RAERESA
Regional Association of Energy Regulators for Eastern Africa

COMESA

Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)

COMESA Electricity Market Monitoring Report

March 2026

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Abbreviations

COMESA	Common Market for Eastern and Southern Africa
CRU	COMESA Regional Utility
GWh	Gigawatt-hour
HHI	Herfindahl–Hirschman Index
ICT	Information and Communication Technology
IMS	RAERESA Information Management System
IPP	Independent Power Producer
KPIs	Key Performance Indicators
kWh	Kilowatt-hour
MW	Megawatt
MWh	Megawatt-hour
NRA	National Regulatory Authority
RAERESA	Regional Association of Energy Regulators for Eastern and Southern Africa
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
T&D	Transmission and Distribution
TPA	Third Party Access
USD	United States Dollar

Foreword

Access to reliable, affordable, and sustainable electricity remains one of the most critical enablers of economic transformation across the Common Market for Eastern and Southern Africa (COMESA) region. As COMESA continues to advance regional integration and economic development, the role of electricity in supporting industrialisation, trade, and improved livelihoods cannot be overstated.

The region is endowed with diverse energy resources and is experiencing steadily growing electricity demand driven by economic expansion, urbanisation, and ongoing electrification initiatives. However, many member states still face structural challenges related to electricity infrastructure development, investment mobilisation, system reliability, and market transparency. Addressing these challenges requires strong regulatory institutions, improved data systems, and coordinated regional policy action. This Electricity Market Surveillance Report, prepared in collaboration with the Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA), provides an analytical overview of electricity market developments across ten participating COMESA member states. It is a product of the support received by the African Development Bank towards developing a robust Database Management Information System. The report examines key indicators including generation capacity, electricity demand, tariff structures, market concentration, cross-border electricity trade, and regulatory governance. Together, these indicators provide valuable insights into the performance and evolution of electricity markets in the region.

The findings highlight that while considerable progress has been made in expanding electricity infrastructure and strengthening regulatory frameworks, disparities remain across member states in areas such as electricity access, system reliability, market maturity, and institutional capacity. These differences underscore the importance of continued cooperation among member states to strengthen regulatory governance, improve electricity market transparency, and promote efficient and competitive electricity markets. Regional electricity market integration remains a cornerstone of COMESA's energy strategy.

COMESA remains committed to supporting its member states in advancing regional energy cooperation, strengthening energy infrastructure, and promoting policies that attract investment into the electricity sector.

I commend RAERESA and the participating national regulatory authorities for their collaboration in producing this report. The analysis presented herein provides a valuable foundation for informed policymaking and regulatory decision-making across the COMESA region. It is my hope that this report will serve as a useful resource for policymakers, regulators, investors, and development partners working to strengthen the electricity sector and advance regional energy integration.

Secretary General

H.E. Chileshe Mpundu Kapwepwe
Common Market for Eastern and Southern Africa (COMESA)

Foreword by the Chairperson of RAERESA

The electricity sector across the Common Market for Eastern and Southern Africa (COMESA) region continues to evolve in response to growing energy demand, rapid economic transformation, and increasing regional integration. Reliable, affordable, and sustainable electricity supply is central to achieving the region's development ambitions, supporting industrialisation, and improving the livelihoods of millions of citizens.

The Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA) was established to strengthen cooperation among energy regulators and to promote sound regulatory practices across the region. One of RAERESA's key mandates is to support transparency and accountability in electricity markets through effective market monitoring and surveillance. It is within this context that RAERESA is pleased to present the COMESA Electricity Market Surveillance Report, which provides a comprehensive assessment of electricity market performance across ten participating member states. The report offers valuable insights into key aspects of electricity sector development, including generation capacity, electricity demand, tariff structures, market competition, regional electricity trade, system reliability, and regulatory governance. We thank the African Development Bank for its support in developing the RAERESA Database Management System from which, templates and data have been used to spearhead the development of this report.

The analysis presented in this report highlights both the progress achieved and the challenges that remain in developing efficient and resilient electricity markets within the region. Several countries have made significant strides in expanding generation capacity, strengthening regulatory institutions, and promoting participation by independent power producers. The report underscores the importance of strong regulatory frameworks, transparent tariff methodologies, reliable electricity data systems, and enhanced regional cooperation in supporting the continued development of electricity markets across the COMESA region.

RAERESA remains committed to supporting member states in strengthening regulatory capacity, promoting harmonised regulatory frameworks, and facilitating knowledge exchange among energy regulators. By enhancing regulatory cooperation and improving market transparency, the region can accelerate the transition toward more integrated and sustainable electricity systems. I would like to express my sincere appreciation to the national regulatory authorities and electricity sector stakeholders who contributed data and insights to this report. It is our hope that the findings and recommendations presented in this report will provide a valuable reference for policymakers, regulators, investors, and development partners working to support electricity sector development across the COMESA region.

Through continued collaboration and commitment to regulatory excellence, we can build electricity markets that are more resilient, efficient, and capable of supporting the region's long-term economic growth and sustainable development.

Chairperson

Mr. Daniel Kiptoo Bargoria, MBS, OGW.
Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)

Foreword by the CEO of RAERESA

This report represents a significant milestone in the journey toward a more integrated, transparent, and efficient electricity market in the COMESA region. It presents the first comprehensive market surveillance assessment of electricity sector performance across ten reporting countries, drawing on data and insights provided by national regulatory authorities and electricity sector institutions.

The analysis highlights both the progress recorded and the persistent challenges in electricity system adequacy, tariff design, market structure, cross-border trade, and regulatory governance. By documenting these patterns and trends, the report provides an evidence-based foundation for targeted policy and regulatory reforms at both national and regional levels.

The completion of this maiden report is directly linked to Phase I of the *Regional Harmonization of Regulatory Frameworks and Tools for Improved Electricity Regulation in COMESA* project, particularly the development of the COMESA Regional Utility (CRU) Key Performance Indicators (KPIs) and the RAERESA Information Management System (IMS). These tools have enhanced the capacity of RAERESA and its member regulators to monitor performance, benchmark practices, and support informed decision-making.

The substantial support extended by the African Development Bank, including a grant of USD 1.5 million and strong technical engagement, has been instrumental in achieving the Phase I deliverables with high credibility and stakeholder buy-in. Member States have expressed appreciation for the regional frameworks and tools and have shown clear interest in advancing to Phase II, which will deepen domestication, implementation, and use of these instruments to deliver tangible benefits to consumers and markets.

On behalf of RAERESA, I extend our sincere appreciation to the African Development Bank, national regulatory authorities, utilities, and all stakeholders who contributed to this report. We look forward to continued collaboration as we build on these foundations to strengthen regional electricity markets in COMESA.

For RAERESA, this report is not an endpoint but a starting point for data-driven, cooperative reform in the region's electricity sector.

Chief Executive Officer

Prof. Geoffrey Aori Mabea
Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)

Acknowledgements

We gratefully acknowledge the African Development Bank's financial support of USD 1.5 million for the Regional Harmonization of Regulatory Frameworks and Tools for Improved Electricity Regulation in COMESA—Phase I project. This inaugural report stems directly from the development of the COMESA Regional Utility (CRU) Key Performance Indicators (KPIs) and the RAERESA Information Management System (IMS).

We extend our sincere thanks to the RAERESA Liaison Committee for their ongoing efforts in updating the IMS, as well as to the heads of National Regulatory Institutions for their invaluable support in validating the data.

Executive Summary

Electricity systems across the Common Market for Eastern and Southern Africa (COMESA) region are undergoing significant structural transformation. Rising electricity demand, increased regional power trade, expanding renewable energy deployment, and ongoing regulatory reforms are reshaping the region's electricity markets. At the same time, persistent infrastructure constraints, reliability challenges, and institutional capacity gaps continue to affect the pace and effectiveness of electricity market development.

This report provides a market surveillance assessment of electricity sector performance across ten reporting countries, focusing on key indicators of electricity system adequacy, market structure, tariff design, regional integration, and regulatory governance. The analysis is based on data provided by national regulatory authorities and electricity sector institutions and aims to provide evidence-based insights to support regional market development.

The findings highlight significant heterogeneity across national electricity systems, reflecting differences in system size, regulatory maturity, infrastructure development, and participation in regional power trade.

Electricity System Size and Structure

Electricity system size varies widely across the reporting countries; with generation capacity and electricity demand concentrated in a small number of larger power systems. Countries such as Ethiopia and Kenya operate larger electricity systems, while smaller systems such as Burundi and Eswatini face structural constraints related to limited generation capacity and reliance on electricity imports. Electricity demand growth across the region has continued to increase alongside population growth and economic development. However, disparities in electricity access remain significant, reflecting differences in infrastructure investment and electrification policies across member states. The data indicate that several electricity systems continue to operate with limited generation reserves, increasing vulnerability to supply disruptions and demand fluctuations.

Supply Adequacy and System Reliability

Supply adequacy indicators show that reserve margins vary substantially across the region. While some electricity systems maintain comfortable generation reserves, others operate with narrower margins, increasing the risk of supply shortages during peak demand periods or generation outages.

Reliability indicators also reveal substantial variation in system performance across the reporting countries. Some power systems exhibit relatively low outage frequency and duration, indicating comparatively stable electricity supply conditions. In contrast, other systems experience more frequent and prolonged service interruptions, reflecting infrastructure constraints, transmission bottlenecks, and generation shortfalls.

These differences highlight the importance of continued investments in generation capacity, transmission infrastructure, and grid management technologies to enhance system reliability across the region.

Electricity Tariffs and Cost Recovery

Electricity tariff structures across the reporting countries show substantial variation in both tariff levels and cost recovery performance. Retail electricity tariffs generally reflect differences in generation costs, system scale, and regulatory frameworks.

While several countries have implemented tariff structures that approach full cost recovery, others continue to operate under tariff regimes that do not fully reflect the underlying cost of electricity supply.

Insufficient cost recovery can constrain the financial sustainability of utilities and reduce incentives for private sector investment in generation and transmission infrastructure. Strengthening tariff design and regulatory methodologies therefore remains a critical component of electricity sector reform.

Electricity Market Structure and Competition

Electricity market structures across the reporting countries range from vertically integrated systems to partially liberalized markets with increasing participation by independent power producers.

Market concentration indicators suggest that many electricity systems remain highly concentrated, with a limited number of generation companies dominating electricity supply. While this structure is typical for smaller power systems, increasing market participation and independent power production can contribute to greater competition and efficiency in electricity generation.

Wholesale electricity prices also vary significantly across the region, reflecting differences in generation technologies, fuel costs, and market design.

Understanding the relationship between wholesale market conditions and retail tariff levels remains critical for assessing the efficiency and transparency of electricity pricing structures.

Cross-Border Electricity Trade and Regional Integration

Regional electricity trade plays an increasingly important role in balancing electricity supply and demand across interconnected power systems. Cross-border electricity exchanges enable countries with surplus generation capacity to export electricity while allowing deficit systems to import electricity during periods of high demand.

The analysis indicates that cross-border electricity trade volumes vary widely across the region. Some countries maintain active participation in regional power markets, while others engage in more limited bilateral electricity exchanges.

Electricity trade prices also differ across markets depending on generation costs, transmission constraints, and contractual arrangements.

Regulatory Governance and Institutional Capacity

Strong regulatory institutions are essential for ensuring transparent electricity markets, protecting consumers, and facilitating infrastructure investment. Regulatory capacity indicators reveal significant variation in institutional resources, staffing levels, and regulatory frameworks across the region.

Several regulatory authorities have made substantial progress in strengthening governance frameworks, including tariff regulation methodologies, market monitoring systems, and regulatory independence. However, continued institutional development remains necessary in several jurisdictions to support effective market oversight.

Strategic Reform Priorities

The analysis identifies several strategic priorities for strengthening electricity markets across COMESA member states:

i) **Strengthening regulatory institutions -** Enhancing the technical and analytical capacity of regulatory authorities will support more effective market monitoring and tariff regulation.

ii) **Improving electricity market data systems -** Developing standardized data reporting frameworks will improve transparency and support evidence-based decision-making.

iii) **Enhancing regional electricity trade -** Expanding cross-border transmission infrastructure and harmonizing regulatory frameworks will facilitate regional market integration.

iv) **Promoting cost-reflective tariff structures -** Gradual implementation of cost-reflective tariffs will strengthen utility financial sustainability and encourage investment in generation and network infrastructure.

v) **Accelerating digitalisation of electricity systems -** Investments in smart metering and digital grid technologies will improve system monitoring, reduce losses, and enable more efficient electricity markets.

Electricity markets across COMESA are progressively evolving toward more integrated, transparent, and efficient systems, but continued investments in infrastructure, regulatory capacity, and regional market coordination will be essential to fully realize the benefits of regional electricity integration.

1. Introduction and Market Context

1.1. Background

Electricity plays a central role in economic development, industrialisation, and social welfare across the Common Market for Eastern and Southern Africa (COMESA). Reliable and affordable electricity supply is essential for supporting industrial growth, improving public service delivery, and enabling regional economic integration. As electricity demand continues to grow across the region, electricity systems are undergoing significant structural changes, including the expansion of generation capacity, increased deployment of renewable energy technologies, and the gradual development of competitive electricity markets.

At the same time, many electricity systems within the region continue to face structural challenges, including generation capacity constraints, aging transmission infrastructure, limited financial resources for investment, and institutional capacity gaps. Addressing these challenges requires improved market monitoring and stronger regulatory oversight to ensure that electricity markets operate efficiently, transparently, and in a manner that supports long-term system sustainability.

Electricity market surveillance has therefore become an increasingly important function for energy regulators and regional market institutions. By systematically monitoring key electricity sector indicators, including supply adequacy, tariff structures, market concentration, cross-border electricity trade, and regulatory governance, market surveillance enables policymakers and regulators to identify emerging risks, assess market performance, and design appropriate regulatory interventions.

This report provides a comprehensive electricity market surveillance assessment for ten reporting countries within the COMESA region, based on data collected from national regulatory authorities and electricity sector stakeholders.

1.2. Purpose of the Report

The primary objective of this report is to provide a structured analysis of electricity market performance across selected COMESA member states using a set of standardized electricity market indicators.

Specifically, the report aims to:

i) Assess the structural characteristics of electricity systems, including generation capacity, electricity demand, and electricity access levels.
ii) Evaluate electricity system adequacy and reliability, including reserve margins and service interruption indicators.
iii) Analyse electricity tariff structures and cost recovery performance across different customer categories.
iv) Examine electricity market structure and competition, including market concentration and wholesale electricity price dynamics.
v) Assess regional electricity trade and power system integration across interconnected electricity markets.
vi) Evaluate regulatory governance and institutional capacity within electricity sector regulatory authorities.
vii) Identify strategic reform priorities to strengthen electricity market performance and regional electricity market integration.

Through this analysis, the report seeks to provide policymakers, regulators, and market participants with evidence-based insights that support the continued development of efficient and sustainable electricity markets across the COMESA region.

1.3. Scope of the Analysis

The analysis presented in this report covers electricity sector indicators from ten reporting countries within the COMESA region: Burundi, Democratic Republic of Congo, Eswatini, Ethiopia, Kenya, Mauritius, Tunisia, Uganda, Zambia, and Zimbabwe.

These countries represent a diverse set of electricity systems that differ significantly in terms of system size, generation technologies, electricity demand patterns, and institutional frameworks. As a result, the comparative analysis presented in this report provides valuable insights into both common regional challenges and country-specific electricity sector characteristics.

The analysis focuses on several core dimensions of electricity market performance:

i) **Electricity system fundamentals -** Generation capacity, electricity demand, generation output, and electricity access levels.

ii) **Supply adequacy and system reliability -** Indicators such as reserve margins, outage frequency (SAIFI), and outage duration (SAIDI).

iii) **Electricity tariff structures -** Retail electricity tariffs for residential, commercial, and industrial consumers, as well as tariff cost recovery performance.

iv) **Electricity market structure and competition -** Market concentration indicators, number of generation companies and independent power producers, and wholesale electricity price levels.

v) **Regional electricity trade and market integration -** Cross-border electricity trade volumes, electricity trade prices, and regional power system interconnections.

vi) **Electricity market governance and regulatory capacity -** Institutional capacity indicators, regulatory governance frameworks, and electricity market reform progress.

By examining these dimensions together, the report provides a comprehensive assessment of electricity market performance and development across the region.

1.4. Analytical Framework and Methodology

The analysis presented in this report is based on a market surveillance framework that combines quantitative electricity sector indicators with qualitative assessments of regulatory governance and institutional capacity.

The methodology draws on analytical approaches commonly used in electricity market monitoring reports produced by international institutions such as the International Energy Agency, the African Development Bank, and regional electricity market monitoring authorities.

The analytical framework is structured around five key pillars:

i) **Electricity System Fundamentals -** Indicators assessing electricity system scale and structure, including installed capacity, electricity demand, and generation output.

ii) **Supply Adequacy and Reliability -** Indicators measuring electricity system security and reliability, including reserve margins and power outage indicators.
iii) **Electricity Market Performance -** Indicators assessing electricity pricing structures, market concentration, and wholesale market dynamics.
iv) **Regional Electricity Market Integration -** Indicators evaluating cross-border electricity trade, regional transmission connectivity, and electricity market integration.
v) **Regulatory Governance and Institutional Capacity -** Indicators assessing regulatory frameworks, market reform progress, and institutional capacity within regulatory authorities.

The analysis relies primarily on electricity sector data provided by national regulatory authorities and electricity utilities in the reporting countries. Where appropriate, the report also integrates analytical indicators derived from the collected data, including electricity market concentration indices, electricity trade intensity indicators, and electricity market reform progress scores.

1.5. Structure of the Report

The remainder of the report is organised as follows:

- **Chapter 2** presents an overview of electricity system fundamentals across the reporting countries, including installed generation capacity, electricity demand, generation output, and electricity access levels.
- **Chapter 3** examines electricity supply adequacy and system reliability, focusing on reserve margins and power outage indicators.
- **Chapter 4** analyses electricity tariff structures and cost recovery performance across residential, commercial, and industrial consumers.
- **Chapter 5** evaluates electricity market structure and competition, including market concentration and wholesale electricity price dynamics.
- **Chapter 6** assesses regional electricity trade and power system integration across the reporting countries.
- **Chapter 7** examines digitalisation and data infrastructure in electricity markets, including smart meter deployment.
- **Chapter 8** evaluates electricity market governance and regulatory institutional capacity.
- **Chapter 9** assesses energy security indicators and electricity system resilience.
- **Chapter 10** presents strategic reform priorities for strengthening electricity market performance across COMESA member states.

Together, these chapters provide a comprehensive overview of electricity market development across the region and identify key policy actions required to strengthen electricity market performance and regional power system integration.

2. Electricity System Overview

2.1. Overview of Electricity Systems in the Region

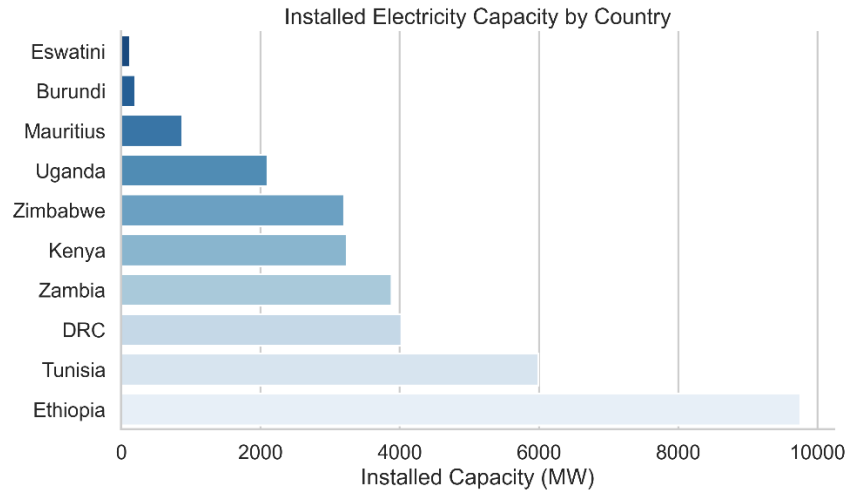
Electricity systems across the reporting COMESA member states vary widely in terms of generation capacity, electricity demand, and electrification levels. These differences reflect disparities in economic development, population size, resource endowments, and historical investment in electricity infrastructure. As a result, electricity market development across the region takes place under heterogeneous structural conditions that shape both electricity supply adequacy and market performance.

Among the ten reporting countries, system size ranges from small electricity systems with installed capacity below 250 MW to larger power systems approaching 10 GW. These differences strongly influence electricity market characteristics such as generation concentration, tariff levels, and participation in regional electricity trade.

In addition, electrification progress across the region remains uneven. While some countries have achieved near-universal electricity access, others still face major challenges in expanding electricity services to rural and underserved populations.

2.2. Installed Electricity Generation Capacity

Installed electricity generation capacity provides a fundamental indicator of the scale of national electricity systems and the ability of these systems to meet demand. Generation capacity also influences electricity market competition and the potential for electricity exports within regional power pools.



Installed generation capacity among the reporting countries shows a wide range of system sizes. Ethiopia operates the largest electricity system among the reporting countries, with approximately 9,749 MW of installed capacity, reflecting significant investments in large hydropower projects. Kenya also operates a relatively large electricity system with 3,237 MW of installed capacity, supported by a diversified generation mix that includes geothermal, hydropower, wind, and thermal generation.

In Southern Africa, Zambia and Zimbabwe also maintain relatively large electricity systems with installed capacities of 3,885 MW and 3,200 MW, respectively. Zambia's generation capacity is dominated by hydropower resources, while Zimbabwe relies on a combination of thermal and hydropower generation.

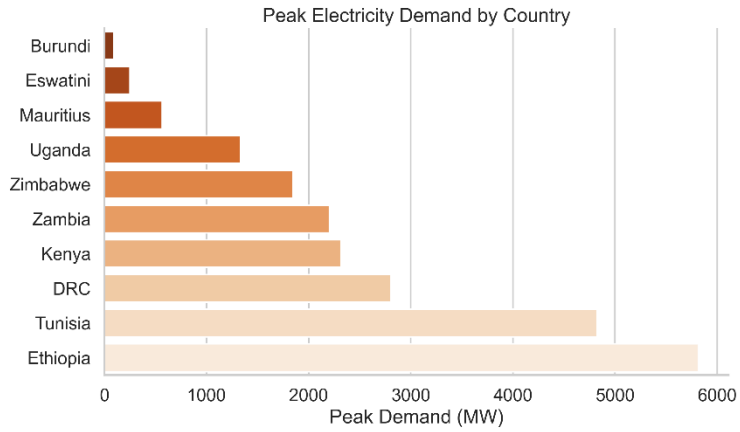
At the other end of the spectrum, smaller electricity systems such as Burundi, with approximately 205 MW of installed capacity, and Eswatini, with around 126 MW, operate with significantly more limited generation resources. Small system size often constrains the degree of competition in electricity generation and increases reliance on electricity imports from neighbouring countries.

Mauritius represents an intermediate system with installed capacity of approximately 882 MW, reflecting the island country's diversified energy mix including coal, oil, and renewable generation.

The scale of installed capacity across these electricity systems has direct implications for supply adequacy, electricity market structure, and the potential for participation in regional electricity trade.

2.3. Electricity Demand and Peak Load

Electricity demand levels across the reporting countries broadly reflect differences in economic size, industrial activity, and electrification rates. Peak demand levels are particularly important because they represent the maximum electricity load that power systems must supply during periods of highest consumption.



Among the reporting countries, Ethiopia records the highest peak electricity demand, reaching approximately 5,820 MW, consistent with its large installed capacity and rapidly expanding electricity system. Tunisia also experiences relatively high peak demand levels of approximately 4,825 MW, reflecting its highly electrified economy and well-developed electricity infrastructure.

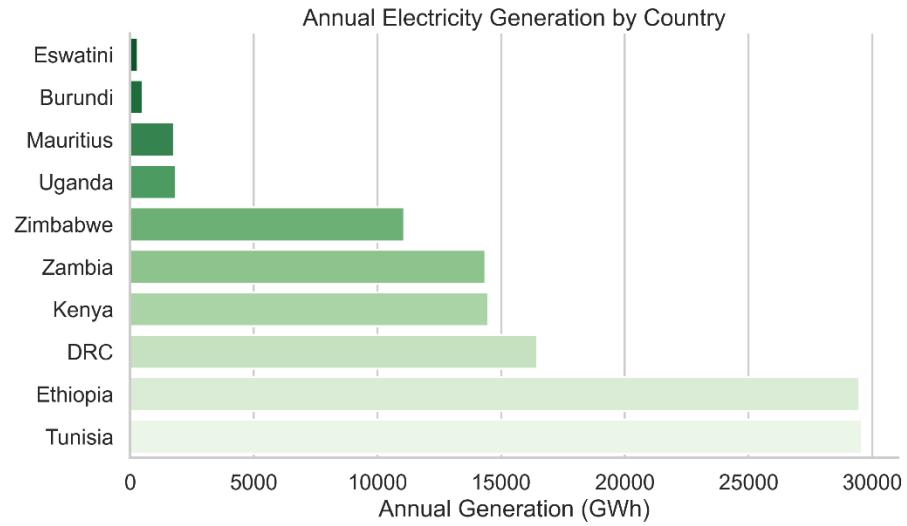
Kenya's peak electricity demand reaches approximately 2,316 MW, indicating the significant role of industrial and commercial electricity consumption within the country's economy. Zambia and Zimbabwe also exhibit substantial peak demand levels of approximately 2,204 MW and 1,850 MW, respectively.

In contrast, smaller electricity systems such as Burundi and Eswatini experience significantly lower peak demand levels, estimated at 95 MW and 252 MW, respectively. These lower demand levels reflect smaller populations and lower electricity access rates.

Understanding peak demand dynamics is critical for electricity system planning because it determines the generation capacity required to maintain reliable electricity supply.

2.4. Electricity Generation

Electricity generation levels reflect the actual production of electricity across power systems and provide insight into how generation assets are utilized to meet demand.



Electricity generation across the reporting countries broadly corresponds to system size and electricity demand levels. Ethiopia again records the highest generation levels among the reporting countries, producing approximately 29,480 GWh of electricity annually. Tunisia generates a similar level of electricity production at approximately 29,564 GWh, reflecting its relatively mature electricity sector.

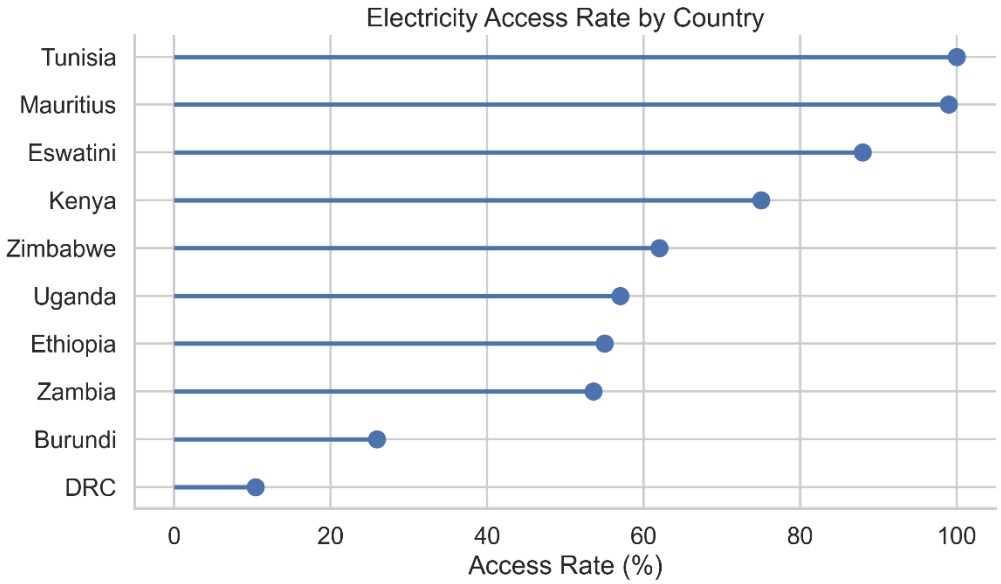
Kenya's electricity generation totals approximately 14,472 GWh, supported by a diverse mix of hydropower, geothermal energy, wind, and thermal generation technologies. Zambia produces approximately 14,360 GWh, primarily from hydropower resources located along the Zambezi River basin. Zimbabwe's annual electricity generation amounts to approximately 11,083 GWh, reflecting both domestic generation and electricity imports during periods of supply shortfall.

In contrast, smaller systems such as Burundi generate approximately 517 GWh annually, highlighting the limited scale of electricity production in some countries within the region.

These differences in generation output illustrate the varying levels of electricity market activity across the reporting countries.

2.5. Electricity Access and Electrification

Expanding electricity access remains one of the most important development priorities across the COMESA region. Electrification contributes directly to economic development, improved public services, and enhanced living standards.



Electricity access rates among the reporting countries vary significantly. Tunisia has achieved universal electricity access, with an access rate of 100%, while Mauritius has also achieved near-universal electrification at approximately 99%. Kenya has made significant progress in expanding electricity access, reaching approximately 75% of the population.

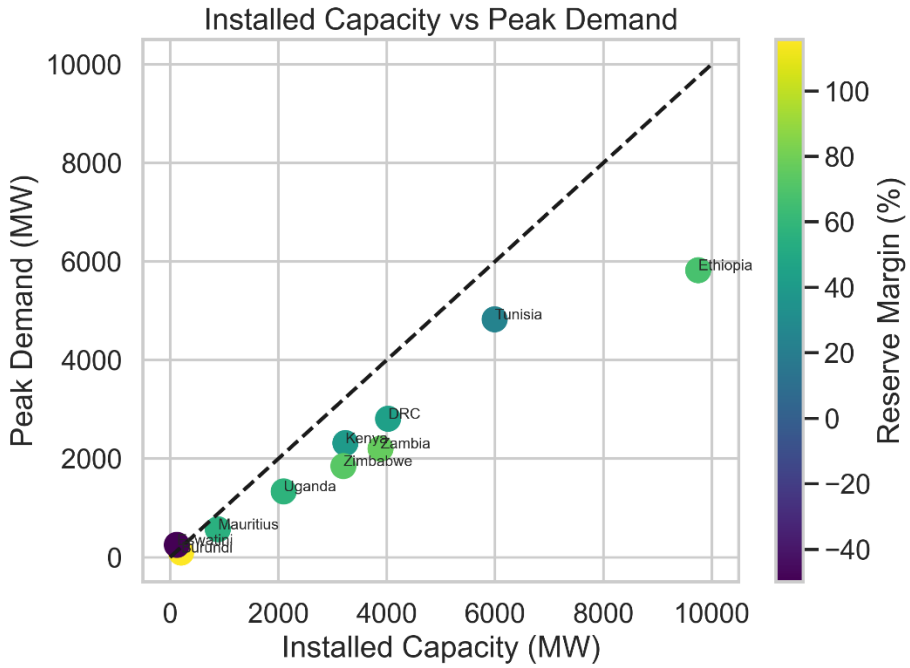
In contrast, several countries continue to face major electrification challenges. Uganda's electricity access rate stands at approximately 57%, while Zambia reports an access rate of approximately 53.6%. Ethiopia has expanded electricity access to approximately 55% of the population, reflecting substantial progress in recent years but still leaving large segments of the population without reliable electricity services.

The lowest electricity access levels among the reporting countries are observed in the Democratic Republic of Congo, where electricity access remains extremely limited at approximately 10.4%, and in Burundi, where access is estimated at around 25.9%.

These disparities highlight the continued need for substantial investments in generation, transmission, and distribution infrastructure to support electrification across the region.

2.6. Capacity Adequacy and Demand Balance

Maintaining sufficient generation capacity to meet electricity demand is essential for ensuring reliable electricity supply. The balance between installed capacity and peak demand provides an initial indication of electricity system adequacy.



In several countries, installed generation capacity significantly exceeds peak electricity demand, indicating the presence of generation reserves that can support system reliability and potential electricity exports. Ethiopia, for example, maintains installed capacity of approximately 9,749 MW compared to peak demand of about 5,820 MW, providing a substantial generation buffer.

Similarly, Zambia operates with installed capacity of approximately 3,886 MW against peak demand of about 2,204 MW, while Zimbabwe maintains 3,200 MW of installed capacity compared with peak demand of approximately 1,850 MW.

However, not all electricity systems operate with sufficient reserve capacity. In Eswatini, installed capacity of approximately 126 MW falls significantly below peak demand of approximately 252 MW, indicating heavy reliance on electricity imports to meet domestic demand.

These differences in generation adequacy have important implications for electricity system reliability, cross-border electricity trade, and electricity market development across the region.

2.7. Key Insights

The analysis of electricity system fundamentals across the reporting countries reveals several key findings.

First, electricity system scale varies significantly across the region, with installed generation capacity ranging from approximately 126 MW in Eswatini to nearly 10 GW in Ethiopia. These disparities influence market structure, competition, and electricity trade dynamics.

Second, electricity demand patterns reflect differences in economic development and electrification progress, with peak demand levels ranging from less than 100 MW in Burundi to more than 5,800 MW in Ethiopia.

Third, electrification progress remains uneven across the region. While countries such as Tunisia and Mauritius have achieved near-universal electricity access, others continue to face significant challenges in expanding electricity services to large segments of the population.

Finally, the balance between installed capacity and electricity demand indicates that several electricity systems maintain significant generation reserves, while others rely heavily on electricity imports to ensure supply adequacy.

These structural characteristics provide the foundation for understanding electricity market dynamics across the region. The following chapter therefore examines electricity system adequacy and reliability indicators in greater detail, focusing on reserve margins and power outage performance.

3. Supply Adequacy and System Reliability

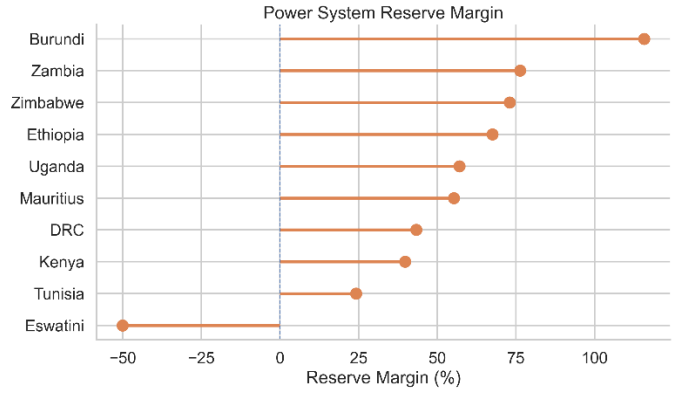
Ensuring adequate electricity supply and maintaining reliable system operation are central objectives of electricity sector planning and regulation. Electricity supply adequacy refers to the ability of the power system to meet electricity demand under both normal operating conditions and during periods of peak consumption. Reliability, by contrast, reflects the operational performance of electricity networks in delivering electricity to consumers without interruption.

Across the reporting COMESA member states, supply adequacy and reliability conditions vary significantly due to differences in generation capacity, infrastructure development, hydrological variability, and system planning practices. Electricity systems with limited generation reserves or constrained transmission infrastructure are more vulnerable to supply disruptions and service interruptions.

This chapter examines the adequacy of electricity generation capacity relative to demand and evaluates reliability performance using outage indicators such as the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI).

3.1. Generation Reserve Margins

Reserve margins provide a key indicator of electricity supply adequacy. The reserve margin measures the percentage by which installed generation capacity exceeds peak electricity demand. Higher reserve margins generally indicate greater system resilience to demand fluctuations or generation outages, while lower reserve margins may signal vulnerability to electricity shortages.

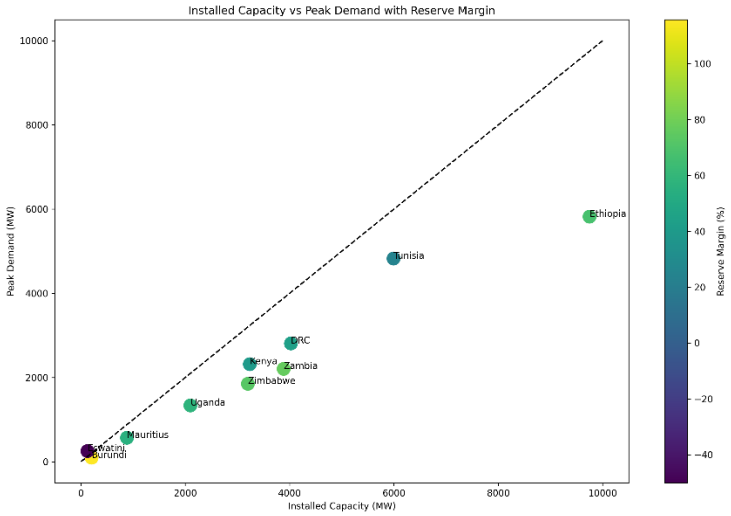


Among the reporting countries, reserve margins vary widely. Zambia records one of the highest reserve margins at approximately 76.3%, reflecting installed generation capacity of about 3,886 MW compared with peak demand of approximately 2,204 MW. Zimbabwe also maintains a relatively high reserve margin of approximately 72.9%, suggesting that existing generation capacity provides a substantial buffer above peak demand levels.

Ethiopia similarly operates with a strong reserve margin of approximately 67.5%, supported by significant hydropower generation capacity. Mauritius also maintains a relatively comfortable reserve margin of approximately 55.3%, indicating a balanced generation portfolio relative to demand.

In contrast, Tunisia operates with a more moderate reserve margin of approximately 24.2%, which remains within typical reliability planning ranges for many electricity systems but provides a smaller operational buffer compared with other countries in the region.

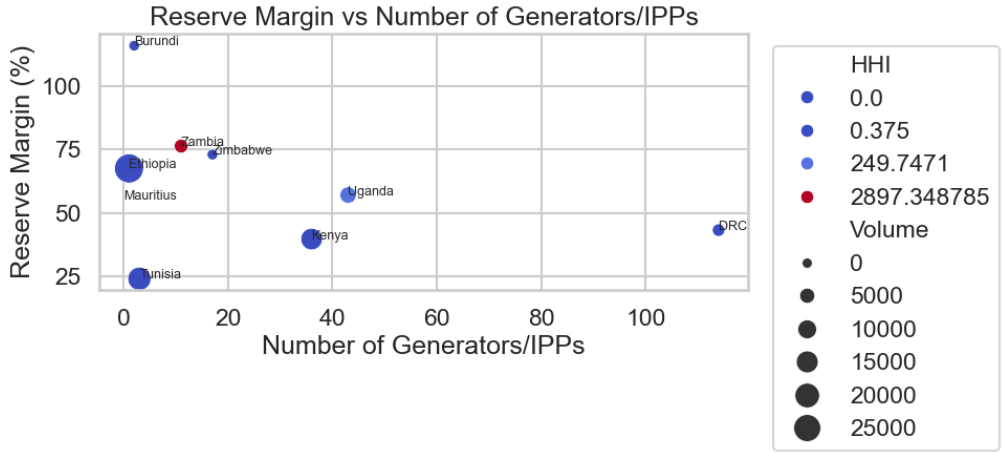
More concerning is the situation in Eswatini, where the reserve margin is estimated at –50%, reflecting installed capacity of only 126 MW compared with peak demand of approximately 252 MW. This structural deficit highlights the country's reliance on imported electricity to meet domestic demand.



These disparities illustrate the importance of generation expansion planning and cross-border electricity trade in ensuring supply adequacy across the region.

3.2. Reserve Margins and Market Structure

Electricity system adequacy is also influenced by electricity market structure and the diversity of generation sources available within each power system.



Countries with a larger number of generation companies and independent power producers tend to operate electricity systems with greater operational flexibility and improved resilience to generation outages. For example, the Democratic Republic of the Congo, with approximately 114

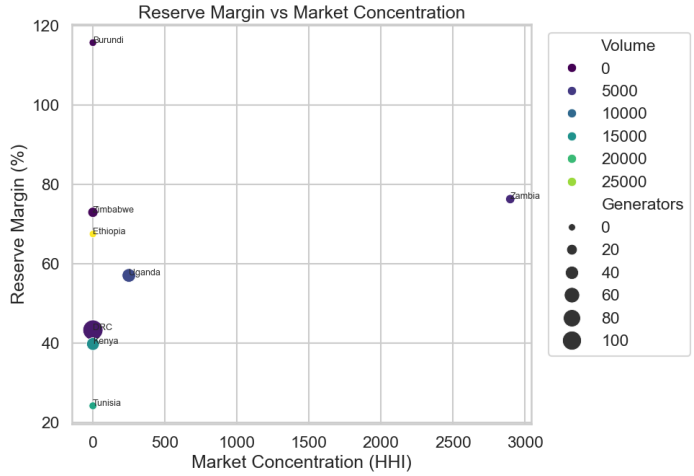
generation entities, operates a highly decentralized generation structure, although infrastructure constraints limit effective electricity supply in some regions.

Uganda also exhibits a relatively diverse generation structure with 43 generation companies and independent power producers, while Kenya hosts approximately 36 generators and IPPs, reflecting progressive market reforms and increased private sector participation in electricity generation.

In contrast, electricity systems with limited numbers of generation entities may face greater operational risks if a small number of generation assets experience outages or maintenance interruptions.

3.3. Market Concentration and Supply Adequacy

Electricity system adequacy can also be influenced by market concentration. Highly concentrated electricity markets may face risks related to limited generation diversity and potential supply constraints.

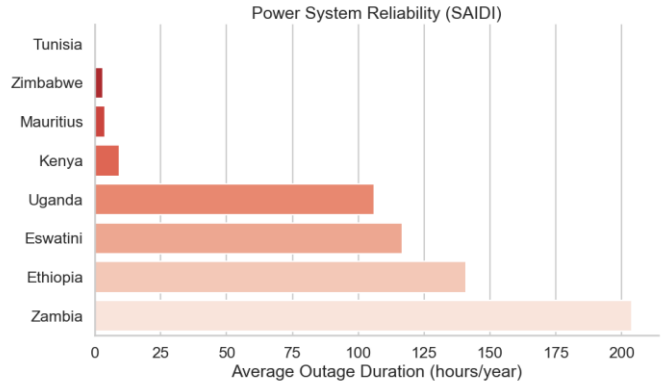


Market concentration indicators show significant variation across the reporting countries. Zambia, for example, records a relatively high Herfindahl-Hirschman Index (HHI) value of approximately 2,897, indicating a concentrated generation market structure. Uganda also exhibits elevated concentration levels with an HHI of approximately 249.7, while Kenya shows a lower concentration level of approximately 0.375, reflecting greater diversification of generation assets.

While concentrated market structures are common in smaller electricity systems, diversification of generation ownership and technologies can improve system resilience and enhance market efficiency.

3.4. Reliability Performance

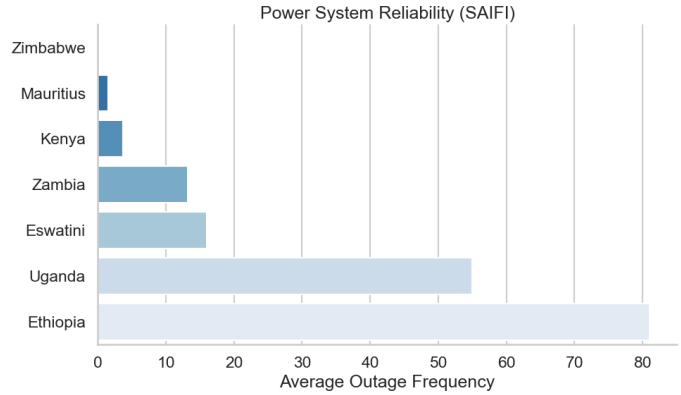
Electricity reliability indicators provide insight into the operational performance of electricity networks and the ability of utilities to maintain continuous electricity supply.



The System Average Interruption Duration Index (SAIDI) measures the average duration of electricity outages experienced by customers over a given period. Lower SAIDI values indicate more reliable electricity supply.

Among the reporting countries, reliability performance varies considerably. Tunisia reports one of the lowest outage duration levels, with SAIDI of approximately 0.2 hours, indicating a highly reliable electricity system. Mauritius and Zimbabwe also exhibit relatively low outage durations of approximately 3.9 hours and 3 hours, respectively.

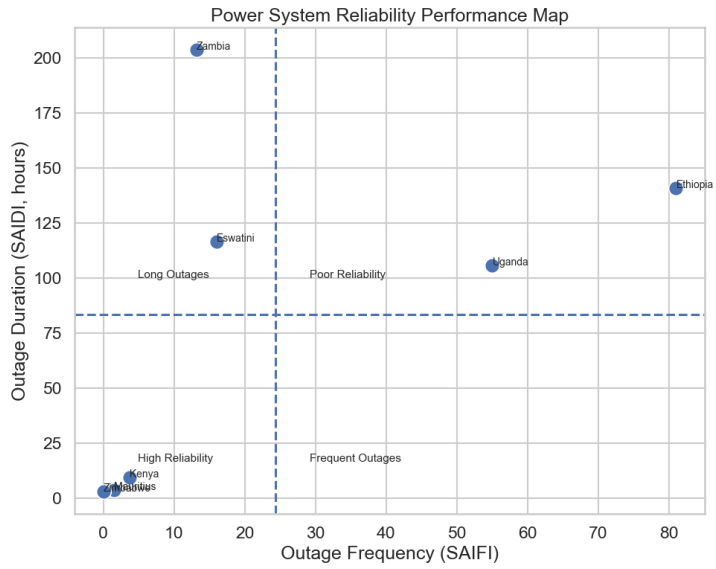
In contrast, some electricity systems experience substantially longer outage durations. Zambia records SAIDI levels of approximately 203.8 hours, while Ethiopia reports outage durations of approximately 141 hours. Uganda also reports relatively high outage duration levels of approximately 106 hours, indicating ongoing reliability challenges in electricity supply.



The System Average Interruption Frequency Index (SAIFI) measures how often electricity interruptions occur for customers.

Kenya records relatively low outage frequency levels, with SAIFI of approximately 3.7 interruptions per year, indicating comparatively stable electricity supply. Mauritius also reports relatively low outage frequency levels of approximately 1.5 interruptions per year.

In contrast, Ethiopia reports a significantly higher outage frequency of approximately 81 interruptions per year, while Uganda experiences approximately 55 interruptions annually. These figures suggest the presence of network reliability constraints and highlight the need for infrastructure investment and improved grid management.



The reliability performance map illustrates the relationship between outage duration and outage frequency across the reporting countries. Systems that experience both high outage frequency and long outage durations face the most severe reliability challenges.

3.5. Policy Implications for Supply Adequacy and Reliability

The analysis of electricity supply adequacy and reliability highlights several policy priorities for electricity sector development across the region.

Strengthening generation capacity planning

Electricity systems with narrow or negative reserve margins require accelerated investments in generation capacity to ensure reliable electricity supply. Countries with structural supply deficits may also benefit from increased participation in regional electricity markets to access surplus generation from neighbouring countries.

Expanding transmission and grid infrastructure

Transmission constraints remain a major driver of electricity reliability challenges. Strengthening transmission infrastructure can reduce congestion, improve electricity flows, and enhance overall system resilience.

Promoting diversification of generation sources

Electricity systems that rely heavily on a single generation technology, particularly hydropower, may face increased vulnerability to hydrological variability. Diversifying generation portfolios through renewable energy technologies such as solar, wind, and geothermal power can enhance system reliability.

Enhancing electricity market participation

Increasing participation by independent power producers and private sector investors can expand generation capacity and improve operational flexibility within electricity markets.

Strengthening system monitoring and reliability regulation

Regulatory authorities can play an important role in improving reliability performance by implementing reliability standards, monitoring outage indicators, and establishing performance-based regulation mechanisms for utilities.

3.6. Key Findings

The analysis of supply adequacy and reliability across the reporting countries highlights several important conclusions:

i) Reserve margins vary significantly across the region, ranging from strong generation buffers in countries such as Zambia and Ethiopia to structural supply deficits in countries such as Eswatini.

ii) Electricity system reliability also varies widely, with some systems achieving high reliability while others experience frequent and prolonged service interruptions.

iii) Market structure and generation diversification play an important role in supporting system resilience and supply adequacy.

iv) Strengthening electricity infrastructure and generation capacity will be essential for supporting continued electricity demand growth across the region.


ELECTRICITY MARKET PRICES
100.54
160.54
120.94
45.07
May
Jul
Nov
June
May

4. Retail Electricity Tariffs and Cost Recovery

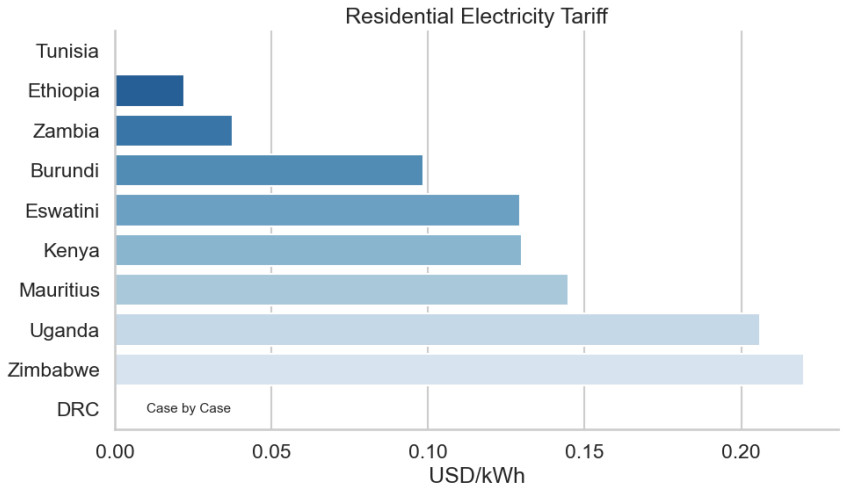
Electricity tariffs play a central role in determining the financial sustainability of power utilities, the affordability of electricity for consumers, and the overall efficiency of electricity markets. Tariff structures are typically designed to balance several objectives, including cost recovery for electricity utilities, affordability for consumers, and incentives for efficient electricity consumption.

Across the reporting COMESA member states, electricity tariff levels vary considerably due to differences in generation costs, electricity system size, regulatory frameworks, and levels of government support to electricity utilities. In many countries, electricity tariffs are also influenced by cross-subsidies between consumer groups, particularly between residential and industrial customers.

This chapter examines electricity tariff structures across the reporting countries, focusing on residential, commercial, and industrial tariffs, as well as the extent to which tariff levels reflect the underlying cost of electricity supply.

4.1. Residential Electricity Tariffs

Residential electricity tariffs are particularly important because they directly affect household affordability and access to electricity services. Electricity tariffs for residential consumers across the reporting countries vary significantly, reflecting differences in electricity supply costs and national tariff policies.



Among the reporting countries, Zimbabwe records one of the highest residential electricity tariffs, with an average tariff of approximately 0.22 USD/kWh. Uganda also records relatively high residential tariffs of approximately 0.206 USD/kWh, reflecting relatively high electricity supply costs and limited cross-subsidies for residential consumers.

Mauritius and Kenya maintain residential electricity tariffs of approximately 0.145 USD/kWh and 0.13 USD/kWh, respectively. These tariff levels are broadly consistent with the cost structures of electricity systems that rely on a combination of imported fuels and renewable energy sources.

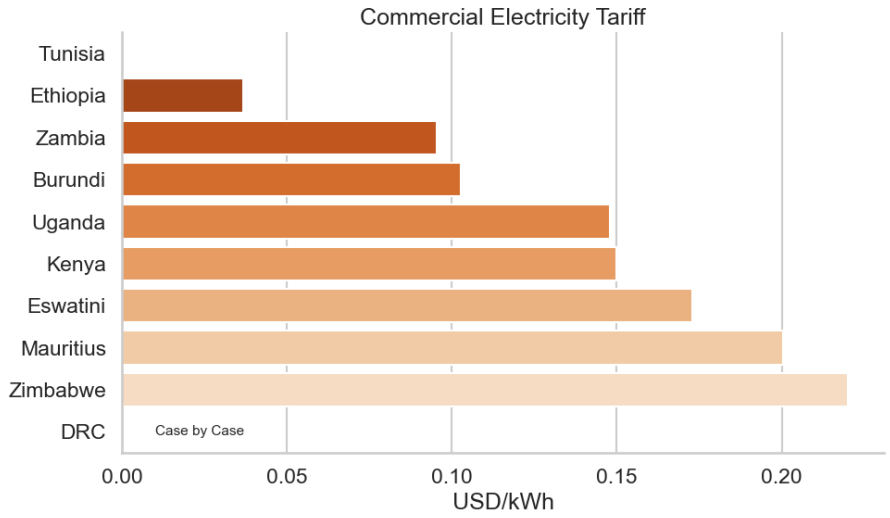
In contrast, several countries maintain significantly lower residential electricity tariffs. Ethiopia reports residential tariffs of approximately 0.022 USD/kWh, while Zambia records tariffs of

approximately 0.0376 USD/kWh. These lower tariffs often reflect government policies aimed at maintaining electricity affordability, although they may also contribute to financial challenges for electricity utilities if tariff revenues do not fully cover electricity supply costs.

Burundi records residential electricity tariffs of approximately 0.099 USD/kWh, placing it within the mid-range of tariff levels among the reporting countries.

4.2. Commercial Electricity Tariffs

Commercial electricity tariffs generally exceed residential tariffs because commercial consumers typically have higher consumption levels and impose different demand patterns on electricity systems. Commercial tariffs also often incorporate higher cost recovery components to support utility financial sustainability.



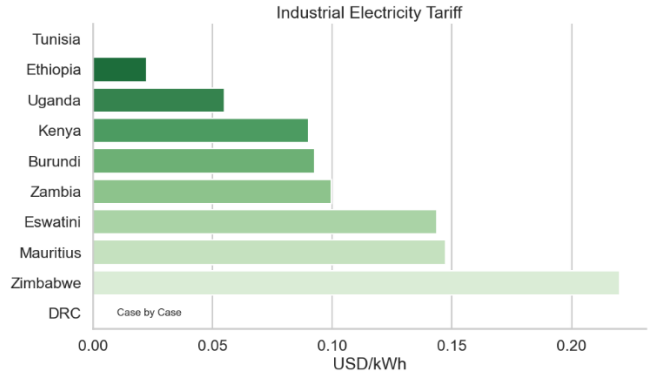
Among the reporting countries, Mauritius records the highest commercial electricity tariffs, reaching approximately 0.200 USD/kWh, reflecting relatively high generation costs and the island nation's reliance on imported fuels.

Zimbabwe also maintains relatively high commercial tariffs of approximately 0.22 USD/kWh, while Eswatini records commercial tariffs of approximately 0.173 USD/kWh. Kenya reports commercial electricity tariffs of approximately 0.15 USD/kWh, while Burundi maintains tariffs of approximately 0.103 USD/kWh for commercial consumers.

Ethiopia again records significantly lower tariff levels, with commercial tariffs of approximately 0.0366 USD/kWh, reflecting government policies that maintain lower electricity prices as part of broader economic development strategies.

4.3. Industrial Electricity Tariffs

Industrial electricity tariffs play a critical role in determining the competitiveness of energy-intensive industries, particularly in sectors such as mining, manufacturing, and processing industries.



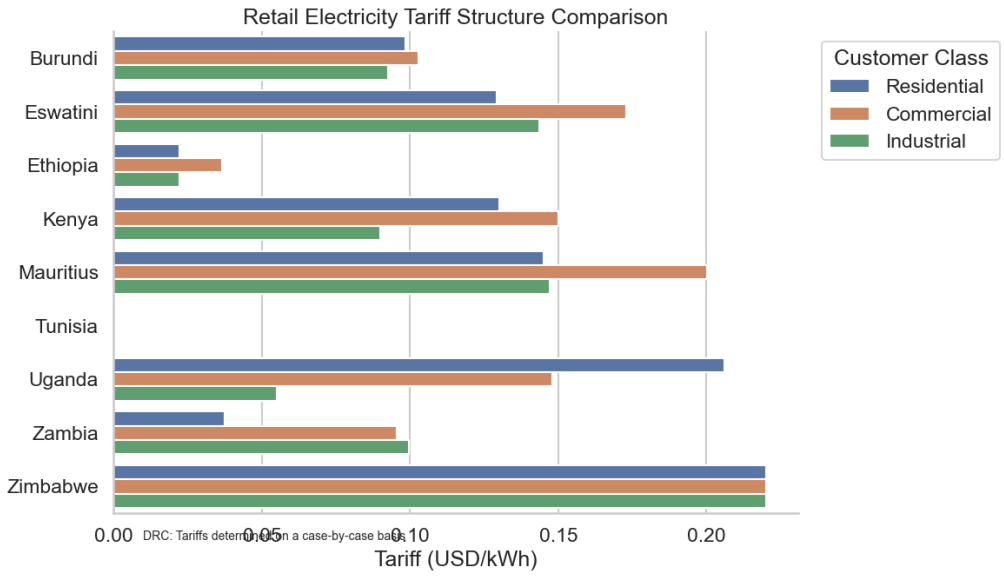
Industrial electricity tariffs across the reporting countries generally fall below residential tariffs, reflecting the importance of electricity costs for industrial competitiveness.

Zimbabwe maintains industrial tariffs of approximately 0.22 USD/kWh, which are among the highest observed in the reporting countries. Mauritius also records relatively high industrial tariffs of approximately 0.147 USD/kWh, while Eswatini reports industrial tariffs of approximately 0.144 USD/kWh. Kenya reports industrial tariffs of approximately 0.09 USD/kWh, reflecting targeted policies aimed at supporting industrial electricity consumption. Zambia records industrial tariffs of approximately 0.0996 USD/kWh, also within a moderate range relative to other countries.

Ethiopia again maintains very low industrial electricity tariffs of approximately 0.0223 USD/kWh, reflecting the country's strategy of using low electricity prices to support industrial development and attract investment in energy-intensive industries.

4.4. Tariff Structure Comparisons

Comparing electricity tariffs across consumer groups provides insight into tariff design and the presence of cross-subsidies between consumer categories.



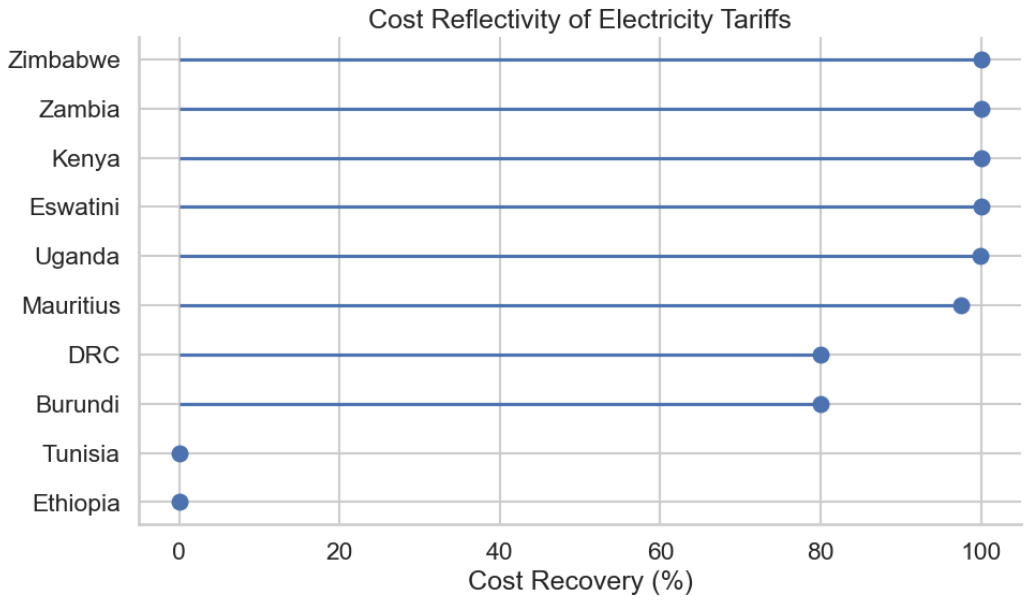
In several countries, commercial and industrial tariffs exceed residential tariffs, suggesting that business consumers provide partial cross-subsidies to support lower residential electricity prices.

This tariff structure is common in many electricity systems and reflects policy priorities aimed at maintaining electricity affordability for households.

However, significant tariff disparities across consumer categories may also distort electricity consumption patterns and affect the competitiveness of electricity-intensive industries. Policymakers must therefore balance affordability objectives with the need to maintain economically efficient electricity pricing structures.

4.5. Cost Reflectivity of Electricity Tariffs

Cost reflectivity measures the extent to which electricity tariffs reflect the full cost of electricity generation, transmission, and distribution. Achieving cost-reflective tariffs is essential for ensuring the financial sustainability of electricity utilities and attracting investment in electricity infrastructure.



Several countries among the reporting group have achieved high levels of tariff cost reflectivity. Kenya, Zambia, and Zimbabwe report cost reflectivity levels of approximately 100%, indicating that electricity tariffs broadly reflect the underlying cost of electricity supply. Mauritius also records a high cost reflectivity level of approximately 97.5%, suggesting that electricity pricing policies in the country closely align with electricity supply costs.

Tunisia also reports cost reflectivity levels close to zero, suggesting that electricity tariffs may be supported by government subsidies or other financial mechanisms. Burundi reports cost reflectivity levels of approximately 80%, indicating that electricity tariffs partially recover supply costs but may still require adjustments to fully ensure financial sustainability.

4.6. Policy Implications for Electricity Tariff Reform

The analysis of electricity tariffs across the reporting countries highlights several important policy considerations for electricity market development.

i) Gradual transition toward cost-reflective tariffs

Countries with tariff levels significantly below cost recovery may need to implement gradual tariff adjustments to ensure the long-term financial sustainability of electricity utilities. Such adjustments should be carefully designed to minimize impacts on vulnerable consumers.

ii) Targeted electricity subsidies

Where electricity affordability remains a concern, targeted subsidies directed at low-income households may provide a more efficient alternative to maintaining artificially low electricity tariffs across all consumer categories.

iii) Improving tariff transparency

Transparent tariff methodologies and regular tariff reviews conducted by independent regulators can improve confidence among investors and electricity consumers.

iv) Aligning tariffs with market conditions

Electricity tariffs should increasingly reflect underlying market conditions, including generation costs, fuel price volatility, and investments in renewable energy infrastructure.

4.7. Key Findings

Several key findings emerge from the analysis of electricity tariffs across the reporting countries:

- Electricity tariffs vary significantly across the region, reflecting differences in generation costs, regulatory policies, and electricity system structures.
- Some countries maintain relatively high electricity tariffs, particularly for residential consumers, while others maintain significantly lower tariffs supported by government policies.
- Cost recovery performance also varies widely across the region, with some countries achieving full cost reflectivity while others maintain tariffs significantly below supply costs.
- Tariff reforms and improved regulatory frameworks will be essential for ensuring the financial sustainability of electricity utilities and supporting continued investment in electricity infrastructure.

5. Electricity Market Structure and Competition

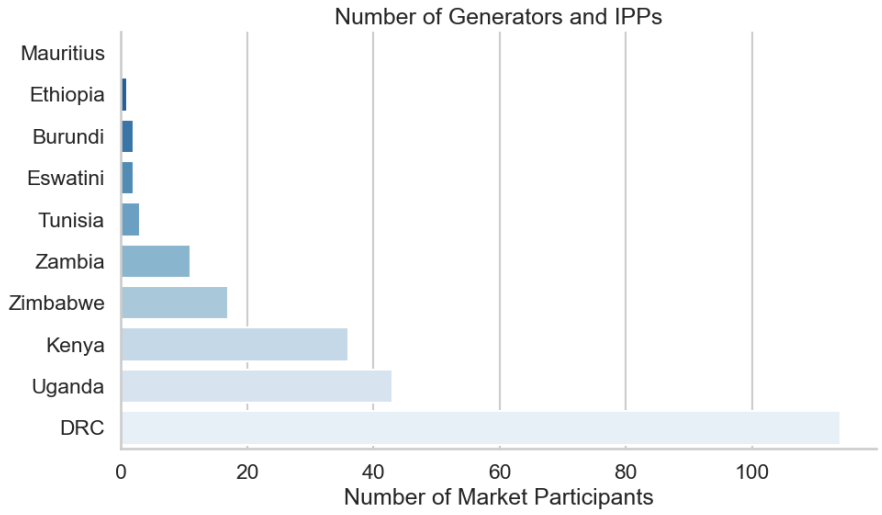
The structure of electricity markets plays a critical role in determining electricity prices, investment incentives, and the overall efficiency of electricity systems. Electricity markets characterized by diverse generation ownership and competitive participation often benefit from improved operational efficiency, greater innovation, and more transparent price formation. Conversely, markets dominated by a limited number of generation entities may exhibit higher levels of market concentration, potentially affecting competition and pricing dynamics.

Across the reporting COMESA member states, electricity market structures vary widely, reflecting differences in regulatory frameworks, electricity system size, and the degree of private sector participation in electricity generation. Some countries operate electricity systems with a relatively large number of generation companies and independent power producers (IPPs), while others remain dominated by vertically integrated state-owned utilities.

This chapter evaluates electricity market structure across the reporting countries using indicators such as the number of generators and independent power producers, market concentration measures, wholesale electricity prices, and electricity trading volumes.

5.1. Number of Generators and Independent Power Producers

The number of generation companies and independent power producers within an electricity system provides an initial indication of the level of market participation and potential competition in electricity generation.



Among the reporting countries, the Democratic Republic of the Congo (DRC) reports the largest number of generation entities, with approximately 114 generators and independent power producers participating in the electricity sector. This large number reflects the presence of both public and private generation facilities across the country's electricity system.

Uganda also exhibits a relatively diverse generation structure with approximately 43 generation companies and independent power producers, reflecting a gradual transition toward increased private sector participation in electricity generation. Kenya similarly reports approximately 36

generation companies and IPPs, supported by regulatory reforms that have facilitated private investment in renewable energy projects, particularly geothermal and wind generation.

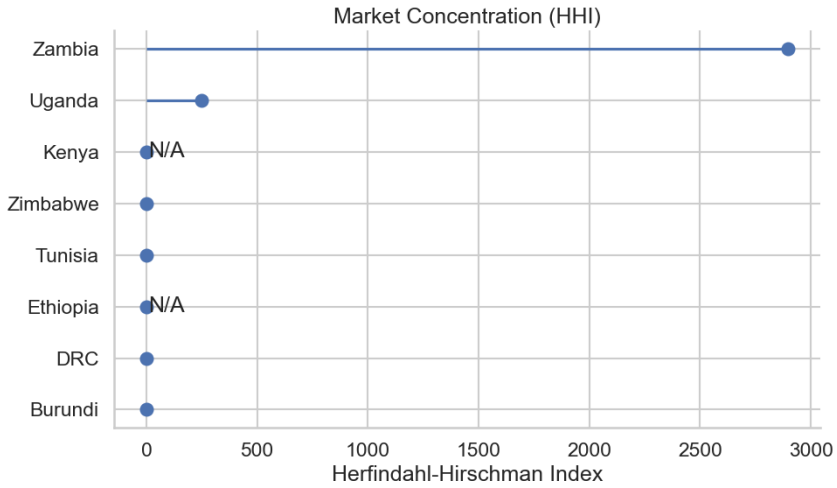
Zimbabwe reports approximately 17 generators and independent power producers, while Zambia reports 11 generation entities, indicating moderate levels of generation participation.

In contrast, smaller electricity systems tend to have significantly fewer generation companies. Eswatini reports two generation entities, while Ethiopia operates with one dominant generation entity, reflecting the continued role of state-owned utilities in electricity generation within certain markets.

The number of generation companies within a power system influences both market concentration and the potential for competition within electricity markets.

5.2. Market Concentration in Electricity Generation

Market concentration provides a quantitative measure of competition within electricity markets. The Herfindahl–Hirschman Index (HHI) is widely used to evaluate the level of concentration in electricity generation markets.



HHI values vary substantially across the reporting countries. Zambia records one of the highest levels of market concentration, with an HHI value of approximately 2,897, indicating a highly concentrated generation structure dominated by a limited number of large generation assets.

Uganda reports a moderate concentration level with an HHI value of approximately 249.7, suggesting a more diversified generation structure relative to other markets in the region.

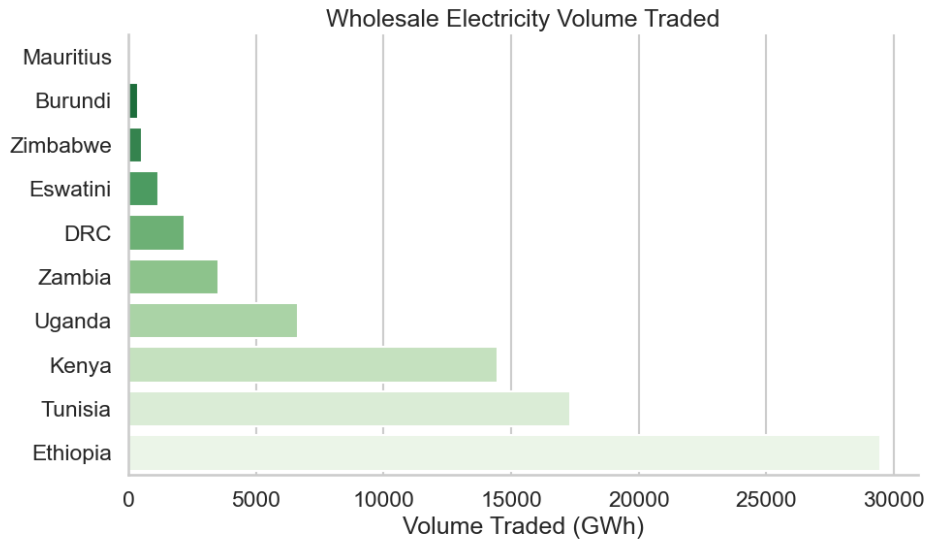
Kenya reports a significantly lower HHI value of approximately 0.375, indicating a relatively diversified generation sector with participation from multiple generation companies and independent power producers.

Tunisia reports an HHI value close to zero, reflecting a vertically integrated electricity system dominated by a state-owned utility. Similarly, Ethiopia's electricity generation sector remains largely concentrated within a single state-owned utility structure.

Market concentration levels are often influenced by electricity system size. Smaller electricity systems typically support fewer generation assets, which can lead to higher levels of market concentration.

5.3. Wholesale Electricity Market Activity

Wholesale electricity trading provides an important mechanism for balancing supply and demand within electricity markets. Electricity trading volumes can therefore provide insight into the level of market activity and the operational dynamics of electricity markets.



Electricity trading volumes vary significantly across the reporting countries. Ethiopia records the largest electricity trading volume, with approximately 29,480 GWh traded annually, reflecting the scale of its electricity system and the role of hydropower generation in supporting electricity exports.

Kenya reports trading volumes of approximately 14,472 GWh, while Zambia records approximately 3,505 GWh of electricity trading activity. Uganda reports electricity trading volumes of approximately 6,623 GWh, indicating an active electricity market supported by diverse generation sources.

In contrast, smaller electricity systems exhibit lower electricity trading volumes. Burundi reports trading volumes of approximately 361 GWh, while Zimbabwe reports approximately 520 GWh of electricity trading activity.

These differences in trading volumes reflect variations in electricity system size, generation capacity, and the level of market participation across countries.

5.4. Wholesale Electricity Prices

Wholesale electricity prices reflect the cost of electricity generation and the dynamics of supply and demand within electricity markets. Wholesale prices are influenced by factors such as fuel costs, generation technology mix, system reliability, and market competition.

Wholesale electricity prices across the reporting countries show substantial variation. Zambia reports one of the highest wholesale electricity prices at approximately 111.5 USD/MWh, while Zimbabwe reports wholesale prices of approximately 120 USD/MWh, reflecting higher generation costs and electricity supply constraints.

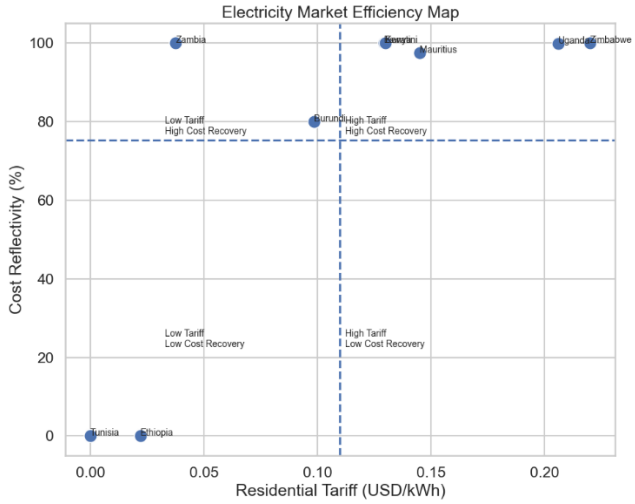
Eswatini reports wholesale electricity prices of approximately 74 USD/MWh, while Ethiopia reports significantly lower wholesale prices of approximately 1.92 USD/MWh, reflecting the country's reliance on large-scale hydropower generation.

Kenya reports relatively low wholesale electricity prices of approximately 0.09 USD/MWh, although this figure may reflect the structure of electricity market reporting rather than actual generation costs.

Differences in wholesale electricity prices highlight the importance of generation technology choices and electricity market design in shaping electricity price outcomes.

5.5. Market Efficiency and Competition

Evaluating electricity market efficiency requires examining the relationship between electricity prices, market concentration, and cost recovery levels.



The electricity market efficiency analysis suggests that electricity markets with diversified generation ownership and competitive participation tend to exhibit more stable pricing dynamics. Conversely, electricity markets characterized by high concentration levels may experience price volatility or higher electricity generation costs.

Ensuring competitive electricity markets requires transparent regulatory frameworks, fair access to transmission networks, and mechanisms that encourage investment in generation capacity.

5.6. Policy Implications for Electricity Market Development

The analysis of electricity market structure across the reporting countries highlights several policy priorities for electricity market development.

i) Promoting competition in electricity generation

Encouraging participation by independent power producers can diversify generation ownership and improve electricity market efficiency. Transparent procurement processes and predictable regulatory frameworks can support private sector investment.

ii) Strengthening wholesale electricity market mechanisms

Developing transparent wholesale electricity trading platforms can enhance price discovery and improve electricity system balancing.

iii) Improving market monitoring and data transparency

Effective market surveillance requires reliable data on electricity generation, prices, and trading activity. Regulators should strengthen reporting requirements and analytical capabilities to monitor electricity market performance.

iv) Supporting regional electricity trade

Cross-border electricity trade can improve electricity market efficiency by allowing countries to access lower-cost electricity generation resources from neighbouring systems.

5.7. Key Findings

Several key insights emerge from the analysis of electricity market structure across the reporting countries:

- Electricity market structures vary widely, with some systems characterized by diverse generation participation while others remain dominated by vertically integrated utilities.
- Market concentration levels differ significantly across countries, reflecting both system size and regulatory frameworks.
- Wholesale electricity prices vary substantially across the region due to differences in generation technology mix and electricity market structures.
- Expanding participation by independent power producers and strengthening electricity market governance will be essential for improving electricity market efficiency.

6. Cross-Border Electricity Trade and Regional Market Integration

Regional electricity trade plays an increasingly important role in improving electricity system efficiency, enhancing supply security, and facilitating the integration of renewable energy resources. Cross-border electricity exchanges allow countries with surplus generation capacity to export electricity to neighbouring systems, while countries facing generation deficits can import electricity to meet domestic demand.

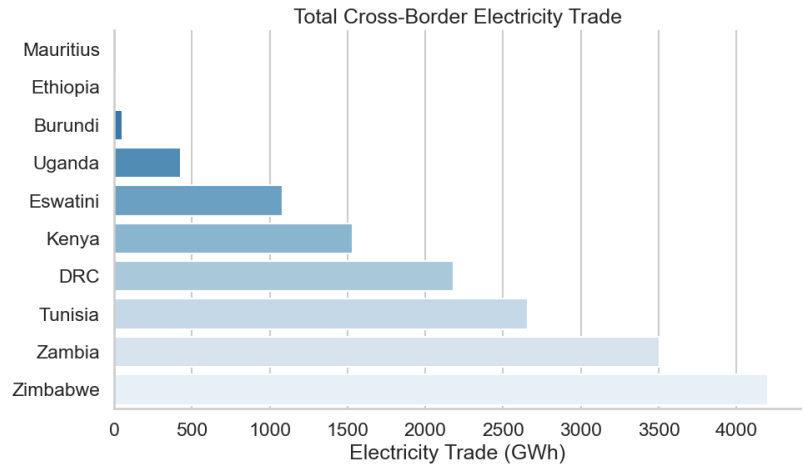
Within the COMESA region, regional electricity trade is supported by several interconnected transmission networks and regional power pool initiatives, including the Southern African Power Pool (SAPP) and the Eastern Africa Power Pool (EAPP). These platforms provide mechanisms for electricity trading between countries, enabling more efficient utilization of generation resources across interconnected systems.

However, the level of cross-border electricity trade varies significantly across the reporting countries due to differences in transmission infrastructure, generation capacity, regulatory frameworks, and participation in regional power markets.

This chapter evaluates cross-border electricity trade across the reporting countries using indicators such as electricity trade volumes, trade intensity, electricity trade prices, and the number of trading partners.

6.1. Cross-Border Electricity Trade Volumes

Cross-border electricity trade volumes provide an important indicator of regional electricity market integration. Countries with larger electricity trade volumes typically play more active roles in regional power markets, either as exporters of surplus generation or as importers seeking to supplement domestic supply.



Among the reporting countries, Zimbabwe records the largest cross-border electricity trade volume, with approximately 4,202 GWh traded annually. Zambia also exhibits significant electricity trading activity, with cross-border trade volumes of approximately 3,506 GWh, reflecting its strong hydropower generation capacity and participation in regional electricity markets.

Tunisia reports cross-border electricity trade of approximately 2,656 GWh, highlighting the role of interconnections with neighbouring electricity systems in supporting electricity supply.

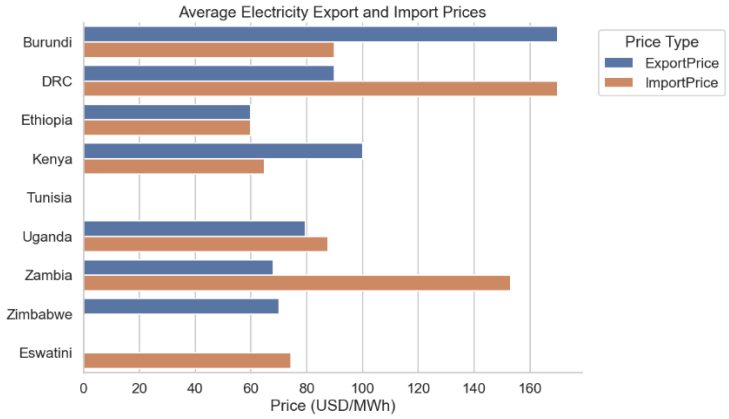
The Democratic Republic of the Congo also reports substantial cross-border electricity trading activity of approximately 2,183 GWh, reflecting the country's significant hydropower resources and regional interconnections. Kenya reports cross-border electricity trade volumes of approximately 1,534 GWh, while Eswatini reports approximately 1,084 GWh, reflecting its reliance on imported electricity to meet domestic demand.

In contrast, smaller electricity systems such as Burundi and Ethiopia report significantly lower cross-border electricity trade volumes, with approximately 50 GWh and 2.95 GWh, respectively.

Mauritius reports no cross-border electricity trade, reflecting its geographic isolation as an island electricity system.

6.2. Electricity Trade Prices

Electricity trade prices provide insight into the economics of regional electricity exchanges. Differences between electricity export prices and import prices can reflect generation costs, transmission constraints, and contractual arrangements between trading partners.

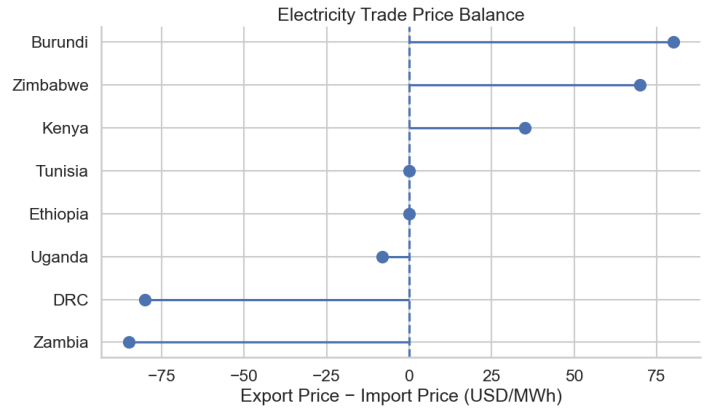


Electricity export prices vary significantly across the reporting countries. Burundi reports relatively high electricity export prices of approximately 170 USD/MWh, while Kenya reports export prices of approximately 100 USD/MWh. The Democratic Republic of the Congo reports export prices of approximately 90 USD/MWh, reflecting the value of hydropower generation exported to neighbouring systems.

Uganda reports export electricity prices of approximately 79.6 USD/MWh, while Zambia records export prices of approximately 68 USD/MWh, consistent with hydropower-based electricity generation costs.

In contrast, Ethiopia reports export electricity prices of approximately 60 USD/MWh, reflecting the relatively low generation costs associated with large-scale hydropower facilities.

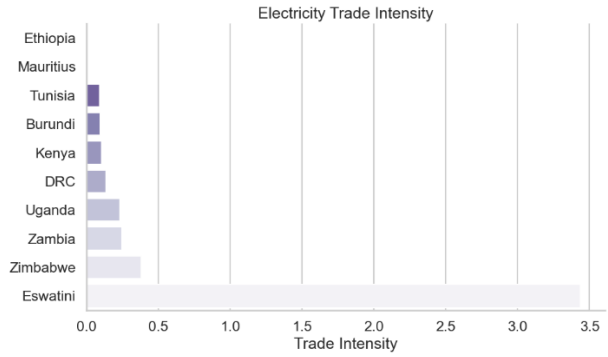
Electricity import prices also vary widely across the region. Burundi reports electricity import prices of approximately 90 USD/MWh, while Zambia reports import prices of approximately 153 USD/MWh, indicating higher costs associated with imported electricity during supply shortages.



The difference between export and import electricity prices provides insight into electricity trade economics and the relative competitiveness of electricity generation across countries.

6.3. Trade Intensity and Regional Integration

Trade intensity measures the relative importance of cross-border electricity trade within national electricity systems. Higher trade intensity levels indicate greater participation in regional electricity markets.



Among the reporting countries, Eswatini records the highest electricity trade intensity, with a trade intensity index of approximately 3.44, reflecting heavy reliance on imported electricity to meet domestic demand.

Zimbabwe also records relatively high trade intensity at approximately 0.379, while Zambia records trade intensity levels of approximately 0.244. Uganda reports a trade intensity of approximately 0.232, indicating moderate participation in regional electricity markets. Kenya records trade intensity levels of approximately 0.106, while Tunisia records approximately 0.09.

In contrast, Ethiopia and Mauritius record very low trade intensity levels, reflecting limited participation in regional electricity markets.

6.4. Electricity Trading Partners

The number of electricity trading partners reflects the level of interconnection between national electricity systems and regional power networks.

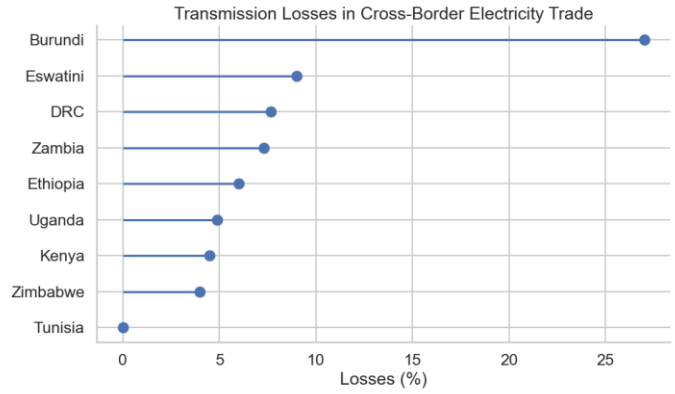
Among the reporting countries, Zambia records the largest number of trading partners, with approximately 11 interconnected electricity trading relationships, highlighting its central role in regional electricity trade within the Southern African Power Pool.

Uganda records approximately four trading partners, while Kenya, Tunisia, and the Democratic Republic of the Congo each report approximately three trading partners. Eswatini and Ethiopia report only one trading partner, indicating more limited regional interconnections.

The number of trading partners influences both electricity market integration and system resilience, as interconnected systems can access electricity from multiple neighbouring power systems during supply shortages

6.5. Transmission Losses in Cross-Border Electricity Trade

Transmission losses represent an important efficiency indicator in electricity trade. High transmission losses can increase electricity costs and reduce the efficiency of cross-border electricity exchanges.



Among the reporting countries, Burundi records the highest transmission losses associated with cross-border electricity trade at approximately 27%, indicating significant inefficiencies in electricity transmission infrastructure.

Eswatini records transmission losses of approximately 9%, while Zambia reports losses of approximately 7.3%. Uganda records transmission losses of approximately 4.9%, while Zimbabwe reports losses of approximately 4%.

Tunisia reports minimal transmission losses in cross-border electricity exchanges, reflecting the efficiency of its transmission infrastructure and interconnection systems.

Reducing transmission losses through network modernization and improved grid management can significantly improve the efficiency of cross-border electricity trade.

6.6. Policy Implications for Regional Electricity Market Integration

The analysis of cross-border electricity trade across the reporting countries highlights several policy priorities for strengthening regional electricity market integration.

i) Expanding regional transmission infrastructure

Strengthening cross-border transmission interconnections will facilitate greater electricity trade and improve electricity system balancing across the region.

ii) Harmonizing regulatory frameworks

Differences in electricity market regulations and trading rules can create barriers to cross-border electricity trade. Harmonizing regulatory frameworks across countries can improve electricity market integration.

iii) Strengthening regional power pools

Regional electricity markets such as the Southern African Power Pool and the Eastern Africa Power Pool provide platforms for electricity trading and market coordination. Strengthening these institutions can improve electricity market efficiency.

iv) Reducing transmission losses

Investments in transmission infrastructure and improved grid management technologies can reduce electricity transmission losses and enhance the efficiency of electricity trade.

6.7. Key Findings

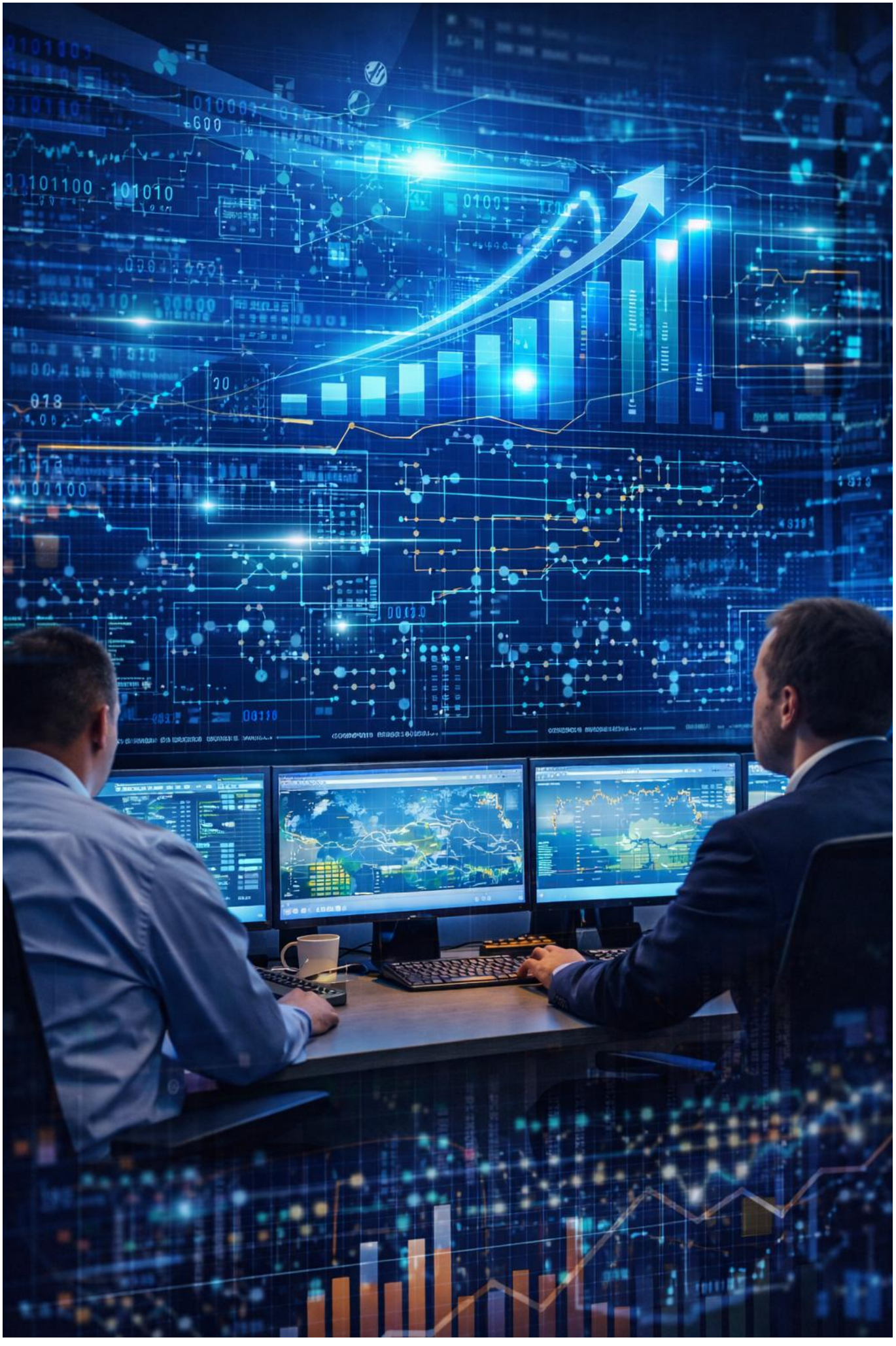
The analysis of cross-border electricity trade across the reporting countries highlights several important conclusions:

i) Cross-border electricity trade volumes vary widely across the region, with some countries actively participating in regional electricity markets while others remain relatively isolated.

ii) Electricity trade prices reflect differences in generation costs, electricity market conditions, and contractual arrangements.

iii) Trade intensity levels highlight the importance of electricity imports for certain countries, particularly those with limited generation capacity.

iv) Strengthening regional transmission infrastructure and harmonizing electricity market regulations will be essential for expanding electricity market integration across the COMESA region.



7. Market Digitalisation and Electricity Data Infrastructure

Digitalisation is increasingly transforming electricity systems around the world by enabling more efficient monitoring, improved operational control, and enhanced transparency in electricity markets. Modern electricity systems rely on advanced data infrastructure to collect and analyse electricity consumption, generation performance, and network conditions in real time.

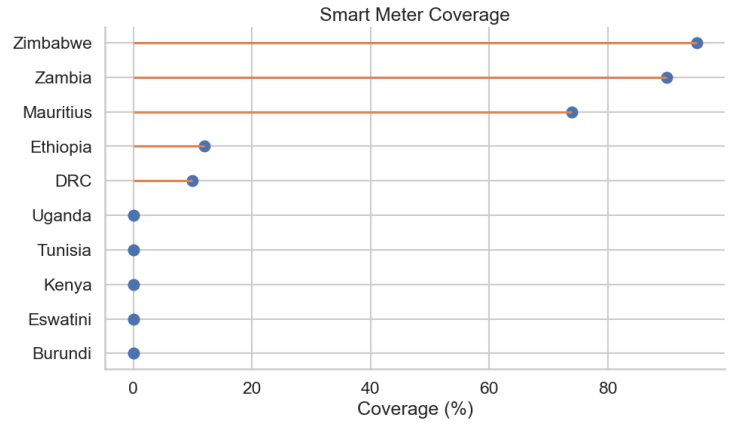
One of the most important components of electricity sector digitalisation is the deployment of advanced metering infrastructure (AMI), commonly referred to as smart meters. Smart meters enable utilities and regulators to collect detailed electricity consumption data, support demand management programs, improve billing accuracy, and detect system losses more effectively.

In addition to improving operational efficiency, digitalisation also strengthens electricity market surveillance by enabling regulators to access more reliable and timely market data. Electricity markets with strong digital data infrastructure are better able to support transparent tariff design, monitor market performance, and identify emerging system risks.

This chapter examines the state of electricity sector digitalisation across the reporting COMESA member states, focusing on smart meter deployment and the relationship between digital infrastructure and electricity market development.

7.1. Smart Meter Deployment

The deployment of smart meters varies significantly across the reporting countries, reflecting differences in electricity system modernization, investment capacity, and regulatory priorities.



Among the reporting countries, Zimbabwe reports the highest level of smart meter coverage, with approximately 95% of electricity customers equipped with smart metering systems. This high level of digital infrastructure supports improved electricity billing accuracy, enhanced demand monitoring, and more effective management of electricity consumption.

Zambia also reports substantial progress in smart meter deployment, with approximately 90% smart meter coverage, reflecting ongoing efforts to modernize electricity distribution infrastructure and improve electricity market monitoring.

Mauritius has achieved significant progress in electricity system digitalisation, with smart meter coverage of approximately 74%, indicating a strong commitment to modern electricity infrastructure and advanced electricity system management.

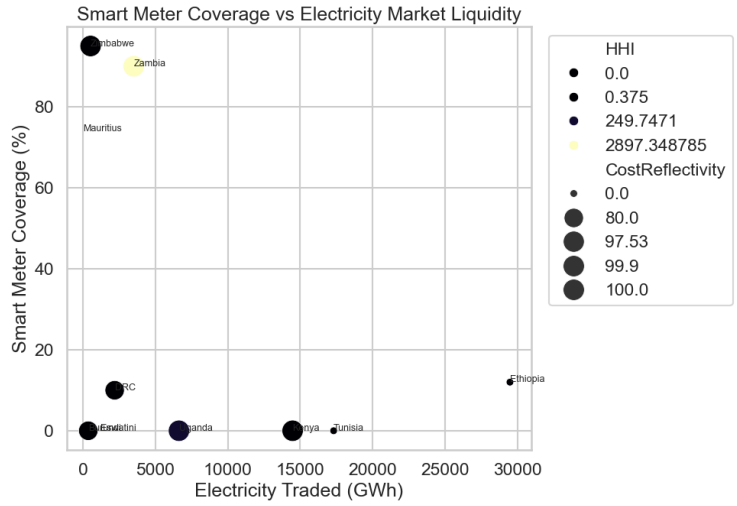
In contrast, several countries report limited smart meter deployment. Ethiopia reports approximately 12% smart meter coverage, while the Democratic Republic of the Congo reports approximately 10% coverage, indicating early stages of digital infrastructure development.

Burundi, Eswatini, and Uganda report no significant smart meter deployment, suggesting that electricity system digitalisation remains at an early stage in these countries.

These disparities highlight the uneven pace of digital infrastructure development across the region.

7.2. Smart Meter Deployment and Electricity Market Activity

Smart meter deployment can influence electricity market performance by improving data transparency and enabling more efficient electricity market operations. Advanced metering systems provide regulators and electricity utilities with real-time information on electricity consumption patterns, system losses, and network performance.



Among the reporting countries, Zimbabwe reports the highest level of smart meter coverage, with approximately 95% of electricity customers equipped with smart metering systems. This high level of digital infrastructure supports improved electricity billing accuracy, enhanced demand monitoring, and more effective management of electricity consumption.

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Burundi, Eswatini, and Uganda report no significant smart meter deployment, suggesting that electricity system digitalisation remains at an early stage in these countries.

These disparities highlight the uneven pace of digital infrastructure development across the region.

7.3. Digital Infrastructure and Electricity Market Transparency

Digital electricity systems also support improved transparency in electricity markets by enabling more reliable data reporting and improved market surveillance. Electricity regulators require accurate and timely information on electricity generation, consumption, and prices to effectively monitor electricity market performance.

In many electricity systems across the region, data reporting remains fragmented and often relies on manual data collection processes. Limited digital infrastructure can therefore constrain the ability of regulators to conduct effective market surveillance and implement evidence-based regulatory policies.

Expanding digital infrastructure across electricity systems can significantly improve electricity market transparency by enabling real-time data collection, automated reporting systems, and advanced analytical capabilities.

In addition, digital electricity systems can support the development of more flexible electricity markets capable of integrating variable renewable energy sources such as solar and wind power.

7.4. Policy Implications for Electricity System Digitalisation

The analysis of digital infrastructure across the reporting countries highlights several important policy priorities for electricity sector modernization.

i) Expanding smart meter deployment

Increasing the deployment of smart meters can significantly improve electricity market transparency, reduce non-technical losses, and enhance electricity demand management capabilities.

ii) Strengthening electricity data systems

Developing centralized electricity data platforms can improve data accessibility for regulators and policymakers while enabling more effective electricity market monitoring.

iii) Supporting advanced electricity market mechanisms

Digital electricity infrastructure enables the implementation of advanced electricity market mechanisms such as demand response programs, dynamic pricing, and distributed energy resource integration.

iv) Enhancing cybersecurity frameworks

As electricity systems become increasingly digitalized, strengthening cybersecurity frameworks will become critical to protect electricity infrastructure from cyber threats and ensure system resilience.

7.5. Key Findings

The analysis of electricity sector digitalisation across the reporting countries highlights several important conclusions:

i) Smart meter deployment remains uneven across the region, with some countries achieving high levels of coverage while others remain in early stages of digital infrastructure development.

ii) Countries with higher levels of smart meter deployment benefit from improved electricity market monitoring and enhanced system efficiency.

iii) Expanding digital infrastructure will be essential for supporting electricity market transparency, improving operational efficiency, and enabling advanced electricity market mechanisms.

iv) Regulatory authorities will play an important role in guiding electricity sector digitalisation through data reporting requirements, digital infrastructure standards, and cybersecurity policies.


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8. Electricity Market Governance and Regulatory Capacity

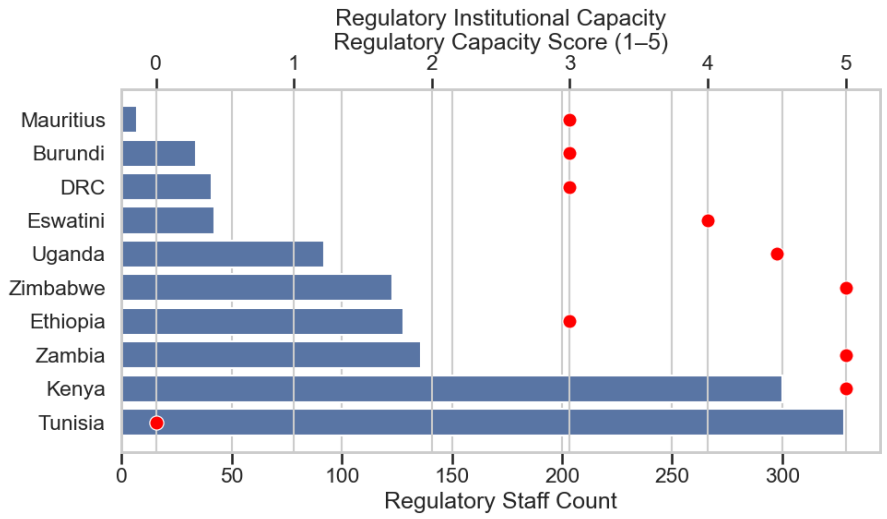
Effective electricity market governance requires strong regulatory institutions capable of overseeing electricity market operations, ensuring transparent tariff regulation, protecting consumer interests, and facilitating investment in electricity infrastructure. Independent regulatory authorities play a critical role in maintaining fair market conditions, monitoring electricity sector performance, and implementing regulatory frameworks that support efficient electricity market development.

Across the reporting COMESA member states, regulatory governance frameworks and institutional capacity vary significantly. Some countries have established well-developed regulatory institutions with comprehensive legal mandates and strong analytical capabilities. In other countries, regulatory institutions remain relatively new or face constraints related to staffing, technical expertise, and financial resources.

This chapter examines electricity market governance across the reporting countries using indicators related to regulatory capacity, institutional frameworks, and progress in electricity market reforms.

8.1. Regulatory Institutional Capacity

The capacity of regulatory institutions is a key determinant of effective electricity market governance. Regulatory authorities require sufficient human resources, technical expertise, and financial resources to monitor electricity markets, conduct tariff reviews, and enforce regulatory compliance.



Among the reporting countries, Kenya's Energy and Petroleum Regulatory Authority (EPRA) reports one of the largest regulatory institutions, with approximately 300 staff members, reflecting the country's relatively advanced electricity market structure and the scale of its electricity sector.

Tunisia reports the largest regulatory staffing levels among the reporting countries, with approximately 328 staff members, although the country's regulatory framework differs from the independent regulatory models adopted in several other countries.

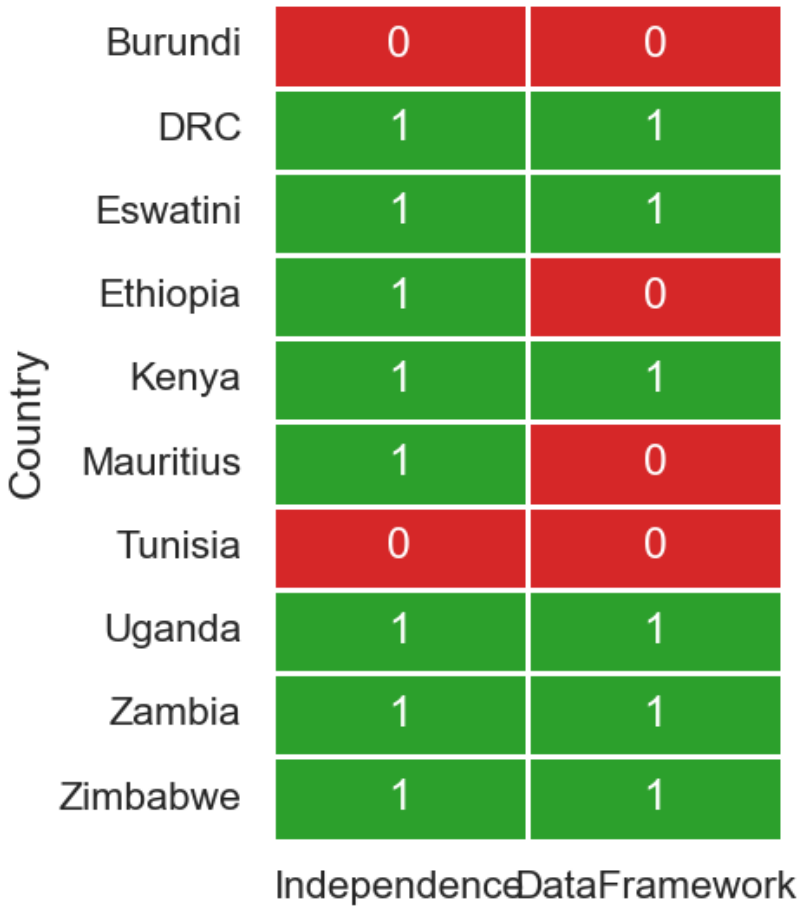
Zambia's Energy Regulation Board reports approximately 136 staff members, while Zimbabwe's regulatory authority reports approximately 123 staff members, indicating relatively strong institutional capacity for electricity sector oversight.

Uganda's Electricity Regulatory Authority reports approximately 92 staff members, while Ethiopia's Petroleum and Energy Regulatory Authority reports approximately 128 staff members.

In contrast, smaller regulatory institutions such as Mauritius' Utility Regulatory Authority, with approximately seven staff members, operate with significantly more limited human resources. Burundi also reports relatively modest regulatory capacity with approximately 34 staff members, highlighting potential challenges in conducting comprehensive electricity market surveillance.

8.2. Regulatory Governance Frameworks

Electricity market governance frameworks include a range of regulatory mechanisms designed to ensure transparency, accountability, and efficiency within electricity markets. Key components of regulatory governance include regulatory independence, tariff-setting methodologies, third-party access to electricity networks, sector unbundling, and data reporting requirements.



Most reporting countries have established regulatory frameworks that support independent oversight of electricity markets. Countries such as Kenya, Uganda, Zambia, Zimbabwe, and the Democratic Republic of the Congo report independent electricity regulatory authorities with formal legal mandates governing electricity sector regulation.

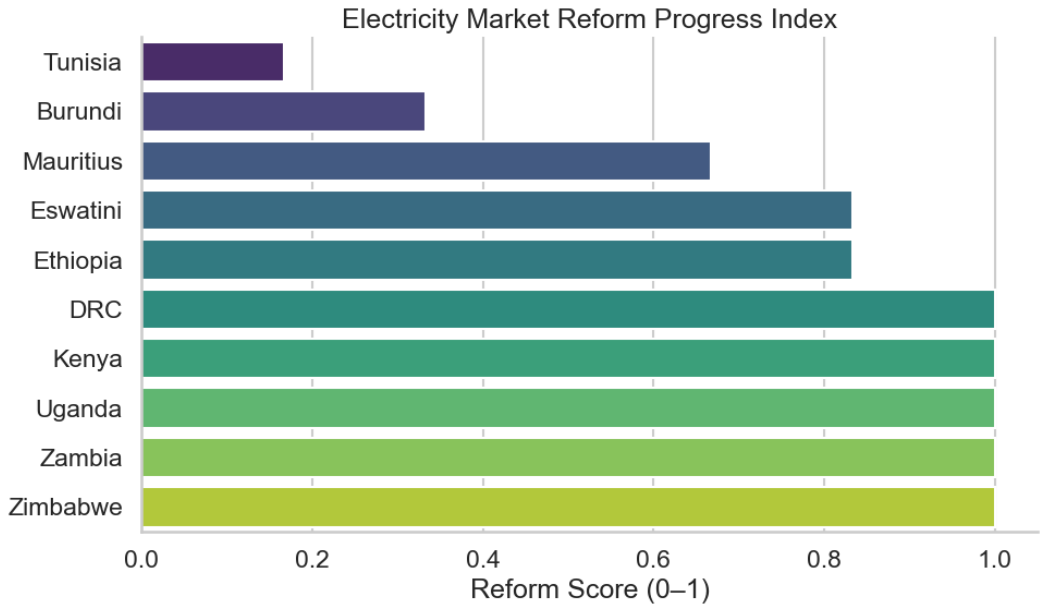
In contrast, Tunisia reports a regulatory structure in which electricity regulation remains closely integrated with government institutions rather than operating under a fully independent regulatory authority.

Tariff methodology frameworks are also widely adopted across the reporting countries. Several regulators, including those in Kenya, Uganda, Zambia, and Zimbabwe, report established tariff-setting methodologies that enable periodic tariff reviews based on cost-of-service principles.

Third-party access to electricity networks is another important component of electricity market governance. Allowing independent electricity generators access to transmission networks supports competition in electricity generation and enables participation in electricity markets by private sector investors.

8.3. Electricity Market Reform Progress

Electricity market reforms are often implemented gradually as countries transition from vertically integrated electricity systems toward more competitive electricity markets. Reform progress can therefore be assessed through indicators such as regulatory independence, tariff methodologies, sector unbundling, and electricity market monitoring frameworks.

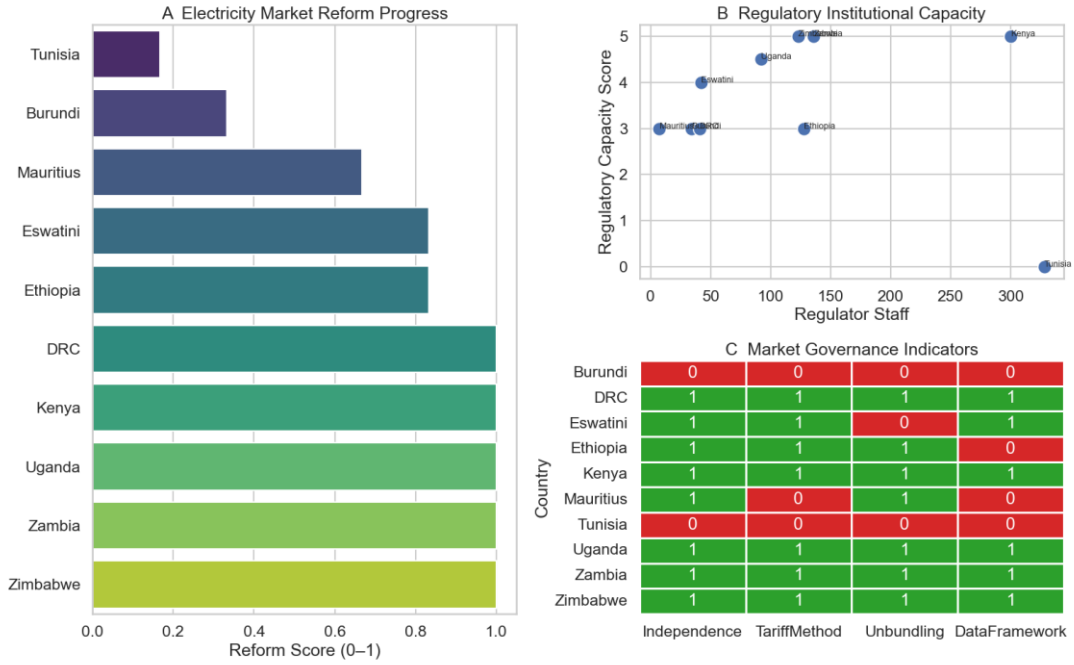


The electricity market reform index indicates that several countries have made significant progress in strengthening electricity market governance. Kenya, Zambia, and Zimbabwe record high reform index scores, reflecting comprehensive regulatory frameworks, independent regulatory authorities, and well-developed tariff methodologies.

Uganda also demonstrates substantial progress in electricity market reforms, supported by a strong regulatory authority and well-defined regulatory frameworks.

In contrast, countries such as Burundi and Ethiopia record more moderate reform index scores, reflecting ongoing regulatory development and evolving electricity market frameworks.

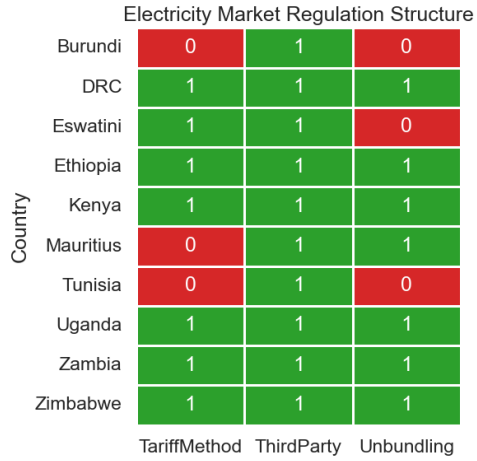
Tunisia records the lowest reform index score among the reporting countries, reflecting a regulatory framework that differs from the independent regulatory models adopted elsewhere in the region.



The governance dashboard highlights differences in regulatory capacity, market reform progress, and institutional frameworks across the reporting countries.

8.4. Market Regulation Structures

Electricity market regulation structures vary across the region depending on national electricity sector policies and market design approaches.



Some countries have implemented sector unbundling reforms that separate electricity generation, transmission, and distribution functions, thereby promoting competition and improving operational transparency. Kenya and Uganda are examples of countries that have implemented partial electricity sector unbundling and opened generation markets to private investors.

In contrast, other electricity systems remain vertically integrated, with state-owned utilities responsible for electricity generation, transmission, and distribution. While vertically integrated electricity systems may offer certain operational efficiencies in smaller electricity markets, they can also limit competition and reduce incentives for private sector investment.

8.5. Policy Implications for Electricity Market Governance

The analysis of regulatory governance across the reporting countries highlights several policy priorities for strengthening electricity market institutions.

i) Strengthening regulatory independence

Independent regulatory authorities are better positioned to implement transparent tariff regulation and enforce electricity market rules without political interference.

ii) Expanding regulatory capacity

Investments in regulatory staff training, analytical tools, and data systems can enhance the ability of regulators to conduct effective market surveillance.

iii) Enhancing transparency in electricity markets

Improved reporting requirements and standardized electricity market data systems can strengthen transparency and facilitate more effective electricity market monitoring.

iv) Supporting electricity market reforms

Gradual implementation of electricity market reforms, such as sector unbundling, competitive procurement of generation capacity, and independent system operation, can improve electricity market efficiency and attract investment.

8.6. Key Findings

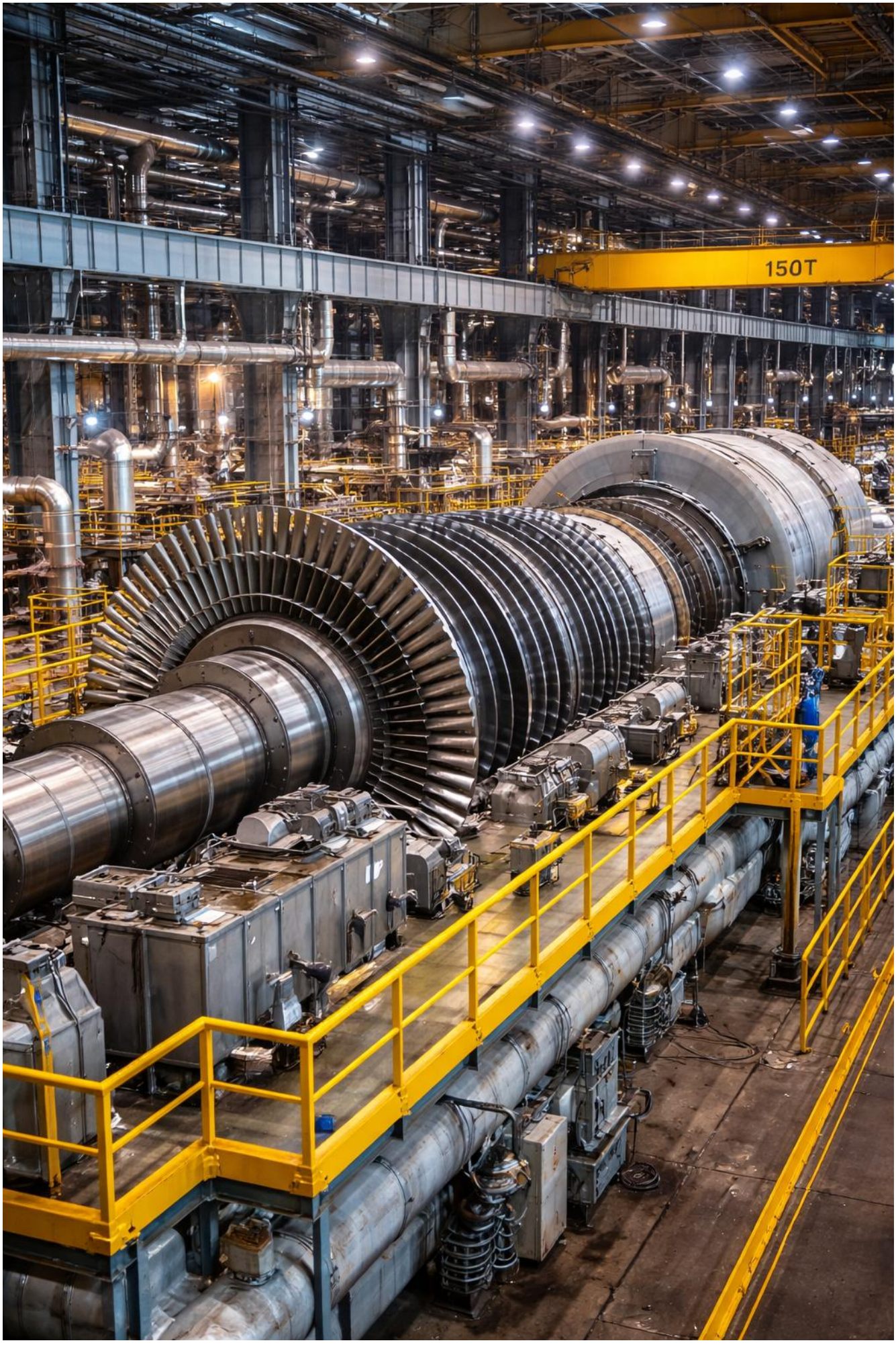
The analysis of electricity market governance across the reporting countries reveals several key insights:

i) Regulatory institutional capacity varies widely across the region, with some regulatory authorities possessing substantial staffing resources while others operate with limited personnel.

ii) Several countries have made significant progress in establishing independent regulatory authorities and implementing electricity market reforms.

iii) Differences in regulatory governance frameworks influence electricity market performance and the ability of regulators to conduct effective market surveillance.

iv) Strengthening regulatory institutions will be essential for supporting electricity market development and ensuring transparent electricity pricing.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9. Energy Security and Electricity System Resilience

Energy security is a fundamental objective of electricity sector planning and regulation. Reliable electricity supply underpins economic growth, industrial productivity, and the delivery of essential public services. Electricity system resilience, the ability of power systems to withstand disruptions and recover quickly from disturbances, is therefore a critical component of electricity market performance.

Across the reporting COMESA member states, electricity system resilience is influenced by several factors, including generation adequacy, fuel supply availability, transmission network reliability, and the robustness of operational and cybersecurity frameworks.

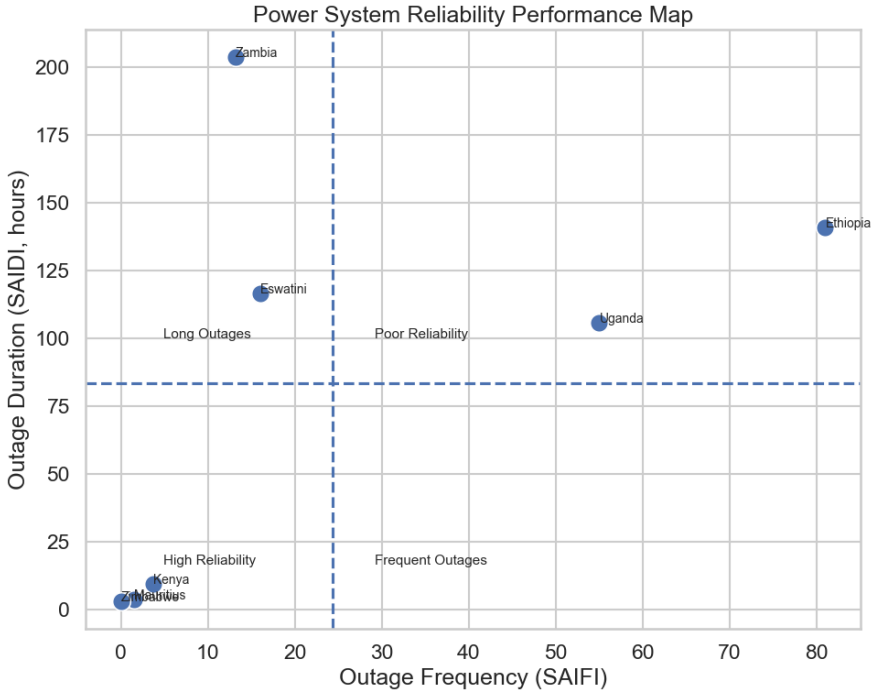
In addition to traditional energy security considerations, electricity systems are increasingly exposed to new risks associated with digital infrastructure and cyber threats. As electricity networks become more digitalized and interconnected, ensuring the security of electricity infrastructure against cyber risks has become an important element of electricity system governance.

This chapter evaluates electricity system resilience across the reporting countries using indicators related to electricity reliability, fuel supply adequacy, and cybersecurity frameworks.

9.1. Electricity System Reliability

Electricity system reliability remains one of the most visible indicators of electricity sector performance. Reliable electricity supply ensures that households, businesses, and public institutions can operate without frequent disruptions.

As discussed in Chapter 3, reliability indicators such as SAIDI and SAIFI show significant variation across the reporting countries.



Countries such as Tunisia, Mauritius, and Kenya report relatively strong reliability performance, with comparatively low outage durations and interruption frequencies. Tunisia records one of the lowest outage duration levels among the reporting countries, with SAIDI of approximately 0.2 hours per year, indicating a highly stable electricity system.

Mauritius and Zimbabwe also report relatively low outage durations of approximately 3.9 hours and 3 hours, respectively. Kenya reports moderate outage levels with SAIDI of approximately 9.4 hours, reflecting ongoing improvements in electricity infrastructure and grid management.

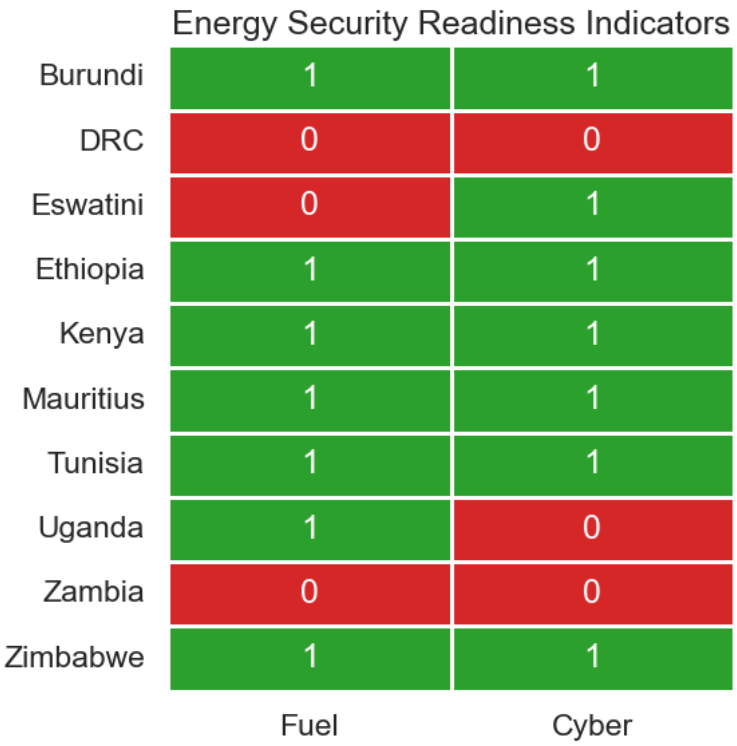
In contrast, several countries experience more significant reliability challenges. Zambia reports outage durations of approximately 203.8 hours, while Ethiopia reports outage durations of approximately 141 hours. Uganda reports outage durations of approximately 106 hours, indicating ongoing constraints in electricity transmission and distribution infrastructure.

These reliability disparities reflect differences in electricity system planning, infrastructure investment, and operational capacity across the reporting countries.

9.2. Fuel Supply Adequacy

Fuel supply adequacy represents another critical component of electricity system resilience. Electricity systems that rely heavily on fuel-based generation technologies, such as coal, oil, or natural gas, must ensure reliable access to fuel supplies to maintain stable electricity generation.

The reporting countries show mixed performance in terms of fuel supply adequacy.



Several countries report adequate fuel supply arrangements to support electricity generation. Burundi, Ethiopia, Kenya, Mauritius, Tunisia, Uganda, and Zimbabwe report that fuel supply systems are sufficient to support electricity generation operations.

However, the Democratic Republic of the Congo and Eswatini report challenges related to fuel supply adequacy, reflecting vulnerabilities associated with fuel procurement, supply chain constraints, or limited domestic fuel resources.

Fuel supply risks can affect electricity system reliability, particularly in electricity systems that depend on imported fossil fuels or operate with limited fuel storage capacity.

Diversifying generation portfolios and increasing renewable energy deployment can help reduce fuel supply risks while improving long-term electricity system sustainability.

9.3. Cybersecurity and Electricity System Protection

As electricity systems become increasingly digitalized, cybersecurity has emerged as a critical dimension of electricity sector resilience. Cybersecurity frameworks help protect electricity infrastructure from cyberattacks, data breaches, and operational disruptions.

Among the reporting countries, several have established cybersecurity frameworks designed to protect electricity sector infrastructure. Burundi, Eswatini, Ethiopia, Kenya, Mauritius, Tunisia, and Zimbabwe report the existence of cybersecurity frameworks or policies aimed at safeguarding electricity system operations.

In contrast, the Democratic Republic of the Congo and Uganda report limited cybersecurity frameworks, suggesting that electricity system digitalization may be advancing faster than cybersecurity preparedness in some jurisdictions.

As digital technologies such as smart meters, advanced grid management systems, and automated electricity trading platforms become more widespread, strengthening cybersecurity frameworks will become increasingly important for ensuring electricity system resilience.

9.4. Policy Implications for Electricity System Resilience

The analysis of electricity system resilience highlights several policy priorities for strengthening energy security across the reporting countries.

i) **Strengthening electricity infrastructure -** Investments in transmission and distribution infrastructure can significantly improve electricity system reliability and reduce the frequency and duration of power outages.
ii) **Diversifying electricity generation sources -** Electricity systems that rely heavily on a single generation technology may face increased vulnerability to supply disruptions. Diversifying generation portfolios, including renewable energy sources, can enhance system resilience.
iii) **Improving fuel supply management -** Countries that rely on fuel-based electricity generation should strengthen fuel procurement strategies, improve fuel storage capacity, and diversify fuel supply sources to reduce supply risks.
iv) **Expanding cybersecurity frameworks -** As electricity systems become increasingly digitalized, robust cybersecurity frameworks will be essential for protecting electricity infrastructure and ensuring operational security.

v) **Strengthening regulatory oversight -** Electricity regulators can support system resilience by implementing reliability standards, monitoring electricity system performance, and enforcing operational requirements for electricity utilities.

9.5. Key Findings

The analysis of electricity system resilience across the reporting countries reveals several important conclusions:

i) Electricity system reliability varies significantly across the region, with some countries achieving high reliability levels while others experience frequent service interruptions.

ii) Fuel supply adequacy remains a challenge for certain electricity systems, particularly those dependent on imported fuels or limited domestic generation capacity.

iii) Cybersecurity preparedness remains uneven across the reporting countries, highlighting the need for strengthened digital security frameworks as electricity systems become more digitalized.

iv) Improving electricity system resilience will require coordinated investments in infrastructure, regulatory capacity, and energy system diversification.

10. Strategic Reform Priorities for Electricity Market Development

The analysis presented in the preceding chapters highlights both the progress achieved and the challenges that remain in developing efficient, reliable, and integrated electricity markets across the reporting COMESA member states. While several countries have made substantial progress in expanding generation capacity, strengthening regulatory frameworks, and increasing participation in regional electricity markets, important structural challenges continue to affect electricity system performance.

These challenges include generation capacity constraints, infrastructure limitations, incomplete regulatory frameworks, limited electricity market data systems, and disparities in institutional capacity across regulatory authorities. Addressing these challenges will require coordinated policy action at both the national and regional levels.

This chapter identifies strategic reform priorities that can support the continued development of electricity markets across the COMESA region. The recommendations are derived from the market surveillance analysis presented in this report and from the country-level recommendations submitted by participating regulatory authorities. The findings also identify areas where regional cooperation and institutional support from the Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA) can accelerate reform progress.

10.1. Key Barriers to Electricity Market Development

The market surveillance analysis identifies several structural barriers that continue to affect electricity market development across the reporting countries.

Limited generation capacity and supply adequacy

While some countries maintain comfortable reserve margins, others face generation capacity constraints that limit their ability to meet electricity demand reliably. In Eswatini, for example, installed generation capacity of approximately 126 MW falls significantly below peak demand of approximately 252 MW, creating structural dependence on electricity imports.

Similarly, electricity systems experiencing high outage durations, such as Zambia, with SAIDI of approximately 203 hours, and Ethiopia, with SAIDI of approximately 141 hours, indicate the need for continued investments in electricity infrastructure.

Electricity tariff imbalances and cost recovery challenges

Electricity tariff structures across the reporting countries vary widely, with some countries maintaining cost-reflective tariffs while others continue to operate with tariffs below cost-recovery levels. Countries such as Kenya, Zambia, and Zimbabwe report tariff cost reflectivity levels close to 100%, indicating strong financial sustainability for electricity utilities.

In contrast, countries such as Ethiopia report cost reflectivity levels near zero, suggesting that electricity tariffs do not fully recover the cost of electricity supply.

Limited electricity market competition

Electricity market structures in several countries remain highly concentrated, with limited participation by independent power producers. Zambia, for example, records a Herfindahl–Hirschman Index of approximately 2,897, indicating a highly concentrated generation market.

Increasing private sector participation in electricity generation can help diversify electricity supply and improve market efficiency.

Uneven electricity system digitalisation

Smart meter deployment remains uneven across the reporting countries. Zimbabwe and Zambia have achieved high smart meter coverage levels of approximately 95% and 90%, respectively, while several countries, including Burundi, Eswatini, and Uganda, report limited smart meter deployment.

Expanding digital infrastructure will be essential for improving electricity market transparency and operational efficiency.

Institutional and regulatory capacity constraints

Regulatory institutional capacity varies widely across the reporting countries. While some regulators operate with large professional staff and advanced analytical capabilities, others face limitations related to staffing levels and technical expertise.

For example, Kenya's regulatory authority employs approximately 300 staff members, while Mauritius operates with approximately seven regulatory staff members, highlighting disparities in institutional capacity.

10.2. Strategic Reform Priorities

Addressing the challenges identified above will require a comprehensive set of policy actions aimed at strengthening electricity system performance and promoting regional electricity market integration.

Strengthening generation capacity and system reliability

Continued investment in generation capacity remains essential for maintaining electricity system adequacy. Countries with limited generation reserves should prioritize the development of new generation assets, including renewable energy projects that can diversify electricity supply and reduce fuel supply risks.

Improving transmission and distribution infrastructure will also be essential for reducing electricity outages and improving electricity system reliability.

Promoting cost-reflective electricity tariffs

Achieving cost-reflective electricity tariffs remains a critical objective for ensuring the financial sustainability of electricity utilities. Tariff reforms should be implemented gradually and transparently, with mechanisms to protect vulnerable consumers through targeted subsidies where necessary.

Transparent tariff methodologies and independent regulatory oversight will help ensure that electricity tariffs accurately reflect the cost of electricity supply.

Enhancing electricity market competition

Encouraging participation by independent power producers can increase generation diversity and improve electricity market efficiency. Competitive procurement processes and transparent regulatory frameworks can help attract private sector investment in electricity generation.

Expanding wholesale electricity trading mechanisms can also improve electricity market liquidity and price transparency.

Strengthening regional electricity market integration

Regional electricity trade offers significant opportunities to improve electricity system efficiency and reduce generation costs. Expanding cross-border transmission infrastructure and harmonizing regulatory frameworks will facilitate greater electricity trade between countries.

Strengthening regional power pools such as the Southern African Power Pool and the Eastern Africa Power Pool can also support more efficient electricity market coordination across the region.

Accelerating electricity sector digitalisation

Digital technologies can significantly improve electricity system monitoring, reduce electricity losses, and enhance electricity market transparency. Expanding smart meter deployment, implementing centralized electricity data systems, and strengthening digital infrastructure will support more efficient electricity markets.

Digitalisation also provides opportunities to introduce advanced electricity market mechanisms such as demand response programs and time-of-use pricing.

Strengthening regulatory institutional capacity

Regulatory authorities play a central role in electricity market governance. Strengthening regulatory institutions through training programs, improved data systems, and enhanced analytical capabilities will support more effective electricity market surveillance.

Regional cooperation between electricity regulators can also facilitate knowledge sharing and strengthen regulatory capacity across the COMESA region.

10.3. Reform Pathway for Electricity Market Development

The recommended reform pathway for electricity market development can be summarized through a structured sequence of policy actions addressing the barriers identified in this report.

Table 1: Reform Pathway for Electricity Market Development

Barriers Identified	Priority Actions	Capacity Building Needs	Expected Sector Outcomes
Weak regulatory financing	Establish sustainable funding mechanisms for regulators	Financial modelling and regulatory economics	Financially independent regulators
Limited energy data systems	Develop standardized data reporting frameworks and digital reporting platforms	Energy statistics and data analytics training	Reliable electricity sector statistics
Infrastructure constraints	Invest in grid modernization, generation expansion, and smart metering	Power system planning and modelling skills	Improved reliability and supply adequacy
Incomplete regulatory frameworks	Strengthen tariff methodologies, enforcement mechanisms, and regulatory independence	Regulatory governance and market regulation expertise	Transparent and predictable electricity markets
Limited transparency and information sharing	Introduce digital sector reporting platforms and standardized reporting templates	Data governance and sector monitoring capacity	Evidence-based electricity policy and market oversight

The reform pathway highlights the relationship between structural barriers, priority policy actions, required institutional capacity, and expected electricity sector outcomes.

10.4. Conclusion

Electricity markets across the COMESA region are evolving rapidly as countries expand generation capacity, strengthen regulatory frameworks, and increase participation in regional electricity trade. While significant progress has been made, several structural challenges continue to affect electricity system performance and market development.

Addressing these challenges will require sustained investments in electricity infrastructure, continued regulatory reforms, and strengthened regional cooperation. By implementing the strategic priorities outlined in this chapter, COMESA member states can support the development of more reliable, efficient, and integrated electricity markets capable of supporting long-term economic growth and regional development.

By strengthening regulatory governance, improving energy data systems, and investing in electricity infrastructure, countries can enhance electricity sector performance and support long-term economic development.

Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA)

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