IPPs increased by 73.2 percent, from 398.5GWh recorded in 2013 to 690.3GWh in 2014. The increase in generation was attributed to the commissioning of the 50MW NECL Heavy Fuel Oil (HFO) power plant in November 2013.

2.6 Power Imports and Exports

ZESCO engages in cross border trading of electricity through the Southern African Power Pool (SAPP) and bilateral markets. During the year 2014, ZESCO recorded a 16 percent increase in electricity exports, moving from 1,083.4GWh in 2013 to 1,256.3GWh in 2014. However, electricity imports declined drastically by 82.4 percent, from 72.9GWh in 2013 to 12.8GWh in 2014. The increase in exports and the significant reduction in imports was attributed to new generation projects that were commissioned in the year. Figure 5 shows trends of ZESCO’s power imports and exports from 2010 to 2014.
2.7 Electricity Consumption by Economic Sector

In 2014, national electricity consumption reduced marginally by 1.2 percent from 10,845.7GWh in 2013 to 10,720.5GWh in 2014. The reduction was mainly on account of the slowdown in mining activities and outages for non-mining customers. The largest consumers of electric energy were the mining industry and domestic sector (residential) which accounted for 54.8 percent and 30.3 percent of total consumption in 2014, respectively. The rest of the economic sectors collectively consumed the 14.9 percent balance. This is depicted in table 1.

Table 1: Consumption of electricity by Economic Sector in GWh

<table>
<thead>
<tr>
<th>Sectors</th>
<th>2014 (GWh)</th>
<th>2013 (GWh)</th>
<th>2014 Proportion</th>
<th>2013 Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>5,871.3</td>
<td>5,929.1</td>
<td>54.8%</td>
<td>54.7%</td>
</tr>
<tr>
<td>Domestic</td>
<td>3,250.8</td>
<td>3,360.8</td>
<td>30.3%</td>
<td>31.0%</td>
</tr>
<tr>
<td>Finance &amp; Property</td>
<td>487.4</td>
<td>499.7</td>
<td>4.5%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>479.2</td>
<td>397.1</td>
<td>4.5%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>241.4</td>
<td>270.3</td>
<td>2.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Others</td>
<td>99.1</td>
<td>120.9</td>
<td>0.9%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Trade</td>
<td>107.4</td>
<td>115.8</td>
<td>1.0%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Energy &amp; Water</td>
<td>73.2</td>
<td>71.0</td>
<td>0.7%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Quarrying</td>
<td>62.2</td>
<td>35.0</td>
<td>0.6%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Transport</td>
<td>31.3</td>
<td>28.3</td>
<td>0.3%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Construction</td>
<td>17.2</td>
<td>17.5</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Total</td>
<td>10,720.5</td>
<td>10,845.7</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ZESCO
2.8 ZESCO’S Performance in 2014

ERB monitors the overall performance of ZESCO using the Key Performance Indicator (KPI) framework. During the period under review, ERB had in place a KPI framework running from April 2011 to March 2014. The framework is based on a reward/penalty assessment mechanism that is aligned to the tariff determination process. The KPI framework used in 2014 specifically covered the following assessment areas: Customer metering; Cash management; Staff productivity; Quality of service supply; and System losses.

During 2014, ZESCO was awarded a KPI score of 67 percent which resulted in the Utility being awarded a final tariff increase of 16 percent instead of more than 22 percent had it performed better on the KPIs.

In 2014, ZESCO scored an overall annual score of 67 percent, a reduction from 85 percent in the previous year. Details of ZESCO’s performance on specific KPIs are depicted in Appendix 1. The summary of the performance of ZESCO on specific KPIs is presented in table 2 below.

Table 2: ZESCO’S Performance on KPIs, 2013-2014

<table>
<thead>
<tr>
<th>KPI</th>
<th>Definition</th>
<th>2013 score</th>
<th>2014 score</th>
<th>Assigned Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Metering</td>
<td>Installation of prepaid meters on all customers.</td>
<td>25%</td>
<td>22%</td>
<td>25%</td>
</tr>
<tr>
<td>Cash Management</td>
<td>Trade receivables and debtor days for both GRZ and non-GRZ customers.</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Staff productivity</td>
<td>Customer-employee ratio and staff costs.</td>
<td>15%</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>Quality of Service Supply</td>
<td>Unplanned Power supply interruptions and outages.</td>
<td>23%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>System losses</td>
<td>Transmission and distribution losses.</td>
<td>22%</td>
<td>20%</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>85%</td>
<td>67%</td>
<td>100%</td>
</tr>
</tbody>
</table>

As reflected in table 2, the reduction in overall performance was on account of relatively poor performance on customer metering and cash management. Generally, it was noted that the cash management and staff productivity KPIs continue to be a challenge on account of the utility’s high trade receivables and high staff costs.

2.8.1 New Key Performance Indicators, 2014–2016

In order to enhance the KPI framework following its expiry in March 2014, the ERB undertook a comprehensive review with the view to assessing their relevance and adequacy in addressing the needs of the consumers. The new framework that has been agreed will run from October 2014 to December 2016. The details of the new framework are shown in table 3.
### Table 3: New ZESCO’s KPI framework, October 2014 - December 2016

<table>
<thead>
<tr>
<th>KPI</th>
<th>Details</th>
<th>Assigned Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer Metering</strong></td>
<td>i. All new connections are metered upon connection;</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>ii. Zero unmetered customers from October 2014 onwards;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. Quotations for all types of connections must be issued within 30 days from the date of application;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv. All new standard residential connection to supply must be done within 30 days upon payment.</td>
<td></td>
</tr>
<tr>
<td><strong>Cash Management</strong></td>
<td>i. Reduce non-GRZ debtor days to not more than 60 days; and</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>ii. Reduce GRZ debtor days to not more than 90 days.</td>
<td></td>
</tr>
<tr>
<td><strong>Staff productivity</strong></td>
<td>i. Maintain the Corporate customer employee ratio of 100:1;</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>ii. Maintain the Lusaka division customer employee ratio of 100:1;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. Maintain the Copperbelt division customer employee ratio of 100:1;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv. Maintain the Northern division customer employee ratio of 100:1;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>v. Maintain the Southern division customer employee ratio of 100:1;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vi. Reduce staff costs to 45% or less as a share of total costs.</td>
<td></td>
</tr>
<tr>
<td><strong>Quality of Service Supply</strong></td>
<td>i. Maintain the Dry Season (DS)(^2) System Average Interruption Duration Index (SAIDI) at 27 hours or less and Wet Season (WS)(^3) SAIDI at 36 hours or less;</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>ii. Maintain the DS System Average Interruption Frequency Index (SAIFI) at 5 times or less and WS-SAIFI at 5.5 times or less;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iii. Maintain the DS-Customer Average Interruption Duration Index (CAIDI) at 5 hours or less and WS-CAIDI at 7 hours or less; and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv. Maintain the Average System Availability Index (ASAI) at 90% or better.</td>
<td></td>
</tr>
<tr>
<td><strong>System losses</strong></td>
<td>i. Maintain Transmission losses at 5% or less(^4); and</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>ii. Maintain Distribution losses at 12% or better, per quarter.</td>
<td></td>
</tr>
<tr>
<td><strong>Power Generation</strong></td>
<td>i. Maintain the Unit Capability Factor (UCF) for large hydro plants(^5) at 80% or better per quarter; and</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>ii. Maintain the UCF for Mini hydro plants(^6) at 60% or better per quarter.</td>
<td></td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>i. Achieve Zero fatality per quarter; and</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>ii. Achieve Zero Lost Time Injury (LTI) per quarter.</td>
<td></td>
</tr>
<tr>
<td><strong>Customer Complaints</strong></td>
<td>i. Replacement of faulty Meters must be done within 5 days after a complaint is lodged; and</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>ii. Maintain a total customer complaint resolution rate of 90% or better per quarter.</td>
<td></td>
</tr>
</tbody>
</table>

**Total**                                                                  | 100%             |
2.9 Performance of Other Companies

2.9.1 Lunsemfwa Hydropower Company

LHPC is a privately owned power company involved in generating, distributing and supply of electricity. The company has a total installed generation capacity of 56MW at its two power plants namely: Lunsemfwa (25MW); and Mulungushi (31MW).

In 2014, power generation from the company declined significantly by 25.5 percent, from 398.4GWh in 2013 to 296.9GWh. The reduction in generation was attributed to the poor rainfall pattern recorded during the 2013/2014 rain season which resulted in low water levels in the two rivers which host the two (2) generation stations. LHPC sells the bulk of its electricity to ZESCO. In 2014, it sold a total of 289.9GWh which is 97.6% of its total generation. The balance is supplied to the local manganese mine.

Planned investments by LHPC

During the period under review, LHPC completed technical feasibility studies on the lower Lunsemfwa/Mkushi rivers for the purpose of developing hydropower projects. One of the planned projects involves construction of a new power station at the foot of the Muchinga Escarpment, with an installed capacity of 263MW down-stream off the existing Lunsemfwa Power Station.

Challenges faced by LHPC

During the year under review, LHPC faced some challenges among them: the poor rainfall which consequently led to the reduction in the volume of water collecting at the reservoir. This problem was compounded by the competition for water by Mkushi and Nansanga farming blocks which are located upstream of the Lunsemfwa Power Station.

2.9.2 Copperbelt Energy Corporation Plc

CEC is a Copperbelt Province based company that owns and operates high-voltage transmission and distribution systems that supply electricity to Zambia’s mining companies based on the Copperbelt. Apart from supplying electricity to local mines, CEC has been exporting/wheeling electricity to a mine in the Democratic Republic of Congo (DRC), since 2007.

In 2014, CEC accounted for 39 percent of the country’s electricity consumption. This is depicted in table 4.

Table 4: Performance of CEC on key business functions in 2013-2014

<table>
<thead>
<tr>
<th>Business element</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity sales to the mines</td>
<td>4,281GWh</td>
<td>4,208GWh</td>
</tr>
<tr>
<td>Transmission losses</td>
<td>2.84%</td>
<td>2.93%</td>
</tr>
<tr>
<td>Standby generation capacity</td>
<td>60MW</td>
<td>80MW</td>
</tr>
</tbody>
</table>

Source: CEC
In 2014, CEC sold 4,208GWh of electrical energy to its mining customers, representing a marginal reduction of 1.7 percent from sales made in 2013 of 4,281GWh. Similarly, transmission losses increased from 2.84 percent recorded in 2013 to 2.93 percent in 2014. However, the company’s standby installed generation capacity increased from 60MW in 2013 to 80MW in 2014.

**CEC projects in 2014**

During the year under review, CEC was involved in various generation and transmission projects aimed at expanding its capacity in order to satisfy the requirements of its various customers and also to diversify its business portfolio. Some of the projects that CEC was actively pursuing are presented below:

a. **Kabompo Hydro Generation Project**

   During 2014, CEC continued the development of the Kabompo hydro generation project. This project involves construction of a 40MW hydropower station and a 132KV transmission line to evacuate power into the national electricity grid. The total project cost is estimated at about US$ 210 million. Substantial progress has been made on the project with regard to engineering, procurement and construction. Further, various regulatory approvals have been sought.

b. **Luapula Hydropower Schemes**

   In 2014, CEC continued to consider various bankable feasibility studies for various hydropower schemes in Luapula Province. Some of these studies investigated optimal evacuation of bulk power from the proposed power schemes once developed.

**Challenge faced by CEC in 2014**

During the year under review, CEC was faced with the challenge of vandalism and theft of transmission infrastructure. Counter measures have since been instituted including security and sensitisation of the public.

**2.9.3 Ndola Energy Company Limited**

NECL is one of the newest IPPs in the electricity supply sector with an installed capacity of 50MW. The company has a plant based in Ndola, Copperbelt Province and uses HFO from INDENI Petroleum Refinery Limited to produce electricity. The plant was commissioned in November, 2013.

ZESCO is the off-taker of power from the plant under a Power Purchase Agreement (PPA). In 2014, being the first full year of operations, NECL delivered to the national electricity grid a total of 393.4GWh of electricity. The company has plans to construct another plant with a capacity of 50MW.
Challenges faced by Ndola Energy Company Limited
NECL faced some challenges in its first full year of operations. Lack of adequate fuel testing laboratories in Zambia to compressively test HFO has meant that samples have to be shipped out of the country at great cost to the company thereby, impacting on operational turn around. Voltage and frequency incursions also impacted negatively on its operations.

2.9.4 Kariba North Bank Power Extension Corporation Limited
KNEBPC Limited is a subsidiary wholly owned by ZESCO. The company owns the 360MW Kariba North Bank Extension Power Station. The power station was commissioned in May, 2014 and operates as a peaking plant with a planned 3.5 hours per day.

ZESCO is the off-taker of power from the plant under a PPA. In 2014, being the first year of operations, KNEBPC, delivered to the national grid a total of 1,162 GWh of electricity.

2.9.5 Zengamina Power Limited
ZPL is a private company that owns and operates an off-grid mini-hydro plant with an installed capacity of 0.75 MW. The power plant was officially commissioned in July 2007. ZPL is based in Kalene, North-Western Province and is owned by the North-West Zambia Development Trust (NWZDT). The Company generates and supplies power to Kalene Mission Hospital, Ikelengi central business district and surrounding areas.

Challenges faced by Zengamina Power Limited
In 2014, ZPL continued to face challenges. Some of the challenges faced were: the need for cost reflective tariffs despite low income levels in rural Kalene; inadequate capital to expand its distribution network in order to increase its customer base; conflict between providing philanthropic services for the rural poor and the need to adopt commercial business practices; as well as the apparent high tariffs in Kelene compared to the tariffs charged by ZESCO elsewhere in the country.

2.9.6 North Western Energy Corporation Limited
NWEC owns and operates distribution and supply systems that provide electricity to serve the non-mining load of Lumwana Mine and the surrounding areas in Lumwana mine townships in North Western Province of Zambia. In 2014, NWEC extended its supply of electricity to the new mine townships of Kabitaka and Kalumbila.

Challenges faced by North Western Energy Corporation Limited
NWEC continued to face the following challenges during the period under review:

i. Lack of local finance to expand the current business operations;

ii. Low market penetration and low opportunities for Private Public Partnerships especially with regard to new projects; and

iii. Unwillingness to pay for electricity by the customers owing to the free electricity supply enjoyed in the past.
2.10 Tariff Setting Procedures

The mandate to adjust electricity tariffs by ERB is drawn from the Electricity Act Cap 433 of the laws of Zambia as amended. The tariff application process must also conform to the license conditions. The ERB has developed Tariff Filing Guidelines (TFG) that prescribe what should be contained in the tariff application. To process a tariff application, the following steps are followed:

**Step 1: Submission of application by the Utility**

The process of tariff adjustment is initiated by the Utility. The Utility submits an application to the ERB for tariff adjustment, six (6) months, before the commencement of its financial year.

The ERB reviews the application to ensure that it conforms to the TFG. The applicant is notified that the application is duly submitted within 14 days of its submission. Where a tariff application has not been duly lodged in accordance with the guidelines, the ERB rejects the application and notifies the applicant within 14 days of receipt of the application. The notice specifies the reasons for such rejection. The applicant is, however, allowed to resubmit the application within 21 days of the notification of the unduly lodged application.

**Step 2. Notification of the Public**

The applicant is also obliged to issue a notice to the customers and the public in print and electronic media of its intention to vary the tariffs. The notice must specify the following:

- The proposed tariff adjustment in percentage terms per customer category;
- The current tariffs and proposed tariffs in monetary terms per customer category;
- Reasons for the proposed tariff adjustment;
- Latest audited statements of revenue, net profit/loss and proposed revenue, net profit/loss after tariff adjustment; and
- Areas where revenues derived from the proposed tariffs will be applied to.

The notice shall be issued by the applicant only after the ERB has advised that the application is duly lodged.

**Step 3: Public Consultation Paper (PCP)**

Once the ERB accepts an application, it issues a notice in the print and electronic media inviting consumers to make written submissions (comments and their views) on the tariff application within 30 days of receipt of the duly lodged application.

**Step 4: Receipt of submissions from the Public**

After issuing a Public Consultation Paper (PCP), the ERB begins to receive and compile submissions from the public which are availed to the applicant (Utility) before the public hearings are held. The
Utility is then requested to prepare written responses to the submissions made by the public before the public hearings are held.

**Step 5: Public Hearing**

Following receipt of submissions from members of the public, the ERB convenes public hearings in selected parts of the country, where those who made submissions and the applicant are accorded an opportunity to make oral presentations of their written submissions. The notice of invitation to the public hearing is issued to members of the public and those who made written submissions not later than 14 days after expiration of the notice inviting submissions.

**Step 6: Tariff Determination and Announcement**

After the public hearings, the ERB considers the application including submissions from various stakeholders and then renders its decision on the tariff application. Where no submissions have been received, the ERB may proceed to consider the tariff application and makes its decision and an announcement is made to the public of the decision. The applicant is also notified in writing accordingly.

**2.11 Electricity Tariff Reviews**

In 2014, the ERB approved new electricity tariffs for ZESCO, ZPL and the mining customers.

**2.11.1 ZESCO Electricity Tariffs**

In 2012, ZESCO had applied to the ERB to increase electricity tariffs by an average of 26 percent for all customer categories, broken down as follows: 32 percent for residential; 24 percent for commercial; 18 percent for the services customers; 24 percent for small power and 11 percent for large power customers.
During the year under review, after due consideration of the application and taking into account the various submissions made thereon, including ZESCO’s performance on the KPIs, the ERB approved the electricity tariff increases for various customer categories (see appendix 2) as follows:

a. Residential consumers - 24.63 percent  
b. Commercial consumers - 15.38 percent  
c. Social services - 15.38 percent  
d. Small power (MD1 & 2) - 19.49 percent  
e. Large power (MD 3 & 4) - 5.11 percent

The above increment represented an average of 16 percent for all customer categories.

2.11.2 Mining Tariffs

During the year under review, after consultations with stakeholders, the ERB reviewed electricity tariffs for the mining customers as follows:

a. The Bulk Supply Agreement (BSA) tariffs between ZESCO and CEC were adjusted to US cents 6.84 per kWh from an average of US cents 5.31 per kWh. This implied an increase of 28.8 percent.

b. All other mines supplied directly by ZESCO had their tariffs adjusted upwards to a new minimum tariff of US cents 6.84 per kWh;

c. The Power Supply Agreements (PSAs) tariffs between CEC and its mining customers were adjusted upwards to an average of US cents 8.01 per kWh, an increase of 17.0 percent;

d. The ERB further determined that, in all the cases above, in the event that the recommended minimum average tariffs were lower than the prevailing average tariffs as per existing bilateral PSAs/PPAs, then the prevailing tariff were to be maintained.

The effective date for the implementation of the new tariffs was 1st April 2014. However, the ERB’s decision was contested by the mining companies and by the close of 2014, it was still undergoing judicial review.

2.11.3 Zengamina Power Limited Tariffs

In October 2012, ZPL applied to the ERB to increase electricity tariffs by between 8.3 - 13.33 percent. After due consideration of the application and taking into account the various public submissions made thereon, the ERB approved the application as requested by ZPL during the year under review (see Appendix 3).
Electricity Sub-Sector

2.12 Development of REFiT Policy and Regulatory Framework

During the year under review, the Government of the Republic of Zambia (GRZ) commenced the process of drafting a Renewable Energy policy framework. The Policy focuses on the specifics of expansion and diversification of renewable energy uptake, private sector involvement, and the potentials of using Feed-in-Tariffs to spur investments.

In addition to the above, ERB received technical assistance from the USAID-Trade Hub Southern Africa to develop a Renewable Energy Feed-In Tariff (REFiT) Regulatory Frame-work and the REFiT Pricing Methodology.

A key focus area for this initiative is to strengthen regulations in support of the REFiT policy. The policy will enhance access to the grid and also provide regulations and conditions that will facilitate future REFiT programmes and investments in renewable energy. Furthermore, the initiative will provide for development of a standardized license and PPAs for investment and the procurement of power from the renewable energy IPPs. It is expected that once completed in 2015, the policy as well as the regulatory framework will assist in attracting investment in renewable energy.

2.13 New Power Generation Investments

2.13.1 Itezhi-Tezhi Project

The 120MW Itezhi-Tezhi power project is under construction at Itezhi-Tezhi Dam on the Kafue River. It is being developed through a Special Purpose Vehicle (SPV), Itezhi-Tezhi Power Company (ITPC) under a joint venture company arrangement between Tata Africa Holdings of India and ZESCO. The two companies have equal shareholding in the project. ITPC entered into an agreement to sell power to the off taker (ZESCO) under the PPA/PSA that would last for 25 years after the date of commencement of operations. It is expected that the project will be commissioned in 2015.

2.13.2 Rehabilitation and Expansion of Musonda Falls

Musonda Falls is one of ZESCO’s power stations, located on the Luongo River in Luapula Province. The hydropower station has an installed capacity of 5MW. During the year under review, the station which has been under rehabilitation is expected to be uprated to 10MW by 2015.

2.13.3 Uprating of Lunzua Power Station

Lunzua hydropower station is located in Mbala District of Northern Province. Lunzua power station was undergoing rehabilitation and uprating from an installed capacity of 0.75MW to 14.8MW. The main works at the power station have been completed and commissioning was scheduled for January, 2015.
2.13.4 Kabompo Hydropower Project

The 40MW Kabompo hydropower project, located in Mwinilunga District, is being developed by CEC. The project was estimated to cost US$210 million and will involve the construction of a transmission line that will connect to the national electricity grid.

2.13.5 Maamba Thermal Project

The 300MW Maamba thermal power plant is being developed at Maamba Coal mine in Sinazongwe District, at a cost of US$750 million. During the year under review, major construction works were completed and the project is expected to be commissioned in 2015.

2.13.6 Kafue Gorge Lower Hydropower Project

Kafue Gorge Lower Hydropower Project will be located in the Kafue Gorge, about 65km upstream of the confluence of the Kafue River and the Zambezi River and 9km downstream of the existing 990MW Kafue Gorge Upper Hydroelectric Power station. The project will have an installed capacity of 750MW at an estimated cost of US$1.94 billion. It will be developed under a Private Public Partnership (PPP) on Built, Own, Operate and Transfer (BOOT) basis with ZESCO. Construction of the project was expected to take 6 years. As at the close of 2014, not much progress had been made on this project.

2.14 New Power Transmission and Distribution Investments

During the year under review, in order to increase access to electricity and improve the quality of supply, Government and other private stakeholders made investments in transmission and distribution infrastructure (see table 5).

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Name</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Lusaka ring reinforcement</td>
<td>The total cost of the project is US$13 million. The expected date of completion is 2015.</td>
</tr>
<tr>
<td>2.0</td>
<td>Kariba North Bank – Kafue west 330kV transmission line</td>
<td>The transmission line was completed and commissioned in December 2014 at a total cost of ZMW281.7 million.</td>
</tr>
<tr>
<td>3.0</td>
<td>Itezhi–itezhi Mumbwa Lusaka West 330kV transmission line</td>
<td>The project commenced in 2014 and is expected to cost ZMW704.9 million. Commissioning is expected in 2015.</td>
</tr>
<tr>
<td>4.0</td>
<td>Connection of Luangwa to the National Grid</td>
<td>The project is estimated to cost ZMW333.9 million and is expected to be commissioned in 2015.</td>
</tr>
<tr>
<td>5.0</td>
<td>Kalumbila Trident Mine Supply</td>
<td>The project is estimated to cost ZMW662.5 million and is expected to be commissioned in 2015.</td>
</tr>
<tr>
<td>6.0</td>
<td>Connection of North Western Province to the National Grid</td>
<td>The project is expected to be commissioned in 2016 at a total cost of ZMW975 million.</td>
</tr>
</tbody>
</table>
Electricity Sub-Sector

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Name Details</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>Pensulo-Kasama 330kV transmission line project.</td>
<td>The project is estimated to cost ZMW 885.1 million and is expected to be commissioned in 2015.</td>
</tr>
<tr>
<td>8.0</td>
<td>Pensulo – Chipata 330kV transmission project.</td>
<td>The project is estimated to cost ZMW 890.4 million and is expected to be commissioned in 2015.</td>
</tr>
<tr>
<td>9.0</td>
<td>Construction of 97KM transmission line from Lunsemfwa power station to Mkushi Mine</td>
<td>The project is estimated to cost ZMW 68.9 million and is expected to be completed in 2015.</td>
</tr>
</tbody>
</table>

Source: ZESCO

2.15 Investment Endorsements

The ERB issues Investment Endorsements (IE) prior to actual investment in the power sector. The IE is issued at the investment proposal stage and is valid for a specific period. The IE, among other things, indicates the project estimated tariffs on the basis of the key project assumptions. The IE is not a legal provision, but assures the investor of issuance of an operating licence upon commissioning of the infrastructure. During the period under review, one (1) IE was issued for generation of power using solar technology.

2.16 Power Purchase Agreements approved

During the year under review, ERB approved the following PPA/PSAs: ZESCO and Itezhi-Tezhi Power Corporation; ZESCO and Maamba Collieries Limited; ZESCO and Tanzania Electricity Supply Company Limited (TANESCO); ZESCO and Societe' Nationale D'electricite' (SNEL S.A.R.L).

2.17 Licensing in 2014

During the year under review, ERB issued a total of 13 licenses in the electricity sub-sector as depicted in table 6. For the generation licences, two (2) provisional licences were issued. In addition, two provisional licenses were issued under distribution and one provisional licence was issued under supply. For the solar licences, all the licences issued were provisional except for one standard licence.

Table 6: ERB licenses issued in 2014 – Electricity Sub-sector.

<table>
<thead>
<tr>
<th>S/N</th>
<th>LICENCE TYPE</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generation</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Transmission</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>Distribution</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Supply</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Solar⁷</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9</td>
<td>13</td>
</tr>
</tbody>
</table>

⁷ For manufacturing, supply, installation and maintenance of solar energy systems.
2.18 Development and Implementation of the Power Quality Management Framework

In July 2014, the ERB developed and commenced the implementation of the Power Quality Management System (PQMS) for the Zambian ESI. The PQMS focuses on developing a sustainable mechanism to continuously monitor the power quality performance of the Zambian electricity grid.

The PQMS provides rights and responsibilities to all stakeholders (the licensees, customers and equipment suppliers) in the ESI. Specifically, the PQMS aims to attain the following:

i). a mechanism to ensure that customers are correctly informed of their rights and obligations with regard to power quality supplied by their utilities;

ii). that appropriate power quality performance information is made available through measurement, data management, and statistical analysis;

iii). accessible complaints resolution mechanisms, to ensure that workable procedures are in place to resolve customer power quality concerns;

iv). long-term sustainability of the supply industry with regard to power quality; and

v). that the interests of licensees and their customers are balanced in as far as power quality and reliability of supply is concerned.

During the year under review, ERB issued Power Quality Directives (PQDs) to the industry to enforce the technical requirements for the quality and reliability of electricity supplied by the ESI. The ERB ordered the licensees to put in place a power quality management system that will ensure that power quality parameters at the points of common coupling among the respective stakeholders are monitored, measured, recorded and analysed for future system improvement and potential complaints resolution with customers.

The PQD compels all licensees to present and establish a uniform methodology and guidelines to measure Power Quality and Reliability (PQR) parameters in the Zambian ESI.
2.19 Rural Electrification

The Government of the Republic of Zambia (GRZ), through the Rural Electrification Authority (REA), has been implementing the rural electrification programme, which is aimed at increasing access to electricity in the rural areas for improved productivity and quality of life.

During the period under review, REA implemented eight (8) grid extension projects shown in table 7.

Table 7: Grid Extension Projects implemented by REA in 2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of project</th>
<th>District</th>
<th>Province</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Isoko</td>
<td>Mpulungu</td>
<td>Northern</td>
</tr>
<tr>
<td>2</td>
<td>Mushindamo Phase 2</td>
<td>Solwezi</td>
<td>North - Western</td>
</tr>
<tr>
<td>3</td>
<td>Kabweza/ Lishuko</td>
<td>Kafue</td>
<td>Lusaka</td>
</tr>
<tr>
<td>4</td>
<td>Mundu II</td>
<td>Chinsali</td>
<td>Muchinga</td>
</tr>
<tr>
<td>5</td>
<td>Mulungushi Agro</td>
<td>Kabwe</td>
<td>Central</td>
</tr>
<tr>
<td>6</td>
<td>Mwinuna</td>
<td>Mpongwe</td>
<td>Copperbelt</td>
</tr>
<tr>
<td>7</td>
<td>Milenge Phase II</td>
<td>Milenge</td>
<td>Luapula</td>
</tr>
<tr>
<td>8</td>
<td>Baambwe</td>
<td>Namwala</td>
<td>Southern</td>
</tr>
</tbody>
</table>

Source: Rural Electrification Authority

REA also constructed four substations to facilitate the extension of the national electricity grid. These were Mushindano substation Project in Solwezi District of North Western Province; Luampa and Kalabo substations in Mongu District of Western Province; and Chinsali substation in Chinsali District of Muchinga Province.

Further, within 2014, REA commenced solar installations in selected areas where the national electricity grid is not planned to reach in the next five (5) years.
REA has plans to construct two (2) solar mini-grid projects in the near future. The projects are Chunga solar mini-grid which will be located in Mumbwa District and the Lunga solar mini-grid which will provide electricity in the new Lunga District located on the Bangweulu swamps in Luapula Province.

2.20 Regional Developments

2.20.1 Southern African Power Pool (SAPP) Generation Capacity

The Southern African Power Pool (SAPP) is made up of 12 Countries with a combined population of 250 million people. During the year under review, SAPP’s total interconnected capacity was recorded at 54,616MW against available capacity of 49,387MW and peak demand of 45,703MW. In 2014, SAPP posted a capacity shortfall of 1,253MW at 7.5 percent calculated reserve margin[^8].

A total of 2,896MW of new capacity was targeted to be commissioned during the year under review. Of this capacity Republic of South Africa (RSA) accounted for 2,376MW; Zambia 195 MW; Angola 150MW; and Mozambique 175MW.

The SAPP outlook for the period 2014 to 2018, is to commission about 27,881MW of new generation.

Plans to connect the SAPP to the Eastern African Power Pool (EAPP) are making steady progress. In December 2014, Ministers from Zambia, Tanzania and Kenya signed an Inter-Governmental Memorandum of Understanding (IGMOU) for the construction and connection of the 700km, 330KV transmission line that will interconnect the 3 countries.

2.20.2 SAPP System Disturbances

The SAPP system disturbance in 2014 is depicted in figure 6. Generally, since January 2014, the system disturbance declined except for spikes that were recorded in August and December.

[^8]: A measure of available generating capacity over and above the capacity needed to meet normal peak demand levels.
2.20.3 SAPP Power Trading

Trading on the SAPP is done via Day Ahead Market (DAM) and Post Day Ahead Market (PDAM). The performance of the market is depicted in figure 7. As shown in the graph the bulk of the trading was under DAM. During the year under review, the share of competitive trading progressed steadily throughout the year, rising from 4 percent to 8 percent by the close of the year.

Figure 7: SAPP 2014 Trading trend

Source: SAPP
3.0 Petroleum Sub-Sector

3.1 Importation of Petroleum Products

Zambia’s petroleum requirements are met through importation of petroleum feedstock and finished petroleum products. Petroleum feedstock is imported through the TAZAMA pipeline which runs from Dar-es-Salaam (Tanzania) to Ndola (Zambia). Petroleum feedstock imports in 2014 accounted for approximately 50 percent of the country’s needs. The balance came as finished petroleum products, which was imported by road from the region. Both feedstock and finished petroleum products were imported by the Government.

3.1.1 Petroleum Feedstock

Zambia imports commingled petroleum feedstock which is refined at INDENI Petroleum Refinery. The country imports commingled petroleum feedstock instead of pure crude oil because the refinery is not designed to process the heavier products such as heavy fuel oil into lighter products like petrol and diesel. The petroleum feedstock is comprised of crude oil (Murban or Oman), diesel, and naphtha. Figure 8 shows the trends in the importation of petroleum feedstock from 2010 to 2014.

---

9 Naphtha is a mixture of various volatile flammable liquid hydrocarbons used as a solvent.
In 2014, the amount of feedstock imports declined by 7.7 percent from 606,463MT in 2013 to 559,916MT in 2014.

3.1.2 Finished Petroleum Products

The Government imports finished petroleum products to supplement refinery production. Figure 9 shows imports of finished petroleum products by the Government for the period 2010 to 2014. Generally, between 2010 and 2014, there was a rise in imports of petroleum products which was consistent with the growth in the economy.
During the year under review, imports of petrol and diesel increased by 124 percent from 238,612 m³ in 2013 to 534,485 m³ in 2014. Notably, there were more imports of diesel (297,361 m³) compared to petrol (237,125 m³) during the period under review.

### 3.2 Operations at TAZAMA

#### 3.2.1 TAZAMA Throughput

TAZAMA Pipelines Limited (TAZAMA) is responsible for the conveyance of petroleum feedstock to Ndola Fuel Terminal (NFT) in Ndola from the Dar-es-Salaam tank farm via a 1,710 km pipeline. At inception, the pipeline had a design throughput capacity of 1,100,000 MT per annum. Currently, the throughput capacity has reduced to 700,000 MT per year due to degradation. The pipeline has over the years required major rehabilitation. In 2014, the throughput reduced to 519,725 MT from 615,916 MT in 2013, representing a 15.6 percent reduction. Notably, throughput for 2014 was below the capacity of the pipeline. Figure 10 shows the throughput trends for the period 2010 to 2014.
Petroleum Sub-Sector

**Figure 10: Throughput for Feedstock for TAZAMA Pipeline, 2010 -2014**

<table>
<thead>
<tr>
<th>Year</th>
<th>Throughput (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>603,234 MT</td>
</tr>
<tr>
<td>2011</td>
<td>579,058 MT</td>
</tr>
<tr>
<td>2012</td>
<td>596,094 MT</td>
</tr>
<tr>
<td>2013</td>
<td>615,916 MT</td>
</tr>
<tr>
<td>2014</td>
<td>519,720 MT</td>
</tr>
</tbody>
</table>

Source: TAZAMA Pipelines Limited

**3.2.2 Petroleum Storage**
Petroleum Sub-Sector

The Government of the Republic of Zambia embarked on a programme to construct fuel storage depots to be located in each province in order to enhance security of supply. TAZAMA Pipelines Limited has been engaged to supervise the construction works and also manage the depots. Details on the construction of the petroleum storage depots are shown in table 8.

Table 8: Construction of Petroleum Storage Depots, 2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Project</th>
<th>Status/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ndola Fuel Terminal</td>
<td>Rehabilitation works continued in 2014 with an overall work progress of 98 percent. The works included rehabilitation and upgrading of existing storage tanks. The completion of the project was expected by the end of June, 2015.</td>
</tr>
<tr>
<td>2.</td>
<td>Mpika Petroleum Storage Depot</td>
<td>Construction of the Depot was completed in May, 2014 and was officially commissioned on 5th August 2014. The Depot has five (5) petroleum storage tanks with a combined storage capacity of 6,500m³ (diesel - 4,000m³; petrol - 2,000m³; and kerosene - 500m³). The Depot was constructed at a cost of over US$23 million.</td>
</tr>
<tr>
<td>3.</td>
<td>Solwezi Petroleum Storage Depot</td>
<td>Construction of the Solwezi Fuel Storage Depot commenced in 2013. In 2014 the construction works were at 92 percent. The works include construction of five (5) fuel storage tanks and fuel containment facilities. The depot will have a combined fuel storage capacity of 15,500m³ as follows: diesel - 10,000m³; petrol - 5,000m³; and kerosene - 500m³. The project is expected to be completed by June 2015 at a cost of over US$25 million.</td>
</tr>
<tr>
<td>4.</td>
<td>Mongu Petroleum Storage Depot</td>
<td>Construction works of the Mongu Fuel Depot commenced in 2014. The construction work is 5 percent complete. The works include construction of five (5) fuel storage tanks and fuel containment facilities. The Depot will have a combined fuel storage capacity of 6,500m³ as follows: diesel - 4,000m³; petrol - 2,000m³; and kerosene - 500m³. The project is expected to be completed in April 2016 at a cost of over US$27 million.</td>
</tr>
</tbody>
</table>

Source: TAZAMA
3.2.3 TAZAMA Pipeline Rehabilitation Works

During 2014, TAZAMA undertook a number of rehabilitations as shown in table 9.

Table 9: TAZAMA Pipeline Rehabilitation Works, 2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Rehabilitation Works</th>
<th>Status/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Intelligent Pigging Project</td>
<td>After the intelligent pigging exercise from Kigamboni Pumping Station in Dar-es-Salaam to Ndola in 2013, works were undertaken to repair the corroded areas along the pipeline. Works continued in 2014 and are expected to be concluded in 2018 at a cost of US$7.5 million.</td>
</tr>
<tr>
<td>2.</td>
<td>Rehabilitation of Pipeline</td>
<td>TAZAMA Pipeline Limited continued to repair all corroded areas along the pipeline which had metal losses of more than 80 percent. It was anticipated that after completion of repair works on all corroded areas with metal losses of more than 80 percent, throughput capacity would be improved to 110m³/hr from the current 105m³/hr. The total cost for repairs was about US$1.4 million.</td>
</tr>
<tr>
<td>3.</td>
<td>Replacement of Pumping Units</td>
<td>Work to replace the pumping units and the main pumps at Elphons Pass Station, in Tanzania, continued at a cost of US$6.2 million. Ninety percent (90%) of requirements for pumping units and main pumps were procured for the replacement of four pumping units and installation works are scheduled to be concluded in June, 2015.</td>
</tr>
<tr>
<td>4.</td>
<td>Electrifications of Elphons Pass Pumping Station</td>
<td>Electrification of Elphons Pass Station and surrounding villages was undertaken jointly with the Rural Electrification Agency (REA) in Tanzania. The project was concluded and commissioned in October 2014. The total cost for the project was US$2 million which was jointly financed on a 50-50 basis between TAZAMA and REA in Tanzania.</td>
</tr>
<tr>
<td>5.</td>
<td>Rehabilitation of Tank No. 4 at the Dar-es-Salaam Tank Farm</td>
<td>Repair works on Tank No. 4 continued in 2014 and are scheduled to be concluded in March 2015 at a cost of US$ 1.2 million.</td>
</tr>
</tbody>
</table>

3.3 Operations at INDENI

INDENI is responsible for refining petroleum feedstock and has a throughput capacity of 850,000MT per annum. During the year under review, INDENI was operational for a total number of 304 days, having shut down for 61 days. This is in comparison to 267 days of operation and 98 days of shutdown.

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10 Intelligent Pigging in the context of pipelines refers to the use of devices known as pigs to perform various maintenance operations on the pipeline without disruption of the flow of the crude feedstock.
Petroleum Sub-Sector

in 2013. During planned shutdowns, the Government imports finished petroleum products to cover for the shortfall.

In 2014, the composition of the petroleum feedstock processed by INDENI was on average 52 percent diesel, 21 percent Murban crude oil and 27 percent Naphtha. Figure 11 shows the trend in the quantity of feedstock processed by the Refinery from 2010 to 2014.

**Figure 11: Petroleum feedstock processed by INDENI, 2010-2014**

As shown in figure 11, INDENI throughput averaged 661,400MT between 2010 and 2014. Specifically in 2014, the throughput was 701,000MT compared to 627,000MT in 2013 representing a rise of 11.8 percent.

In 2012, INDENI commenced the rehabilitation of the bitumen plant at an estimated cost of US$20.7 million. By the end of 2014, the plant was yet to commence full scale operations. Consequently, the ERB modified the Petroleum Pricing Model in preparation for full scale operation.

### 3.4 National Consumption of Petroleum Products

The national consumption of petroleum products continued to increase in 2014. Figure 12 shows the trends in national fuel consumption from 2010 to 2014.
The national consumption of all petroleum products was 1,179,444MT in 2014 compared to 1,067,460MT in 2013 reflecting a growth of 10.5 percent. In 2014 diesel was the most consumed petroleum product at 700,558MT (824,186m³)\(^{11}\) followed by petrol at 304,562MT (406,083m³)\(^{12}\) while the least consumed was LPG at 3,680MT.

Notably, there has been a sustained increase in the consumption of petrol and diesel from 2010 to 2014. Specifically, between 2013 and 2014, the national consumption for petrol increased by 10.5 percent. This increase can be, partially, attributed to the growth in the population of motor vehicles in the country. The population of registered vehicles increased by 13.3 percent; that is, from 534,532 in 2013 to 605,637 in 2014.

Similarly, the national consumption of diesel increased by 3.62 percent; between 2013 and 2014. The increased consumption of diesel can be attributed to the sustained growth of the economy.

On the other hand, the national consumption of Heavy Fuel Oil (HFO) increased from 50,793MT in 2013 to 118,492MT in 2014 reflecting a growth of 133.3 percent. The increment in the national consumption is attributed to the demand from Ndola Energy Company Limited that was commissioned in November 2013.

The national consumption for Jet A-1 declined by 22.8 percent from 49,613MT in 2013 to 38,289MT (48,162m³)\(^{12}\) in 2014. This decline can, partially, be attributed to the discontinuation of flights by British Airways in October 2013 and KLM Royal Dutch Airlines in October 2014.

\(^{11}\) In the case of diesel 1 Metric Tonne is equal to 1.19m³ using a density of 0.84

\(^{12}\) In the case of Petrol 1 Metric Tonne is equal to 1.33m³ using a density of 0.75
The national consumption of kerosene increased by 12.6 percent; from 12,315MT in 2013 to 13,863MT (17,437m³) in 2014. The increment is consistent with the growth in the economy.

The national consumption of LPG increased by 21.8 percent; from 3,021MT in 2013 to 3,680MT in 2014.

### 3.5 Daily National Consumption

As depicted in figure 13, diesel is the most consumed commodity in comparison to all the other petroleum products. Generally, for all the petroleum products, there has been a gradual rise in consumption over time.

With regard to diesel, the average consumption was 2,284,986 litres per day in 2014 compared to 2,179,138 litres in 2013. Similarly, the daily national average consumption of petrol increased to 1,112,555 litres per day from 1,006,772 litres per day in 2013. The daily national average consumption for kerosene increased to 47,474 litres from 42,296 litres while the daily national average consumption of HFO increased from 139,160MT to 324,637MT. The daily national average consumption for LPG increased to 10,083MT in 2014 from 8,278MT in 2013.

![Figure 13: National Average Daily Consumption, 2012–2014](image)

The daily national average consumption of Jet A-1 declined from 169,907 liters in 2013 to 131,125 litres in 2014.

### 3.5.1 Consumption by Province

Figure 14 shows the average daily consumption of petroleum products. As depicted in the figure, the top most consumers of petroleum products are Lusaka Province, Copperbelt Province and North Western Province in that order. The least consumers are Muchinga Province, Northern Province and Western Province.

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13 1 Metric Tonne of Jet A1 and Kerosene is equal to 1.26m³ using density of 0.795
In 2014, the national daily average consumption of diesel (inclusive of Low Sulphur Gasoil), petrol and kerosene combined was 3,444,954 litres per day. Lusaka Province consumed the highest volumes of the three petroleum products combined at 1,173,817 litres per day representing 34.1 percent of national average daily consumption. This comprised 628,921 litres of diesel, 534,165 litres of petrol and 10,730 litres of kerosene per day respectively.

The second highest consumer was Copperbelt Province with a combined average daily consumption of 972,611 litres per day (28.2 percent of total consumption) comprising 687,007 litres of diesel, 265,445 litres of petrol and 20,159 litres of kerosene per day, respectively.

North Western province was the third highest consumer with a combined daily average of 584,754 litres of fuel per day, comprising 544,814 litres of diesel, 39,415 litres of petrol and 524 litres of kerosene per day, respectively.

The three provinces accounted for 79.3 percent of the total national consumption. This is consistent with the level of economic activities in these provinces, including the number of retail outlets.

Muchinga province had the lowest average daily combined consumption of the three petroleum products at 41,344 litres per day (1.2 percent of total consumption). Of the 41,344 litres daily consumption, 25,649 litres was diesel, 15,576 litres was petrol and 119 litres was kerosene. The rest of the provinces consumed 19.5 percent of the national fuel consumption.

### 3.5.2 Consumption by Economic Sector

Figure 15 shows the consumption of diesel (including Low Sulphur Gasoil), petrol, kerosene and Jet A-1 in 2013 and 2014 by economic sector. The economic sectors are classified as follows retail, mining and non-mining. Retail refers to petroleum products that are sold at the forecourt while mining refers to petroleum products delivered to and directly consumed by the mines. Non-mining refers to all the other sectors in the economy.
In 2013 and 2014, the retail sector consumed the highest proportion of petroleum products followed by the mining sector. In 2014, the retail and mining sectors collectively accounted for 75 percent of the national consumption. Meanwhile, during the same period the non-mining sector accounted for 25 percent compared to 29 percent in 2013.

3.6 Market Share of Oil Marketing Companies (OMCs)

Market share refers to the percentage of the total quantity (litres) of sales of petroleum products in a market (in this case Zambia) that an Oil Marketing Company (OMC) sold in a specified period. It is expressed as a percentage of the total sales of an OMC to the total sales in the industry in a specified
period of time. This section gives an outline of OMCs combined market share for diesel (inclusive of Low Sulphur Gasoil), petrol, kerosene, lubricants and Jet A-1.

3.6.1 Market Share of White Products

Figure 16 shows the market shares of OMCs for white products i.e. diesel (inclusive of Low sulphur gasoil), petrol and kerosene. As depicted in figure 16, the market share was dominated by Puma Energy Zambia Plc and Total Zambia Limited, which collectively accounted for 51.1 percent of the market in 2014 compared to 53.7 percent in 2013. Despite the decline, Puma Energy Zambia Plc was the highest (25.7 percent) market share followed by Total (Z) Limited at 25.3 percent in 2014. The large market share for Puma Energy Zambia Plc and Total (Z) Limited could be attributed to the supply contracts that they have with the mines.

Notably, there was an increase in the market share for other OMCs except for SGC Investment Zambia and Spectra Oil Zambia which remained constant at 3.6 percent and 5.7 percent, respectively, in 2014. Mount Meru Petroleum (Z) Limited and Engen Petroleum (Z) Limited increased their market share to 8.2 percent and 8.4 percent compared to 8.3 percent and 7.6 percent, respectively. Further, Kobil Zambia Limited and Petroda Zambia Limited's market share grew by 0.1 percent and 0.6 percent respectively. Similarly, the combined market share for the Other OMCs (20) increased by 1.3 percent.

3.6.2 Market Share of Jet A-1

Figure 17 shows the market share for Jet A-1. The figure shows that during the period under review, Puma Energy had the highest market share (64.6%), followed by Total (32.5%) and Oryx (2.7%). The least market share was held by Mount Meru at 0.2 percent. For Puma Energy, the share had significantly increased from 39.5 percent in 2013, to 64.6 percent in 2014. The market share for Total reduced from 55.1 percent in 2013 to 32.5 percent in 2014.
The market share for Oryx declined from 4.5 percent to 2.7 percent between 2013 and 2014. Meanwhile, the market share for Mount Meru remained the same at 0.2 percent during the same period.

**3.6.3 Market Share for Lubricants**

Figure 18 shows the market share of lubricants during the period under review. Puma Energy Zambia Plc continued to lead although the market share declined from 49.6 percent in 2013 to 27.5 percent. However, Spectra Oil Zambia Limited recorded an increase in market share from 21.8 percent in 2013 to 24.2 percent in 2014. Engen Petroleum Zambia Limited’s market share significantly increased from 5.4 percent in 2013 to 20.7 percent in 2014.
As figure 18 shows, Total (Z) Limited was next with a growth of 3.9 percent; that is moving from 13.0 percent in 2013 to 16.8 percent in 2014. Fuchs Zambia Limited and SGC Zambia Limited had 4.6 percent and 3.5 percent of market share respectively while the rest (6) of the companies with a market share of 2 percent or less had a combined market share of 2.6 percent declining from 3.9 percent in 2013.

3.7 Pricing of Petroleum Products

3.7.1 Determinants of Petroleum Prices

The wholesale and pump prices of petroleum products are reviewed for each cargo of feedstock and finished petroleum products procured. The ERB continued to determine prices of petroleum products using the Cost Plus Model (CPM). This model works on the principle of cost recovery along the petroleum supply chain. The main factors that influence the domestic fuel prices are the international oil price and the exchange rate of the Zambian Kwacha against the United States Dollar.
3.7.2 International Oil Prices

The trend in international oil prices for 2014 is depicted in figure 19. Generally, crude oil prices were stable between January and July. Thereafter, prices started to fall sharply until the close of the year. This decline in prices was attributed to the increased supply on the market by oil producing countries.

Specifically, for Murban crude, prices fell from US$109.55/bbl\textsuperscript{14} in January to US$60.02/bbl in December. Likewise, West Texas Intermediate (WTI) fell from US$91.86/bbl to US$52.60/bbl while Brent Crude fell from US$109.18/bbl to US$60.31/bbl.

\textsuperscript{14} 1 Barrel (bbl) is equivalent to 159 litres.
Petroleum Sub-Sector

3.7.3 Trend in Exchange Rate

Figure 20 shows the trend of the Zambian Kwacha against the United States Dollar in 2014.

The Zambian Kwacha depreciated steeply between January and May 2014, falling from monthly average of K5.53/US$ in January to K6.62/US$ in May 2014. The depreciation of the Kwacha was partially caused by the strengthening of the US dollar against other major currencies following the US Federal Reserve’s decision to reduce the amount of liquidity it injects into the US economy through its monetary stimulus measures (BoZ: 2014). This led to scarcity of the US dollar and subsequent depreciation of most currencies that are pegged to it. Beyond June 2014, it appreciated slightly and reached a level of K6.39/US$ in December 2014.

3.7.4 Uniform Pump Pricing

During the year under review, the ERB continued to use the Uniform Pump Pricing (UPP) framework that entails that the price of fuel at all retail sites throughout the country is the same for petrol, diesel and kerosene. Prior to the introduction of the UPP in September 2010, the price of petrol, diesel and kerosene at retail sites furthest from the Ndola Fuel Terminal (NFT) was higher than the price obtaining at sites closer to the NFT. The UPP is administered through a transport cross subsidy mechanism. OMCs or independent dealers delivering fuel to retail sites near the depots are required to remit the transport differential for each litre of fuel into the UPP fund. OMCs or independent dealers delivering fuel to sites far from the fuel depots are reimbursed the transport differential for each litre of fuel.
Petroleum Sub-Sector

In 2014, the ERB revised the downstream margins for OMCs, dealers and transporters. This was after consultations with key stakeholders regarding the inadequacy of the margins, as these were last reviewed in May 2010. Following the review, the margins were revised as follows: OMCs from K0.40/litre to K0.42/litre; Dealers from K0.26/litre to K0.28/litre per litre and an increment of 12 percent for transporters.

3.8 Domestic Fuel Pump Prices

Figure 21 shows the trends in the domestic pump prices of petrol, diesel and kerosene. Generally, petroleum pump prices have been on the rise for the period 2000 to 2014. The rise in price was gradual between 2000 and 2008 and steeper beyond this period. The prices have sometimes remained fairly stable, such as the period between 2008 and 2009. Beyond 2009, as a result of increasing oil prices, pump prices started rising steeply. Notably, in 2013, subsidies were abolished and prices thereafter have been determined on the principle of full cost recovery. As at end of 2014, the prices for petrol, diesel and kerosene were K9.89, K9.19 and K6.77, respectively.

Figure 21: Trends in Domestic Fuel Pump Price, 2000-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Petrol (K)</th>
<th>Diesel (K)</th>
<th>Kerosene (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3.40</td>
<td>3.38</td>
<td>1.85</td>
</tr>
<tr>
<td>2001</td>
<td>3.34</td>
<td>3.32</td>
<td>2.02</td>
</tr>
<tr>
<td>2002</td>
<td>3.53</td>
<td>2.91</td>
<td>2.35</td>
</tr>
<tr>
<td>2003</td>
<td>3.75</td>
<td>3.19</td>
<td>2.40</td>
</tr>
<tr>
<td>2004</td>
<td>4.91</td>
<td>4.42</td>
<td>3.43</td>
</tr>
<tr>
<td>2005</td>
<td>5.12</td>
<td>4.77</td>
<td>3.51</td>
</tr>
<tr>
<td>2006</td>
<td>5.40</td>
<td>4.97</td>
<td>3.92</td>
</tr>
<tr>
<td>2007</td>
<td>7.19</td>
<td>6.00</td>
<td>4.39</td>
</tr>
<tr>
<td>2008</td>
<td>5.82</td>
<td>5.48</td>
<td>3.83</td>
</tr>
<tr>
<td>2009</td>
<td>5.82</td>
<td>5.48</td>
<td>3.83</td>
</tr>
<tr>
<td>2010</td>
<td>7.64</td>
<td>7.00</td>
<td>5.01</td>
</tr>
<tr>
<td>2011</td>
<td>8.16</td>
<td>7.57</td>
<td>5.15</td>
</tr>
<tr>
<td>2012</td>
<td>8.16</td>
<td>7.57</td>
<td>6.83</td>
</tr>
<tr>
<td>2013</td>
<td>9.91</td>
<td>9.20</td>
<td>6.77</td>
</tr>
<tr>
<td>2014</td>
<td>9.89</td>
<td>9.19</td>
<td>6.77</td>
</tr>
</tbody>
</table>

Note: Prices used in figure 21 are year end prices.

In 2014, ERB adjusted the wholesale and pump prices three times, as depicted in figure 22. Prices were reduced in April, November and December as shown. The reductions were consistent with the changes in the fundamentals that affect domestic pricing; that is the international oil prices and the exchange rate between the Zambian Kwacha and the United States Dollar.
3.8.1 Regional Comparative Prices

Petroleum prices vary across countries. The reasons for price differences are varied but mainly relate to the following: different supply systems; different fiscal policy regimes; different pricing methodologies; among others.

Figure 23 shows the prices of diesel, petrol and kerosene in Zambia compared to other countries in Southern and East Africa, as at 31st December, 2014. Among the selected countries, prices of petrol per litre ranged from US$1.00 to US$1.78, while diesel prices per litre ranged from US$0.97 to US$1.79. Meanwhile, the price of kerosene per litre ranged from US$0.72 to US$1.54.
Among the countries analysed, generally, Malawi, Zambia and Zimbabwe had high petroleum prices relative to the other countries. The countries with lower prices relative to others were Kenya, Namibia and South Africa.

### 3.9 Compliance to Technical Standards in the Petroleum Retail Sector

The ERB is mandated by the Energy Regulation Act, CAP 436 to issue licenses to entities operating retail sites in the petroleum sub-sector. One of the conditions of a retail licence is that the licensee needs to ensure that petroleum products are retailed in a manner that does not compromise safety, health, environment and product quality.

During the year under review, the ERB undertook compliance monitoring and also introduced a construction licence for the purpose of monitoring infrastructure standards. Under compliance monitoring, it was established that compliance had increased by 3.6 percentage points, from 80.4 percent in 2013 to 84 percent in 2014.

In 2014, a total of 22 service stations were ultimately closed due to major non-compliances such as to poor condition of the forecourt. Out of these, 15 were reopened upon rectification of the anomalies by the respective licensees and verification by the ERB.
With regard to construction and rehabilitation of petroleum infrastructure, the ERB developed and introduced a Construction Licence (CL). The licence was intended to enable the ERB monitor the development and maintenance of retail sites, among other petroleum infrastructure. To be issued with a CL, the applicant must meet the following conditions:

a) Approval letter from Zambia Environmental Management Agency;
b) Site Plan for the proposed retail infrastructure;
c) Engineering and Structural Drawings;
d) Approval from the Road Development Agency or its designated agent;
e) Supervising Engineer’s Practicing Licence;
f) Zoning approval from the local authority; and
g) Documentary evidence of the Registered Engineer’s commitment to the project.

3.10 Strategic Reserve Fund

In April 2005, Cabinet authorised the Minister responsible for Energy to establish the National Petroleum Strategic Reserves (NPSR). This directive was an implementation of the 1994 Energy Policy Objective on securing reliable petroleum supply for the country. Consequently, the Strategic Reserve Fund (SRF) was constituted in 2005 to establish and maintain strategic reserves and to help stabilise fuel prices. The ERB introduced a cost-line in the price build-up to accommodate this fund. The Strategic Reserve Fund was also created to contribute towards the development of the petroleum sector infrastructure in order to have reliable petroleum reserves in the country.

The SRF is financed by Strategic Reserve Fund fees. These are financial obligations that are required of a licensee upon collection of such fees. The fee is inbuilt in the price of petroleum products and is derived as a pre-determined amount on the quantity [litre] of fuel sold by the licensee. The SRF fee is K0.15/litre for petrol, diesel, kerosene and jet A-1. The SRF fee is K0.15/kg for HFO and liquefied petroleum gas. The fee amounts are collected by the licensee who in turn remits to the ERB.

In 2014, the ERB continued to collect and pay out of the SRF. The SRF contributed to the financing of the following:

i. Construction of fuel storage depots in Solwezi and Mongu.

ii. Importation of finished petroleum products;

iii. Road works around fuel storage depots;

iv. Rehabilitation of tanks and purchase of firefighting equipment at the Ndola Fuel Terminal and fuel storage depots; and

v. Rehabilitation of upstream infrastructure, for example, the bitumen plant at INDENI Petroleum Refinery Limited.
3.11 Challenges in the Petroleum Sub-Sector

During the year under review, the key challenges in the petroleum sub-sector were the following: poor state of infrastructure; uneven distribution of service stations in the country which were concentrated in the major towns; and compliance to petroleum technical standards.

3.11.1 Poor State of Infrastructure

The main infrastructure that supports the petroleum supply value chain has existed for a long time and most of it was in need of rehabilitation. For example, the pipeline, the refinery and the fuel terminal were built over forty years ago. The 1,710km TAZAMA pipeline, which comprises 954 kilometres of operational 8” diameter and 798 kilometres of 12” diameter looped pipelines, is in need of rehabilitation. As a result, the pipeline capacity has been reduced to a volume throughput of around 700,000MT per annum. However, rehabilitation works have commenced to improve the performance of the pipeline.

Further, INDENI is operating an old plant while the demand profile has grown significantly over the years. With higher growth in demand for diesel and petrol, petroleum feedstock imports have had to be heavily spiked to include greater than 50 percent of lighter fractions of naphtha (15-20%) and diesel (35-55%).

LSG demand cannot be met by the refinery’s current configuration and is therefore, imported as a finished product. The refinery requires to be upgraded by installing a de-sulphureting unit. In order to improve the quality of the excess light gasoline produced at the refinery, INDENI also receives some of the high octane petrol imported by the Government for blending purposes.

Excess HFO continued to be produced at INDENI, despite the recent commissioning of a 50MW power plant and upgrading of the bitumen plant. With the reduced uplifts of HFO there was accumulation of HFO in the storage tanks at INDENI threatening the closure of the refinery in early 2014. The uptake of HFO is dependent on demand from the mines, Ndola Lime and Ndola Energy. During 2014 demand from Ndola Lime drastically reduced and contributed to the ullage constraint.

In 2014, there was negligible production of Jet A-1 at INDENI which resulted in OMCs importing it. Since the landed cost is usually higher than the INDENI price, the Government provides price support to the OMCs authorized to import Jet A-1.

3.11.2 Uneven Distribution of Service Stations

During 2014, the challenge of uneven distribution of service stations in the country continued. Notably, there were fewer service stations in remote areas compared to urban areas. The OMCs prefer to build service stations in urban areas especially; Lusaka and the Copperbelt Provinces. Meanwhile, areas further away from the line of rail are inevitably serviced by illegal fuel vendors.
3.11.3 Low Compliance Levels

During the year under review, there were concerns on the adherence to technical standards by service stations. In particular, there were concerns on the state of infrastructure around the existing service stations while new ones were not adhering to construction standards. Therefore in 2014, the ERB carried out enforcement action that led to the closure of some service stations. Furthermore, the ERB developed service station grading standards which were implemented in Lusaka and Livingstone. To address the challenge of poor infrastructure the ERB developed and implemented the construction licenses.

3.12 Prospects for 2015

In 2015, the petroleum sub-sector is expected to experience continued growth as new developments take place. The developments include: the construction of rural service stations; the implementation of a tax measure on the removal of 5 percent customs duty on Jet A-1; and the commitment to cost reflective pricing of petroleum products.

3.12.1 Roll out of Rural Filling Stations

The MMEWD intends to roll-out the construction of rural service stations in selected rural areas which have no filling stations. Once rolled out, the programme is expected to address the challenges that rural areas face in the supply of fuel.

3.12.2 Removal of Customs Duty on Jet A-1

Following concerns about production and price of Jet A-1 which was deemed to be uncompetitive, the ERB engaged Government with the view to finding a lasting solution to this matter. In 2014, the Government announced the removal of 5 percent customs duty on Jet A-1, a measure which was expected to be effected in 2015. This measure is expected to contribute to the development of the aviation industry.

3.12.3 Cost Reflective Pricing and Review of Margins

In 2013, the Government removed subsidies on fuel. Consequently in 2014 the Government directed that there should be cost reflective pricing of energy products so as to guarantee security of supply. Consequently, going forward, the ERB will review the Cost-plus Model to ensure that there is full cost recovery on procurement of petroleum feedstock and imported finished petroleum products. The implementation of new margins for downstream players is expected to bring efficiency to their operations and allow for recapitalization.

3.12.4 Development of New Bio-Energy Standards

The ERB spearheads the development of technical standards in the energy sector. This is done in conjunction with Zambia Bureau of Standards (ZABS) and other key stakeholders through
Technical Committees such as the Petroleum Products Quality Technical Committee (PPQTC). The Technical Committee has developed several product quality standards and specifications including those for bio-diesel, bio-ethanol, automotive gasoil, unleaded petrol, Jet A1, kerosene, bitumen and lubricant products.

In 2014, the ERB constituted a Bio-gas Technical Committee to develop standards for the Bio-gas sector in Zambia. Through this Technical Committee, it is expected that the standards on bio-gas will be developed soon.

3.12.5 Bio-Fuels Blending Standards

During the year under review, the ERB, in conjunction with other stakeholders developed bio-fuel blending standards for Automotive Spark Ignition Engines- Specification. The standard is expected to provide performance requirements for various gasoline-ethanol blends and recommended test methods. This will allow for the use of blended petroleum products in the country.

3.12.6 Bio-Gas Standards

The bio-gas sector is gradually growing but there are no bio-gas standards in Zambia that deal with digester sizing and design, installation, warranties to customers, information about operations and maintenance of the system to ensure optimal operation and longevity. Therefore a standard aimed at protecting players in the sector and also safeguarding the interests of consumers was developed. The standard was published for public comments in December 2014 and would be finalized for approval by the ZABS council and will be published in 2015.
APPENDIX 1: ZESCO’s Performance on specific KPIs in 2014

i) Customer Metering

Performance under customer metering was below target on account of the ZESCO’s inability to meter all un-metered customers by the target date of March 2013. During the year under review there was still a backlog of unmetered customers.

ii) Cash Management

The cash management KPI comprises trade receivables and debtor days for both GRZ and non-GRZ customers. The debtor days indicator measures the average number of days it takes for the Utility, from the initiation of credit sale to the realisation of the cash when non-GRZ and GRZ customers settle their debt obligations. ZESCO performed poorly on this KPI throughout the period under review.

Non-GRZ Trade Receivables

ZESCO’s non-GRZ receivables were required to be 17 percent or less of trade turnover by March 2013. At the end of March 2014, non-GRZ trade receivables increased to 36 percent from 25 percent as at end of March, 2013.

Consequently, the Utility attained a zero percent score on its performance for this indicator for the quarterly period under review and FY.

GRZ Trade Receivables

ZESCO’s GRZ trade receivables were required to be 25 percent or less of GRZ trade turnover by March 2013. In 2014, GRZ receivables increased to 242 percent as at the end of March 2014 from 203 percent as at the end of March, 2013.

Non-GRZ Debtor Days

ZESCO’s non-GRZ debtor days were required to reduce to no more than 60 days by March 2013. During 2014, Non-GRZ debtor days stood at 131 days, an increase from 85 days recorded in 2013.

GRZ Debtor Days

Under this KPI, ZESCO was required to reduce non-GRZ debtor days to not more than 90 days by March 2013. GRZ debtor days stood at 923 days at the end of March 2014 an increase from 826 days recorded in 2013.

iii) Staff Productivity

The staff productivity KPI is composed of the customer-employee ratio and staff cost to total costs ratio. In 2014, ZESCO’s annual score on the KPI was 15 percent, unchanged from the score of 15 percent achieved in 2013 against the weighting score of 15 percent. The target customer-employee ratio for the period under review was 100:1.

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15 Non GRZ trade receivables percentage equal to Non GRZ trade receivables at the end of the quarter over the Non GRZ turnover earned for the quarter multiplied by four by 100%
16 GRZ receivable percentage equals GRZ trade receivables at the end of the quarter over the GRZ turnover earned for the quarter multiplied by four by 100%
17 GRZ trade receivable days equal to GRZ percentage of trade receivables multiplied by 365 days
18 Total costs include cost of sales, total operating and maintenance costs, financing charges and exchange losses/gains
Customer – Employee ratio

In 2014, ZESCO’s average customer-employee ratio was 121:1, an improvement from the 2013 performance of 98:1. The increase in ZESCO’s customers from 527,378 in 2013 to 603,179 in 2014 also contributed to the positive performance on this KPI.

Staff Costs

The target for this KPI was to have ZESCO’s staff costs as a percentage of total operating expenses at no more than 45 percent by March 2014. In 2014, ZESCO’s staff costs deteriorated to 49 percent from 32 percent recorded in 2013.

iv) Quality of Service Supply

The quality of service supply KPI comprises of the System Average Interruption Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Customer Average Interruption Duration Index (CAIDI) and Average System Availability Index (ASAI) indices.

The quality of service supply indices are differentiated between Dry (i.e. April to September) and Wet seasons (i.e. October to March) in the year. This is to take into account challenges of the rainy season in the distribution and supplying of electricity.

The annual score achieved for 2014 was 22 percent, a marginal reduction from the 23 percent attained in 2013 against the weighting score of 25 percent.

SAIDI

ZESCO is required to maintain a WS-SAIDI of 36 hours and DS-SAIDI of 27 hours per customer or less per quarter.

In 2014, ZESCO recorded an average annual SAIDI score of 25 hours, a marginal reduction from 26 hours recorded in 2013 against the annual average target of 32 hours.

SAIFI

ZESCO is required to maintain a DS-SAIFI of 5 and 5.5 WS-SAIFI outages per customer each quarter. ZESCO recorded an average annual SAIFI of 3 times for 2014, which was an improvement from 7 times recorded in 2013 against the average annual target of 5 times. Like the SAIDI, the SAIFI indice is computed by excluding outage hours on account of load shedding.

CAIDI

The average annual CAIDI was 8 hours in 2014, an increase from 5 hours recorded in 2013 against the annual average target of 6 hours. The performance for the year was below target.

ASAI

ZESCO is required to maintain an ASAI of at least 90 percent. For the period under review, ZESCO recorded an average annual ASAI of 97 percent, an improvement from 96 percent recorded in 2013.

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19 It should be noted that in computing the quality of service indices outage hours relating to load shedding were excluded as it was understood and agreed that in the short-term load shedding was a capacity challenge that was beyond the Utility’s control.
v) **System losses**

The KPI is comprised of transmission and distribution losses sub indicators. In 2014, ZESCO’s annual score on this KPI was 22 percent. This was the same score recorded in 2013.

**Transmission losses**

ZESCO was required to maintain transmission losses of 5 percent or less. ZESCO’s annual average transmission losses for 2014 were 6 percent, a reduction from 2013 when transmission losses were at 7 percent.

**Distribution losses**

During 2014, ZESCO was required to maintain distribution losses of 14 percent or less. ZESCO’s average annual distribution losses in 2014 was 14 percent compared to 13 percent in 2013.
## APPENDIX 2: ZESCO’S Approved Tariffs

<table>
<thead>
<tr>
<th>CUSTOMER CATEGORY</th>
<th>Old Tariffs (K)</th>
<th>% increment</th>
<th>2014 ERB Approved tariffs (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. METERED RESIDENTIAL (Prepaid) (capacity 15 kVA)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1 - Consumption up-to 100 kWh</td>
<td>Energy charge/kWh</td>
<td>0.15</td>
<td>0%</td>
</tr>
<tr>
<td>R2 - Consumption between 101 &amp; 300 kWh</td>
<td>Energy charge/kWh</td>
<td>0.25</td>
<td>24.63%</td>
</tr>
<tr>
<td>R3 - Consumption above 300 kWh</td>
<td>Energy charge/kWh</td>
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<td>24.63%</td>
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<tr>
<td>Prepaid</td>
<td>Energy charge/kWh</td>
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<td>abolished</td>
</tr>
<tr>
<td>Fixed Monthly Charge</td>
<td>14.63</td>
<td>24.63%</td>
<td>18.23</td>
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<tr>
<td><strong>2. COMMERCIAL TARIFFS (capacity 15kVA)</strong></td>
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<td></td>
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<tr>
<td>Commercial</td>
<td>Energy charge/kWh</td>
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<td>15.38%</td>
</tr>
<tr>
<td>Fixed Monthly Charge</td>
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<td>15.38%</td>
<td>55.09</td>
</tr>
<tr>
<td><strong>3. SOCIAL SERVICES</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Schools, Hospital, Orphanages, churches, water pumping &amp; street lighting</td>
<td>Energy charge K/kWh</td>
<td>0.24</td>
<td>15.38%</td>
</tr>
<tr>
<td>Fixed Monthly Charge</td>
<td>41.52</td>
<td>15.38%</td>
<td>47.91</td>
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<td><strong>4. MAXIMUM DEMAND TARIFFS</strong></td>
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<td></td>
</tr>
<tr>
<td>MD1 - Capacity between 16 - 300 kVA</td>
<td>MD charge/kVA/Month</td>
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<td>19.49%</td>
</tr>
<tr>
<td></td>
<td>Energy charge/kWh</td>
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<td></td>
<td>Fixed Monthly Charge</td>
<td>114.50</td>
<td>19.49%</td>
</tr>
<tr>
<td>MD2 - Capacity 301 to 2,000 kVA</td>
<td>MD charge/kVA/Month</td>
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</tr>
<tr>
<td></td>
<td>Energy charge/kWh</td>
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<td>19.49%</td>
</tr>
<tr>
<td></td>
<td>Fixed Monthly Charge</td>
<td>228.99</td>
<td>19.49%</td>
</tr>
<tr>
<td>MD3 - Capacity 2,001 to 7,500kVA</td>
<td>MD charge/kVA/Month</td>
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<tr>
<td></td>
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<td>Fixed Monthly Charge</td>
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<td>MD4 - Capacity above 7500kVA</td>
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<td></td>
<td>Energy charge/kWh</td>
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</tr>
<tr>
<td></td>
<td>Fixed Monthly Charge</td>
<td>1,103.13</td>
<td>5.11%</td>
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## APPENDIX 3: ZPL Approved Tariffs

<table>
<thead>
<tr>
<th>Tariff Type</th>
<th>Current Tariffs ZMK</th>
<th>Year 2012/13 ZMK</th>
<th>Year 2013/14 ZMK</th>
<th>Year 2014/15 ZMK</th>
<th>% Change 2014</th>
<th>% Change 2015</th>
<th>% Change 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential No-Meter Tariffs</strong></td>
<td></td>
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<tr>
<td>Connection fee</td>
<td>250.00</td>
<td>275.00</td>
<td>305.00</td>
<td>335.00</td>
<td>10.00%</td>
<td>11.91%</td>
<td>9.84%</td>
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<tr>
<td>Monthly tariff</td>
<td>40.00</td>
<td>44.40</td>
<td>50.22</td>
<td>56.91</td>
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<td><strong>Residential Metered Tariffs</strong></td>
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<tr>
<td>Connection Fee</td>
<td>500.00</td>
<td>550.00</td>
<td>605.00</td>
<td>670.00</td>
<td>10.00%</td>
<td>10.00%</td>
<td>10.74%</td>
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<tr>
<td>Monthly Service Fee</td>
<td>50.00</td>
<td>56.10</td>
<td>61.92</td>
<td>69.47</td>
<td>12.15%</td>
<td>10.45%</td>
<td>12.16%</td>
</tr>
<tr>
<td>Tier one (0 – 150 kWh)*</td>
<td>Abolished</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier two (151 – 300 kWh)</td>
<td>0.32</td>
<td>0.40</td>
<td>0.40</td>
<td>0.43</td>
<td>11.11%</td>
<td>11.43%</td>
<td>10.26%</td>
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<tr>
<td>301-450 kWh</td>
<td>0.45</td>
<td>Abolished</td>
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<td></td>
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<tr>
<td>Tier three (Above 300 kWh)</td>
<td>N/A</td>
<td>0.48</td>
<td>0.53</td>
<td>0.59</td>
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<td>Above 450 kWh</td>
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<td><strong>Standard Commercial Tariff</strong></td>
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<tr>
<td>Single phase connection</td>
<td>500.00</td>
<td>550.00</td>
<td>605.00</td>
<td>670.00</td>
<td>10.00%</td>
<td>10.00%</td>
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<tr>
<td>Three phase connection</td>
<td>750.00</td>
<td>825.00</td>
<td>910.00</td>
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<td>10.00%</td>
<td>10.30%</td>
<td>9.89%</td>
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<tr>
<td><strong>Tariff Type</strong></td>
<td>Current Tariffs ZMK</td>
<td>Year 2012/13 ZMK</td>
<td>Year 2013/14 ZMK</td>
<td>Year 2014/15 ZMK</td>
<td>% Change 2012/13</td>
<td>% Change 2013/14</td>
<td>% Change 2014/15</td>
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<td>50.00</td>
<td>55.00</td>
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<td>10.00%</td>
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<tr>
<td>Tariff rate/kWh</td>
<td>0.43</td>
<td>0.48</td>
<td>0.53</td>
<td>0.59</td>
<td>11.63%</td>
<td>10.42%</td>
<td>11.32%</td>
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<tr>
<td><strong>Off Peak Commercial</strong></td>
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<td>Single phase connection</td>
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<td>605.00</td>
<td>670.00</td>
<td>10.00%</td>
<td>10.00%</td>
<td>10.74%</td>
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<tr>
<td>Three phase connection</td>
<td>750.00</td>
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<td>Monthly Service Fee</td>
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<td>9.09%</td>
<td>8.33%</td>
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<tr>
<td>Tariff rate/kWh</td>
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<td>0.38</td>
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<td>10.14%</td>
<td>10.53%</td>
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<td><strong>Community Service Tariff</strong></td>
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<tr>
<td>Connection Fee</td>
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<td>605.00</td>
<td>670.00</td>
<td>10.00%</td>
<td>10.00%</td>
<td>10.74%</td>
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<tr>
<td>Monthly service fee</td>
<td>50.00</td>
<td>56.10</td>
<td>61.94</td>
<td>69.47</td>
<td>12.15%</td>
<td>10.45%</td>
<td>12.16%</td>
</tr>
<tr>
<td>Tier one (0 – 150 kWh)</td>
<td>N/A</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier two (151 – 300 kWh)</td>
<td>0.35</td>
<td>0.39</td>
<td>0.43</td>
<td>-</td>
<td>11.43%</td>
<td></td>
<td>10.26%</td>
</tr>
<tr>
<td><strong>Small Business Tariff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Connection Fee</td>
<td>N/A</td>
<td>550.00</td>
<td>605.00</td>
<td>670.00</td>
<td>10.00%</td>
<td>10.74%</td>
<td></td>
</tr>
<tr>
<td>Monthly service fee</td>
<td>-</td>
<td>56.10</td>
<td>61.94</td>
<td>69.47</td>
<td>10.45%</td>
<td>12.16%</td>
<td></td>
</tr>
<tr>
<td>Tier one (0 – 150 kWh)</td>
<td>N/A</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
The Energy Regulation Board (ERB) is a statutory body charged with the responsibility of regulating the energy sector in Zambia. Key functions of ERB include issuance of licenses, monitoring the efficiency and performance of utilities and ensuring they comply with relevant standards and license conditions. The regulator also receives, investigates and resolves complaints from consumers and utilities regarding price adjustments, quality of energy products and services including the location of energy facilities.

The ERB is pleased to announce the launch of its Energy Consumer Toll Free Line – 8080 to broaden its interaction with consumers and expedite complaints resolution effectively. Consumers can now call the ERB free of charge to:

- Lodge outstanding complaints on energy products and services;
- Report wrong doing among players in the sector; and
- Report energy related accidents and incidents.

To access the regulator regardless of your geographical location call 8080 every Monday to Friday from 08:00 hours – 13:00 hours and 14:00 hours to 17:00 hours. Remember, the toll free line 8080 is accessible on Airtel and MTN networks.

For more details, contact ERB at the following addresses:

**Head Office**  
Plot No 9330, Off Alick Nkhata Road, P O Box 37631, Lusaka, Zambia  
**Tel:** 260-211-258844 – 49  
**Fax:** 260-211-258852

**Copperbelt Office**  
Plot 332, Independence Avenue, P O Box 22281, Kitwe, Zambia  
**Tel:** 260-212-220944  
**Fax:** 260-212-220945

**Livingstone Office**  
Stand No. 708, Chimwemwe Road, P.O. BOX 60292, Nottie Broadie, Livingstone, Zambia  
**Tel:** +260 213 321562-3  
**Fax:** +260 213 321576

**Chinsali Office**  
Plot No. 76 Mayadi, P. O. BOX 480052, Chinsali, Zambia  
**Tel:** +260-214-565170  
**Fax:** +260-214-565171

**Email:** erb@erb.org.zm  
**Website:** www.erb.org.zm

Energy Toll Free Line 8080 – Call ERB, for free!

We safeguard your interests…
ZAMBIAN ELECTRICAL POWER SYSTEM OVERVIEW

**ZESCO’s Major Hydro Power Stations**
- Kafue Gorge Power Station (990MW) (operating at 220KV, 66KV)
- Kariba North Bank Power Station (720MW) (operating at 220KV, 66KV)
- Victoria Falls Power Station (108MW)

**Mines**
- Copperbelt Energy Corporation Ltd
  - Lunsemfwa Hydro Power Company, EMCO – 600MW & NEC – 50MW
  - Lunsemfwa and Mulungushi (56MW)
  - Maamba – 600MW, EMCO – 600MW, ZESCO Sub-Transmission System

**NEW PROJECTS**
- ZESCO’s Sub-Transmission System 220kV, 132kV, 88kV & 66kV
- ZESCO’s Sub-Transmission System 330Kv & 220Kv
- ZESCO’s Primary Distribution System 33kV
- ZESCO Sub-Distribution System 220kV, 132kV, 88Kv & 66Kv

**POWER GENERATION PLANTS**
- ZENGAMINA POWER COMPANY 0.75MW
- LUSEMFWA HYDRO-POWER COMPANY 56MW
- ZESCO’s Major Hydro-Power Stations
  - Katue Gorge Power Station (990MW)
  - Kabwe North Bank Power Station (108MW)
  - Kariba North Bank extention (360MW)
  - Itezhi-Tezhi - 120MW
  - Kabompo - 40MW

**Import/Export**
- Industrial, commercial & domestic loads
- Islanded/isolated grid
- 220kV, 132kV, 88Kv & 66Kv
- 330Kv & 220kV
- 33Kv

**Generators**
- ZESCO Transmission System
- ZESCO’s Sub-Distribution System
- Copperbelt Energy Corporation Ltd
- North Western Energy Company
- Privately owned company
1.3.2 PETROLEUM SUB-SECTOR

Zambia has an over dependence on crude oil imports which directly affects growing sectors like manufacturing, construction, mining, tourism, and agriculture. With ever-rising crude oil prices, for example, from US$76.6/bbl in 2010 to US$105/bbl in 2013, there is now demand for cheaper and environmentally friendly forms of energy that can be produced locally.

Zambia has no known proven reserves of crude oil and therefore imports all its fuel requirements. The import is in two modes, namely, the petroleum feedstock mode through the 1,710 km long TAZAMA pipeline from the port of Dar-es-Salaam in Tanzania to Ndola in Zambia for refining at INDENI Refinery. The other

The petroleum feedstock imported is specifically tailored to the configuration of the INDENI Refinery and is best suited to meeting the needs of the Zambian market. The refinery is not configured to process pure crude oil but is configured to process a spiked or commingled feedstock which typically comprises pure crude oil, condensate, naphtha, and gasoil (diesel). Figure 1.2 shows the key players in the Zambian fuel supply value chain.