# Regional Harmonization of Regulatory Frameworks and Tools for Improved Electricity Regulation in COMESA

## Maiden Report on Harmonized Comparison of Electricity Tariffs and Cost Reflectivity Assessment in the COMESA region

**Submitted to: Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)**

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## Abbreviations

| Acronym | Full form |
|---|---|
| ABER | Agence Burundaise de l'Électrification Rurale *(Burundi)* |
| AfDB | African Development Bank |
| AfSEM | African Single Electricity Market |
| ANOFT | Average number of forced outages for all transmission lines |
| AREEN | Autorité de Régulation des secteurs de l'Eau potable et de l'Énergie *(Burundi)* |
| ARMD | Autorité de régulation multisectorielle de Djibouti *(Djibouti)* |
| AUC | African Union Commission |
| BGT | Bulk Generation Tariff |
| COMESA | Common Market for Eastern and Southern Africa |
| CoS | Cost of Supply |
| CRAFT | Cost Reflectivity Assessment Framework Tool |
| EAC | East African Community |
| EAPP | Eastern Africa Power Pool |
| ECOWAS | Economic Community of West African States |
| EDD | Electricité de Djibouti *(Djibouti)* |
| PEA | Petroleum and Energy Authority *(Ethiopia)* |
| EEC | Eritrean Electricity Corporation *(Eritrea)* |
| EEP | Ethiopian Electric Power *(Ethiopia)* |
| EEU | Ethiopian Electric Utility *(Ethiopia)* |
| EHV | Extra High Voltage |
| EPRA | Energy and Petroleum Regulatory Authority *(Kenya)* |
| ERA | Electricity Regulatory Authority *(Sudan, Uganda)* |
| ERB | Energy Regulatory Board *(Zambia)* |
| ERC | Electricity Regulatory Committee *(Eritrea)* |
| EREA | Energy Regulators Association of East Africa |
| ERI | Electricity Regulatory Index for Africa |
| ESP | Electricity Service Provider |
| EUCL | Energy Utility Corporation Limited *(Rwanda)* |
| EUT | End User Tariff |
| EV | Electric Vehicle |
| GDP | Gross Domestic Product |
| GECOL | General Electricity Company of Libya *(Libya)* |
| GWh | Giga Watt Hours |

| Acronym | Full form |
|---|---|
| HCET | Harmonized Comparison of Electricity Tariffs |
| HV | High Voltage |
| IPP | Independent Power Producer |
| IRL | Information Requirement List |
| JEDCO | Juba Electricity Distribution Company *(South Sudan)* |
| KenGen | Kenya Electricity Generating Company *(Kenya)* |
| KETRACO | Kenya Electricity Transmission Company *(Kenya)* |
| KPI | Key Performance Indicator |
| KPLC | Kenya Power and Lighting Company *(Kenya)* |
| kV | Kilo Volt |
| LV | Low Voltage |
| MIS | Management Information System |
| MoU | Memorandum of Understanding |
| MV | Medium Voltage |
| MVA | Mega Volt Ampere |
| MW | Mega Watt |
| MYT | Multi Year Tariff |
| NEC | National Electricity Corporation *(Sudan)* |
| O&M | Operations & Maintenance |
| PPA | Power Purchase Agreement |
| PPP | Public Private Partnership |
| PTWG | Project Technical Working Group |
| RAERESA | Regional Association of Energy Regulators for Eastern and Southern Africa |
| RE | Renewable Energy |
| REG | Rwanda Energy Group *(Rwanda)* |
| REGIDESO | Régie de Production et de Distribution de l'Eau et de l'Électricité *(Burundi)* |
| RERP | Regional Electricity Regulatory Principles |
| RKPI | Regulatory Key Performance Indicator |
| RURA | Rwanda Utilities Regulatory Authority *(Rwanda)* |
| SADC | Southern African Development Community |
| SOP | Standard Operating Procedure |
| STEG | Société Tunisienne de l'électricité et du gaz *(Tunisia)* |
| T&D | Transmission & Distribution |
| ToU | Time of Use |
| TPA | Third Party Access |

| Acronym | Full form |
|---|---|
| UKPI | Utility Key Performance Indicator |
| USD | United States Dollar |
| USc | United States Cent |
| VRPP | Variable Renewable Energy-based Power Plants |
| WACC | Weighted Average Cost of Capital |

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# Executive Summary

The Workstream 2 on **Harmonized Comparison of Electricity Tariffs (HCET) and Cost Reflectivity Assessment Framework Tool (CRAFT)** seeks to provide support to COMESA Member States to develop a framework for harmonized comparison of electricity tariffs of member countries across the electricity supply chain. The other aspect of this workstream involves development of a framework and tool to track and assess the real time process of countries migrating towards cost reflectivity of tariffs in accordance with the decision of the COMESA Council of Ministers responsible for Energy, that urged Member States to migrate to cost reflective tariffs to encourage investments in the energy sector.

The framework report for Workstream 2 has been submitted separately. This is the *Maiden Report on Electricity Tariffs of COMESA Member States* wherein the frameworks and tools have been populated with data collected and information received from the Member States and the results of the analysis presented herein.

**Review of Market Structure of the Member States**

The countries vary in the market design of the electricity sector structure, with different degrees of unbundling. In terms of the overall market structure for the countries under consideration:

- Majorly unbundled: Egypt, Kenya, Sudan, Uganda. Additionally, Kenya is in the process of unbundling system operations.
- Partially unbundled: Ethiopia. In the case of Ethiopia, Ethiopian Electric Power (EEP) carries out both generation and transmission activities (> 66 kV). Ethiopian Electric Utility (EEU) manages electric power distribution and the operation of power transmission lines of ≤66 kV within the national power grid
- Fully bundled: Burundi, Djibouti, Eritrea, Libya, Rwanda, and Tunisia. Additionally, Burundi is in process of transitioning to a partially unbundled state.
- Isolated grids, Private operators: Somalia, South Sudan

Complete unbundling is observed in the case of Egypt, Kenya, Sudan and Uganda.

**Review of tariff framework and methodologies in the Member States**

Based on the review of the tariff framework and methodologies in the specified Member States, key findings are as below.

Tariff approval

- Tariff approved by Regulator: Egypt, Kenya, Rwanda, Uganda
- Tariff approved by Government/ Parliament: Burundi, Djibouti, Eritrea, Ethiopia, Libya, Somalia, South Sudan, Sudan, Tunisia

Tariff methodology

Most countries have adopted a cost-plus based approach, particularly those with well-defined regulations in place.

Pass-through charges

Countries such as Kenya, Rwanda and Uganda have well-defined pass-through mechanisms which are implemented at regular intervals. Burundi and Somalia have, as per the recently notified Law and tariff regulations respectively have also defined the pass-through charges.

Tariff revisions

Regular tariff revisions are observed in the case of Egypt, Kenya, and Uganda. Rest of the countries do not have regular tariff revision mechanisms in place.

Multi-Year Tariff (MYT) regime

The MYT regime is observed in the case of Ethiopia, Kenya and Uganda.

Time-of-Use tariffs

Time-of-Use tariffs have been implemented for the commercial and industrial categories in countries such as Egypt, Kenya, Rwanda, Tunisia, and Uganda (as per available information).

Lifeline tariff

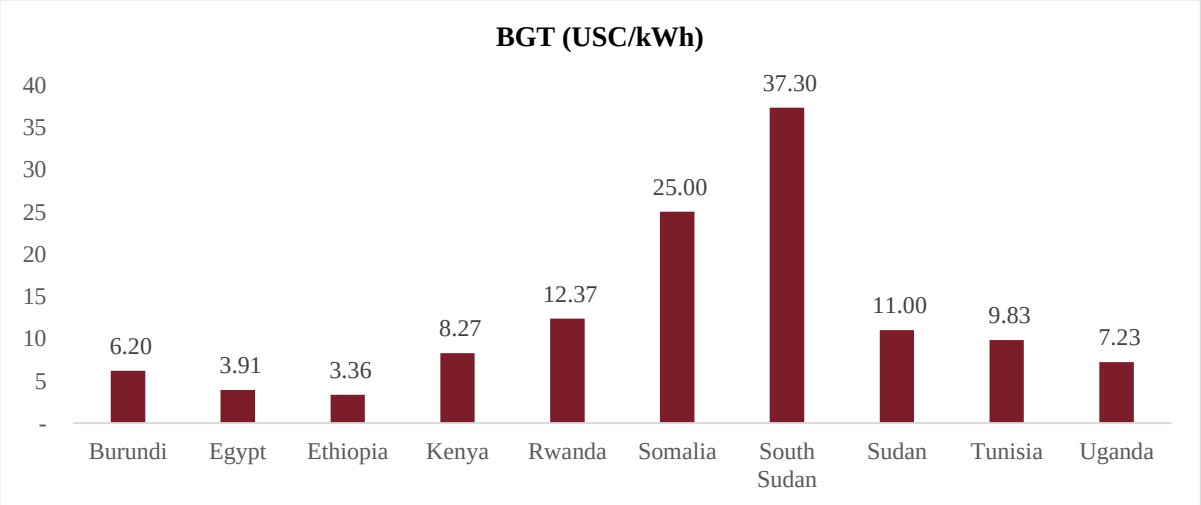
Most countries have a lifeline tariff in place. The lifeline tariff threshold varies across countries. Rwanda and Uganda have the lowest lifeline tariff threshold at 15 kWh whereas countries such as Djibouti and Sudan have a very high threshold of 200 kWh. Kenya has recently reduced lifeline threshold from 100 kWh to 30 kWh.

Pre-paid metering

Pre-paid metering systems are in practice in most countries.

**Analysis of Bulk Generation Tariff (BGT) across the Member States**

The BGT has been compiled for the specified countries as per data provided by the respective countries as well as using a proxy for cost of production wherever possible. The same is as shown below.



**Technology-wise share and BGT**

| Country | Share of Hydro (%) | Share of Thermal (%) | Share of Renewable (%) | BGT (USc/kWh) |
|---|---|---|---|---|
| Burundi | 50% | 38% | 12% | **6.20** |
| Egypt | 5% | 89% | 6% | **3.91** |
| Ethiopia | 92% | 0% | 8% | **3.36** |
| Kenya | 25% | 22% | 53% | **8.27** |
| Rwanda | 39% | 57% | 4% | **12.37** |
| Somalia | 0% | 100% | 0% | **25.00** |
| South Sudan | 0% | 86% | 14% | **37.30** |
| Sudan | 71% | 29% | 0% | **11.00** |
| Tunisia | 1% | 94% | 5% | **9.83** |
| Uganda | 82% | 5% | 13% | **7.23** |

In general, a high share of hydro plants in the capacity mix is expected to lead to lower generation cost. Somalia and South Sudan which are largely run on diesel-based plants have one of the highest BGT. Egypt is an exception, with high share of thermal having low generation cost, in part because of assured supply of gas and higher availability of gas-based plants.

## Transmission tariffs in the Member States

Generally, countries with extensive transmission networks and substation capacity have lower transmission tariffs. Rwanda with a smaller network has higher transmission tariff (1.73 USc/kWh) vis-à-vis Kenya (0.26 USc/kWh) and Uganda (0.21 USc/kWh).

## Analysis of End User Tariff across the Member States

**Tariff structure across the Member States**

| Country | Domestic and Small Commercial | Commercial and Industrial |
|---|---|---|
| Burundi | 2-part | 2-part |
| Djibouti | 3-part | 3-part |
| Egypt | 1-part | 2-part |
| Eritrea | - | - |
| Ethiopia | 1-part | 2-part |
| Kenya | 1-part | 2-part |
| Libya | - | - |
| Rwanda | 1-part | 3-part |
| Somalia | - | - |
| South Sudan | 1-part | 1-part |
| Sudan | 1-part | 1-part |
| Tunisia | 2-part | 2-part |
| Uganda | 1-part | 2-part |

*Note: The blank above indicates that data was not available*

From the above it is seen that mostly the residential and small commercial consumers have single part tariff in place. Industrial and big commercial consumers have adopted a two-part tariff comprising of the energy

and demand charges. Three-part tariff structure indicates that a monthly service charge is billed regardless of the demand and consumption during the month.

Tariff design must reflect the nature of underlying costs imposed by customers on the system:

- Energy charge ($$/kWh) → Variable cost of generation
- Demand charge ($$/kW) → Fixed cost of network
- Customer charge ($$/customer) → Cost of customer service

This is critical for the provision of right efficiency signals to customers.

**Social and subsidized tariffs**

Social and subsidised tariffs are present in most countries with varying degree of the lifeline threshold. The lifeline threshold in the different countries is as shown below.

| Country | Lifeline Threshold |
|---|---|
| Burundi | 50 kWh |
| Djibouti | 200 kWh |
| Egypt | 50 kWh |
| Eritrea | - |
| Ethiopia | 50 kWh |
| Kenya | 30 kWh |
| Libya | - |
| Rwanda | 15 kWh |
| Somalia | - |
| South Sudan | 100 kWh (JEDCO) |
| Sudan | 200 kWh |
| Tunisia | 50 kWh |
| Uganda | 15 kWh |

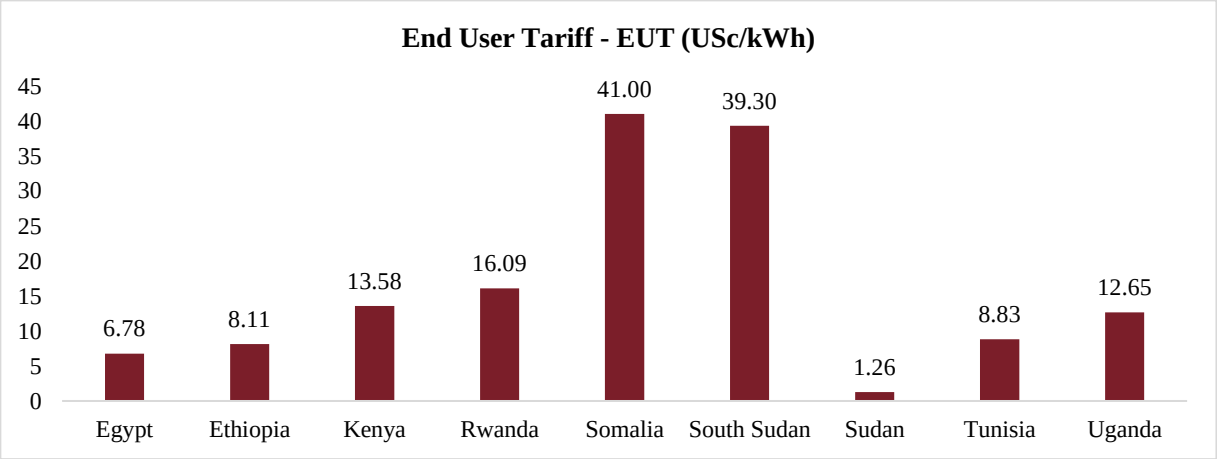
*Note: The blank above indicates that data was not available*

Djibouti and Sudan have one of the highest lifeline thresholds at 200 kWh. Uganda and Rwanda have a low lifeline threshold of 15 kWh. It is to be noted that there is little information on the extent of cross-subsidy, or any explicit government support required to maintain social tariffs.

Key suggestions are as follows:

- Setting the right consumption threshold is important otherwise subsidy benefits tend to get diffused and enjoyed by higher income classes as well
- Subsidy design should provide significant disincentive for poor customers to surpass threshold consumption limit
- Better to have a different consumption category for poor customers rather than integrate it in existing Domestic category as the lowermost slab

**End User Tariffs (EUT) across the Member States**




EUT is largely linked to the input cost of generation. Somalia and South Sudan have one of the highest EUTs, in large part due to the high cost of diesel-based generation. Ethiopia and Uganda have lower tariff due to low cost of hydro power generation. It is also to be noted that the above is only for representative purpose, and direct peer to peer comparison of tariffs cannot be undertaken as generally there is an underlying subsidy component about which limited information is available.

**Analysis of cost reflectivity assessment of tariffs**

A detailed cost of service model discussion and training was imparted to the participant Member States during the Addis Ababa workshop held from 18th to 20th September 2024 wherein all the required data points and information required for updating the model were explained in detail. The cost-of-service model has been populated based on available information and as per discussions held during this workshop.

The closest data set available was for Kenya and therefore the results of the same for Kenya Power and Lighting Company (KPLC) – the key distribution utility in the country are as below.

| S. No. | Category name | Voltage level | Cost recovery percentage (%) |
|---|---|---|---|
| 1 | Domestic-DC | LV | 36% |
| 2 | Small Commercial-SC | MV | 283% |
| 3 | Commercial and Industrial-CI | HV | 475% |
| 4 | Street lighting-SL | LV | 22% |

The above cost reflectivity assessment shows that the domestic and street lighting categories are being heavily cross subsidized by the commercial and industrial consumer categories. Currently, the cost recovery from the domestic and street lighting categories is quite nominal, and their cost recovery gap is being borne by the commercial and industrial category.

**Way forward**

From the comparative analysis of the various tariff components, it is clear that not only are the tariff frameworks different in different countries but also the end-user tariff varies in different geographies. The key contributing factor for the wide variation in the end-user tariff is in large part due to the difference in the cost of generation across different Member States. A large share of hydro generally helps keep the bulk generation tariff low which has a consequent impact on the electricity supply chain.

The region has significant diversity in generation resources and costs, which can result in significant potential benefits from cross-border electricity trade. In surplus countries extra revenue could be obtained through electricity export, and in deficit countries the demand gap could be met at the lowest available cost through electricity import. Ensuring open access to transmission networks for international flows is critical to achieving these gains.

In most of the countries with vertically integrated entities, cost accounting processes do not separate the costs related to generation, transmission and distribution activities. The introduction of Regulatory Accounting systems with requirements for reporting costs by activity and service would enhance understanding of key costs drivers by utilities and regulators alike.

As part of this report, for the various tariff components, only limited information was available. We have relied upon available data and other publicly available documents to furnish the above results. The data gaps suggest that focus needs to be placed on the role of regulatory information management systems in the application of tariff regulation, so that the information used is sufficient and reliable to correctly implement regulatory tariff models and frameworks.

Additionally, the data based on cost reflectivity assessment shows that substantial cross-subsidization exists between the consumer categories. The results of the exercise show that streamlining of the tariff borne by each consumer class in proportion to the cost to serve each category would require concerted efforts from all concerned stakeholders especially the national and regional regulatory bodies. It calls for a judicious and cautious approach so as not to result in any kind of tariff shock while rationalizing the tariff across consumer categories.

# 1 Introduction

## 1.1 Background

The Workstream 2 on **Harmonized Comparison of Electricity Tariffs (HCET) and Cost Reflectivity Assessment Framework Tool (CRAFT)** seeks to provide support to COMESA to carry out harmonized comparison of electricity tariffs of Member States across the electricity supply chain.

The other aspect of this workstream involves development of a framework and tool to track and assess the real time process of countries migrating towards cost reflectivity of tariffs in accordance with the decision of the COMESA Council of Ministers responsible for Energy, that urged Member States to migrate to cost reflective tariffs to encourage investments in the energy sector.

The key objective of Workstream 2 is to harmonize and align tariff frameworks to ensure standardization and facilitate greater electricity exchange amongst the COMESA Member States.

The framework report on tariff has been submitted separately. This is the Maiden Report on Electricity Tariffs of COMESA Member States based on data collected and information received from the Member States.

## 1.2 Structure of the Maiden Report on Electricity Tariffs of Member States in the COMESA region

In accordance with the terms of reference, the *''Maiden Report - Electricity Tariffs of Member States in the COMESA region''* for COMESA Member States is being submitted herein.

The "Framework Report" describes the methodology and framework for two key components of Workstream 2:

1. Harmonized comparison of electricity tariffs
2. Cost Reflectivity Assessment in the COMESA region

The framework so developed has been populated with data and the analytical findings have been discussed as part of the "Maiden Report".

This report is structured as follows:

**Chapter 1: Introduction**

This chapter provides a brief description of the project background and the structure of the report.

**Chapter 2: Comparative analysis of tariffs across COMESA Member States**

In this chapter, a comparative analysis of generation, transmission and end-user tariffs (EUT) has been carried out across the specified COMESA Member States.

**Chapter 3: Cost-reflectivity assessment of tariffs**

In this chapter, we bring out the results of the cost reflectivity assessment of tariffs based on the cost reflectivity assessment framework tool (CRAFT) as discussed in the framework report based on available data of the COMESA Member States.

**Chapter 4: Conclusion**

This chapter highlights the key outcomes/findings of the report and provides a conclusion to the report.

**Annexure 1: Details about the regulatory and market structure; generation-mix**

**Annexure 2: Tariff related details for COMESA Member States**

# 2 Comparative analysis of tariffs across COMESA Member States

In this chapter a comparative analysis of tariffs across the specified COMESA Member States has been carried out. To begin with, we have discussed the market structure and regulatory/tariff framework in each of the Member States. Then, we have analysed the generation, transmission and end-user tariff along with the key drivers for each of the tariff components.

We have relied upon information that was provided to us by the Member States as well as documents available in the public domain. We also gathered data and information during the **field missions** to the five countries - Egypt, Ethiopia, Rwanda, Tunisia and Uganda. The same has been integrated into our report.

## 2.1 Regulatory Structure

Amongst the 13 countries which are the subject of our study, only seven countries have operational regulatory bodies namely: *Burundi, Egypt, Ethiopia, Kenya, Rwanda, Sudan and Uganda*. The remaining six countries - Djibouti, Eritrea, Libya, Somalia, South Sudan and Tunisia either do not have a regulatory body or it is not yet operational. The Ministry with portfolio responsibility for energy in the respective countries is carrying out the de facto role of a regulator for the power sector in these countries. The respective department in the Ministry of Energy carries out the regulatory functions. This limits the bandwidth of exercising regulatory powers as the regulator is not an independent body.

The group includes countries that are very far apart in terms of power sector development. Egypt, Kenya and Uganda can be considered regional (if not continental) leaders in the implementation of power sector and regulatory reform, while others such as Somalia and South Sudan are only taking the first steps down the reform road.

Within the group are two states - Somalia and South Sudan – which do not yet have an integrated national grid – which makes interconnection with other states in the region difficult. These states are managed by private isolated distribution systems.

Somalia and South Sudan have taken steps towards setting up independent regulatory bodies. In Somalia, National Electricity Authority (NEA) has been recently established and is yet to be operationalized. In South Sudan, a bill has been proposed to set up a regulatory body.

The countries with regulatory bodies namely *Burundi, Egypt, Ethiopia, Kenya, Rwanda, Sudan and Uganda* are also seen to have well-defined legal, regulatory and tariff framework governing the electricity sector in these countries. However, complete regulatory independence is amiss in some countries as all key decisions require the Ministry's approval. This is the case in point in countries - Burundi, Ethiopia and Sudan.

The detailed comparative assessment of the countries in terms of their regulatory structure is in **section 5.1** (Annexure 1).

## 2.2 Market Structure

The countries also vary in the market design of the electricity sector structure, with different degrees of unbundling. Complete unbundling is observed in the case of Egypt, Kenya, Sudan and Uganda.

In terms of the overall market structure for the countries under consideration:

- Majorly unbundled: Egypt, Kenya, Sudan, Uganda. Additionally, Kenya is in the process of unbundling system operations.
- Partially unbundled: Ethiopia. In the case of Ethiopia, Ethiopian Electric Power (EEP) carries out both generation and transmission activities (> 66 kV). Ethiopian Electric Utility (EEU) manages electric power distribution and the operation of power transmission lines of ≤66 kV within the national power grid
- Fully bundled: Burundi, Djibouti, Eritrea, Libya, Rwanda, and Tunisia. Additionally, Burundi is in process of transitioning to a partially unbundled state.
- Isolated grids, Private operators: Somalia, South Sudan

An unbundled market structure is critical for transparency since it facilitates accounting separation and reporting of costs by nature of activity. This allows investors to understand the cost buildup across the electricity sector value chain and make informed decisions. It also allows more accurate determination of the cost of service and facilitates transition towards cost reflective tariffs.

Unbundling is also the first step towards the introduction of **true competition** in power markets. It is observed that although all countries have introduced competition in the generation function in the form of independent power producers (IPPs) (even the unbundled ones), true competition is only possible when the transmission and distribution functions also get unbundled and both public as well as private sector generators are able to compete on a level playing field.

The detailed comparative assessment of the countries in terms of their market structure is in **section 5.2** (Annexure 1).

## 2.3 Key Macro-Economic Indicators

A brief overview of the key macro-economic variables has been included to provide context for the study.

**Table 1: GDP per capita and electricity access rate across the COMESA Member States**

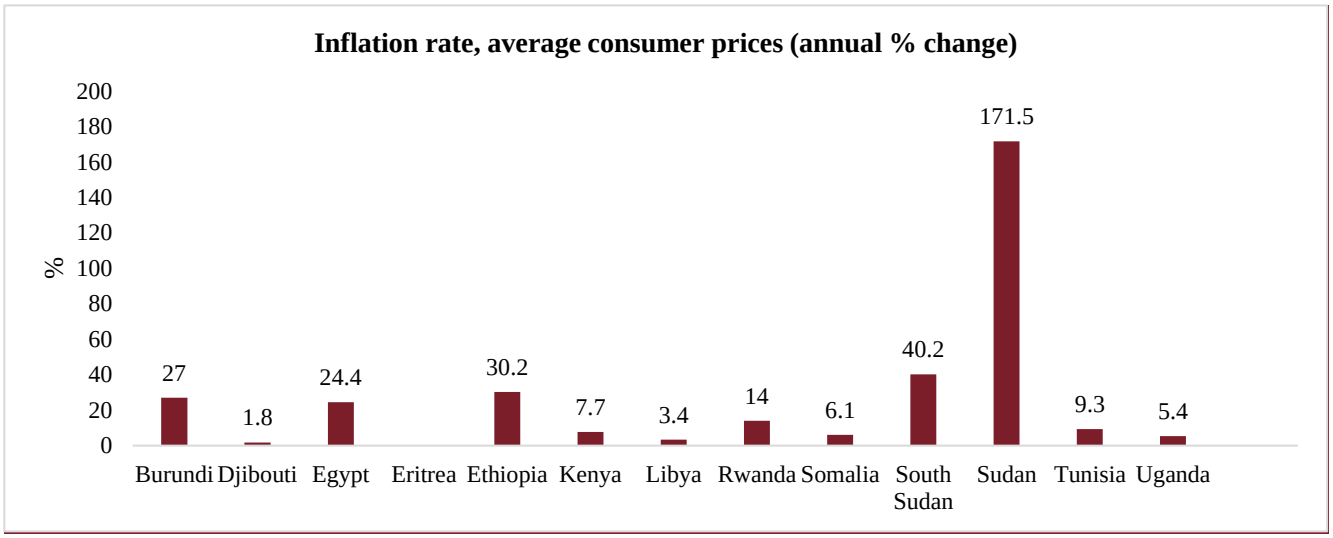
| Country | GDP per capita (USD) | Electricity Access (%) |
|---|---|---|
| Burundi | 311 | 10% |
| Djibouti | 3667 | 65% |
| Egypt | 4587 | 100% |
| Eritrea | - | 55% |
| Ethiopia | 1143 | 55% |
| Kenya | 2245 | 76% |
| Libya | 6388 | 70% |
| Rwanda | 1005 | 51% |
| Somalia | 667 | 49% |
| South Sudan | 551 | 8% |
| Sudan | 723 | 63% |
| Tunisia | 3814 | 100% |
| Uganda | 1082 | 47% |

*Source: IMF, World Bank database (data for 2022)*

From the above table it is clear that there is a positive correlation between GDP per capita and increased access to electricity. Burundi and South Sudan with one of the lowest GDP per capita also have low electricity access rates.

The figure below shows the trend of inflation rate across the specified COMESA Member States. Inflation is an important macro-economic parameter as higher the inflation, greater the risk of tariffs and costs becoming misaligned and therefore, greater need for tariff adjustment processes to be in place. From the figure below, it is seen that many countries have double-digit inflation rate and the need for regulatory intervention against inflation is most critical in these countries.

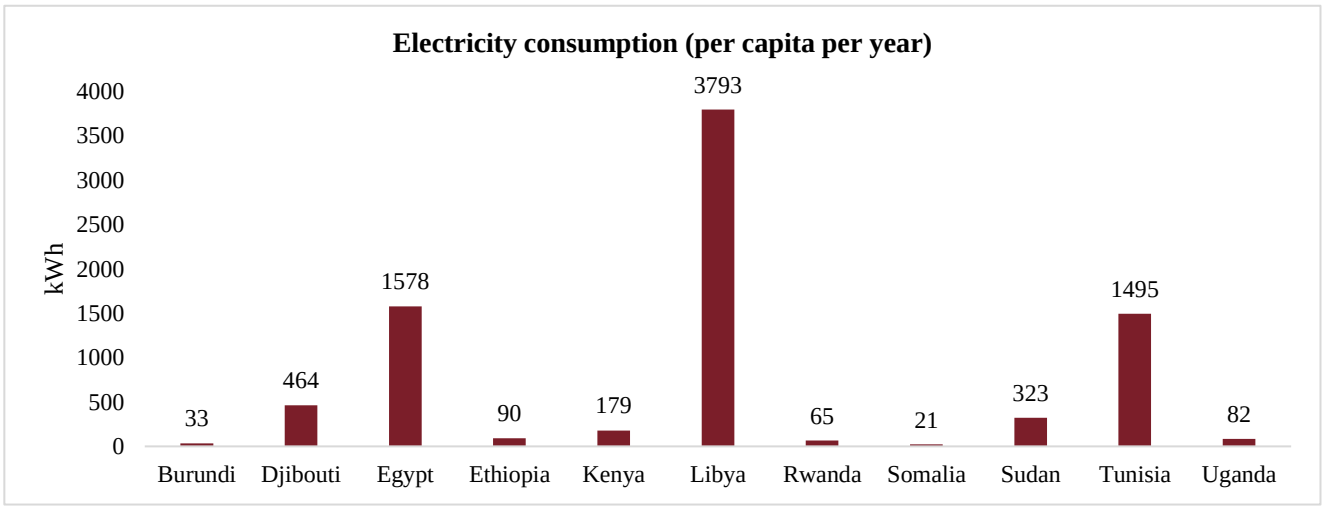
**Figure 1: Inflation rate (%) across the specified COMESA Member States**




*Source: IMF database; There is no data for Eritrea (data for 2023)*

The figure below shows the trend of electricity consumption per capita across the specified COMESA Member States.

**Figure 2: Electricity consumption per capita per year across the specified COMESA Member States**




*Source: US Energy Information Administration; World Bank database*

The electricity consumption per capita is very high for Egypt, Libya and Tunisia amongst the Member States.

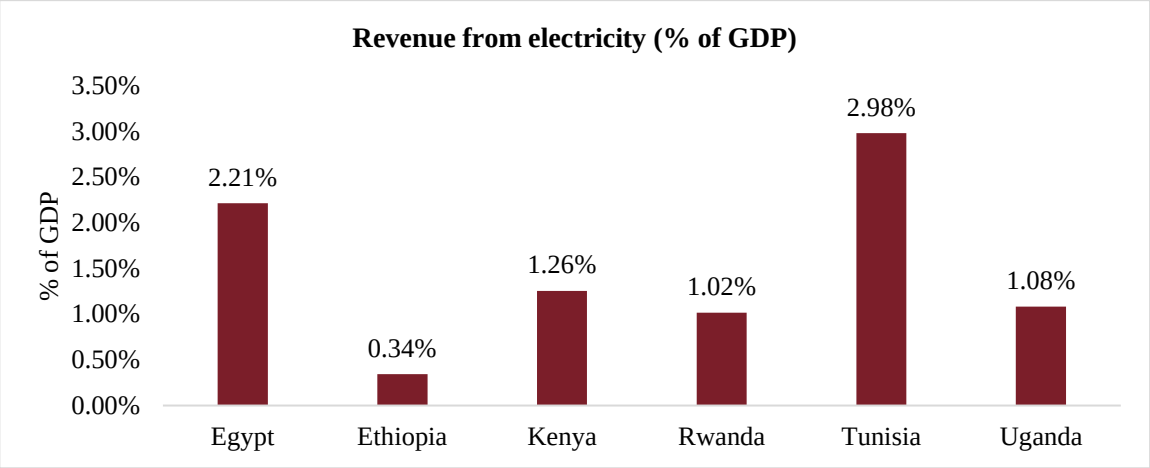
An estimate of electricity sales as a percentage of the GDP is shown in the table and figure below.

**Table 2: Electricity sales as %age of GDP across select COMESA Member States**

| Country | Total revenue from electricity sales (million USD) | GDP (million USD) | Revenue from electricity sales % of GDP |
|---|---|---|---|
| Egypt | 8,716 | 393910 | 2.21% |
| Ethiopia | 548 | 159750 | 0.34% |
| Kenya | 1,367 | 108920 | 1.26% |
| Rwanda | 143 | 14020 | 1.02% |
| Tunisia | 1,528 | 46270 | 2.98% |
| Uganda | 561 | 51820 | 1.08% |

*Source: GDP data taken from IMF*

**Figure 3: Revenue from electricity (%age of GDP)**




*Source: GDP data taken from IMF*

From the above, it is seen that Egypt and Tunisia have a high share of revenue from electricity as percentage of GDP.

## 2.4 Tariff Frameworks

Based on the review of the tariff framework and methodologies in each of the specified countries, a snapshot of the comparison of the same across the specified countries is as shown below.

**Table 3: Tariff frameworks and methodologies: Comparative assessment**

| | Burundi | Djibouti | Egypt | Eritrea | Ethiopia | Kenya | Libya | Rwanda | Somalia | South Sudan | Sudan | Tunisia | Uganda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tariff approval** | *Government* | *Government followed by Parliament* | *Regulator* | *Government* | *Government* | *Regulator* | *Government* | *Regulator* | *Government* | *Government followed by Parliament* | *Government* | *Government* | *Regulator* |
| **Tariff method** | Cost plus Return | -- | Cost plus Return | -- | Cost plus Return | Cost plus Return | -- | Cost plus Return | Cost plus Return | Cost plus Return | -- | -- | Cost plus Return |
| **Pass-through charges - Coverage** | Unforeseen costs, Windfall gains as per new Law | -- | -- | -- | -- | Fuel cost, Forex, Inflation, Water resources authority levy | -- | Yes | Fuel cost, Forex | -- | -- | -- | Fuel cost, Forex, Inflation, Generation mix |
| **Pass-through charges - Frequency** | -- | -- | -- | -- | -- | Monthly | -- | -- | -- | -- | -- | -- | Quarterly |
| **Regularity in tariff revision** | Irregular | Irregular | Regular | Irregular | Irregular (Last tariff 2018) | Regular | Irregular | Irregular (Last tariff 2020) | Irregular | Irregular | Irregular | Irregular | Regular |

| | Burundi | Djibouti | Egypt | Eritrea | Ethiopia | Kenya | Libya | Rwanda | Somalia | South Sudan | Sudan | Tunisia | Uganda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (Last tariff 2017) | (Last tariff 2020) | | | | | | | | | | | |
| **Multi-Year Tariff (MYT) Regime** | -- | -- | -- | -- | Yes | Yes | -- | -- | -- | -- | -- | -- | Yes |
| **Cost-of-Service study** | -- | -- | Yes | -- | -- | Yes | -- | -- | -- | -- | -- | -- | Yes |
| **Time-of-Use (ToU) tariffs** | -- | -- | Yes | -- | No | Yes | -- | Yes | -- | -- | -- | Yes | Yes |
| **Lifeline tariff threshold** | 50 kWh | 200 kWh | 50 kWh | -- | 50 kWh | 30 kWh | -- | 15 kWh | -- | 100 kWh (JEDCO) | 200 kWh | 50 kWh | 15 kWh |
| **Pre-paid metering system** | Yes | -- | Yes | -- | Yes | Yes | -- | Yes | -- | Yes | Yes | -- | Yes |
| **Best practices** | | Tariff incentive for reducing demand during peak hours | Inclining block tariff<br>EV tariffs | | | EV tariffs | | Lower tariff for medium and large industries | | Lower tariffs for industrial customers | | Inclining block tariff<br>Four-shift structure based on seasonal variations | Declining block tariff for large and extra-large industrial consumers |

Key findings related to the tariff frameworks are as below.

**Tariff approval**

- Tariff approved by Regulator: Egypt, Kenya, Rwanda, Uganda
- Tariff approved by Government/ Parliament: Burundi, Djibouti, Eritrea, Ethiopia, Libya, Somalia, South Sudan, Sudan, Tunisia

**Tariff methodology**

Most countries have adopted a cost-plus based approach, particularly those with well-defined regulations in place.

**Pass-through charges**

Countries such as Kenya, Rwanda and Uganda have well-defined pass-through mechanisms which are implemented at regular intervals. Burundi and Somalia have, as per the recently notified Law and tariff regulations respectively have also defined the pass-through charges.

**Tariff revisions**

Regular tariff revisions are observed in the case of Egypt, Kenya, and Uganda. Rest of the countries do not have regular tariff revision mechanisms in place.

**Multi-Year Tariff (MYT) regime**

The MYT regime is observed in the case of Ethiopia, Kenya and Uganda.

**Time-of-Use tariffs**

Time-of-Use tariffs have been implemented for the commercial and industrial categories in countries such as Egypt, Kenya, Rwanda, Tunisia, and Uganda (as per available information).

**Lifeline tariff**

Most countries have a lifeline tariff in place. The lifeline tariff threshold varies across countries. Rwanda and Uganda have the lowest lifeline tariff threshold at 15 kWh whereas countries such as Djibouti and Sudan have a very high threshold of 200 kWh. Kenya has recently reduced lifeline threshold from 100 kWh to 30 kWh.

**Pre-paid metering**

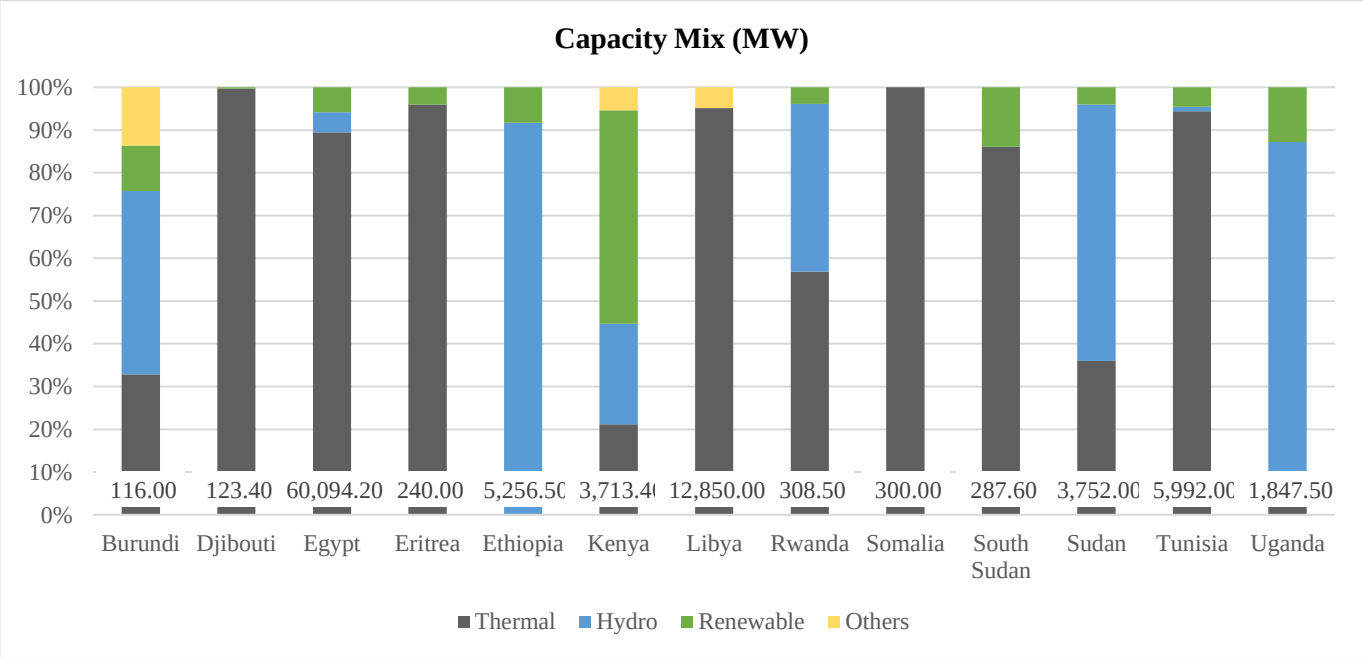
Pre-paid metering systems are in practice in most countries.

## 2.5 Bulk Generation Tariff (BGT)

### 2.5.1 Generation Mix

The installed capacity (MW) and electricity production (GWh) for the respective countries of our study is as shown below.

**Figure 4: Installed Capacity - Mix**

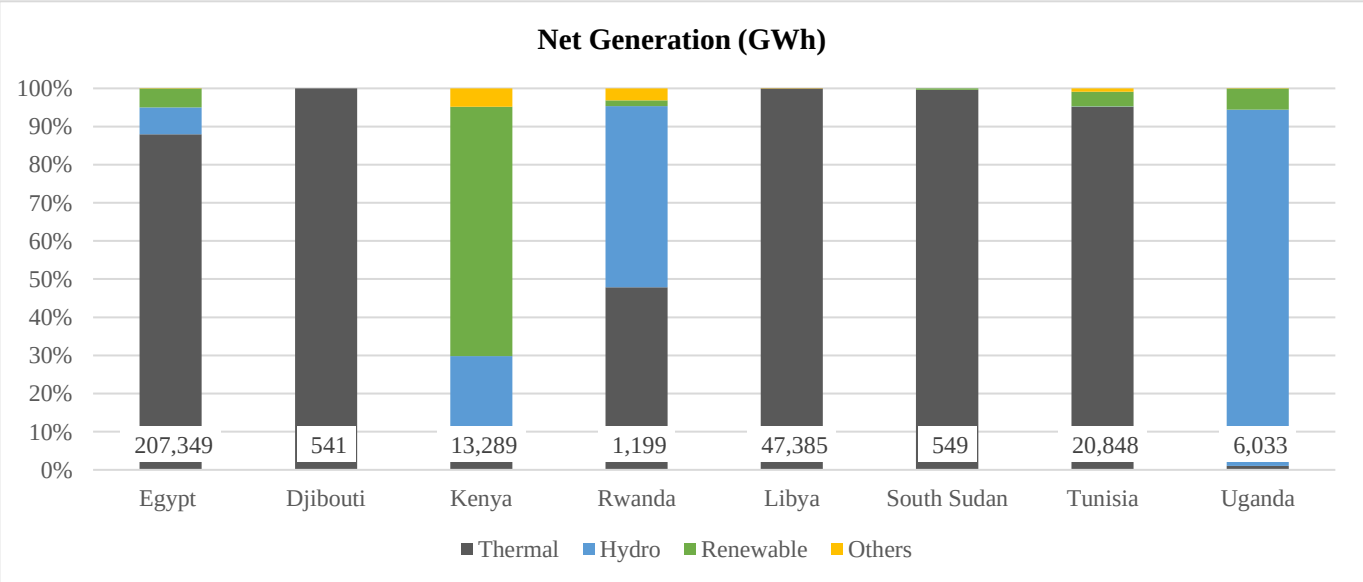



*Note: Burundi: 16 MW import; Kenya: 200 MW import; Rwanda: 46 MW import; Libya: 620 MW out of service*

The detailed installed capacity mix is shown in Annexure 1 of this report.

The break-up of the net energy generation (GWh) in terms of the fuel-type based on information available is shown in the figure below.

**Figure 5: Net energy generation (GWh) mix**



To complement our analysis, we have also analyzed the ratio of peak demand to the installed capacity wherever available.

**Table 4: Ratio of peak demand to installed capacity**

| Country | Peak Demand (MW) | Installed capacity (MW) | Ratio: Peak demand to installed capacity |
|---|---|---|---|
| Burundi | 72 | 116 | 0.62 |
| Egypt | 34,200 | 60,094 | 0.57 |
| Kenya | 2,149 | 3,713 | 0.58 |
| Rwanda | 185 | 308 | 0.60 |
| South Sudan | 26 | 288 | 0.09 |
| Sudan | 3,454 | 3,752 | 0.92 |
| Tunisia | 4,825 | 5,992 | 0.81 |
| Uganda | 919 | 1,848 | 0.50 |

From the above, it is seen that in all the above countries, the installed capacity is sufficient to meet the system peak demand.

To compare the costs of generation which vary across countries, we have made the following classification of countries:

- **Pre-dominantly hydro**: Countries with 50% or more of hydro capacity
- **Pre-dominantly thermal**: Countries with 50% or more of thermal capacity

It is observed that the following countries are pre-dominantly hydro:

- Burundi
- Ethiopia
- Sudan
- Uganda

The following countries are pre-dominantly thermal:

- Djibouti (diesel-based)
- Egypt (gas-based)
- Eritrea (diesel-based)
- Libya (gas-based)
- Rwanda (gas and peat)
- Somalia (diesel-based)
- South Sudan (diesel-based)
- Tunisia (gas-based)

Kenya is an exception having a large share of other renewable energy technologies – geothermal, solar and wind in the capacity mix.

### 2.5.2 Dependence on imports

Certain countries rely on imports to meet the electricity demand. Data on export and imports of electricity is as shown below.

**Table 5: Electricity import and export (GWh)**

| Country | Cross Border Electricity Export (GWh) | Cross Border Electricity Import (GWh) | Net Import of Electricity (Import-Export) (GWh) |
|---|---|---|---|
| Egypt | 95.00 | 1,589.00 | 1,494.00 |
| Kenya | 27.00 | 644.00 | 617.00 |
| Rwanda | 9.15 | 97.27 | 88.12 |
| Sudan | 72.00 | 1361.20 | 1289.20 |
| Tunisia | 79.74 | 2,576.02 | 2,496.28 |
| Uganda | 485.00 | 41.00 | (444.00) |

Share of imports in countries with available data is as shown below.

**Table 6: Share of imports in electricity production (%)**

| Country | Net Electricity produced (GWh) | Import of electricity (GWh) | Electricity produced + electricity imports (GWh) | Electricity import/ (production + electricity imports) (%) |
|---|---|---|---|---|
| Egypt | 207349 | 1589 | 208938 | 1% |
| Kenya | 13289 | 644 | 13933 | 5% |
| Rwanda | 1199 | 97 | 1297 | 8% |
| Sudan | 17089 | 1361 | 18450 | 7% |
| Tunisia | 20848 | 2576 | 23424 | 11% |
| Uganda | 6033 | 41 | 6074 | 1% |

From the above it is seen that Kenya, Rwanda and Tunisia are dependent upon imports to meet the electricity demand. Additionally, Burundi imports about 15.5 MW of power – which is significant at 14% of the total installed capacity (including imports).

### 2.5.3 Bulk Generation Tariff (BGT)

The BGT has been compiled for the specified countries as per data provided by the respective countries as well as using a proxy for cost of production wherever possible. The same is as shown below.

**Table 7: BGT for the specified COMESA countries (USc/kWh)**

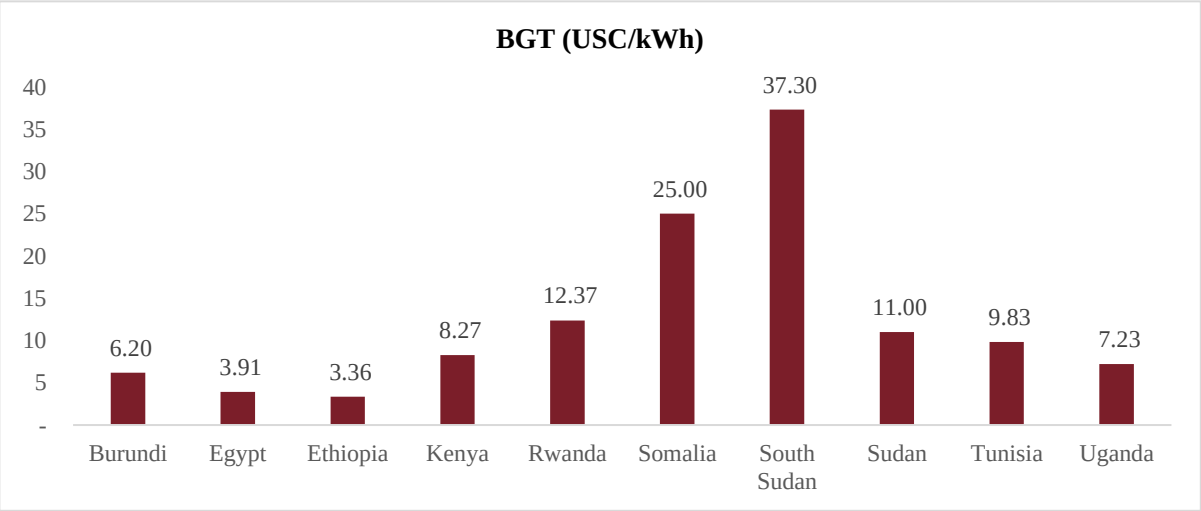
| Country | BGT (USc/kWh) |
|---|---|
| Burundi | 6.20 |
| Djibouti | - |
| Egypt | 3.91 |
| Eritrea | - |
| Ethiopia | 3.36 |
| Kenya | 8.27 |
| Libya | - |
| Rwanda | 12.37 |
| Somalia | 25.00 |
| South Sudan | 37.30 |
| Sudan | 11.00 |
| Tunisia | 9.83 |

| Country | BGT (USc/kWh) |
|---|---|
| Uganda | 7.23 |

*Note: The blank indicates that the data on cost of production was not available*

Individual plant-wise data across the Member States was not available and hence the average bulk generation tariff has been showcased. The figure below shows the trend of the BGT across the specified countries:

**Figure 6: Bulk Generation Tariff (USc/kWh) across the specified countries**




### 2.5.4 Key underlying drivers of BGT

A key expected driver of difference in the BGT is the energy generation mix. The same is as shown below for the countries whose BGT has been mentioned.

**Table 8: Technology-wise share and BGT**

| Country | Share of Hydro (%) | Share of Thermal (%) | Share of Renewable (%) | BGT (USc/kWh) |
|---|---|---|---|---|
| Burundi | 50% | 38% | 12% | **6.20** |
| Egypt | 5% | 89% | 6% | **3.91** |
| Ethiopia | 92% | 0% | 8% | **3.36** |
| Kenya | 25% | 22% | 53% | **8.27** |
| Rwanda | 39% | 57% | 4% | **12.37** |
| Somalia | 0% | 100% | 0% | **25.00** |
| South Sudan | 0% | 86% | 14% | **37.30** |
| Sudan | 71% | 29% | 0% | **11.00** |
| Tunisia | 1% | 94% | 5% | **9.83** |
| Uganda | 82% | 5% | 13% | **7.23** |

In general, a high share of hydro plants in the capacity mix is expected to lead to lower generation cost. Somalia and South Sudan which are largely run on diesel-based plants have one of the highest BGT. Egypt is an exception, with high share of thermal having low generation cost, in part because of assured supply of gas and higher availability of gas-based plants.

## 2.6 Transmission Tariffs

### 2.6.1 Transmission Tariff

We have tabulated the transmission tariffs for the countries as per available data. We have considered the data as provided by the respective countries as well as analyzed the annual accounts for the operational and financial costs wherever available. Somalia and South Sudan do not have an integrated national transmission grid as yet. For the other countries segregated accounts were not available.

**Table 9: Transmission Tariff (USc/kWh)**

| Country | Tx Tariff (USc/kWh) |
|---|---|
| Burundi | - |
| Djibouti | - |
| Egypt | - |
| Eritrea | - |
| Ethiopia | - |
| Kenya | 0.26 |
| Libya | - |
| Rwanda | 1.73 |
| Somalia | - |
| South Sudan | - |
| Sudan | 0.20 |
| Tunisia | - |
| Uganda | 0.21 |

*Note: The blank above indicates that data was not available for the Member States*

### 2.6.2 Key underlying drivers of transmission tariff

The first driver of transmission tariff analysed is the transmission losses (%). Transmission losses as per available data are as:

**Table 10: Transmission loss (%)**

| Country | Transmission loss (%) |
|---|---|
| Djibouti | 2.33% |
| Egypt | 3.68% |
| Ethiopia | 5.00% |
| Kenya | 4.50% |
| Rwanda | 3.06% |
| Somalia | 4.00% |
| South Sudan | 1.90% |
| Sudan | 4.00% |
| Tunisia | 2.16% |
| Uganda | 4.78% |

The second driver considered concerns the transmission assets: length of the transmission network and transmission substation capacity (MVA). The available datasets have been shown below.

**Table 11: Transmission network length (ckt. km.)**

| Country | HV (ckt. km.) | EHV (ckt. km.) |
|---|---|---|
| Djibouti | 419 | - |
| Egypt | 22,503 | 22,575 |
| Ethiopia | 1,908 | - |
| Kenya | 2,672 | 6,917 |
| Libya | 17,365 | 1,204 |
| Rwanda | 1,158 | - |
| Somalia | 1,100 | - |
| Sudan | 6,635 | - |
| Tunisia | 6,646 | 210 |
| Uganda | 3,913 | 606 |

*Note: The blank above indicates that data was not available for the Member States*

**Table 12: Transmission substation capacity (MVA)**

| Country | HV (MVA) | EHV (MVA) |
|---|---|---|
| Djibouti | 36 | - |
| Egypt | 70,741 | 118,290 |
| Kenya | 5,455 | - |
| Rwanda | 999 | - |
| Sudan | 5,953 | 619 |
| Tunisia | 13,525 | 1,600 |
| Uganda | 4,513 | 1,932 |

*Note: The blank above indicates that data was not available for the Member States*

In general, the countries with lower transmission tariffs are the ones with extensive transmission networks and substation capacity. Rwanda with a smaller network has a higher transmission tariff vis-à-vis Kenya and Uganda.

## 2.7 End-User Tariffs (EUT)

### 2.7.1 Tariff Structure

The following table presents an overview of the tariff structure across the Member States.

**Table 13: Tariff Structure across the countries**

| Country | Domestic and Small Commercial | Commercial and Industrial |
|---|---|---|
| Burundi | 2-part | 2-part |
| Djibouti | 3-part | 3-part |
| Egypt | 1-part | 2-part |
| Eritrea | - | - |
| Ethiopia | 1-part | 2-part |
| Kenya | 1-part | 2-part |
| Libya | - | - |
| Rwanda | 1-part | 3-part |
| Somalia | - | - |
| South Sudan | 1-part | 1-part |

| Country | Domestic and Small Commercial | Commercial and Industrial |
|---|---|---|
| Sudan | 1-part | 1-part |
| Tunisia | 2-part | 2-part |
| Uganda | 1-part | 2-part |

*Note: The blank above indicates that information was not available for the Member States*

From the above it is seen that mostly the residential and small commercial consumers have single part tariff in place. Industrial and big commercial consumers have adopted a two-part tariff comprising of the energy and demand charges. Three-part tariff structure indicates that a monthly service charge is billed regardless of the demand and consumption during the month.

Tariff design must reflect the nature of underlying costs imposed by customers on the system:

- Energy charge ($$/kWh) → Variable cost of generation
- Demand charge ($$/kW) → Fixed cost of network
- Customer charge ($$/customer) → Cost of customer service

This is critical for the provision of right efficiency signals to customers.

### 2.7.2 Time-of-Use (ToU) Tariffs

The time-of-use tariffs are in practice in the following countries:

**Table 14: Time-of-Use tariffs**

| Country | ToU tariffs |
|---|---|
| Burundi | - |
| Djibouti | - |
| Egypt | Yes |
| Eritrea | - |
| Ethiopia | No |
| Kenya | Yes |
| Libya | - |
| Rwanda | Yes |
| Somalia | - |
| South Sudan | No |
| Sudan | No |
| Tunisia | Yes |
| Uganda | Yes |

*Note: The blank above indicates that information was not available for the Member States*

Egypt, Ethiopia, Kenya, Rwanda, Tunisia and Uganda have implemented time-of-use tariffs with lower tariff rates during off-peak periods. This is to encourage consumers to shift to off-peak period consumption. This can help flatten the load curve and reduce costs incurred in expensive “peaking” source of generation.

### 2.7.3 Social and Subsidised Tariffs

Social and subsidised tariffs are present in most countries with varying degree of the lifeline threshold. The lifeline threshold in the different countries is as shown below.

**Table 15: Lifeline tariff threshold**

| Country | Lifeline Threshold |
|---|---|
| Burundi | 50 kWh |
| Djibouti | 200 kWh |
| Egypt | 50 kWh |
| Eritrea | - |
| Ethiopia | 50 kWh |
| Kenya | 30 kWh |
| Libya | - |
| Rwanda | 15 kWh |
| Somalia | - |
| South Sudan | 100 kWh (JEDCO) |
| Sudan | 200 kWh |
| Tunisia | 50 kWh |
| Uganda | 15 kWh |

*Note: The blank above indicates that data was not available*

Djibouti and Sudan have one of the highest lifeline thresholds at 200 kWh. Uganda and Rwanda have a low lifeline threshold of 15 kWh. It is to be noted that there is little information on the extent of cross-subsidy, or any explicit government support required to maintain social tariffs.

Key suggestions are as follows:

- Setting the right consumption threshold is important otherwise subsidy benefits tend to get diffused and enjoyed by higher income classes as well
- Subsidy design should provide significant disincentive for poor customers to surpass threshold consumption limit
- Better to have a different consumption category for poor customers rather than integrate it in existing Domestic category as the lowermost slab

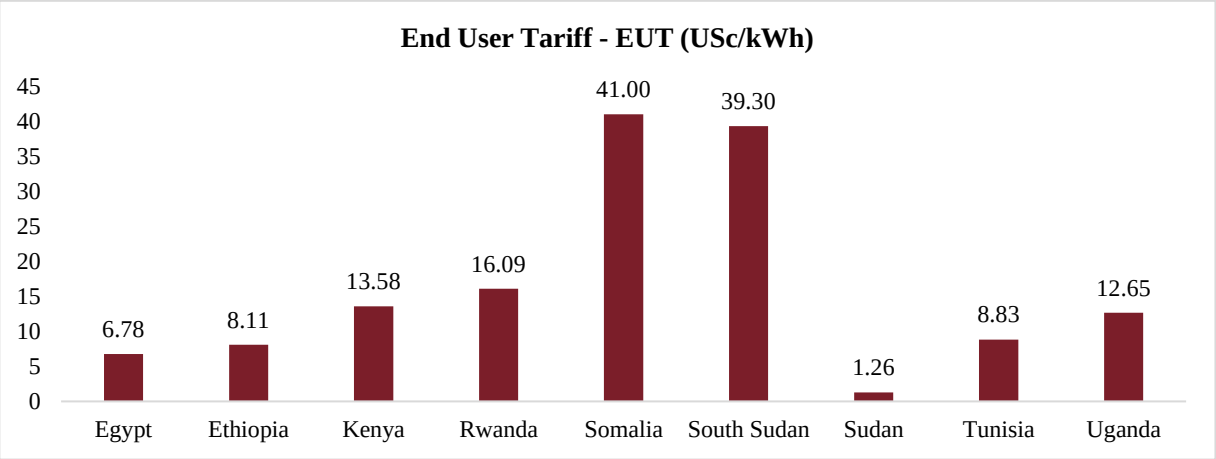
### 2.7.4 End-User Tariffs (EUT)

The table below shows the estimate of the EUT based on data provided by the respective countries.

**Table 16: End user tariffs (USc/kWh)**

| Country | Total (USc/kWh) |
|---|---|
| Egypt | 6.78 |
| Ethiopia | 8.11 |
| Kenya | 13.58 |
| Rwanda | 16.09 |
| Somalia | 41.00 |
| South Sudan | 39.30 |
| Sudan | 1.26 |
| Tunisia | 8.83 |
| Uganda | 12.65 |

**Figure 7: End User Tariff (USc/kWh) across the specified countries**




From the above, it is seen that Somalia and South Sudan have one of the highest EUTs, in large part due to the high cost of diesel-based generation. Ethiopia and Uganda have lower tariff due to low cost of hydro power generation. It is also to be noted that the above is only for representative purpose, and direct peer to peer comparison of tariffs cannot be undertaken as generally there is an underlying subsidy component about which limited information is available.

### 2.7.5 Taxes and levies

In some countries, additional taxes and levies are charged on the EUT. The details of the same based on available information are as below.

**Table 17: Tax and other levies on EUT**

| Country | Taxes and other levies |
|---|---|
| Burundi | VAT at 18% |
| Djibouti | - |
| Egypt | - |
| Eritrea | - |
| Ethiopia | Regulatory tax |
| Kenya | VAT at 16%, REP levy at 5% of revenue from unit sales and EPRA levy at 3 Kenya cents/kWh |
| Libya | - |
| Rwanda | VAT at 18% and regulatory fee at 0.3% |
| Somalia | - |
| South Sudan | - |
| Sudan | Zero VAT |
| Tunisia | VAT at 18% |
| Uganda | VAT at 18% |

*Note: The blank above indicates that information was not available for the Member States*

### 2.7.6 Key underlying drivers of end-user tariff

The key underlying drivers of the end-user tariff analysed are:

- Distribution losses
- Distribution network length
- Quality of service standards – SAIDI and SAIFI

The same is as shown below.

**Table 18: Distribution losses (%)**

| Country | Distribution loss (%) |
|---|---|
| Burundi | 19.00% |
| Djibouti | 17.34% |
| Egypt | 21.39% |
| Eritrea | 23.00% |
| Ethiopia | 17.00% |
| Kenya | 18.00% |
| Libya | 16.90% |
| Rwanda | 17.07% |
| Somalia | 17.50% |
| South Sudan | 20.00% |
| Sudan | 20.50% |
| Tunisia | 16.54% |
| Uganda | 17.35% |

The details of the distribution network length based on available information is as shown below.

**Table 19: Distribution network length (ckt. km.)**

| Country | LV | MV |
|---|---|---|
| Djibouti | 640 | 399 |
| Egypt | 232,516 | 330,290 |
| Ethiopia | 60,704 | 54,300 |
| Kenya | 83,245 | 217,784 |
| Rwanda | 18,726 | 10,777 |
| South Sudan | 695 | 252 |
| Tunisia | 125,042 | 64,614 |
| Uganda | 31,090 | 34,038 |

SAIDI and SAIFI for the select countries is as shown below.

**Table 20: SAIDI and SAIFI**

| Country | SAIFI | SAIDI |
|---|---|---|
| Djibouti | 28.7 | 17.11 |
| Egypt | 1.28 | 107.40 |
| Kenya | 44.91 | 8.37 |
| Rwanda | 29.32 | 14.69 |
| Sudan | 14.00 | 58.60 |

**High distribution losses and poor performance related to SAIDI and SAIFI suggest that tariffs may need to be raised to allow the utility to invest in network improvements and loss reduction measures to enhance operational efficiency.** While raising tariffs, socio-political considerations also come into play, which makes it challenging to raise tariffs.

# 3 Cost reflectivity assessment of tariffs

Based on the Cost Reflectivity Assessment Framework Tool (CRAFT) as discussed and elaborated in the ''Framework Report'' of Workstream 2, we have populated the Cost-of-Service model for the Member States based on available information and as per discussions held during the Addis Ababa workshop from 18th to 20th September 2024. A detailed cost of service model discussion and training was imparted to the participant Member States during this workshop wherein all the required data points and information required for updating the model were explained in detail. Further, run through of the models based on data as shared by the participant Member States during the workshop was also carried out with them. Most of the Member States did not have the complete data set required for updating the Cost-of-Service model. An additional one-week time was given to the Member States to provide atleast the critical data points required for updating the model. However, critical data points were made available only for Kenya and therefore, we have updated the Cost-of-Service model for Kenya and the results of the same have been presented below. Sudan shared incomplete information, and the requirement of the desired data points was explained to them again. Burundi also shared the draft Cost-of-Service model – however critical data such as consumer category-wise demand charge, depreciation on consumer grant funded assets, coincidence factor etc. was missing. The requirement of the complete data set was explained to them with a request for complete information.

Herein, while updating the model for Kenya we have relied upon data as available and other inputs provided by the participant Member State during the workshop for arriving at the cost-of-service results for the country.

## 3.1 Results of the cost reflectivity assessment

We have carried out the cost reflectivity assessment for Kenya Power and Lighting Company (KPLC) which is the key distribution utility in Kenya. We have relied upon data as available in their latest annual report (financial year ending 30th June 2023) and other technical data inputs as provided by the participant Member State during the Addis Ababa workshop.

As detailed in the Framework Report, the input data points are in the first four sheets of the model – ''RR'', ''Customer'', ''Loss'' and ''Assets''. We have detailed the key data input points in the below tables and accordingly arrived at the cost-of-service results for KPLC. The blue font highlighted data points are those that have been input to arrive at the cost-of-service results.

The key input points for the ''RR'' sheet – related to the revenue requirement of the utility are as elaborated below.

**Table 21: Annual Revenue Requirement from Tariffs (KPLC)**

| S. No. | Annual Revenue Requirement | Value (KSh million) |
|---|---|---|
| **A** | **Expenses** | **180,271** |
| | Fuel, water, chemicals | 0 |
| | Power purchase | 143,576 |
| | *Capacity charge* | *115,482* |
| | *Energy charge* | *28,094* |
| | Transmission charge | 0 |

| S. No. | Annual Revenue Requirement | Value (KSh million) |
|---|---|---|
| | Maintenance | 1,313 |
| | Staff costs | 15,853 |
| | Admin & General | 2,239 |
| | Chargeable depreciation (excl. CGF assets) | 15,506 |
| | *Total depreciation (all assets)* | *15,506* |
| | *Less: Depreciation on CGF assets* | *0* |
| | Interest & Financing expense | 0 |
| | Provision for bad debts | 1,785 |
| **B** | **Income from non-tariff sources pertaining to electricity business** | **9,096** |
| | Interest on consumer security deposit | 0 |
| | Re-connection charges | 962 |
| | Meter rent | 126 |
| | Penalties, fines, miscellaneous, etc. | 8,008 |
| **C** | **Return on Regulated Asset Base (RAB)** | **30,714** |
| | Rate | 10.50% |
| | RAB | 292,514 |
| **D** | **Revenue to be recovered from Tariffs** (A - B + C) | **201889** |

Income from non-tariff sources has been deducted to arrive at the revenue requirement of the utility. The Regulated Asset Base (RAB) has been computed from the data as available in the balance sheet of the utility pertaining to the fixed assets. The net fixed assets funded by the utility and adjusting for capital works in progress and the net working capital have been considered to arrive at the RAB. The return on RAB at 10.5% has been considered as being allowed by the regulator for the return on assets and as provided by the participant Member State during the workshop.

Another data point considered in the ‘’RR’’ sheet is the employee count of 10018 based on data in the annual report.

In the ‘’Customer’’ sheet, four consumer categories have been considered – domestic, small commercial, commercial & industrial and streetlighting category. Consumer category energy sales, customer count and category-wise revenue has been considered as available in the annual report. Suitable assumptions for the load factor and coincidence factor based on inputs received during the Addis Ababa workshop from the participant Member State have been considered. The same is as shown below.

**Table 22: Consumer category-wise data (KPLC)**

| Category name | Geography | Voltage level | Load factor | Coincidence factor | Customer count | Energy sales (annual) |
|---|---|---|---|---|---|---|
| *Entries to be separate for customers of same consumption category but with premises in different geography (Urban v/s Rural)* | *Urban/ Rural?* | *Connected at which voltage?* | *%* | *(between 0 to 1)* | *Number* | *GWh* |
| Domestic-DC | Urban | LV | 34% | 0.95 | 6,646,169 | 2,798.00 |

| Category name | Geography | Voltage level | Load factor | Coincidence factor | Customer count | Energy sales (annual) |
|---|---|---|---|---|---|---|
| Small Commercial-SC | Urban | MV | 40% | 0.10 | 327,293 | 1,504.00 |
| Commercial and Industrial-CI | Urban | HV | 40% | 0.10 | 4,081 | 5,137.00 |
| Street lighting-SL | Urban | LV | 45% | 0.20 | 20,501 | 99.00 |

**Table 23: Consumer category-wise revenue breakup (KPLC)**

| Category name | Energy Charge | Demand Charge | Fixed Charge | Total |
|---|---|---|---|---|
| *Entries to be separate for customers of same consumption category but with premises in different geography (Urban v/s Rural)* | *Million KSh* | *Million KSh* | *Million KSh* | *Million KSh* |
| Domestic-DC | 57,057.00 | 0.00 | 0.00 | 57,057.00 |
| Small Commercial-SC | 34,811.00 | 0.00 | 0.00 | 34,811.00 |
| Commercial and Industrial-CI | 68,219.36 | 29,376.64 | 0.00 | 97,596.00 |
| Street lighting-SL | 948.00 | 0.00 | 0.00 | 948.00 |

No fixed charge is presently being levied on the consumer categories and same has not been considered.

Key assumptions related to the ‘’Loss’’ sheet are as follows:

**Table 24: Energy requirement and loss data inputs (KPLC)**

| | | |
|---|---|---|
| Energy Requirement | GWh | 11,632.00 |
| Technical loss | GWh | 1,046.88 |
| Energy Consumption (1-2) | GWh | 10,585.12 |
| Non-technical loss | GWh | 1,046.88 |
| Energy Sales (3-4) | GWh | 9,538.24 |

| | |
|---|---|
| Technical loss as % of System Energy Requirement | 9.00% |
| Non-technical loss as % of System Energy Requirement | 9.00% |

| | |
|---|---|
| HV Loss as % of Energy requirement at HV level | 3.65% |
| MV Loss as % of Energy requirement at MV level | 4.00% |
| LV Loss as % of Energy requirement at LV level | 10.24% |

A peak demand of 2149 MW has been considered to arrive at the corresponding power balance of the country.

In the next sheet ‘’Assets’’ – suitable assumptions pertaining to the functionalised break-up of assets have been considered in absence of exact data points. This break-up helps to segregate the assets into various SBUs – generation, HV network, MV urban network, MV rural network, LV urban and LV rural network. This break-up of the assets helps to functionalise the net fixed assets and then arrive at the functionalised regulated asset base (RAB). The detailed assumptions have been showcased in the model being submitted alongside.

Next, the model automatically computes the functionalised expenses to allocate them to energy-related, demand-related, and customer-related costs. The expenses are considered on a net basis, after deducting the non-tariff income recovered from consumers. As detailed in the Framework Report, the model automatically computes the demand-related RAB and demand-related expense, reallocated to HV, MV, and LV levels. Upon applying the rate of return to RAB and adding it to expenses, the final revenue requirement (RR) re-allocated amongst HV, MV, LV levels is obtained. The final results of the exercise are as shown below.

**Table 25: Cost of service results for KPLC**

| S. No. | Category name | Voltage level | Cost recovery percentage (%) |
|---|---|---|---|
| 1 | Domestic-DC | LV | 36% |
| 2 | Small Commercial-SC | MV | 283% |
| 3 | Commercial and Industrial-CI | HV | 475% |
| 4 | Street lighting-SL | LV | 22% |

As seen from the above table, the data on cost reflectivity assessment shows that the domestic and street lighting categories are being heavily cross subsidized by the commercial and industrial consumer categories. Currently, the cost recovery from the domestic and street lighting categories is quite nominal, and their cost recovery gap is being borne by the commercial and industrial category. A gradual transition to cost-of-service approach should be adopted so as not to lead to any kind of tariff shock to the sensitive consumer categories.

# 4 Conclusion

From the comparative analysis of the various tariff components, it is clear that not only are the tariff frameworks different in different countries but also the end-user tariff varies in different geographies. The key contributing factor for the wide variation in the end-user tariff is in large part due to the difference in the cost of generation across different Member States. A large share of hydro generally helps keep the bulk generation tariff low which has a consequent impact on the electricity supply chain.

The region has significant diversity in generation resources and costs, which can result in significant potential benefits from cross-border electricity trade. In surplus countries extra revenue could be obtained through electricity export, and in deficit countries the demand gap could be met at the lowest available cost through electricity import. Ensuring open access to transmission networks for international flows is critical to achieving these gains.

In most of the countries with vertically integrated entities, cost accounting processes do not separate the costs related to generation, transmission and distribution activities. The introduction of Regulatory Accounting systems with requirements for reporting costs by activity and service would enhance understanding of key costs drivers by utilities and regulators alike.

As part of this report, for the various tariff components, only limited information was available. We have relied upon available data and other publicly available documents to furnish the above results. The data gaps suggest that focus needs to be placed on the role of regulatory information management systems in the application of tariff regulation, so that the information used is sufficient and reliable to correctly implement regulatory tariff models and frameworks.

Additionally, the data based on cost reflectivity assessment shows that the cost recovery from the domestic and agriculture is quite nominal, and their cost recovery gap is being borne by the commercial and industrial category. The results of the exercise show that streamlining of the tariff borne by each consumer class in proportion to the cost to serve each category would require concerted efforts from all concerned stakeholders especially the national and regional regulatory bodies. It calls for a judicious and cautious approach so as not to result in any kind of tariff shock while rationalizing the tariff across consumer categories.

# 5 Annexure 1

The below tables capture the following aspects in detail for the specified COMESA Member States:

1. Presence/absence of a regulatory body
2. Market structure
3. Installed capacity mix

## 5.1 Presence of a regulatory body

The table below shows the presence/absence of regulatory bodies in the respective countries of our study.

**Table 26: Regulatory Structure: Comparative assessment**

| | Burundi | Djibouti | Egypt | Eritrea | Ethiopia | Kenya | Libya | Rwanda | Somalia | South Sudan | Sudan | Tunisia | Uganda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Whether a distinct regulatory agency is available and operational?** | Yes<br>AREEN | No<br>ARMD formed in 2020 but is not operational | Yes<br>EgyptERA | No<br>Electricity Regulatory Committee (ERC) is a unit within the Ministry | Yes<br>PEA | Yes<br>EPRA | No<br>*The Electric Energy Sector Regulatory Authority is yet to be established* | Yes<br>RURA | No<br>*National Electricity Authority (NEA) has been recently established and yet to be operationalized* | No<br>*A bill has been proposed to set up a regulatory body* | Yes<br>ERA | No | Yes<br>ERA |
| **Whether the regulator is financially or administratively independent of the Government?** | No.<br>All key decisions need Ministry approval. | No.<br>All key decisions need Ministry's approval. | Yes | -- | No.<br>All key decisions need Ministry's approval. | Yes | -- | Yes | -- | -- | No<br>Fully funded through budgetary allocations | -- | Yes |

*Note: AREEN = Autorité de Régulation des secteurs de l'Eau potable et de l'Énergie | ARMD = Autorité de régulation multisectorielle de Djibouti | EgyptERA = Egyptian Electric Utility and Consumer Protection Regulatory Agency | PEA = Petroleum & Energy Authority | EPRA = Energy and Petroleum Regulatory Authority | RURA = Rwanda Utilities Regulatory Authority | ERA = Electricity Regulatory Authority*

## 5.2 Market Structure

The table below provides a comparative assessment of overall market structure and the status of unbundling, competition across different segments of the electricity sector value chain.

**Table 27: Market structure: Comparative assessment**

| | Burundi | Djibouti | Egypt | Eritrea | Ethiopia | Kenya | Libya | Rwanda | Somalia | South Sudan | Sudan | Tunisia | Uganda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Overall market structure** | | | | | | | | | | | | |
| | *Bundled, but IPPs allowed; Full retail competition allowed as per new Electricity Law* | *Bundled, but IPPs allowed* | *G T D unbundled, IPPs allowed* | *Bundled, but IPPs allowed* | *G+T and D unbundled, IPPs allowed* | *Transition to fully unbundled structure, IPPs allowed* | *Bundled, IPPs have started to invest* | *Bundled with separation of Infra Planning & Development function, IPPs allowed* | *Isolated mini grids which are privately operated* | *Isolated mini grids which are privately operated* | *G T D unbundled, IPPs allowed* | *Bundled, but IPPs allowed* | *G T D unbundled, IPPs allowed* |
| | **Unbundling, Competition** | | | | | | | | | | | | |
| G | No, but IPPs exist | No, but IPPs exist | Yes, IPPs exist | No, but IPPs exist | G+T unbundled, IPPs exist | Yes, IPPs exist | No, IPPs exist | No, but IPPs exist | IPPs exist | IPPs exist | Yes, IPPs exist | No, IPPs exist | Yes, IPPs exist |
| SO | No | No | No | No | No | In process | No | No | -- | -- | No | No | No |
| T | In process | No | Yes | No | G+T unbundled | Yes | No | No | -- | -- | Yes | No | Yes |
| D | In process | No | Yes | No | Yes | Yes | No | No | -- | -- | Yes | No | Yes |
| RS | In process | No | No | No | No | In process | No | No | -- | -- | No | No | No |

*Note: G = Generation, SO = System operations, T = Transmission, D = Distribution, RS = Retail supply*

## 5.3 Installed Capacity Mix

The table below shows the details of the installed capacity across the respective countries of our study.

**Table 28: Installed Capacity Mix (MW)**

| Installed capacity | Burundi | Djibouti | Egypt | Eritrea | Ethiopia | Kenya | Libya | Rwanda | Somalia | South Sudan | Sudan | Tunisia | Uganda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thermal | 38 | 123 | 53770 | 230 | | 703 | 7525 | 59 | 300 | 248 | 1351 | 5,656.00 | 100 |
| Large Hydro (> 10 MW) | 50 | | 2832 | | 4820 | 872 | | 63 | | | 2251 | 62 | 1300 |
| Solar | 8 | 0.40 | 1859 | 10 | | 368 | | 12 | | 40 | 150 | 20.00 | 88 |
| Wind | | | 1633 | | 404 | 436 | | 0 | | | | 229 | |
| Small Hydro (<= 10 MW) | | | - | | | | | 58 | | | | | 211 |
| Cogen/ Biomass | 4 | | - | | 25 | 108 | 4705 | 0 | | | | | 148 |
| Geothermal | | | - | | 7 | 944 | | 0 | | | | | |
| Others | | | - | | | 84 | | 117 | | | | 25 | |
| Import and out of service | 16 | | | | | 200 | 620 | | | | | | |
| **Total (MW)** | **116** | **123** | **60094** | **240** | **5257** | **3713** | **12850** | **308** | **300** | **288** | **3752** | **5992** | **1848** |

*Note: Burundi: 16 MW import; Kenya: 200 MW import; Rwanda: 46 MW imports; Libya: 620 MW out of service*

**%age mix is as below.**

| Technology | Burundi | Djibouti | Egypt | Eritrea | Ethiopia | Kenya | Libya | Rwanda | Somalia | South Sudan | Sudan | Tunisia | Uganda |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thermal | 38% | 100% | 89% | 96% | 0% | 22% | 100% | 57% | 100% | 86% | 36% | 94% | 5% |
| Hydro | 50% | 0% | 5% | 0% | 92% | 25% | 0% | 39% | 0% | 0% | 60% | 1% | 82% |
| Renewable | 12% | 0% | 6% | 4% | 8% | 53% | 0% | 4% | 0% | 14% | 4% | 5% | 13% |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

# 6 Annexure 2: Tariff related details for COMESA Member States

The below sections provide further details on the tariff approval mechanism, tariff methodology, tariff revision, pass-through charges, tariff structure, lifeline tariff and pre-paid metering systems in each of the COMESA Member States based on available information. We have also tried to capture any special tariff such as that for EVs or industries in the specified Member States.

## 6.1 Burundi

**Tariffs are set by the regulator after approval by the Ministry**

Tariffs are set by AREEN after approval by the Ministry. A ministerial commission includes representatives of the various stakeholders, including REGIDESO. The tariffs developed by the commission are then presented by the Minister to Parliament.

The law gives AREEN the authority to set ex-ante methodologies for transmission and distribution network tariffs for cross-border infrastructure projects.

**Tariff Methodology**

There is neither a tariff determination methodology nor a cost-of-service study in place. The tariffs for electricity produced by REGIDESO are set in relation to the prices in neighbouring countries and are the result of negotiations with the private sector, depending on what REGIDESO sells.

Regarding pricing for independent producers, the PPP contract and the Electricity Purchase Contract determine the rates to be applied and whether they are constant, linear, or decreasing. For the moment, there is no independent electricity manager in Burundi under a PPP contract except certain operators of isolated mini networks whose tariff differs from the tariff applied on the interconnected network.

In addition to the fixed charges levied on the consumers, a Value Added Tax (VAT) of 18% is applied.

**Frequency of tariff revisions**

The last tariff revision took place in 2017. Earlier, tariffs were revised in 2011 and 2012. Currently, the country is in the process of developing new tariffs, which are expected to be in place by the end of this year.

**Pre-Paid Tariff System**

In Burundi, there are two forms of payment including the prepayment system for those who already have smart meters and the post payment system for those who have traditional meters.

## 6.2 Djibouti

**Tariffs are set after approval by the Parliament**

The electricity tariffs are set by the resolution of the Board of Directors of EDD, then approved by the Council of Ministers and finally sent to the Parliament for approval.

**Tariff Methodology**

The Order No. 2016-199PRMERN defined the calculation method applied since January 1, 2017, as follows:

Erf = Ere x [tge(phi) - tgr(phi)]

Erf = Reactive energy billed

Ere = Reactive energy recorded

tge (phi) = tangent phi recorded

tg, (phi) = reference tangent phi = 0.48

The cost-of-service study has not been carried out yet.

**Frequency of tariff revisions**

A tariff revision took place in 2020 during the COVID-19 specifically for domestic consumers. Earlier, tariffs were revised in 2016. The irregularity in tariff determination makes it difficult to cover the cost of costly imported fuels, which makes the sector dependent on subsidies from the government.

**Three-part tariff system**

The country has a three-part tariff system in place. Consumers have to pay a demand and an energy charge based on their consumption level. Separate tariff exist for the Low Voltage, Medium Voltage and High Voltage consumers.

The Board of Directors may, on the proposal of the Director of Electricity of Djibouti, grant more advantageous specific supply contracts to large consumers or to those who undertake steps to reduce their power consumption during peak hours.

**Social tariff threshold**

The social tariff band reserved for domestic subscribers with a Subscribed Power (PS) of 1 kVA, is 200 kWh per month as per the available tariff schedule.

## 6.3 Egypt

The adopted tariff methodology is the cost-plus approach, wherein a specified rate of return is given on the regulatory asset base. The key components as part of the revenue requirement of the utility include the fuel expense, operating expenditure, interest & finance charges, depreciation, and taxes. The standard Weighted Average Cost of Capital (WACC) formula has been adopted.

The tariff is being revised regularly and same is updated each year on the regulator's website. The Cost of Service (CoS) approach for each segment of the electricity supply chain across generation, transmission and distribution has been adopted. Separate tariffs are determined for generation, transmission, and distribution according to their respective cost components. The Cost-of-Service approach includes the standard cost functionalization, cost classification and cost allocation approach.

A special Electric Vehicle (EV) tariff has recently been introduced. For the domestic consumer category, lifeline tariff is upto 50 kWh (as per 2021 schedule). Increasing block-tariff approach has been adopted for all consumer categories (depending upon the consumption and load profile).

The key consumer categories include - domestic, agricultural, commercial, industrial, public lighting, government facilities and public facilities. Pre-paid metering system exists in the country.

## 6.4 Eritrea

The tariffs are set by the Department of Energy but do not cover the production costs. They are revised periodically by the MoEM following requests by the EEC.

The high system losses (estimated at 23 percent) and overreliance on oil products, fuel oil and diesel fuel for electricity generation translate to high production costs estimated at US cents 20/kWh and with average tariff set at US cents 17/kWh, the sector cannot generate adequate revenues to cover its development and recurrent obligations.[1]

## 6.5 Ethiopia

**Limited independence of the regulator in setting tariffs**

Ethiopian Energy Authority (EEA) reports to the Ministry of Water, Irrigation and Energy. All tariffs have to be approved by the government before the same are ratified. This limits the functional independence of the regulator.

**Single part tariff for residential and commercial consumers**

Residential consumers have to pay energy charge based on their consumption block. In addition, the residential consumers have to pay a service charge. Service charge varies depending on whether the consumer has adopted the pre-paid or post-paid tariff scheme. General (commercial) category has flat energy rate applicable to them.

**Two-part tariff for industrial and bulk supply consumers**

Industrial and bulk supply consumers in addition to the energy charge have to pay demand charge. These consumers have flat energy rate applicable to them. Service charge is applicable based on whether the consumer has opted for a pre-paid or post-paid scheme.

**Lifeline tariff threshold**

The lifeline tariff band for domestic consumers is 50 kWh per month as per the tariff schedule. The tariff for this category has not been revised as per the latest schedule.

**Pre-paid tariffs**

Pre-paid tariff exists in the country with the share of pre-paid consumers as 20%.

## 6.6 Kenya

**Lifeline tariff threshold**

During the review period, the Authority granted approval for the Retail Electricity Tariff for the fourth Tariff Control Period spanning from 2022/23 to 2025/26, with an effective date of 1st April 2023.

One of the key modifications under the new tariff was the reduction of the Lifeline Band from 100 kWh to 30 kWh. This adjustment was implemented to provide relief to low-income customers, particularly those with low incomes, constituting approximately 71.31% of the total customer count.

Additionally, the tariff restructuring introduced the Domestic Customer Category 2, catering to consumers using between 31 kWh to 100 kWh of electricity. This adjustment was made to encourage electric and clean

[1] *Source: Project Appraisal Report for Dekemhare 30 MW Solar PV Project by AfDB*

cooking practices, aligning with Kenya's commitment to climate change mitigation efforts. As per EPRA, research suggested that on an average 41 kWh/units are used in electric cooking by families who adopt this approach.

**Multi-Year Tariff Regime**

Kenya's legal framework provides for a three- year multi-year tariff regime which provides various incentives through Key Performance Indicators for the utilities to be efficient.

**Pass-through charges**

In addition to the base tariffs, the Authority also authorizes monthly pass-through costs that are transferred to consumers by utility providers in response to fluctuations in specific cost components. These pass-through costs account for variations in the Fuel Energy Charge (FEC), Foreign Exchange Rate Fluctuation Adjustments (FERFA), inflation adjustments, and the contributions to the Water Resources Authority (WRA).

**Time of Use (ToU) Tariff**

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

In the recent notification, the regulator extended the Time of Use tariff to include small commercial customer categories, expanding eligibility beyond commercial and industrial customers.

**Tariff Structure**

Single part – energy charge exists for the domestic and small commercial consumer category. Two-part tariff comprising of demand charge and energy charge exists for the large commercial and industrial category.

**Special tariff introduced for E-Mobility**

In a move to encourage the embrace of electric transportation, the Authority implemented a special tariff for e-mobility effective from 1st April 2023.

## 6.7 Libya

Not much information was available.

## 6.8 Rwanda

**Last tariff revision took place in 2020**

The current tariff in place was notified in 2020.

**Tariff adjustment frequency**

Electricity end user tariffs are adjusted on a quarterly basis in accordance with electricity tariff methodology and such adjustment is approved by the Director General of RURA.

**Lifeline tariff threshold for residential consumers**

The lifeline tariff threshold has been set at 15 kWh.

**Non-industrial categories have a single part tariff in place**

Non-industrial categories pay only the applicable energy charge.

**Industrial category has a three-part tariff in place**

The industrial category is divided into three categories – small, medium, and large depending upon their consumption level. Industrial consumers pay the energy, demand, and customer service charge on monthly basis (with smart meters). In Rwanda, **in order to encourage large industries, large industrial tariff is lower than the small and medium industrial tariff.** Likewise, medium industries pay less than the small industries.

Industries pay the demand charge based on **time-of-use** of the day. Further, industrial customers without smart meters are charged at flat rates until the smart meters are installed in their facilities in order to apply the Time of Use tariff.

**Pre-paid tariff exists in the country**

There is a provision of pre-paid tariff system in the country.

## 6.9 Somalia

Recently, the Electricity Tariff Regulations 2023 have been issued to streamline the process of tariff determination for the licensees and the ESPs. The tariffs are to be approved for a period of one year; with provision for review of tariff every six months based on fuel price and foreign exchange rate fluctuation. Tariff determination is based on a cost-plus approach, with a reasonable return to the licensee.

The licensee is required to submit the application for tariff annually and the regulator will follow due process of public consultation, inviting stakeholder comments before the final issuance of tariff.

NEA is responsible for the tariff determination process. The tariffs are then approved by the Ministry.

Regarding costs per kilowatt-hour of electricity, Somalia has one of the highest unit prices in Africa. This is in large part due to the fragmented nature of the power sector in the country.

It is expected that with the coming up of the NEA, tariff determination will be more streamlined and uniform approach for tariff determination will be adopted.

## 6.10 South Sudan

**Tariff approval mechanism**

The MoED proposes tariffs which are then approved by the Council of Ministers. In the absence of an independent regulatory body, MoED proposes the tariffs which are finally approved by the Parliament.

**Tariff Schedule**

The existing tariff schedule and charges are as below.

**Table 29: Tariff categories and tariff schedule – South Sudan**

| S. No. | Consumer Category | Tariff (USD/kWh) |
|---|---|---|
| 1 | Domestic Customers using 100 kWh or below every month | 0.316 |

| S. No. | Consumer Category | Tariff (USD/kWh) |
|---|---|---|
| 2 | Domestic Customers using more than 100 kWh every month | 0.336 |
| 3 | Government Customers | 0.336 |
| 4 | Commercial Customers | 0.440 |
| 5 | Industrial Customers | 0.450 |

*Source: JEDCO*

Tariffs are denominated in USD terms and subject to the market currency exchange rate, thereby exposing the customer to the *foreign exchange risk.* Additionally, customers are required to pay the meter connection charges, monthly service charge, meter reconnection charge etc. to cover the underlying fixed costs of service.

**High Tariffs and High Connection Costs**

JEDCO customers pay some of the highest tariffs in Sub-Saharan Africa at USD 0.40/kWh. Given that the average cost of supply is more than USD 0.70/kWh, however, even these high tariffs are not adequate for complete cost-recovery.

JEDCO's tariff covers its operating costs but creates significant affordability challenges, even in relatively affluent Juba. Taking the Regulatory Indicators for Sustainable Energy (RISE) definition of subsistence-level electricity consumption of 30 kWh/month, the annual cost of subsistence electricity consumption of USD 114 (30 kWh X 12 months X 31.6c/kWh) is equivalent to almost 20% of household Gross National Income (GNI) for the poorest 40% of households. JEDCO's connection costs on an average are ~USD 100 including application fees, meter/wiring, poles, labour cost, and other charges, which further contribute to the relative unaffordability of grid power.[2]

The tariffs are high due to the dependence on imported fuel and electrical equipment which makes tariffs unaffordable to a large section of the population. Plans to invest in domestic refinement capacity as well as low-cost renewable energy generation would help to bring down the cost of supply.

**Lifeline Tariff Threshold**

JEDCO has kept the lifeline tariff at 100 kWh – which covers a large number of households as most of them are poor and consume below the specified threshold level.

**Special Industrial Tariff**

JEDCO has kept industrial tariff relatively low to encourage customers to use more energy.[3]

**Pre-paid Tariff System**

All JEDCO consumers are connected through Conlog or Kein prepaid energy meters, which are managed by a management information system (MIS).

**Cost Recovery Elements**

[2] *Source: World Bank Diagnostic Study on South Sudan's Power Sector 2021*

[3] *Source: JEDCO - https://www.jedcopower.com/about/*

As per the Draft South Sudan National Electricity Regulatory Authority Bill, 2022, the regulator while setting tariffs is expected to set tariffs to enable the licensee to recover his or her investment and the full costs of operation, including financing costs, by:

1. Charge for the electricity supplied as measured in kWh
2. Fixed commercial fee
3. Rent or any other charge in respect of any electricity meter or electrical plant provided by the distribution and supply licensee

## 6.11 Sudan

**The lifeline tariff band in Sudan is quite high.** The tariff structure includes a low lifeline tariff of US¢0.7 per kWh with a high threshold of 200 kWh per month. This relatively generous threshold of social tariff results in higher per customer consumption and also increases the sector's operating losses and required subsidy.

As per a World Bank study, the social tariff is not effectively supporting poor households. At the current threshold of 200 kWh per month, roughly half of residential customers fall into the social category, which is excessively broad. In addition, most of these customers are likely to be urban and belong to a relatively well-off segment of the population, given that a large segment of the population does not have access to electricity. As a result, the lifeline tariff benefits a large number of consumers with higher income at a significant loss of revenue to the power sector.

**Block-Tariff approach**

As per the 2018 tariff schedule, block-tariff approach has been adopted. Single-part tariff for all consumer categories is in place. Key consumer categories include Domestic, Agricultural, Industrial, Commercial, Service, Schools, private hospitals and universities, Government departments, tourism (hotels) and Communications companies, embassies, and organizations.

**Lack of regular tariff revisions**

In 2020, the country began implementing a gradual three-year reform program for electricity prices. However, the same was met by public protests. In January 2022, as part of the reform program, the authorities increased electricity prices by 500% for household consumption, leading to public protests. This price reform also applied to the industrial sector. The cost of electricity for the agricultural sector increased from 1.6 to 9 pounds per KW. Numerous local businesses shut down in response to this abrupt increase, citing it will affect their business. So, by and large public is not receptive to the tariff increases.

Earlier tariff increases were in 2018 and 2016.

**Inadequate cost recovery**

The average retail tariff in Sudan in 2017 was Sudanese Pound (SDG) 0.35 per kWh or US¢1.5 per kWh. Assuming the marginal fuel cost of domestic thermal generation as US¢15 per kWh, the tariff is highly under-priced.

So, there is huge under-recovery by means of the tariff.

**Prepaid tariff system:** The pre-paid tariff system is existing in the country.

## 6.12 Tunisia

Tariffs are insufficient to cover the cost of supply. According to available data, the gap between the selling price and the supply cost has increased. This problem is not entirely addressed by subsidies. The average cost of supply increased due to the increase in the price of imported natural gas and increased losses in the system.

**Table 30: Unit selling price of electricity and average cost - Tunisia**

| S. No. | Parameter (in millimes/kWh) | 2021 | 2022 (P) |
|---|---|---|---|
| 1 | Total selling price (excluding taxes) | 245 | 273 |
| 2 | Average cost | 308.1 | 440.9 |
| **3** | **Difference** | **(63.3)** | **(168.3)** |

*Source: Bulletin of the Ministry of Industry, Mines and Energy of January 2024; P- provisional*

The main categories of consumers are as follows.

- Residential LV
- Non-residential LV
- Public lighting LV
- Water heater LV
- Heating and Air Conditioning (LV)
- Irrigation (LV)
- Irrigation (MV)
- Category HV
- Special category for Cement Manufacturers

The main characteristics of the Tunisian tariff system are as follows.

**Unique four-shift system based on seasonal variations**

Tunisia follows with a unique four-time system based on seasonal variations. Depending on seasonal variations, HV and MV consumers experience a variation in the energy rate billed to them.

The four-time system is shown below.

**Table 31: Four-time system - Tunisia**

| S. No. | Position calendar | From September 1 to May 31 | June 1 to August 31 |
|---|---|---|---|
| 1 | Day | 7 a.m. to 6 p.m. | 6:30 a.m. to 8:30 a.m.<br>1:30 p.m. to 7 p.m. |
| 2 | Summer morning peak | - | 8:30 a.m. to 1:30 p.m. |
| 3 | Evening peak | 6 p.m. to 9 p.m. | 7 p.m. to 10 p.m. |
| 4 | Night | 9 p.m. to 7 a.m. | 10 p.m. to 6:30 a.m. |

*Source: STEG website*

**Increasing block tariff approach for the LV category**

As per the latest tariff schedule, an increasing block tariff approach has been adopted for the general LV category. In case a residential consumer consumes units above the specified threshold, the highest energy tariff would be applicable to the entire consumption. This increasing tariff approach based on units consumed is only applicable for the energy tariff of the general LV category.

In addition, the LV consumer must pay the monthly power tax.

**Lifeline tariff threshold**

The lifeline tariff threshold is 50 kWh for LV residential consumers.

**Prices for MV and HV categories**

Tariffs for the MV and HV consumer category are based on demand and energy load. Energy billing is based on the four-shift system for these categories.

**Rates for Cement Workers**

Energy charges are linked to the purchase price of natural gas. Energy rates follow a four-shift system; Additionally, application fees are also applicable.

## 6.13 Uganda

**Transmission company is regulated under a MYT regime**

There are incentives to increase efficiency, reduce costs and achieve energy loss target.

**Retail end-user tariffs**

Annual base tariffs - at the beginning of the calendar year determined by the regulator.

**Quarterly tariff adjustments**

The bulk supply tariffs, and retail end user tariffs are subjected to quarterly adjustment in line with quarterly tariff review methodology and the licenses for changes due to change in fuel costs, exchange rates, inflation and dispatch affect the revenue requirement, and any costs approved by the Authority hence need for the quarterly tariff adjustment.

- Foreign exchange
- Consumer Price Index
- Fuel Prices
- Generation Mix
- Other costs

**Key features of Q2 2024 tariffs**

- Only domestic customers whose consumption does not exceed 100 units per month based on their six months running average shall qualify to purchase the first 15 units are charged at a lifeline tariff of Ugandan Shilling (UGX) 250 per kWh
- Declining block tariff for large and extra-large industrial consumers shall be applicable to energy consumed above the threshold

**Time of Use Tariffs**

The Time of Use Periods are set by ERA and may be amended from time to time should the load profile change. At present, there are three time periods: Peak (five hours between 18:00 and 23:00), Shoulder (thirteen hours between 05:00 and 18:00) and Off-Peak (six hours between 23:00 and 05:00). ToU tariffs are applicable for the commercial and industrial consumers

**Tariff Structure**

Single part – energy charge exists for domestic consumers. Two-part tariff comprising of demand charge and energy charge exists for the commercial and industrial category.

**---------- End of the report. This page is intentionally left blank ----------**