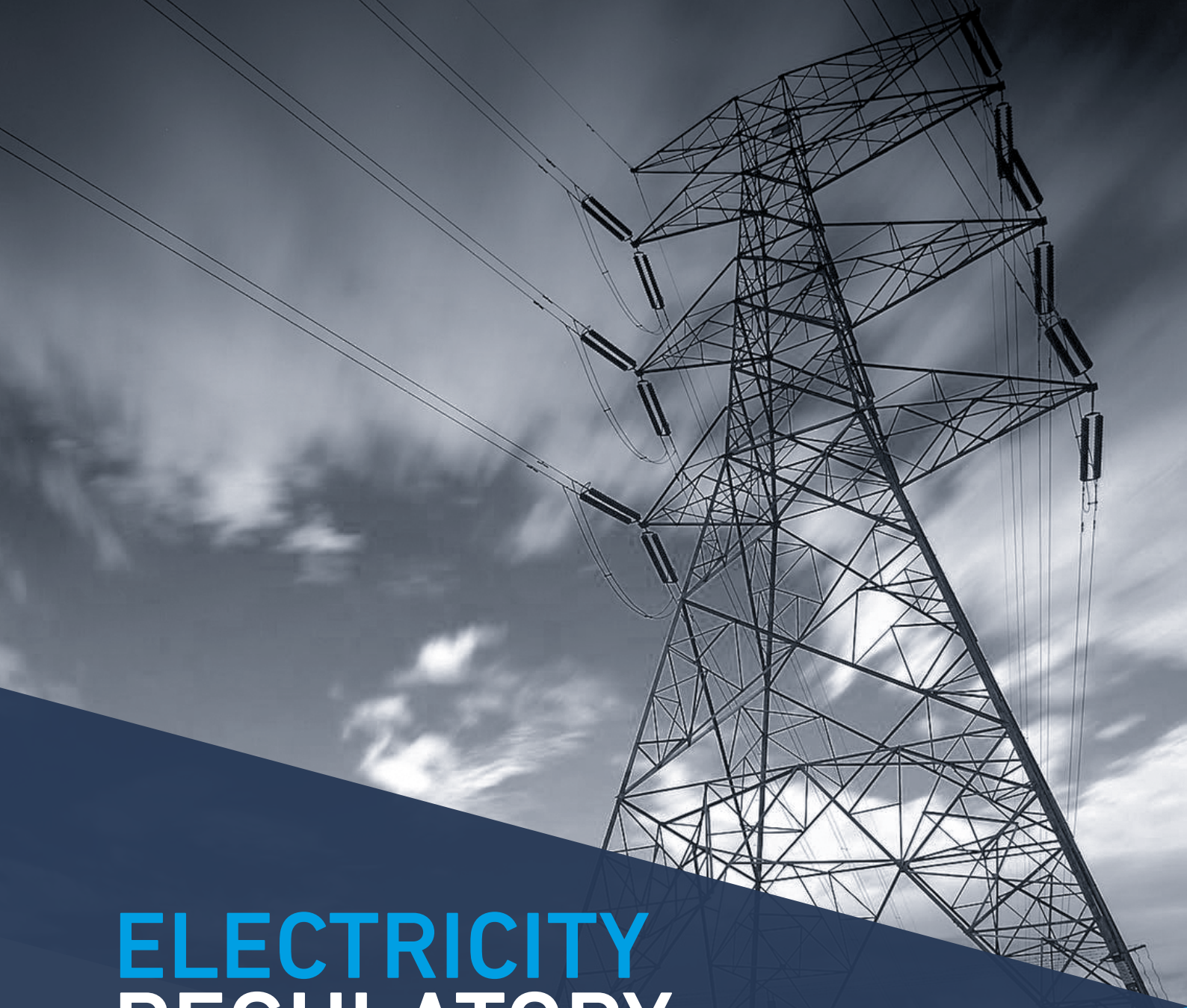

ELECTRICITY REGULATORY INDEX FOR AFRICA 2018

AFRICAN DEVELOPMENT BANK GROUP

ACKNOWLEDGEMENTS

The Electricity Regulatory Index (ERI) for Africa is a product of the Power, Energy, Climate Change and Green Growth Complex of the African Development Bank (AfDB). This first edition represents the beginning of a series of knowledge products that aim to shed light on the nature and development of the energy and power sectors of the African continent using an array of quantitative and qualitative research methods.

The ERI was prepared under the overall leadership of the Vice President, Power, Energy, Climate Change and Green Growth Complex, Amadou Hott, with strategic advice and guidance from the senior management team, namely: Director, Energy Financial Solutions, Policy and Regulation, Wale Shonibare; Director, Power Systems Development, Batchi Baldeh; Director, Renewable Energy, Ousseynou Nakoulima ; and Director, Climate Change and Green Growth, Anthony Nyong. The Energy Policy, Regulation and Statistics Division Manager, Callixte Kambanda, provided technical supervision and management of the ERI consultation process.

Chief Power Sector Regulations Expert, Rhoda Mshana led the core team of staff and consultants working on the ERI. Specifically, this team comprised William Gboney, who led the design and development of the Index and interpretation of the Index results on a macro- and country-by-country basis, as well as Chief Statistician, Nirina Letsara, who provided technical input on the statistical database for the Index. Carlos Mollinedo, Solomon Sarpong, Nicolas Miyares, and Francine Mbock provided additional technical input and methodological guidance on the Index.

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We would also like to acknowledge and express gratitude to the Chief Economist Complex of the AfDB, led by the Chief Economist Célestin Monga, which provided critical and constructive feedback on the design and development of the Index, as well as the practical and economic implications of the findings contained therein.

The Index was calculated from answers to a comprehensive array of survey questions that were administered to national regulators and utilities across the African continent. In this respect, special appreciation goes to all survey respondents, including the national electricity sector regulators and utilities from Cameroon, Cote d'Ivoire, Gambia, Ghana, Kenya, Lesotho, Malawi, Namibia, Nigeria, Senegal, South Africa, Tanzania, Togo, Uganda, and Zimbabwe. We also wish to express gratitude for the collaboration of the African Forum for Utility Regulators (AFUR) and the Association of Power Utilities of Africa (APUA), both of whose support was instrumental in facilitating the survey dissemination and consultations process.

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It is worth noting that we have not exhausted the list of acknowledgements since many people contributed to the success of delivering this report, including representatives from national electricity sector regulators not mentioned above and support staff at the African Development Bank. We owe to all our utmost gratitude for their contribution.

African Development Bank Group

African Development Bank Group

Avenue Joseph Anoma - 01 B.P. 1387 Abidjan 01, Côte d’Ivoire
Phone: (+225) 20 26 10 20 • Fax: (+225) 20 21 31 00
www.afdb.org

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Abbreviations

AfDB	African Development Bank Group
AFUR	African Forum for Utility Regulators
APUA	Association of Power Utilities of Africa
BoS	Balance of Systems
EE	Energy Efficiency
ERI	Electricity Regulatory Index
EU	European Union
FAO	Food and Agriculture Organization
GETFIT	Global Energy Transfer Feed-in Tariff
GHG	Greenhouse Gas
LED	Light-Emitting Diode
MEPS	Minimum Energy Performance Standards
O&M	Operations and Maintenance
PCA	Principal Component Analysis
PPA	Power Purchase Agreement
PV	Photovoltaic
RE	Renewable Energy
REFIT	Renewable Energy Feed-In Tariff
RGI	Regulatory Governance Index
ROI	Regulatory Outcome Index
RSI	Regulatory Substance Index
UN	United Nations
USA	United States of America

Definitions

Accountability	The ability of the regulated entity or other stakeholders, as set out in the primary legislation, to challenge the regulator's decision in the courts through an appeal to a commission or a specialised body
Best Practice Regulation	Refers to the set of principles which guide the behaviour of regulators, the processes which provide structured approach for regulation, as well as the structural characteristics required by the regulator to implement its mandate
Clarity of Roles and Objectives	The regulator's functions and duties, including the utility's obligations, as defined in primary legislation, or the regulated entity's and/or regulator's obligations and functions as codified in a licence or contract
Commercial Quality of Electricity Supply	The non-technical aspect of power supply that describes the relationship between power utilities and customers with respect to information on outages, meter readings and disputes, consumer account queries, response to consumer complaints, etc.
Economic Regulation	The aspect of the regulator's functions and duties which affect the financial and commercial viability of the utility company and long-term financial sustainability of the sector
Electricity Regulatory Index	Refers to the final Electricity Regulatory Index which is obtained by aggregating the results of the Electricity Regulatory Index for Regulatory Governance and Regulatory Substance, and Regulatory Outcome Index
Electricity Regulatory Index for Governance and Substance	The index obtained by aggregating the scores for the Regulatory Governance Index and the Regulatory Substance Index
Energy Labels	Informative labels affixed to manufactured products that indicate a product's energy performance (usually in the form of energy use, efficiency, and/or energy cost) in order to provide consumers with the data necessary for making more informed purchase decisions
Independence	Autonomy amongst political authorities, stakeholders and regulators
Legal Mandate	Primary legislation under which the regulatory body was established
Licensing Framework	This refers to the sub-indicator of the Regulatory Substance Index
Micro-Grid	Micro-grids are similar to mini-grids but operate at a smaller size and generation capacity, ranging between 1 and 10 kW
Mini-Grid System	Small-scale distribution network that provides electricity (usually from 10kW to 10MW), to one or more communities, by providing electricity from small generators using fossil fuel, renewable energy technology or a hybrid of the two
Minimum Energy Performance Standards	The set of procedures and rules detailing the energy performance of manufactured products, sometimes prohibiting the sale of products less energy efficient than the minimum standard
Off-Grid System	A decentralized or isolated power system, without connection, either directly or indirectly, to the distribution or transmission network. Off-grid systems can be categorized as mini-grid, micro-grid or individual stand-alone systems
Open Access to Information	A situation in which the primary legislation, licences or contracts, consultation documents, regulator's comments on consultation documents or tariff decisions are made available to the public and utilities
Participation	Stakeholder involvement via consultations prior to making regulatory decisions and processes via public hearings, as well as distribution of draft reports for comments to stakeholders

Power Purchase Agreement	An agreement that provides for the purchase and sale between the buyer and seller of electricity; the basic terms of the agreement define the price to be charged, the amount of power to be sold, how to meter power flows and how the information needed to conduct a specific transaction is communicated; additional terms may describe required interconnection facilities, as well as how to manage the implementation of the agreement
Predictability	A regulatory environment in which processes and procedures exist for changing key regulatory documents, in addition to well-established tariff review procedures
Quality of Service Code	The document that enables the regulator to establish the requirements for ensuring that the regulated utility delivers an adequate level of quality and reliability in electricity service provided to customers
Regulatory Capture	A situation in which the regulated utilities or any of the stakeholders try to influence the decisions of the regulator by using various approaches or means; considered a regulatory risk, such action can make the regulator compromise its decision-making independence
Regulatory Governance	The institutional design and structure of the regulatory authority that enables it to perform its functions as an independent regulator; also defined as the institutional and legal design of the regulatory system that defines the framework within which decisions are made by the regulator
Regulatory Governance Index	The index obtained by aggregating the main indicator scores for Regulatory Governance
Regulatory Outcome Index	The index that measures the outcome or impact of regulator's decisions, actions and activities on the regulated sector, as well as the entire sector generally
Regulatory Substance	The attributes of regulation linked to the actual actions or decisions of regulators that affect the performance of the regulated industry; the practical operation of regulatory practices and processes that have direct impact on regulatory outcomes
Regulatory Substance Index	The index obtained by aggregating the main indicator scores for Regulatory Substance
Stand-Alone Individual System	Refers to generation systems which are not connected to the distribution network, and which range from household-sized systems of 30–100 watt peak, capable of powering a few bulbs, a fan and possibly a small television, to institutional sizes (100–500 watt peak) for use in schools, health centers etc.
Technical Regulation	The aspect of the regulator’s duties and functions that affect the quality and reliability of electricity supply to consumers
Transparency	Full disclosure to relevant stakeholders of key regulatory documents, consultation responses, and regulator comments on issues raised during the consultation process


Photo © Pak Rie

FOREWORD

Over the past two decades, African governments have made tremendous strides in developing robust electricity sector regulatory frameworks. Unfortunately, progress has been uneven across the continent and just under 600 million Africans still have no access to electricity. Delivering access to sustainable, affordable sources of electricity at this scale represents one of the greatest challenges faced by governments across the continent.

To help meet this challenge, in 2016, the African Development Bank launched the New Deal on Energy for Africa, a partnership-driven effort with the aspirational goal of achieving universal access to electricity in Africa by 2025. The New Deal unifies all Bank initiatives currently geared towards attaining this goal. Supporting African governments to strengthen their energy policy, regulation, and sector governance is a key component of the New Deal. A robust regulatory system, grounded in a strong policy framework and transparent governance structure, is crucial to maintaining the reliability of power supply and sustainability of the electricity sector.

African governments, with the support of development partners, including the African Development Bank, have made material progress in recent years in reforming and building capacity among policymakers and regulators in their respective electricity sectors. Although the establishment of electricity sector regulators in Africa has been associated with numerous challenges, progress has nevertheless been made. Over the last decade, over thirty African countries have established electricity sector regulators. Private sector participation and improvements in overall sector performance, however, are only likely to happen once electricity sector regulation is enhanced to facilitate additional necessary reforms.

Among the efforts to identify electricity sector regulation challenges, the African Development Bank is launching this *Electricity Regulatory Index (ERI)* — a comparative, country-by-country assessment of the sector's level of regulatory development. In compiling the ERI, the Bank, together with its partners, including the African Forum for Utility Regulators (AFUR) and the Association of Power Utilities of Africa (APUA), consulted more than twenty-five African national regulators and power utilities to collect information on the regulatory framework and quality of their respective electricity sectors.

The ERI is intended to serve as a diagnostic tool, highlighting key areas in regulatory design and practice that require improvement and reform. In this respect, the ERI is informative, noting that the majority of African countries in the first sampling have developed relatively robust institutional frameworks underpinning regulation of their electricity sectors. Credit for this goes mainly to national governments that, with the support of their development partners, have widely passed and implemented key laws establishing solid policies governing their respective electricity sectors and creating transparent and empowered regulators to oversee them. In spite of this progress, however, the ERI scores also capture the fact that much work remains in strengthening regulatory independence vis-a-vis the regulated industry and the executive branch of government, as well as capacity for regulators to be able to effectively regulate the electricity sector and ensure its long-term health and sustainability.

Our immediate goal for this first edition of the ERI is to incite action among key stakeholders in the African electricity sector—particularly African governments and their development partners. We believe this will help drive further targeted support and assistance aimed at improving national regulatory environments and building capacity among sector regulators. In the long run, the ERI is intended to be a benchmarking tool that will track progress made by African countries as they align the regulatory frameworks governing their electricity sectors with international standards and best practices.

Sound regulatory systems across the continent are critical to ensuring Africa mobilizes the financing it needs to deliver universal electricity access. The Bank is committed to supporting credible initiatives in support of this goal.

Amadou Hott
Vice President
Power, Energy, Climate Change and Green Growth Complex
African Development Bank

1 WHY THE NEED FOR AN INDEX?

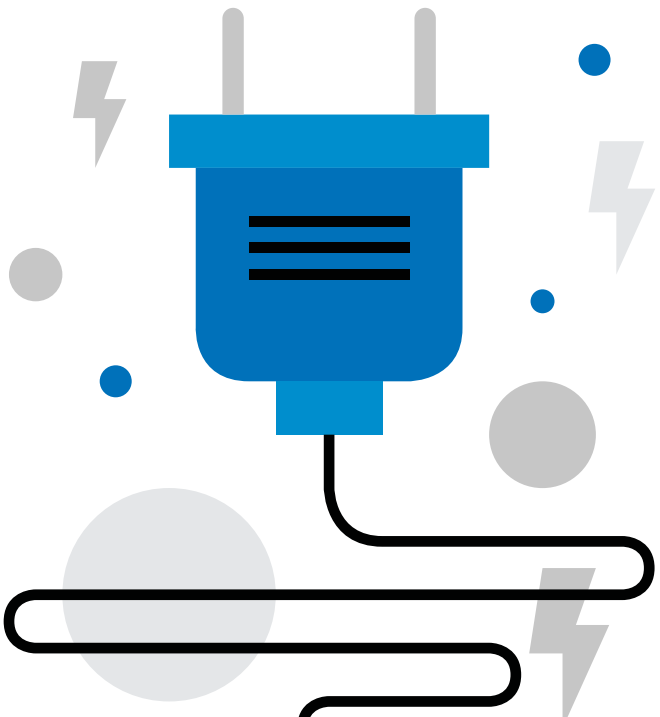
The past two decades have witnessed a transformation of the electricity market in Africa following the gradual opening, liberalization, and reform of national electricity markets. A fundamental component of the transformation process has been the establishment of national regulatory institutions that are tasked with independently regulating and overseeing their respective electricity sectors. These regulators, where they are effective, have a fundamental role in attracting private investment into national energy and power assets. Investors seek transparency, predictability, and good governance in sectors in which they operate, all of which well-developed regulators are expected to provide.

African governments have made tremendous strides in recent years in developing robust regulatory frameworks for their electricity sectors; however, progress has been uneven across the continent. As a means to identifying areas in which improvement is most needed, AfDB commissioned a study to develop this Electricity Regulatory Index. Results are based upon an empirical approach to measure the level of development of the regulatory framework in Africa and to investigate its impact on the performance of the continent's electricity sector. It is also aimed at enhancing the understanding of the conduct of regulatory authorities, including the human and financial constraints that affect electricity sector regulation in Africa.

The African Development Bank, through its New Deal on Energy for Africa, aims to achieve universal access to energy in Africa by 2025. Achieving this goal will require a significant amount of private investment into the energy and power assets of African countries. Key to mobilizing this crucial flow of financing is the development of a robust power sector regulatory environment, grounded in the rule of law and governed transparently and effectively.

The periodic evaluation of regulators, which is a common standard in many developed countries, is important as it enables early identification of problems or gaps so that corrective actions can be implemented as soon as possible. The European Commission produces an annual benchmarking report on member country energy regulators, while American regulatory agencies are subject to regular legislative oversight hearings.

This first Electricity Regulatory Index therefore aims to serve as the basis for carrying out future periodic assessments of the sector's regulatory environment in African countries. It provides regulators a tool with which they may begin assessing current progress compared to their peers, as well as against international best practice. For other stakeholders, it may serve as a useful tool to better understand the context within which they are working or investing.



2 WHAT DOES THE INDEX MEASURE?

The Electricity Regulatory Index (ERI) is a composite index that aims to measure the level of development of an African country's electricity regulatory sector based upon industry best practice. It is composed of three sub-indexes:

- Regulatory Governance Index,
- Regulatory Substance Index, and
- Regulatory Outcome Index.

The **Regulatory Governance Index (RGI)** assesses the level of development of a country's regulatory framework and the scope at which the laws, procedures, standards, and policies governing the electricity sector, provide for a transparent, predictable, and credible regulator up to par with international best practices. The RGI thus assesses the level of development of the processes and tools as established in the primary law and the practices that are derived from their implementation.

The RGI is based upon the following eight indicators described further in the next section: Legal Mandate, Clarity of Roles and Objectives, Independence, Accountability, Transparency, Participation, Predictability and Open Access to Information.

The **Regulatory Substance Index (RSI)** evaluates the extent to which electricity sector regulators are carrying out their mandate and operationalizing the regulatory practices and processes which affect regulatory outcomes. RGI and RSI constitute the two main pillars of ERI.

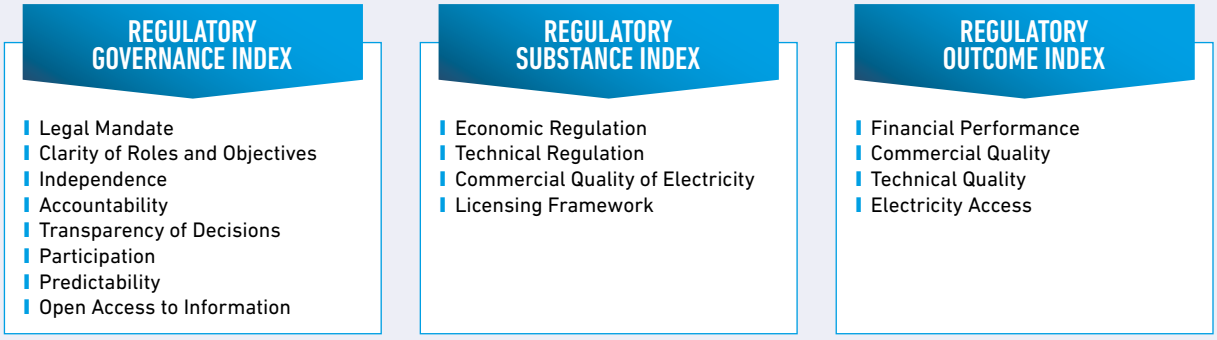
The RSI is based upon the following four indicators described further in the next section: Economic Regulation, Technical Regulation, Commercial Quality of Electricity and Licensing Framework.

Finally, **the Regulatory Outcome Index (ROI)** measures, from the perspective of the utility, the degree to which the electricity sector regulator has a positive or negative impact on the sector. The ROI adjusts the combined average of the RGI and RSI, correcting for discrepancies between the level of development and performance of a country's electricity sector regulatory environment, vis-a-vis the real impact that the regulator has on the power utility and ultimately on the sector.

The ROI considered the following four indicators described further in the next section: Financial Performance, Technical Quality of Electricity Supplied, Commercial Quality of Service, and Electricity Access.

3 BEST PRACTICE INDICATORS

FIGURE 3.1 SUB-INDICES OF THE ERI AND UNDERLYING MAIN INDICATORS



Regulatory Governance Indicators

Indicator 1: Legal Mandate

When a regulatory authority is established by legislation, it is difficult for new political leadership in the country to engage in arbitrary changes in policy. Regulatory authorities created by both electricity sector laws and regulatory acts therefore provide stronger and better safeguards to regulatory frameworks compared to those established solely by presidential decrees. A regulatory body established by legislation enhances the credibility of the institution and is likely to have a positive impact on investor confidence. A primary law and any related laws that clearly set out the autonomous decision-making powers or duties of the regulator clarify potential ambiguities and help ensure objectives are not diluted.

Indicator 2: Clarity of Roles and Objectives

A best practice regulatory model is one that clearly spells out the functions of the regulator in the primary law or any other relevant document and removes any possible sources of confusion between the regulator, the sector ministry or any other agency. The functions and objectives of the regulator and of regulated entities must be set out clearly and made known to stakeholders. The functions to be carried out by the regulator, as opposed to those carried out by the ministries or other bodies, should also be clearly established to avoid overlap.

Indicator 3: Independence

Regulatory independence refers to the formal independence from government and legislature; independence from stakeholders and market players; independence of decision-making; and financial and budgetary independence. Ensuring an "arm's length" relationship with regulated entities reduces the ability of stakeholders to influence the decisions of the regulator. Limiting the scope of political interference by means of aligning with best practice the mode of appointment of commissioners and/or board members, the term of appointment, as well as the regulator's organizational and institutional arrangements helps limit the potential for regulatory capture. A regulator's organizational independence is further enhanced if it has control of its input resources, such as through a stable and adequate source of funding, and if it has the authority and ability to appoint and provide adequate remuneration to its own staff.

Indicator 4: Accountability

A best practice regulatory model helps ensure the necessary mechanisms are in place to guarantee that regulators behave in accordance with the legal mandate that established them and are held accountable if they do not. This can be done by either putting in place a legal framework that provides all stakeholders the means of redress or establishing an independent body outside the regulatory authority to resolve conflicts. Regulators can be held accountable

through requirements that they justify the rationale for their decisions, as well as by formal and informal mechanisms that allow for their decisions to be appealed and/or challenged. Since the regulator's decisions affect the decisions of operators, investors are often more confident if there is an appeal mechanism for resolving disputes between the regulator and operators.

Indicator 5: Transparency

Transparency of regulatory decisions is important for regulated utilities and other stakeholders so they are aware of key issues and factors taken into account by the regulator upon arriving at various decisions. A regulator is more likely to gain the necessary stakeholder confidence, legitimacy and acceptance if it maintains a high degree of openness and transparency in its decision-making process. This can be done by disseminating information and providing rationale for decisions made.

Indicator 6: Participation

A regulatory process which is participatory provides a mechanism that enables the regulator to obtain information and views from all stakeholders. It also enables stakeholder views to be taken into account as part of the decision-making process. Clear mechanisms for allowing stakeholder's submissions to be incorporated as part of the regulatory decision-making process should therefore be in place.

Indicator 7: Predictability

A predictable regulatory environment helps ensure a gradual or evolutionary change in regulatory methods and practices to meet changes in circumstances in an orderly and consistent manner. In order to achieve this, the regulator must develop clear mechanisms regarding the process to be followed when making and subsequently implementing any changes. Regulatory decisions should, to the extent possible, be consistent with previous decisions. The principles of consistency and predictability will assure investors that there will not be unexpected changes to the regulatory environment. This will encourage them to commit to longer-term investments.

Indicator 8: Open Access to Information

Open access to information enhances regulatory decision-making because it enables the regulated utilities and other stakeholders to understand the key issues and factors that were taken into account by the regulator to arrive at a final decision. Open access requires utilities and stakeholders to have access to key documents such as tariff setting guidelines and methodologies, primary legislation, licenses, consultation documents, and regulator responses to stakeholder comments. It also ensures that underlying justifications to major regulatory decisions are made available to stakeholders via regulator websites, press statements, press releases, etc.

Regulatory Substance Indicators

Indicator 9: Economic Regulation

The development of an enabling environment for economic regulation supports transparency and credibility of the tariff setting regime and gives more comfort to investors to commit to making long-term investments. It further incentivizes investors to make more commercially driven investments and encourages competition in the electricity sector. For the large grid-connected power plants, this includes developing tariff setting guidelines and methodologies and carrying out a cost-of-service tariff study. A good economic regulatory regime will also include the development of tariff guidelines for grid-connected renewable energy systems and off-grid systems.

Indicator 10: Technical Regulation

Establishing a proper regulatory framework involves developing technical codes and rules that establish the rules and procedures for interconnection to the power system so that the system can be planned and operated in a safe, reliable, secure and economical manner. Development of quality of service regulations and grid codes establishes the requirements which must be met by the power utility to deliver an acceptable level of quality and reliability.

Indicator 11: Commercial Quality of Electricity

A sound regulatory environment is one in which there is an established regulatory framework that deals with the relationship between service providers and customers (i.e. commercial quality). A proper framework typically covers issues related to general consumer account queries, such as information or queries on meter readings and other disputes, as well as how to respond to consumer complaints.

Indicator 12: Licensing Framework

It is important for regulators to streamline the licensing framework for the power sector by developing separate frameworks for large and small power plants, especially isolated mini-grids and stand-alone systems. A different licensing regime for small power plants using light-handed regulation will reduce the regulatory processes involved in obtaining licenses or permits. It will also further reduce the cost of regulation to off-grid operators.

Regulatory Outcomes Indicators

Indicator 13: Financial Performance

Regulators are required to continuously monitor the financial performance of a utility in order to determine its financial position, as well as its financial sustainability. The financial position of a utility company depends largely on whether the total tariff revenue from electricity sales is adequate to cover the utility's total operation and maintenance expenses, as well as its debt service obligations.

As per best regulatory practice, the financial position of a utility company in assessed against the following key indicators:

- Return on Regulated Asset Base: This indicator is used by the regulator to establish whether the utility has earned a reasonable return on its regulatory asset base, which is at least equal to its cost of capital.
- Current Ratio: This indicator provides an indication of a company's ability to meet its short-term financial obligations.
- Interest Service Coverage Ratio: This indicator provides an indication as to whether the company has the capacity to meet its interest payments on its debt.
- Debt Service Coverage Ratio: This indicator provides an indication of the company's capacity to meet both interest and debt payments.

Indicator 14: Technical Quality of Electricity Supplied

The technical quality of electricity supplied to consumers should be monitored regularly by the regulator through periodic reporting by the utility, usually on a quarterly basis. The aim is to know whether the utility company is making efforts to reduce the nuisance associated with the number of times (or frequency) of outages, as well as the duration of the outages. Under best regulatory practice, the Quality of Service Performance Report submitted to the regulator should cover the following: System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI) and Customer Average Interruption Duration Index (CAIDI).

Indicator 15: Commercial Quality of Service

With respect to monitoring the commercial quality of service, best regulatory practice requires the utility to report on the quality of customer service provided to electricity consumers through the following:

- Connection of electricity: Time taken to respond to customer requests for new connections, as well as the time for a connection to be made;
- Customer care: Punctuality of appointment with customers; time taken to respond to customer complaints and response time to queries on disputed bills and account queries; and
- Metering and billing: Time taken for reconnection or restoration of power due to non-payment after payment is made, as well as the time given to post-paid meter users rom receipt of a notice-to-pay until disconnection.

Indicator 16: Electricity Accessibility

Regulators are required to continuously assess the social impact of utility performance on the population through regular reporting by the utility. The aim is to find out if the utility is implementing the government policy in enhancing access to electricity. It also aims to find out if the regulator's affordable tariff and connection policies are being implemented by the utility company.

4 METHODOLOGY IN BRIEF

The Electricity Regulatory Index scores were computed based upon responses to comprehensive surveys distributed to electricity sector regulatory institutions and utilities in twenty-five African countries. Out of the twenty-five countries surveyed, only fifteen submitted responses from the regulatory agencies and the regulated utilities. Resulting data and analysis are therefore based upon a sample of fifteen countries.

Survey questions were framed to capture and assess the sub-indicators falling within the component indices of the ERI. Answers to these questions therefore formed the basis by which the sub-indices RGI, RSI, and ROI were measured and compiled. The indicators for Regulatory Governance and Regulatory Substance were used to construct an Electricity Regulatory Index for Governance and Substance (ERI_{GS}) using primary data obtained from questionnaires sent to regulators. This preliminary calculation also provides important insight into measuring national regulatory development.

FIGURE 4.1 KEY CONSIDERATIONS FOR DEVELOPING THE ERI

THEMATIC QUESTIONS	SUB-INDEX	FACTORS TO CONSIDER
How are the regulators established and how are the regulatory tools and processes in the law implemented?	Regulatory Governance	Legal Mandate, Clarity of Roles & Objectives, Independence, Transparency, Accountability, Predictability, Participation, and Open Access to Information
Does the regulator implement the required regulatory actions and decisions as required under its mandate?	Regulatory Substance	Economic, Technical, and Commercial Regulation and Licensing Framework
Are the regulators making an impact on the regulated utilities and the overall sector?	Regulatory Outcome	Utility Financial Performance, Electricity Accessibility, Commercial Quality of Service, Technical Quality of Service

In order to investigate the impact of the quality of the regulatory environment on the sector, a regulatory impact analysis was also carried out to assess the effect of the regulator's decisions and actions on the performance of the power utilities and ultimately on the sector. The results of this analysis are captured by the Regulatory Outcome Index. The ROI was based on primary information obtained from completed questionnaires submitted by the power utilities. The results from the ERI_{GS} and ROI were combined to determine the Electricity Regulatory Index (ERI).

FIGURE 4.2 CALCULATING THE ERI_{GS} AND ERI

The ERI for Governance and Substance (ERI_{GS}) was calculated by aggregating the results of RGI and RSI as follows:

$ERI_{GS} = (\alpha \times RGI) + (\beta \times RSI)$

Where:

ERI_{GS} = Electricity Regulatory Index (Governance & Substance)
α = Weight for RGI = 1/2
β = Weight for RSI = 1/2
RGI = Regulatory Governance Index
RSI = Regulatory Substance Index

The ERI was calculated by aggregating the results of ERI_{GS} and ROI using the geometric mean of the two values as follows:

$ERI = \sqrt{(ERI_{GS} \times ROI)} = (ERI_{GS} \times ROI)^{1/2}$

Where:

ROI = Regulatory Outcome Index

FIGURE 4.3 CLASSIFICATION OF SCORES

Score Range	Color	Interpretation
0.7501–1.0000		**High level of development**; largely aligned with international best practice
0.5001–0.7500		**Well developed**; however, regulator or framework still displays a number of insufficiencies not aligned with international best practice
0.2501–0.5000		**Average level of development**; regulator or framework displays numerous insufficiencies not aligned with international best practice
0.000–0.2500		**Low level of development**; regulator or framework is insufficient and largely not aligned with international best practice

Scores for each indicator range between 0.00 and 1.00. A score of 1.00 indicates that the regulator, and/or the national regulatory framework, conforms to international best practices with respect to the relevant indicator, while a score of 0.00 is indicative of a complete absence of conformity with international best practices. The RGI, RSI and ROI sub-indices are calculated based upon a simple average of their underlying indicators. Given this, cumulative scores of the RGI, RSI and ROI sub-indices, as well as the overall ERI score, also range from 0.00–1.00, with the same implications given above, and as detailed below.

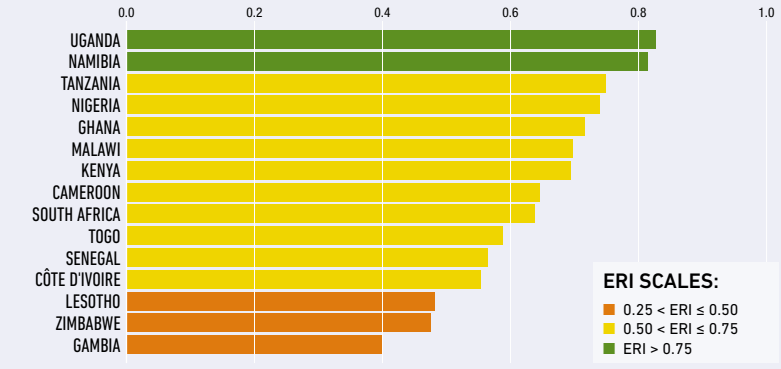
A complete description of the methodology used to calculate the ERI may be found in Annex One.

Photo © ADB

5 SUMMARY OF KEY FINDINGS

- ***On average, well-developed governance systems for electricity regulation exist in all fifteen sample countries; however there is room for improvement with respect to accountability and independence to align with international best practices often necessary to attract future investment into the sector.***
- ***Although many sample countries had established the legal and institutional frameworks for electricity sector regulation, regulators are yet to build an adequate level of capacity and develop the appropriate mechanisms to effectively carry out their mandates and make decisions under the key aspects of regulatory substance.***
- ***In spite of falling well short of international best practices, regulators in the sample countries have a moderately positive impact in the sector, especially when it comes to measures being instituted to promote energy access and enhance commercial quality of electricity to consumers; however, on average, regulators faltered most with respect to instituting cost-reflective tariffs.***

FIGURE 5.1 ERI RESULTS BY COUNTRY



It is important to keep in mind that the aim of the ERI is to measure national regulatory development. As a result, the ERI scores for certain countries that have low electricity access rates and power sector issues—such as Nigeria and Malawi—may be significantly higher than countries that have, in relative terms, more developed energy and power sectors marked by higher levels of energy access and investment into power infrastructure—such as South Africa and Kenya. This can be partly explained by the existence of a myriad of other factors other than the level of regulatory development that may influence investment and access, such as government policy decisions, political stability, and environmental security, in addition to macro-economic factors like foreign exchange risks, interest rate risks and capital market risks. Laws regulating repatriation of investor profit and national legal systems also influence such progress.

Overall, the Index revealed that countries in the sample scored an average ERI of 0.65, which falls within the yellow zone. This implies that regulatory frameworks governing the electricity sectors, as well as the effectiveness and capacities of the regulators

2018 Electricity Regulatory Index (ERI) Results

Overall, the results highlight that well developed electricity regulatory systems exist in a majority of the fifteen sample countries. This is largely due to the fact that almost all countries in the sample have instituted legal and regulatory frameworks establishing electricity sector regulators. Generally, however, the capacity to more effectively carry out their required mandates and make the maximum impact on the electricity sector is what separated the top performers from the rest. **Uganda and Namibia achieved the highest ERI scores because the actions and decisions of their regulators had a positive influence on the utilities' performance.** Weaknesses were identified in the moderate to low performing countries with respect to the effectiveness and impact of regulatory actions. **Critical areas of improvement include decision making in tariff setting, technical regulation, development of appropriate licensing framework to support off-grid systems, and commercial regulations.**

operating within them, are at a generally *intermediate* stage, with room for further development, despite there being a foundation of regulatory good practice.

In addition to serving as a measure of development, the ERI is also designed to serve as a diagnostic tool identifying key areas in electricity sector regulation that require the most significant improvement. In order to identify these areas, the ERI was broken down into its component indexes.

Regulatory Governance Index

Based upon the results, 33% of regulators in the sample countries recorded scores in the green zone and 67% in the yellow zone. In other words, **most countries in the sample have developed satisfactory regulatory frameworks within their electricity sectors**. Kenya registered the highest RGI score, whereas Togo came in at the lowest. All the sample countries have established the necessary framework for the creation of independent regulators as part of broad sector-wide reform programs.

The scores of the indicators comprising the RGI sub-index, as well as their underlying sub-components, indicate areas in which improvement is most needed. In particular, the **sample countries on average scored well below the sample RGI average on measures of accountability and independence**. A closer look at the sub-components of these measures reveal that the majority of surveyed countries lack policies that limit conflicts of interest at the sector ministry and regulator levels and between the utility and the regulator. They also lack informal mechanisms for holding regulators accountable to the public. Policies that align these areas with international best practices would go the furthest in improving the average RGI sub-index for the sample countries.

The results also highlight the institutional and governance challenges associated with the establishment of regulatory authorities in Africa. It takes time to establish and entrench good governance, as well as sound management and organizational systems and practices. There is also the issue of the mode of appointment of commissioners

FIGURE 5.2 RGI SCORES BY COUNTRY

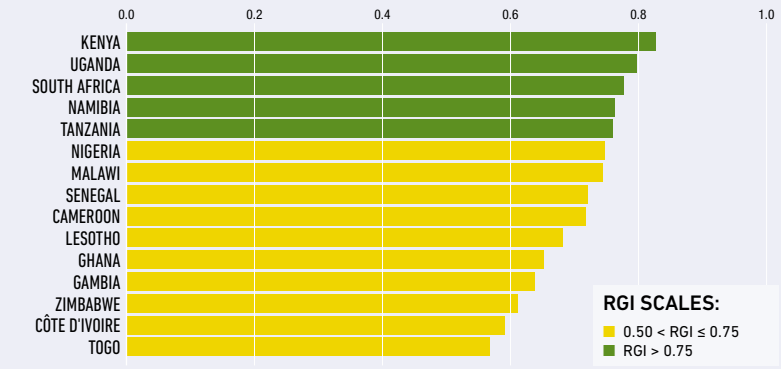
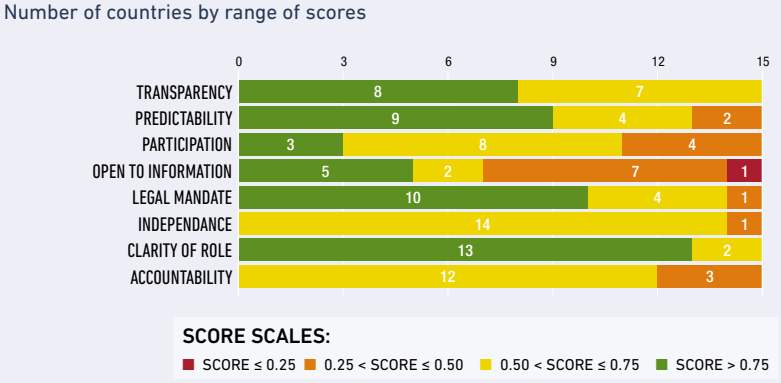


FIGURE 5.3 COUNTRY PERFORMANCE BY RGI INDICATORS



where the countries are yet to adopt appointment committees to nominate and appoint commissioners. The current approach, in which the government is largely responsible for making appointments, can lead to the nomination or appointment of commissioners who do not possess the requisite skills and experience.

Regulatory Substance Index

The average score of the RSI sub-index of the sample countries was 0.5452, just within the yellow zone. This suggests that regulators **in sample countries fell well short of international best practices with respect to the substance of their actual regulatory practices**. The wide gap between the average RGI and RSI scores indicates that while many sample countries have established the legal and institutional framework for electricity sector regulation, they have not yet built an adequate level of capacity or provided the appropriate mechanisms for regulators to effectively carry out their mandates. The results also imply that regulators are constrained by numerous challenges in regulatory substance such as the quality, credibility and impact of their regulatory decisions. Regulatory substance is also affected by the lack of skills and experience of the staff running and managing the electricity sector regulators.

This point is further enforced by the indicator scores that constitute the basis for the RSI. Indicators for licensing, commercial quality, and technical regulation (three of the four indicators comprising the RSI) scored below the RSI average. The widespread lack among sample countries of a publicly accessible licensing framework for off-grid, mini-grid and stand-alone systems reduced the score for the licensing indicator. The lack of a publicly accessible assessment by the regulator of the utility's performance significantly lowered the score of the commercial quality indicator. With respect to technical regulation, sample countries could significantly improve their scores by ensuring that regulators develop and enforce transparent and effective policies and regulations on mini-grids (particularly addressing issues concerning any eventual connection to the national grid), as well as on energy efficiency and greenhouse gas monitoring and reporting.

FIGURE 5.4 RSI SCORES BY COUNTRY

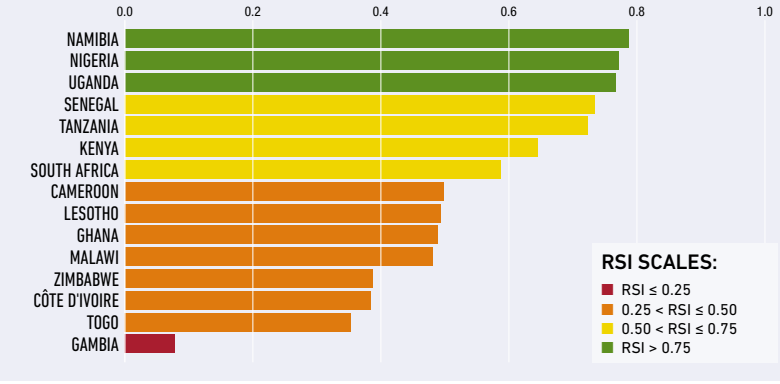
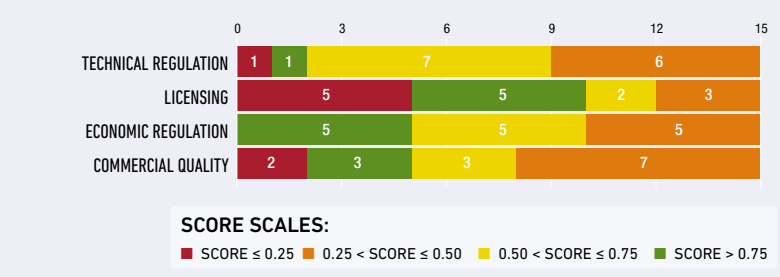


FIGURE 5.5 COUNTRY PERFORMANCE BY RSI INDICATORS



Regulatory Outcome Index

The average score of the ROI sub-index was 0.6663 for the sample countries and was in the yellow zone. This indicates that **while falling well short of international best practices, the regulators in the sample countries have a moderately positive impact in the sector**, especially when it comes to measures being instituted to promote energy access and enhance commercial quality of electricity to consumers.

However, **areas in which regulators, on average, faltered the most were in instituting cost-reflective tariffs for the full range of customer types**.

According to survey results that informed the financial indicator for the ROI sub-index, only 67% of sample countries have either not performed a cost-of-service study or have tariffs below 50% of a cost-reflective tariff for residential customers. This number jumps to 73% for commercial and industrial customers. This gap if not addressed, will affect the financial viability of the utilities as well as the long-term financial sustainability of the power sector. Performing a cost-of-service study and aligning tariffs with their cost-reflective levels would constitute the most effective way to boost ROI scores.

FIGURE 5.6 COUNTRY PERFORMANCE BY ROI INDICATORS

Number of countries by range of scores

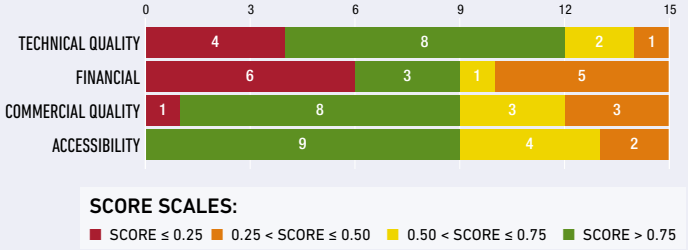


FIGURE 5.7 ROI SCORES BY COUNTRY

Regulatory Outcome Index (ROI)

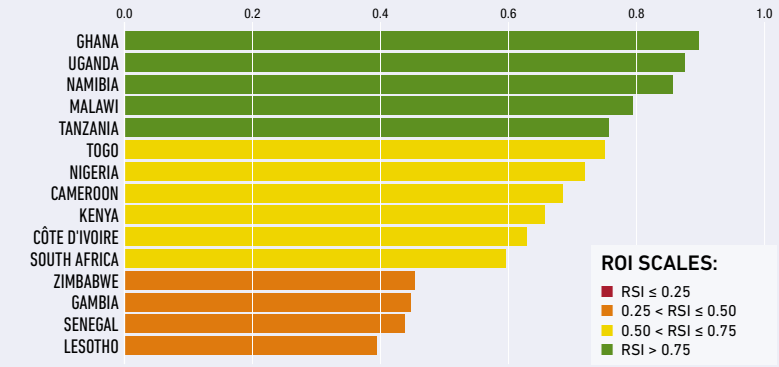



Photo ©: Solar Electric Light Fund
Photo ©: AFDB

6 BREAKDOWN OF FINDINGS

Survey Results

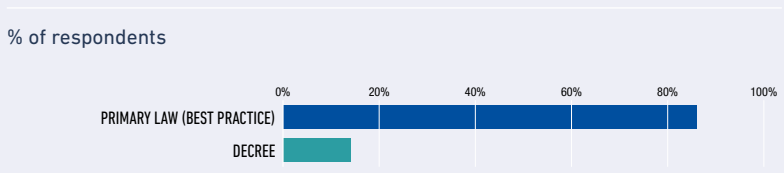
Regulatory Governance

The results from the survey showed that most regulators in Africa were established by law and therefore possess a legal mandate. Sixty-seven percent (67%) were established by an electricity sector law and/or regulatory act with or without backing by presidential decree. In three countries, namely Ghana, Lesotho, and Zimbabwe, there were no electricity sector laws, with only a regulatory act/law establishing the regulators. In the case of Togo, the regulator was established under law and backed by a presidential decree. In the case of Cote d'Ivoire, an electricity sector law established the regulator; however, there was no regulatory act. It is important to also highlight that in some of the countries surveyed, the electricity and regulatory laws are embedded in one document or law. Examples of countries with this feature are Namibia and Nigeria. Table 6.1 provides a breakdown of the distribution of the mode of establishment of the regulatory authorities.

TABLE 6.1 MECHANISM FOR ESTABLISHMENT OF REGULATORY INSTITUTIONS

Mode of Establishment	Countries
Electricity sector Law and a Regulatory Act that has received Presidential/Executive Assent (to become Law) OR Electricity Sector Law and a Regulatory Act backed by a Presidential decree	Cameroon, Gambia, Kenya, Malawi, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda
No Electricity sector Law but only a Regulatory Act that has received Presidential/Executive assent (to become Law) OR No Electricity sector Law but only a Regulatory Act backed by a Presidential decree	Ghana, Lesotho, Togo, Zimbabwe
Electricity sector Law but no Regulatory Act with Presidential/Executive assent (to become Law) OR Electricity sector Law but no Regulatory Act backed by a Presidential decree	Côte d'Ivoire

FIGURE 6.1 INSTRUMENTS USED TO DEFINE REGULATOR'S ROLES AND RESPONSIBILITIES



Clarity of Roles and Objectives

The results of the survey showed that the function and roles of the regulator are either defined in the primary law or in another legal document. The distribution of the instruments used to define the regulator's roles, duties and powers is depicted in Figure 6.1 below.

The results from the survey indicated that 86% of the respondents reported that the regulator's roles, duties and powers are outlined in the primary legislation, while 14% of respondents indicated that the regulator's functions and duties of the regulator are prescribed by a decree.

Independence

The survey examined the level of operational and financial (budgetary) independence of the regulators. In order to determine potential conflict of interest in terms of decision-making, the survey sought information regarding provisions in the regulatory acts/laws that prohibit commissioners

from working in the regulated utility after their terms of office. The countries with less than a one-year prohibition are Cote d'Ivoire and Senegal. Those with a prohibition of more than one year include Tanzania and Nigeria. The rest of the sample had no laws or standards prohibiting commissioners of electricity sector regulators from working at a regulated utility after their term of office.

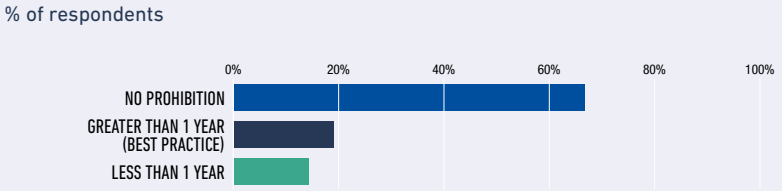
BEST PRACTICE IN ACTION: INDEPENDENCE

Mitigating conflicts of interest post terms of office in Nigeria and Tanzania

Under the Nigeria Electricity Power Sector Reform Act, for any person who holds the office of Commissioner, for a period of two years after he/she ceases to be a Commissioner, he/she shall not acquire, hold, maintain any interest, office, employment or consultancy arrangement in the regulated utilities in Nigeria. If such a person acquires any such interest involuntarily or by way of succession, he/she shall divest him/herself from such interest within a period of three months of such interest being acquired.

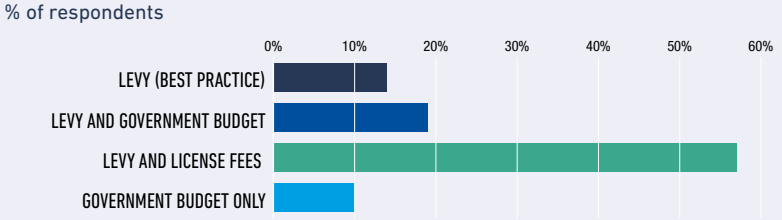
Under Tanzania's Energy and Water Utilities Regulatory Authority Act, a member of the Board, including the Chairman and the Director General, as well as any employee of the Authority, shall not, during a period of eighteen months after the expiration or termination of the term of office or service within the Authority, enter into any contract of employment with, or contract for the supply of services to, any person or organisation under the jurisdiction of the Authority.

FIGURE 6.2 PROHIBITION OF WORK IN REGULATED UTILITY AFTER TERM OF OFFICE



The survey results show that most regulators derive their funding from a combination of fees levied on utilities and licensing fees. This conforms to international best practice and helps ensure regulator independence. Regulators from a small subset of the sample, however, receive funding, in whole or in part, from the government. This erodes the financial Independence of the regulator, and may have a negative impact on its capacity to make independent, market-friendly decisions. The results on the funding sources for the respondents are depicted below in Figure 6.3.

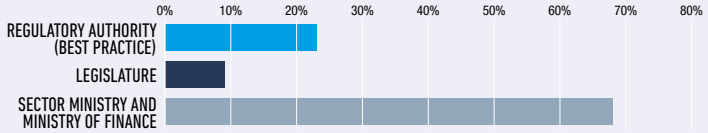
FIGURE 6.3 SOURCES OF FUNDING FOR REGULATORS



The survey also examined the institutions responsible for approving the regulator's budget. The results of the survey revealed that 23% of respondent budgets are approved by the regulatory authority, 9% by the legislature and 68% by the government (i.e. sector ministry and the ministry of finance). What these results imply is that even though most regulators in the research sample have external sources of funding, they may not have full budgetary independence.

FIGURE 6.4 BUDGET APPROVAL PROCESS

% of respondents



BEST PRACTICE IN ACTION: INDEPENDENCE

Appointment to Tanzania's Board of the Energy and Water Utilities Regulatory Authority

In Tanzania, appointment of commissioners to the Board of the Energy and Water Utilities Regulatory Authority (EWURA) follows a competitive process involving many parties. Under the EWURA Act, the Chairman of the Commission is appointed by the President while the other five commissioners are appointed by the sector minister.

Under Clause 9 of the EWURA Act, before anyone is appointed to the Board as a commissioner, he/she must be nominated by the Nomination Committee, which is made up of a panel comprising the Permanent Secretary and two other persons from the private sector.

In declaring their nominations, the Committee is required under the EWURA Act to undertake further consultations with industry organisations and the Chamber of Commerce. The Nomination Committee is also allowed under the Act to advertise for the positions in mass media located both within and outside the country. This process is meant to ensure that the best candidates are identified before the nominations are made for appointment, and that candidate nominations are made independent from presidential or ministerial input and influence.

Accountability

An important measure of accountability is the existence of an appeals mechanism that can be used to challenge the regulator's decision. The appeals mechanism can take the form of a specialized independent body or the aggrieved party can go to court to challenge or overturn the regulator's decision. Based upon the survey results, specialized bodies such as competition, energy or electricity tribunals have been established to challenge regulator decisions in Tanzania, Uganda and Kenya. For the rest of the respondents, regulator decisions can only be overturned by a legal right of appeal or a judicial review process.

BEST PRACTICE IN ACTION: ACCOUNTABILITY

Establishment of the Electricity Dispute Tribunal in Uganda

The Uganda Electricity Act provides for the establishment of the Electricity Disputes Tribunal. The Tribunal shall have jurisdiction to hear and determine all matters referred to it relating to the electricity sector.

The judgements and orders of the Tribunal shall be executed and enforced in the same manner as judgments and orders of the High Court. Any person aggrieved by a decision of the Tribunal may, within thirty days from the date of the decision or order, appeal to the High Court. The law applicable to appeals from the High Court in civil matters shall, with the necessary modifications or other adjustments as the Chief Justice may direct, apply to appeals from the Tribunal to the High Court. Except in the case of an appeal under the Act, it shall not be lawful for any court or tribunal to entertain any action or proceeding of any nature for the purpose of questioning any judgment, finding, ruling, order or proceeding of the Tribunal.

BEST PRACTICE IN ACTION: TRANSPARENCY

Transparency and openness in decision making in Cameroon

In an effort to promote transparency and openness in its decision-making process, Cameroon's electricity regulatory agency, ARSEL, has ensured that the consumer is made aware of its rights and responsibilities by publishing on its website the rights and obligations of the consumer. ARSEL has indicated that since the rights of consumers are not always protected, the regulator, through its Legal Unit, will receive and examine consumer complaints related to quality of service through conciliation sessions organized between the utilities and consumers who have filed complaints with the regulator. These sessions are to be held in Yaoundé and Douala every month. Moving forward, these meetings are expected to be extended to other parts of the country.

In a recent demonstration of best practice in regulatory transparency and openness, ARSEL further proved its role as a consumer advocate. In March 2018, an over-billing and quality of service dispute between the utility company and consumers was brought to light during a conciliation session held between the utility, Eneo, and 38 of its subscribers at ARSEL headquarters.

After a thorough examination of the complaints by ARSEL, the regulator found that there were indeed anomalies in the billing compared to the actual meter readings. It subsequently requested the utility to reconcile the invoices as soon as possible. The utility admitted that there was indeed a case of an accounting error and agreed to rectify its mistake with all due speed.

Participation

With respect to involving stakeholders in the regulatory process, most regulators indicated that they do so. Of those that do so, the results revealed that 71% of the regulators undertake the consultation exercise because it is compulsory and required by law, while 29% of the respondents indicated that they did so voluntarily. The survey results imply that for the latter group, even though the consultation process is not required under the legislation, they have found it useful towards making the regulatory process participatory.

BEST PRACTICE IN ACTION: PARTICIPATION

Encouraging consumer participation in the regulatory process in Ghana, Malawi and Tanzania

Under Ghana's Public Utilities Regulatory Commission Act (Act 538), the Commission is required to establish in such areas of the country as it considers necessary, consumer service committees and shall, by legislative instrument, prescribe the membership and functions of a consumer services committee. With respect to approving tariffs, the Commission shall, before approving any rates, provide the public utility and consumers affected by the rates a reasonable opportunity of being heard and shall take into account any representation made before it.

Meanwhile, under the Malawi Energy Regulation Act, the Authority may establish customer-consumer fora consisting of as many members of the Authority, employees of the Authority and any other persons representing the interests of consumers.

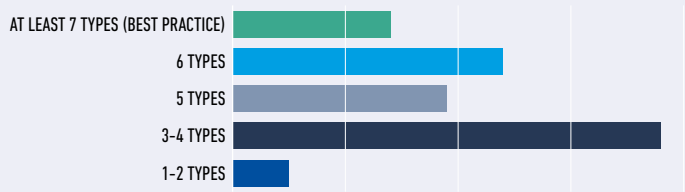
Tanzania's Energy and Water Utilities Regulatory Authority Act also requires that a Consumer Consultative Council be established. The Council shall consist of not less than six members, and no more than ten members appointed by the Minister from among a list of relevant businesses or by an organization or organizations legally recognized as being representative of private sector interests. The functions and powers of the Council include, among others, representing the interests of consumers by making submissions to, providing views and information to, and consulting with the Authority and the sector minister, as well as receiving and disseminating information and views on matters of interest to consumers. Other functions include consulting with industry, government and other consumer groups on matters of interest and establishing local and sectoral consumer committees and consulting with them.

Open Access to Information

The survey examined the amount and the types of information that are made publicly available by the regulators, such as documents pertaining to primary legislation, licenses, consultations, tariff guidelines and methodology. The results of the survey on the different types of information published is shown below and highlights that less than 15% of the respondents provide open access to more than seven types of information regarding regulatory matters and decisions.

FIGURE 6.5 NUMBER OF TYPES OF INFORMATION ON WEBSITE

% of respondents



BEST PRACTICE IN ACTION: OPEN ACCESS

Ensuring transparency and knowledge sharing in South Africa

The National Energy Regulator of South Africa (NERSA) has exhibited best regulatory practice by publishing key regulatory and other consultation documents which can be accessed by all stakeholders on its website. Some of the documents and information available on NERSA's website include:

- Legislation: Acts, policies, regulations and rules;
- Licensing: License application procedures, registration application forms, registered utilities and applications under consideration;
- Consultation documents: Notices, documents and presentations;
- Scheduled meetings of the Grid Code Advisory Committee;
- Pricing and tariffs;
- Technical Standards: Transmission Grid Code, Distribution Grid Code, Renewable Energy Grid Code, scheduling and dispatch rules;
- Market documents on: Single buyer model, electricity distribution industry and wholesale trading;
- Sustainable development documents on: Renewable energy and energy efficiency; and
- Investigations and Dispute Resolution: Documents on dispute resolution, reasons and rationale behind decisions.

BEST PRACTICE IN ACTION: OPEN ACCESS & TRANSPARENCY

Open access to tariff decisions in Senegal

Senegal's electricity sector regulatory commission, known as CRSE, has exhibited best practice regulation in open access and transparency by publishing all consultation documents on tariffs and other key areas, as well as on outcomes of regulatory decisions, on its website. Some of the documents published include:

- Revision of the tariff conditions of the power utility, Senelec, for the tariff period 2010–2014
- Interim review of Senelec's tariff conditions for the tariff period 2011–2013
- Revision of Senelec's tariff conditions for 2014–2016
- Revision of the tariff conditions of Senelec for the pricing period 2014–2016
- Ministry of Energy and Mines revision of Senelec tariff conditions on electrification obligations and standards for the period 2014–2016
- Revision of Senelec's tariff terms for the period 2017–2019
- Decision No. 2018-06 on the maximum revenue requirements granted Senelec for 2018
- Decision No. 2018-05 on the selection of independent electricity producers in the setting up of photovoltaic solar power plants with a cumulative capacity of 60 megawatts
- Decision No. 2018-04 approving the updated costs to connect customers to Senelec's distribution network
- Decision No. 2018-01 on annual license fees to be paid in 2018 by operators holding licenses or concessions

The regulator also publishes the results of any investigations it carries out on utility performance. For instance, in order to monitor the quality of the services offered by Senelec between 2009 and 2019, CRSE conducted a survey on frequent breakdowns of utility equipment, which affected the quality of service offered to consumers. The results of that exercise were published on the regulator's website.

Regulatory Substance

Economic Regulation

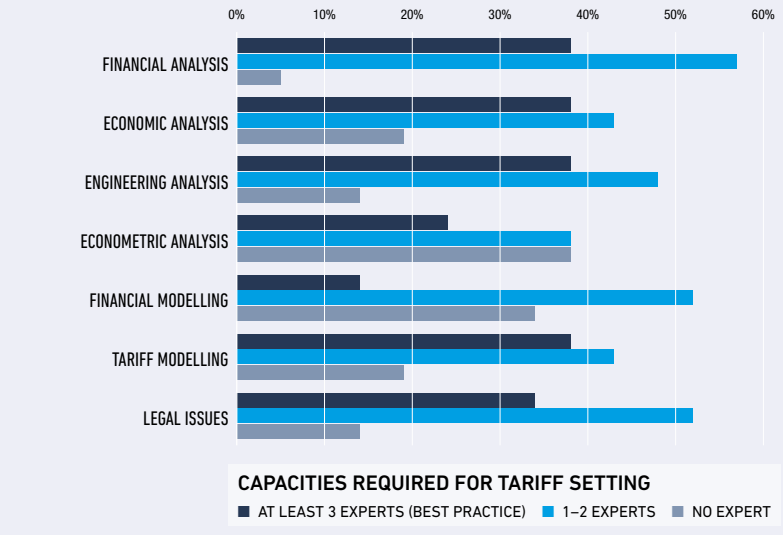
The survey investigated the extent to which the regulators have developed comprehensive tariff guidelines and methodologies. The results distribution is summarized below in Table 6.2.

TABLE 6.2 DEVELOPMENT OF TARIFF GUIDELINES AND METHODOLOGY

Extent of Development of Tariff Guidelines and Methodology	Percentage of Respondents
Developed and published	67%
Developed draft document	14%
Tariff formula is embedded in other documents (i.e. concession agreements)	5%
No tariff guidelines and methodology	14%

The establishment of a credible tariff setting regime also depends upon whether the regulator possesses the capacity to analyze details of the tariff application submitted by the utility company. The survey examined the availability of regulatory capacity in tariff setting in the following areas: financial analysis; economic analysis; econometric analysis; financial modelling; tariff modelling; and legal issues in regulation. The results from the survey are depicted below.

FIGURE 6.6 AVAILABILITY OF EXPERTS FOR TARIFF SETTING



The study also investigated whether the necessary policy, legal and regulatory frameworks have been established to promote off-grid electrification. As illustrated in Table 6.3, the majority of surveyed countries do not have appropriate policy and regulatory frameworks for off-grid systems. Critical issues such as rules that guarantee renewable energy access to the network, as well as ensuring priority of dispatch for RE-generated electricity must still be developed.

TABLE 6.3 LEGAL, POLICY AND REGULATORY FRAMEWORKS FOR OFF-GRID SYSTEMS

Level of Development	Mini-Grid Systems	Stand-Alone Systems
Approved and published frameworks	38%	43%
Draft policy and legal documents	19%	0%
Stand-alone Individual System	43%	57%

Technical Regulation

The survey sought to investigate whether regulators had developed a quality of service code that covers all areas required to monitor the financial, commercial, and technical performance, as well as quality of service performance, of the regulated utilities.

TABLE 6.4 QUALITY OF SERVICE CODE

Level of Development of Quality of Service Code	% of Respondents
Developed approved codes covering all 4 areas	57%
Developed approved codes covering 3 areas	5%
Developed approved codes covering 2 areas	28%
Developed approved codes covering 1 area	5%
No approved codes	5%

With respect to grid code development, 62% of respondents indicated that they have developed approved grid codes, while 38% indicated that they have not. The countries in the latter group include: Cameroon, Côte d'Ivoire and Senegal.

In the survey, regulators were asked if they have adequate senior level staff with the expertise and experience to collect data and analyze the utility company's performance in all areas of quality of service regulation. The responses from the regulators are illustrated in Figure 6.7.

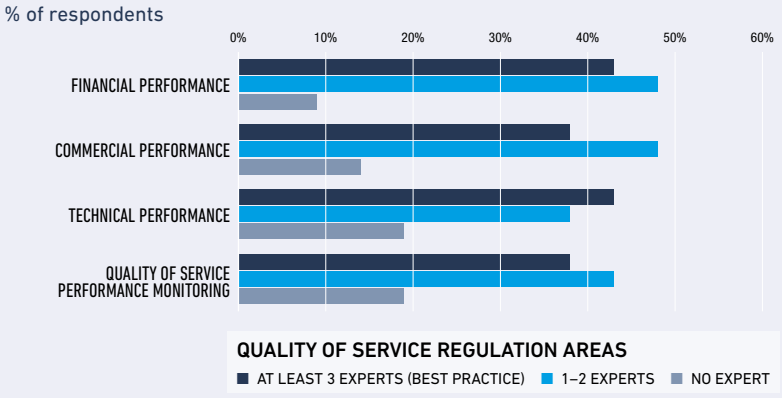
BEST PRACTICE IN ACTION: TECHNICAL REGULATION

Promotion of stand-alone systems in Ghana

Ghana's Energy sector ministry, through its Energy Commission, is implementing the Rooftop Solar Photovoltaic (PV) Programme to facilitate the installation of 20,000 rooftop solar PV systems in residential homes under a capital subsidy scheme. The primary objective of the programme is to provide 200MW peak load relief on the national grid through solar PV technology in the medium term.

Under the programme, a capital subsidy will be given to beneficiaries in two forms, either as a cash payment for the solar panel component of the solar PV system or in the form of the solar panels themselves after the beneficiary has purchased and installed the requisite Balance of Systems (BoS) components such as inverter, batteries, charge controllers, etc. The maximum capacity of solar panels that will be granted to each beneficiary under the programme shall be up to 500 watts. A number of commercial banks have expressed interest in providing loan facilities to interested beneficiaries in respect of the procurement of BoS components for the solar PV systems of their choice.

FIGURE 6.7 AVAILABILITY OF EXPERTS FOR QUALITY OF SERVICE REGULATION



The majority of regulators in the sample countries have not developed standards or codes for the development of mini- and off-grid systems.

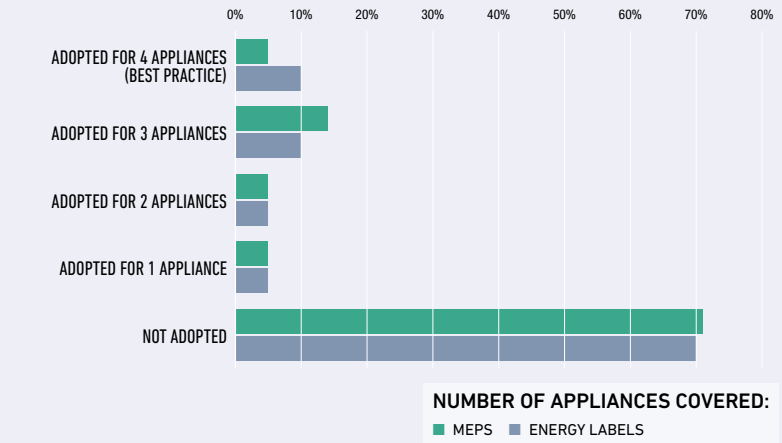
TABLE 6.5 PUBLICATION OF TECHNICAL STANDARDS FOR OFF-GRID SYSTEMS

	Percentage of Respondents	
	Mini-Grid Systems	Stand-Alone Systems
Published standards or codes	24%	38%
Draft standards or codes	10%	14%
No standards or codes	66%	48%

Furthermore, the majority of regulators in the sample countries have not adopted Minimum Energy Performance Standards (MEPS) and energy labeling for electrical appliances and equipment, as Figure 6.8 illustrates.

TABLE 6.8 ADOPTION OF MINIMUM ENERGY PERFORMANCE STANDARDS AND ENERGY LABELLING

% of respondents



Commercial Quality of Electricity

The survey also looked at whether the regulators had carried out and published a comprehensive analysis on the utility's commercial quality performance. As Table 6.6 shows, 66% of respondents do not carry out any form of analysis.

TABLE 6.6 COMMERCIAL QUALITY OF REPORT PUBLICATION

Publication of Report	Percentage of Respondents
Analysis undertaken and report published	24%
Analysis carried out, but report not published	10%
Analysis not carried out	66%

BEST PRACTICE IN ACTION: COMMERCIAL QUALITY OF ELECTRICITY

Commercial Regulation in Uganda

Uganda's Electricity Regulatory Authority has developed Electricity (Quality of Service Code) Regulations. The Regulations apply to licensed activities undertaken by persons holding licences for generation, transmission, system operation, bulk supply, distribution, sale, import, as well as the interaction or the relationship between utilities and consumers. With respect to the interaction with customers, the utility is required to:

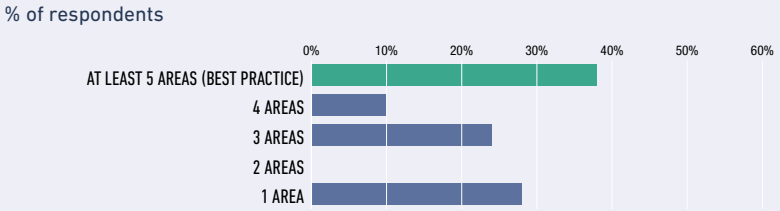
- maintain a current set of maps showing the physical locations of its facilities;
- assist the consumer or applicant in selecting the most economical rate schedule;
- notify consumers affected by a change in rates or schedule classification;
- post a notice in a conspicuous place in each business office of the utility where applications for service are received;
- inform its consumers as to the method of reading meters; and
- provide consumers with an information packet containing the following information:
  - consumer's right to information concerning rates and services;
  - consumer's right to have his or her meter checked;
  - time allowed to pay outstanding bills;
  - grounds for termination of service;
  - time the licensee must take before terminating service;
  - method of resolving billing disputes with the licensee;
  - steps necessary to have service reconnected after involuntary termination;
  - appropriate authority with whom to register a complaint and how to contact them; and
  - hours, addresses and telephone numbers of offices where bills may be paid and where information may be obtained.

Licensing Framework

The survey results showed that 38% of countries in the sample have developed a simplified licensing framework for off-grid and smaller power systems, while 62% indicated that they have not developed a simplified licensing framework. Figure 6.9 depicts the distribution of the coverage of the following key licensing areas:

- Procedures and guidelines for license application
- Development and completion of license forms
- License approval process
- Format for license
- Schedule of license fees

FIGURE 6.9 NUMBER OF AREAS COVERED BY LICENSING FRAMEWORK



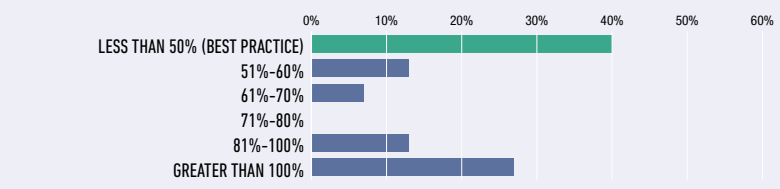
Regulatory Outcomes

The survey investigated the impact of the regulator's actions and decisions on the operations of the power utilities in the following areas: financial performance; commercial quality of service; technical quality of service; and electricity accessibility.

Financial Performance

The survey investigated whether the tariff revenue was adequate to cover all prudently incurred operation and maintenance costs. The results are depicted in Figure 6.10 below.

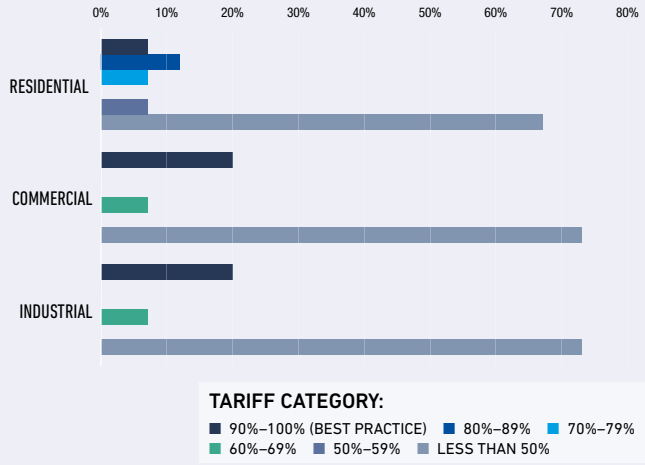
FIGURE 6.10 O&M AS PERCENTAGE OF TARIFF REVENUE



The survey also sought to measure the relationship between the current tariffs and the cost reflective tariffs determined from the cost-of-service studies for residential, commercial and industrial customers.

FIGURE 6.11 CURRENT TARIFF AS A PERCENTAGE OF COST-REFLECTIVE TARIFF

% of respondents

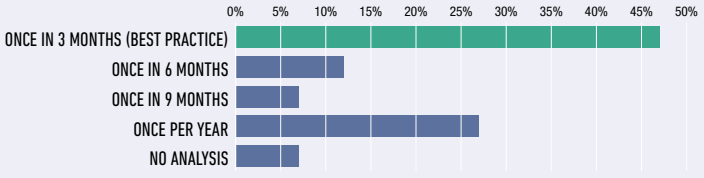


Commercial Quality of Service

As part of the survey, utility companies were asked if the regulators undertake periodic analyses of the utility's commercial quality of service performance and discuss the results with the utility company. The frequency of such discussions is recorded in Figure 6.12 below.

FIGURE 6.12 FREQUENCY OF DISCUSSION OF COMMERCIAL QUALITY PERFORMANCE

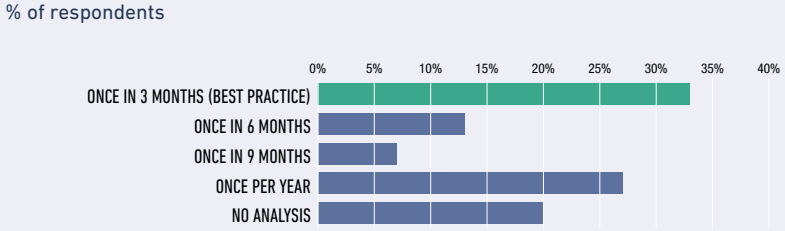
% of respondents



Technical Quality of Service

Utilities were asked if regulators carry out analyses of the utility's performance on technical quality of electricity (for example: duration and number of outages and their causes, voltage disturbances, frequency deviations) and how often such analyses are undertaken. As illustrated in Figure 6.13 below, 20% of utilities stated they received no relevant queries from the regulator at all.

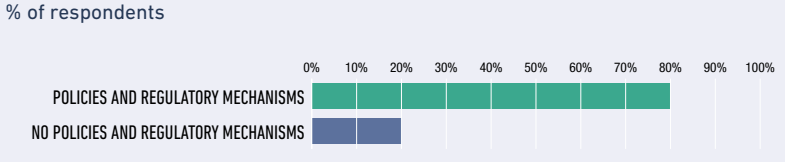
FIGURE 6.13 FREQUENCY OF TECHNICAL ANALYSIS BY REGULATOR



Electricity Accessibility

The survey measured the utilities' perception of whether there were adequate policies and regulatory mechanisms in place to enhance electricity access. Eighty percent (80%) of the respondents believe that there are appropriate government policies and other regulatory mechanisms in place to support increasing access to electricity, while 20% of respondents indicated there are no policies and regulatory mechanisms in place.

FIGURE 6.14 UTILITIES' PERCEPTION OF POLICIES AND REGULATORY MECHANISMS TO ENHANCE ACCESS

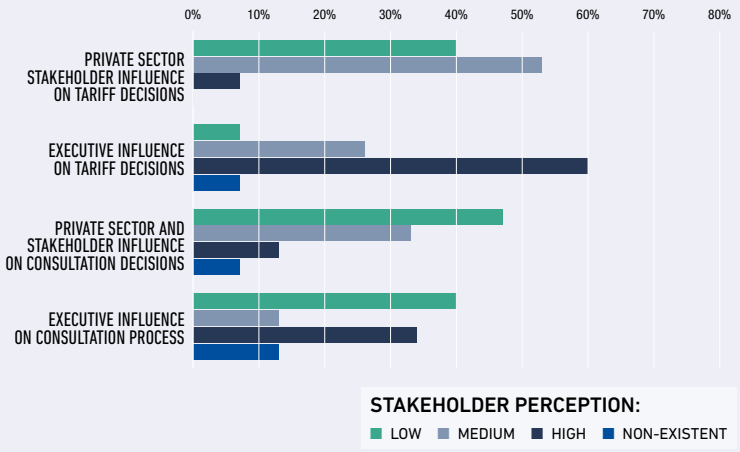


WHAT DO THE UTILITIES THINK?

Examining the perception of regulatory independence

The utilities' perception of how the regulator arrives at its final decisions can have an impact on the credibility and acceptance of the regulator's decisions. The survey examined, as a fifth (non-scoring) dimension to the Regulatory Outcome Index, the perception of power utilities toward the regulator's independence with respect to private sector and executive branch influence on the regulator's tariff and consultation decisions. The responses received from the utilities are illustrated below.

FIGURE 6.15 POWER UTILITIES' PERCEPTION OF REGULATORY INDEPENDENCE



The results of the survey indicate that the majority of power utilities believe that the president or sector ministry tends to have a negative influence on the regulator's tariff setting and consultation functions. Regulators where commissioners are appointed by an executive authority and/or sector ministry without the involvement of an external party or legislature are particularly vulnerable to regulatory capture. This makes it easier for presidents and ministries to influence the regulator's final tariff decision. Another source of the perception of negative influence from the executive can come from the budget approval process. The budget approval process can be used by politicians to "capture" the regulator and dilute its tariff setting independence.

This negative perception can be improved if the appointment process is streamlined to involve the legislature or external parties, and if regulators are afforded the right/ability to approve their own budgets. This approach will enhance operational independence, insulating regulators from the executive and enabling them to operate with minimal political influence.

Index results

This section presents and discusses the results of the Regulatory Governance Index, Regulatory Substance Index, Regulatory Outcome Index and the subsequent composite index—the Electricity Regulatory Index for Governance and Substance and ERI.

TABLE 6.7 RESULTS OF THE REGULATORY GOVERNANCE INDEX

Country	Legal Mandate	Clarity of Role	Independence	Accountability	Transparency	Predictability	Participation	Open Access	RGI	Ranking
Kenya	1.0000	1.0000	0.6042	0.6667	0.8333	0.8333	0.8750	0.8000	0.8266	1
Uganda	1.0000	0.8889	0.5903	0.6667	1.0000	0.8333	1.0000	0.4000	0.7974	2
South Africa	1.0000	1.0000	0.5528	0.6875	0.8333	1.0000	0.7500	0.4000	0.7780	3
Namibia	1.0000	1.0000	0.5444	0.3542	0.6667	0.9167	0.6250	1.0000	0.7634	4
Tanzania	1.0000	0.8889	0.7375	0.6667	0.6667	0.5833	0.7417	0.8000	0.7606	5
Nigeria	1.0000	0.8889	0.6875	0.4375	0.8333	0.8333	0.5000	0.8000	0.7476	6
Malawi	1.0000	1.0000	0.5958	0.5417	0.6667	0.8333	0.9167	0.4000	0.7443	7
Senegal	1.0000	0.7222	0.5132	0.6042	0.8333	0.8750	0.6250	0.6000	0.7216	8
Cameroon	1.0000	1.0000	0.5694	0.6042	0.6667	0.5000	0.6000	0.8000	0.7175	9
Lesotho	0.6667	0.7778	0.5875	0.5000	1.0000	1.0000	0.5250	0.4000	0.6821	10
Ghana	0.6667	0.7778	0.5764	0.6250	0.8333	0.8333	0.5000	0.4000	0.6516	11
Gambia	1.0000	0.8333	0.5153	0.6042	0.6667	0.6667	0.6250	0.2000	0.6389	12
Zimbabwe	0.6667	0.8333	0.4375	0.5417	0.6667	0.7500	0.6000	0.4000	0.6120	13
Cote d'Ivoire	0.3333	0.8889	0.6750	0.6042	0.6667	0.6667	0.4917	0.4000	0.5908	14
Togo	0.6667	0.5556	0.5222	0.6042	0.8333	0.4167	0.3500	0.6000	0.5686	15
Mean	**0.8667**	**0.8704**	**0.5806**	**0.5806**	**0.7778**	**0.7694**	**0.6483**	**0.5600**	**0.7067**	

Score Range	Color	Interpretation
0.7501–1.0000		High level of development
0.5001–0.7500		Well developed
0.2501–0.5000		Average level of development
0.000–0.2500		Low level of development

Regulatory Governance Index

The national results of the RGI for the eight main indicators are presented in Table 6.7 in which 33% of the regulators recorded values in the green zone and 67% scored values in the yellow zone. Given that the majority of regulators fall within the yellow zone, there is still room for improvement, particularly on the following indicators:

- Independence;
- Accountability;
- Participation; and
- Open Access to Information.

Legal Mandate

Among the regulators surveyed, 67% fell within the green zone, while 33% recorded scores in the yellow zone with respect to the Legal Mandate indicator. The high percentage of scores in the green zone support the results of the survey whereby 93% of regulators were established by law, thus providing stronger and better safeguards to the regulatory frameworks. This will also enhance investor confidence in the regulatory authorities. The high degree of dispersion also reflects the case of Cote d'Ivoire, where the regulator was established by an electricity law without an accompanying regulatory act.

Clarity of Roles and Objectives

Among the regulators surveyed, 87% recorded scores in the green zone with 13% scoring values in the

yellow zone. The high percentage of scores in the green zone indicates that for most of the regulators, the powers and duties, as well as the functions of the regulator, are clearly specified in the primary law. This indicator also captures whether the utility's functions are specified in the electricity law. The results show that for Cameroon, Gambia, Malawi, Namibia, and Kenya, the functions and duties of the regulator and the regulated utility are both defined in the electricity law. For the other countries, duties of the utilities are either outlined in licenses or in contracts.

Independence

With respect to the Independence indicator, while 87% scored values in the yellow zone, 13% recorded scores in the orange zone. The high percentage of scores in the yellow zone indicates that the regulators generally performed just above average. The RGI scores seem to support the results from the survey, which noted that 96% of commissioners were appointed by the president, the president in consultation with minister or the sector minister. When it comes to budget approval, 68% of the regulators' budgets were approved by the sector minister. Nigeria and Tanzania recorded high scores for independence partly because of the provisions in their respective regulatory acts/laws prohibiting commissioners from accepting a job in the regulated utility after their term of office. In the case of Nigeria, the period is two years, while in Tanzania the prohibition covers the director-general, as well as employees of the authority, for a period of eighteen months after the expiration or termination of the term of office or service with the authority.

Accountability

Eighty percent (80%) of regulators fell within the yellow zone, while 20% recorded scores in the orange zone, with no country in the green zone. Kenya, Uganda and Tanzania recorded high scores because of the existence of specialized independent bodies such as energy, electricity, or competition tribunals, which can be used to challenge or overturn the regulator's decisions.

Transparency

With respect to the Transparency indicator, 53% of regulators surveyed achieved scores in the green zone, with 47% of the scores in the yellow zone. Lesotho and Uganda scored the highest marks because these regulators publish explanations and rationales behind all major decisions. For the other regulators, neither reasons nor explanations are provided to support major decisions. In some instances, the rationale or reasons behind major decisions are only provided upon request from the stakeholder.

Predictability

The Predictability indicator scores show that 60% of the regulators were in the green zone. A further 27% achieved scores in the yellow zone, while 13% achieved scores in the orange zone. South Africa and Lesotho recorded the highest scores while Togo recorded the lowest. Kenya, Uganda, Nigeria, Namibia, Malawi, Senegal and Ghana all recorded scores in the green zone. The scores reinforce the survey results whereby 86% of the regulators adopted a consultative approach with stakeholders when changing their tariff methodologies. In the case of Lesotho and South Africa, these regulators changed other major documents such as licenses, contracts, authorizations by mutual agreement with the parties involved.

Participation

With respect to the Participation indicator, 20% of the regulators' scores were in the green zone, 60% in the yellow zone and 20% in the orange zone. The dispersion of the scores ranged between 0.34 and 1.00. In Cote d'Ivoire, the consultation process is considered to be voluntary, and the regulator does not publish comments received from the consultation exercise. Uganda scored the highest marks because the consultation process involves at least four stakeholders, as required under the primary law. The Ugandan regulator also publishes comments received from stakeholders during consultation exercises. In the case of Malawi, the consultation process involves at least four stakeholders as required under the law, but the regulator only publishes a summary of the responses from the consultation exercise on its website.

Open Access

The Open Access indicator explores the different types of information provided on the regulator's website. Thirty-three percent (33%) of regulators surveyed recorded scores in the green zone, while 47% recorded values in the orange zone. Meanwhile, 13% of the regulators' were in the yellow zone, while 7% had their scores in the red zone. The Namibia regulator, which was the best performer, provides information on all relevant areas on its website, while Gambia, the worst performer in this category, provides information on only two types of information.

Regulatory Substance Index

The following table shows the results for each of the main indicators as well as the general Regulatory Substance Index for all countries. Out of the regulators surveyed, 20% of the scores fell in the green zone and 27% in the yellow zone, while 47% and 6% were in the orange and red zones, respectively. The best performers were Namibia, Nigeria and Uganda. Senegal, Tanzania, Kenya and South Africa also performed above average. Gambia was the lowest performer and fell in the red zone.

TABLE 6.8 RESULTS FOR REGULATORY SUBSTANCE

Country	Economic Regulation	Technical Regulation	Commercial Quality	Licensing	RSI	Ranking
Namibia	0.5909	0.5550	1.0000	1.0000	0.7865	1
Nigeria	0.5726	0.5150	1.0000	1.0000	0.7719	2
Uganda	0.7817	0.6325	0.6500	1.0000	0.7661	3
Senegal	0.7605	0.4275	1.0000	0.7500	0.7345	4
Tanzania	0.8528	0.6400	0.4000	1.0000	0.7232	5
Kenya	0.7542	0.8250	0.5000	0.5000	0.6448	6
South Africa	0.5774	0.6225	0.4000	0.7500	0.5875	7
Cameroon	0.5993	0.4550	0.5000	0.4375	0.4979	8
Lesotho	0.3560	0.3200	0.3000	1.0000	0.4940	9
Ghana	0.7306	0.4750	0.5000	0.2500	0.4889	10
Malawi	0.7911	0.6300	0.0000	0.5000	0.4803	11
Zimbabwe	0.4585	0.5400	0.3000	0.2500	0.3871	12
Cote d'Ivoire	0.3560	0.4775	0.7000	0.0000	0.3834	13
Togo	0.2524	0.4100	0.7500	0.0000	0.3531	14
Gambia	0.2509	0.0625	0.0000	0.0000	0.0784	15
Mean	**0.5790**	**0.5058**	**0.5333**	**0.5625**	**0.5452**	

Score Range	Color	Interpretation
0.7501–1.0000		High level of development
0.5001–0.7500		Well developed
0.2501–0.5000		Average level of development
0.000–0.2500		Low level of development

Economic Regulation

The Economic Regulation indicator shows that one-third of regulators recorded scores in the green zone, with the same number recording scores in the yellow and orange zones. The best performers were Uganda, Senegal, Tanzania, Kenya, Ghana and Malawi. The lowest performers were Togo and Gambia. All the top six performers recorded high marks in the following three areas: tariff setting guidelines and methodology, economic regulatory framework for grid connected RE and economic regulatory framework for off-grid systems. The low performers, Togo and Gambia, recorded values below the mean for all the above three thematic areas.

Technical Regulation

With respect to the Technical Regulation indicator, 46% of the regulators' scores fell in the yellow zone, 7% in the green zone, 40% in the orange zone and 7% in the red zone. The low percentage of the scores in the green zone, and the high percentage in the orange and yellow zones, is an indication that regulators generally performed poorly in this area. Kenya was the best performer due to its strong performance in all sub-areas of technical regulation namely: quality of service regulation, Regulation

of mini-grid and stand-alone systems, as well promotion of the adoption of energy efficient practices. Gambia was the lowest performer because, with the exception of quality of service regulation, the regulator is yet to develop regulatory mechanisms for technical regulation of mini-grid and stand-alone systems.

In general, there are inadequate policies and regulatory frameworks in place to enhance the scale and scope of adoption of energy efficiency practices. The range of scores seems to indicate that scores for most of the regulators were either average or just above average in technical regulation of mini-grid and stand-alone systems, and that most countries have yet to adopt Minimum Energy Performance Standards and energy labelling for electrical appliances.

Commercial Quality of Electricity

The performance on the Commercial Quality indicator shows that 47% of the regulators' scores were in the orange zone, while 20% recorded scores in the green. Another 20% registered scores in the yellow zone, while 13% achieved scores in the red zone. The degree of dispersion was between 0 and 1. The high combined percentage of 60% of regulators that recorded scores in the orange and red zones is an indication that most regulators performed below average on this indicator. The low performers were Malawi and Gambia, mainly because they have yet to develop quality of service codes defining the approach for regulating the commercial quality of service.

Licensing Framework

With respect to the licensing framework, 33% of regulators fell in the green zone, 20% in the orange zone, 14% in the yellow zone and 33% in the red zone. The combined percentage of 53% of scores in the orange and red zones is an indication that regulators generally perform below average on licensing frameworks. The best performers include Nigeria, Namibia, Uganda, Tanzania and Lesotho because these countries have developed a separate licensing framework for large grid-connected systems and a simplified licensing framework for off-grid systems.

Electricity Regulatory Governance Index for Governance and Substance

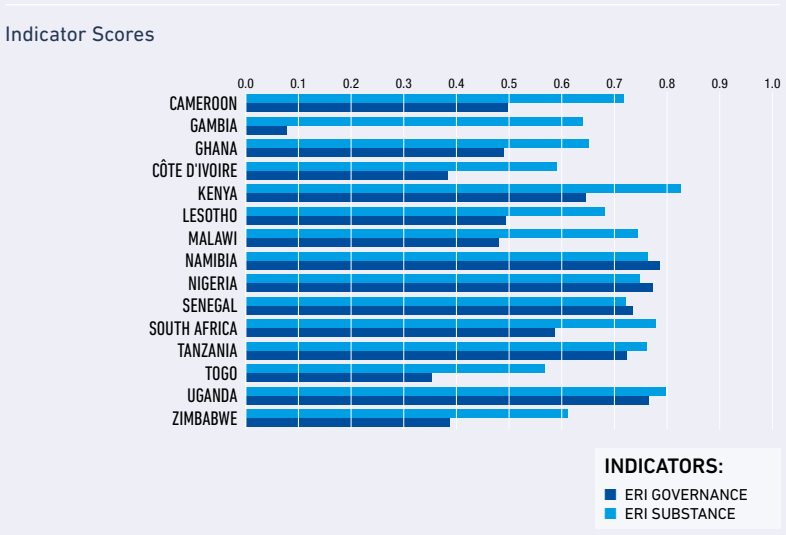
The below table shows the results for ERI_{GS} and cites the best performers as Uganda, Namibia and Nigeria. Twenty percent (20%) of the regulators were in the green zone, while 53% were in the yellow zone and 27% in the orange zone. The results also show that the RGI and RSI means are 1.13 and 0.87 times that of the ERI_{GS}. Further analysis shows that the RGI mean is 1.3 times that of the RSI. This implies that on average, the regulators surveyed performed better on Regulatory Governance than on Regulatory Substance.

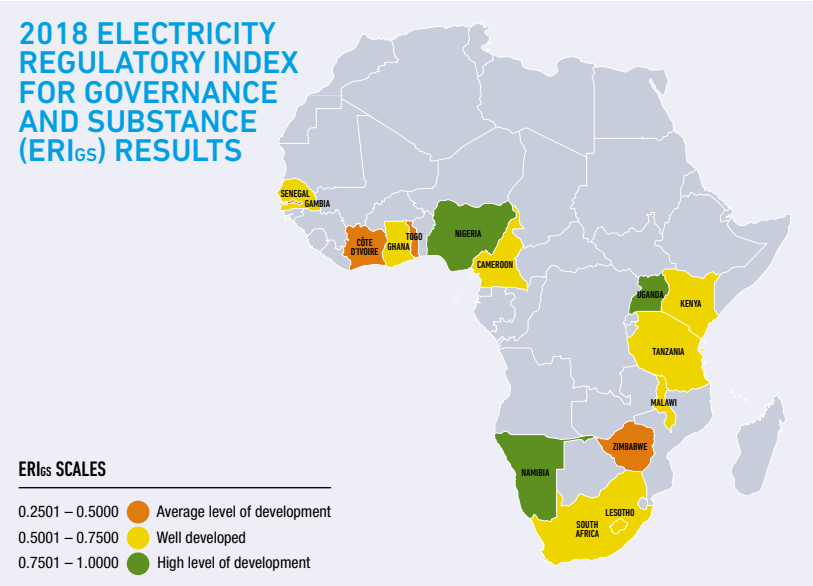
TABLE 6.9 RESULTS FOR ERI_{GS}: GOVERNANCE AND SUBSTANCE

	RGI	RSI	ERI_{GS}	Ranking
Uganda	0.7974	0.7661	0.7817	1
Namibia	0.7634	0.7865	0.7749	2
Nigeria	0.7476	0.7719	0.7597	3
Tanzania	0.7606	0.7232	0.7419	4
Kenya	0.8266	0.6448	0.7357	5
Senegal	0.7216	0.7345	0.7281	6
South Africa	0.7780	0.5875	0.6827	7
Malawi	0.7443	0.4803	0.6123	8
Cameroon	0.7175	0.4979	0.6077	9
Lesotho	0.6821	0.4940	0.5881	10
Ghana	0.6516	0.4889	0.5702	11
Zimbabwe	0.6120	0.3871	0.4996	12
Cote d'Ivoire	0.5908	0.3834	0.4871	13
Togo	0.5686	0.3531	0.4608	14
Gambia	0.6389	0.0784	0.3586	15
Mean	**0.7067**	**0.5452**	**0.6259**	

Score Range	Color	Interpretation
0.7501–1.0000		High level of development
0.5001–0.7500		Well developed
0.2501–0.5000		Average level of development
0.000–0.2500		Low level of development

FIGURE 6.16 RELATIONSHIP BETWEEN RGI AND RSI





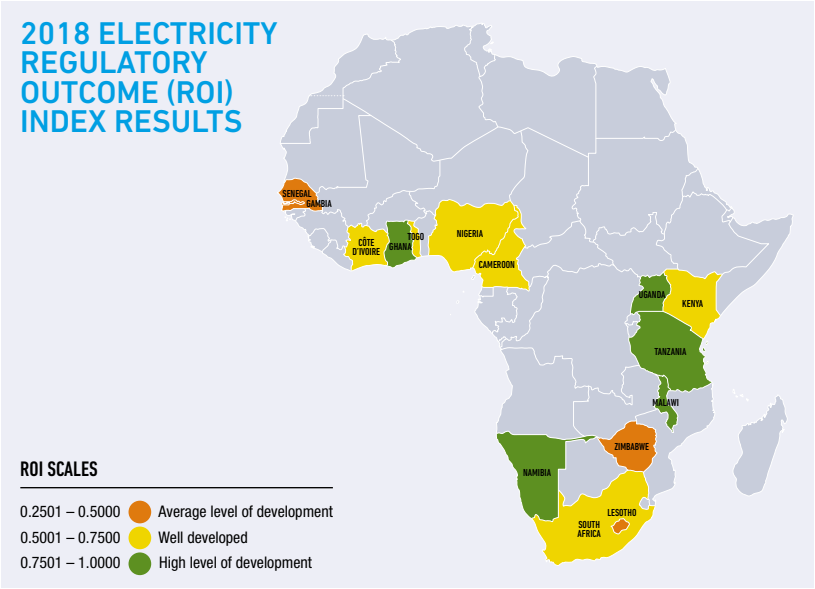
Regulatory Outcome Index

Table 6.10 shows the ROI scores used to adjust the ERIGS to generate the ERI. The top five performers were Ghana, Uganda, Namibia, Malawi and Tanzania. This implies that in these countries, the regulators' actions and decisions had a positive influence on the utilities' performance. The countries in which regulatory impact could be described as above average and were in the yellow zone include Togo, Nigeria, Cameroon, Cote d'Ivoire, South Africa and Kenya. For countries such as Zimbabwe, Gambia, Senegal and Lesotho, the regulatory impact on the utilities was just average and were all in the orange zone.

TABLE 6.10 RESULTS OF THE REGULATORY OUTCOME INDEX

Country	Financial	Commercial Quality	Technical Quality	Access	ROI	Ranking
Ghana	0.8417	0.7500	1.0000	1.0000	0.8979	1
Uganda	0.5000	1.0000	1.0000	1.0000	0.8750	2
Namibia	0.8000	1.0000	0.6250	1.0000	0.8563	3
Malawi	0.1750	1.0000	1.0000	1.0000	0.7938	4
Tanzania	0.4875	1.0000	0.8750	0.6667	0.7573	5
Togo	0.0000	1.0000	1.0000	1.0000	0.7500	6
Nigeria	0.1875	0.9375	1.0000	0.7500	0.7188	7
Kenya	0.3750	0.4375	1.0000	1.0000	0.7031	8
Cameroon	0.2000	1.0000	0.8750	0.6667	0.6854	9
Cote d'Ivoire	0.2625	0.6250	0.6250	1.000	0.6281	10
South Africa	0.3833	0.5000	0.5000	1.0000	0.5958	11
Zimbabwe	0.7333	0.6250	0.1250	0.3333	0.4542	12
Gambia	0.2500	0.8750	0.0000	0.6667	0.4479	13
Senegal	0.2500	0.3750	0.1250	1.0000	0.4375	14
Lesotho	0.8667	0.3750	0.0000	0.3333	0.3938	15
Mean	0.4208	0.7667	**0.6500**	0.8278	**0.6663**	

Score Range	Color	Interpretation
0.7501–1.0000		High level of development
0.5001–0.7500		Well developed
0.2501–0.5000		Average level of development
0.000–0.2500		Low level of development



Electricity Regulatory Index

As illustrated in Table 6.11, 13% recorded ERI scores in the green zone, 67% in the yellow zone, while 20% were in the orange zone. Three of the high performers, namely Uganda, Namibia and Tanzania, had their ERI$_{GS}$ scores adjusted upwards owing to the impact of the ROI. This resulted in Tanzania overtaking Nigeria in the final ERI rankings. The implication of this result is that the impact of the regulator's actions and decisions for Uganda, Namibia and Tanzania, as viewed from the utilities' perspective, seemed to have had a more positive impact on the performance of utilities than in Nigeria.

TABLE 6.11 RESULTS OF THE ERI

	ROI	ERI$_{GS}$	ERI	Ranking
Uganda	0.8750	0.7817	0.8271	1
Namibia	0.8563	0.7749	0.8146	2
Tanzania	0.7573	0.7419	0.7496	3
Nigeria	0.7188	0.7597	0.7390	4
Kenya	0.7031	0.7357	0.7192	5
Ghana	0.8979	0.5702	0.7156	6
Malawi	0.7938	0.6123	0.6971	7
Cameroon	0.6854	0.6077	0.6454	8
South Africa	0.5958	0.6827	0.6378	9
Togo	0.7500	0.4608	0.5879	10
Senegal	0.4375	0.7281	0.5644	11
Cote d'Ivoire	0.6281	0.4871	0.5531	12
Lesotho	0.3938	0.5881	0.4812	13
Zimbabwe	0.4542	0.4996	0.4763	14
Gambia	0.4479	0.3586	0.4008	15
Mean	**0.6663**	**0.6259**	**0.6406**	

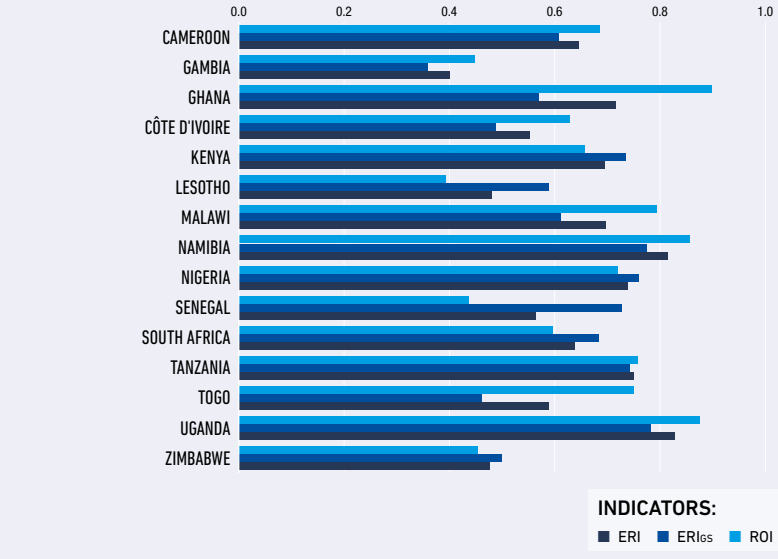
Score Range	Color	Interpretation
0.7501–1.0000		High level of development
0.5001–0.7500		Well developed
0.2501–0.5000		Average level of development
0.000–0.2500		Low level of development

It is important to note that the technical impact component of the ROI did not investigate the technical quality of service of the power utilities such as the frequency of outages or duration of outages, which may have diluted the impact of the Technical Quality sub-component on the overall ROI.

It is also worth noting that the electricity accessibility indicator of the ROI was designed to gauge the effectiveness of the measures that have been put in place to enhance electricity accessibility. The indicator does not therefore measure the current level of access to electricity amongst the population.

Figure 6.17 illustrates influence of the ROI on ERI by super imposing the impact of the regulator's actions and decisions on the ERIGS. Another country that gained from the ROI impact was Ghana. Its strong ROI performance can be attributed to its high performance when existing tariffs are compared with the cost reflective tariffs, as well as the positive regulatory impact on technical and quality of service performance of the utility company. The promising regulatory and policy measures being implemented to expand access to electricity across the country also contributed to the upward adjustment of the ERI. Kenya was one of the countries that also experienced a reduction in its ERI due to the ROI impact.

FIGURE 6.17 IMPACT OF ROI ON ERI



Senegal, however, experienced a reduction in its final ERI scores due to its low scores on ROI sub-components capturing tariff revenue coverage of total expenses and cost-reflectiveness of current tariffs. In the case of Lesotho, regulatory impact in the areas of technical quality and commercial quality performance, as well as on measures being implemented to expand access to electricity, all recorded low scores.

South Africa was also one of the countries whose ERIGS was adjusted downwards when accounting for the ROI. For South Africa, the impact of

the regulator's actions on the utility's financial performance, commercial quality of electricity and technical quality all recorded low scores.

One of the original low performers with an appreciable upward adjustment in its ERI was Togo. This was mainly due to the strong and positive impact of the regulator in the areas of commercial and technical quality, as well as on measures being implemented to expand access to electricity.

Photo © Carol M. Highsmith / US State Department Bureau of International Information Programs (IIP)

7 MOVING FORWARD

This study constitutes the first in a series on the development of sound and effective regulatory frameworks and systems for the respective electricity sectors of African countries. The next edition of the ERI will include a greater number of surveyed countries and also broaden the scope of the regulatory outcome assessment to include other stakeholders in the electricity sector. This should provide valuable insight on discernible patterns and trends of electricity sector development on a country-, regional-, and continent-wide basis. This information will allow country and regional governments to better pinpoint areas in their regulatory practices and frameworks that require the most improvement. It will also guide private investors to countries and regions with markedly high and acceptable levels of regulatory development.

Furthermore, as an index that will be updated periodically, the aim for the ERI, over time, is for it to also serve as a measure of progress on the development of best practice regulatory standards in the region's electricity sectors. This will allow key sectoral stakeholders, including country governments, regulators, and the AfDB, to measure year-on-year changes on a comprehensive range of relevant indicators and propose immediate solutions in cases where negative progress is recorded.

In the meantime, based upon the 2018 Index, governments looking to improve their current levels of regulatory development may wish to begin looking into incorporating the following policy level recommendations if they scored low in the respective areas.

Policy Recommendations

Moving forward, it is imperative that African governments address the key deficiencies in their regulatory frameworks and practices suppressing their respective ERI scores. Given that the results showed that regulators on average performed better in Regulatory Governance than in Regulatory Substance, many countries in the sample may wish to prioritize and address substantive gaps in relevant Regulatory Substance sub-components in the short to medium terms.

Guidance to help improve Regulatory Governance

Mitigating regulatory capture to improve Independence. Given the effects of the Independence indicator's low score on the overall Regulatory Governance score, it is recommended that a two-step process be adopted. The first stage of this process involves ensuring that suitably qualified candidates are selected through a competitive process undertaken by the legislature instead of the sector minister. Any suitable candidate must then be nominated to the executive for appointment. This will help ensure that newly appointed commissioners are insulated from interference when fulfilling their mandate.

Secondly, although most regulators surveyed receive external sources of funding from regulatory levies or license fees, they are less independent

when it comes to budgetary approval. Under the current approach whereby sector ministers must approve regulator budgets, it is possible for the sector ministry and the ministry of finance to use the budget approval process to "capture" and compel the regulator to yield to political pressure, particularly in its tariff setting decisions. Though the concept of a completely autonomous and independent regulator may be difficult to implement in practice, it is recommended that the regulator be given the mandate to approve its budget in order to minimize the possibility of politically motivated interference. An audit of commission accounts by a competent audit firm or the state auditor at the end of every financial year will minimize the extent to which governments can influence regulators through the budget approval process.

Action required. This is a policy decision that requires amending sections of the relevant regulatory act, electricity law or decree that established the regulatory authority.

Accountability. Decisions made by regulatory authorities in most of the sample countries can only be appealed and overturned by a court. However, issues related to regulation are highly specialized in nature for which the courts may not have the capacity to appreciate and effectively analyze. As a result, given that economic regulation involves analysis of financial, accounting, economics, engineering and legal issues, among others, it is recommended that specialized bodies, such as those operating in Tanzania, Uganda, and Kenya in the form of competition, energy, or electricity disputes tribunals, be considered elsewhere.

Action required. Such a policy decision requires amending the relevant acts or laws that established the regulatory authorities.

Open Access to Information. Although most regulators have websites, in reality they publish minimal relevant regulatory information, even though such information exists. While regulators in some cases may publish the new electricity tariff schedules every time new tariffs are approved, they rarely provide a detailed justification for the new tariffs on their websites.

Action required. A formal decision on behalf of the regulator to publish the rationale and reasons behind the tariff decision and other major decisions will undoubtedly enhance open access to information. This will subsequently make it easier for potential investors to make long-term investment and commercial decisions in the electricity sector.

Guidance to help improve Regulatory Substance

When it comes to Regulatory Substance, regulators recorded average scores for the four main indicators, namely economic regulation, technical regulation, commercial quality of electricity and licensing framework.

Economic Regulation. The absence of a tariff mechanism to make electricity affordable to low income and volume consumers, coupled with a lack of adequate expertise in the regulatory institutions to carry out tariff analysis, suppressed the score on this indicator.

Action required. It is therefore recommended that regulatory bodies institute training programs to build capacities in tariff setting, specifically in economic analysis, econometric analysis, tariff modelling, and financial modelling.

One of the key factors required for ensuring the financial sustainability of the power utilities is the development of comprehensive and transparent tariff setting guidelines and methodologies. This document should set out the approach and the methodology for determining the utility's revenue requirements, as well as the tariff structure to be adopted by the regulator in a transparent manner. The findings from the study also showed that in most cases, the current tariff covered less than half of the cost reflective tariffs for the residential, commercial and industrial customers. This financing gap, if not addressed, will affect the financial viability of the utilities, as well as the long-term financial sustainability of the power sector.

Action required. Going forward, it is recommended that regulators undertake Cost-of-Service tariff studies, the results of which will be used to formulate a plan for implementing cost-reflective tariffs.

Technical Regulation. The absence of developed grid codes, appropriate policy frameworks and technical standards for mini-grids and off-grid systems, as well as frameworks for energy efficiency and mechanisms for monitoring and reporting on greenhouse gases, were the underlying factors for the low score of the technical regulation indicator. Also identified as a contributory factor were human capacity gaps in carrying out analyses of commercial performance, technical performance and quality of service monitoring of utilities.

Effective regulation of off-grid and mini-grid systems is crucial for facilitating the expansion of access to electricity to underserved and rural communities, including those that are unlikely to receive grid access in the medium term. With the transition to green growth becoming a global agenda, implementing frameworks and

mechanisms for developing off-grid systems, promoting energy efficiency and reducing greenhouse gases is critical.

Action required. It is recommended that regulators of the countries in which these technical standards, codes, frameworks and mechanisms are not in place take urgent steps to develop these fundamental technical regulation documents and also build the technical capacity of staff.

Commercial Quality. Most regulators in the sample have never carried out and published a comprehensive analysis on the utility's commercial quality performance. If the recommendation on capacity building in this area is adhered to by regulators, this sub-indicator could be improved.

Action required. Regulators should carry out comprehensive analyses on the commercial quality performance of utilities.

Licensing. The absence of a simplified licensing framework for smaller power systems, particularly for off-grid power systems, was responsible for the low score in this category. This gap, if addressed, holds the potential to catalyzing investment in off-grid systems and ensuring that off-grid and other decentralized power systems are well-positioned to play a complementary role to on-grid systems in expanding access to electricity, particularly in rural areas.

This observation reinforces the recommendations contained in the Green Mini-Grids (GMG) Africa Strategy Report (2017), where the following enabling factors for GMG market development and attracting private investment were identified: i) Develop simplified licensing requirements and procedures; ii) Develop a policy on the outcomes if the main grid expands to a GMG location; iii) Adopt appropriate tariff structures and policy for use of public funds to support GMG; iv) Integrate national energy planning and v) Enhance the capacity of the local workforce to support GMG implementation. The Green Mini-Grids Africa Strategy was adopted by the Africa Union Commission's Specialized Technical Committee (STC) on Transport, Transcontinental and Interregional Infrastructures, Energy and Tourism at the Ministerial meeting held in Lomé, Togo in March 2017.

Action required. A simplified licensing framework can expedite the licensing process for a mini-grid system and catalyze private sector investment. The licensing framework should cover generation, distribution and sale of electricity. The framework should also indicate the range of generation or distribution capacities (in megawatts) that qualify for the simplified electricity license.

TABLE 7.1 STRATEGY FOR ADDRESSING GAPS

Country	Areas of Intervention: Short Term (1–2 years)									
	Legal, Policy and Frame-works for Off-Grid Systems	Tariff Guidelines and Meth-odology	Grid Code	Technical Standards: Mini Grid, Stand-Alone Systems	Cost-of-Service Tariff Develop.	Simplified Licensing Framework	Technology Specific PPAs	Publication of Reasons Behind Major Decisions	Capacity Building in areas of Tariff Setting	Capacity Building in Quality of Service Regulation
Cameroon		●	●	●			●		●	●
Côte d'Ivoire		●	●			●	●	●	●	●
Gambia	●		●	●	●	●	●	●	●	
Ghana				●		●		●	●	●
Kenya	●					●		●		●
Lesotho	●			●						
Malawi					●	●		●	●	
Namibia	●			●	●			●	●	●
Nigeria				●	●				●	●
Senegal	●		●	●	●			●	●	
South Africa	●			●	●			●	●	
Tanzania								●		
Togo		●		●	●	●	●	●	●	
Uganda									●	
Zimbabwe				●		●	●	●	●	●

Country	Areas of Intervention: Medium Term (3-4 years)			
	Establish Specialized Bodies for Challenging Regulator Decisions	Amend Electricity Law/Regulato-ry Act for Budgetary Independ-ence	Develop and Adopt MEPs and Energy Labelling	Capacity Building Tariff Setting
Cameroon	●	●		●
Côte d'Ivoire	●		●	●
Gambia	●	●	●	
Ghana	●			●
Kenya		●		
Lesotho		●	●	●
Malawi	●	●	●	●
Namibia	●	●	●	●
Nigeria	●		●	●
Senegal	●	●	●	
South Africa	●	●		
Tanzania			●	
Togo	●	●	●	
Uganda		●	●	
Zimbabwe	●	●		●

8 ANNEX ONE: FULL METHODOLOGY FOR THE 2018 ELECTRICITY REGULATORY INDEX

Assessing Regulatory Framework

According to relevant literature, an effective regulatory framework can be decomposed into two main components, namely: Regulatory Governance and Regulatory Substance. These two pillars are key to determining how an effective regulatory environment can be used to support electricity sector reforms, promote efficiency and fulfil desired social objectives (Smith 1997; Stern and Holder 1999; Brown et al. 2006).

The first pillar, Regulatory Governance, refers to the institutional and legal design of the regulatory framework, which defines the *framework within which decisions are made*. Regulatory Substance, the second pillar, refers to the *content of regulation and measures and the actual decisions implemented* by regulators.

Based on the above, the indicators for the two main pillars to develop the Electricity Regulatory Index for Governance and Substance (ERI_{GS}) are as follows:

Regulatory Governance

- Indicator 1: Legal Mandate
- Indicator 2: Clarity of Roles and Objectives
- Indicator 3: Independence
- Indicator 4: Accountability
- Indicator 5: Transparency of Decisions
- Indicator 6: Participation
- Indicator 7: Predictability
- Indicator 8: Open Access to Information

Regulatory Substance

- Indicator 9: Economic Regulation
- Indicator 10: Technical Regulation
- Indicator 11: Commercial Quality of Electricity
- Indicator 12: Licensing Framework

While it is understood that two main components help assess the effectiveness of regulations, it is important to keep in mind that the regulatory system or environment is much broader. The ultimate aim of effective regulation is to improve sector performance. To this end, a Regulatory Outcome Index (ROI) was also created to assess potential sector outcomes related to regulatory actions. A survey of regulated power utilities was also conducted to assess whether regulators were supporting the achievements of their objectives to develop the sector. The selected indicators for determining the ROI are as follows:

Regulatory Outcomes

- Indicator 13: Financial Performance
- Indicator 14: Technical Quality of Electricity Supplied
- Indicator 15: Commercial Quality of Service
- Indicator 16: Electricity Accessibility

Sources of Data

Questionnaire Design

The data for the study was obtained through responses provided by regulatory authorities and power utilities in the research sample. Two sets of questionnaires were designed, one for the regulators and another for the power utilities. The first set of questionnaires was sent to the regulatory authorities to collect primary data on regulatory governance and substance. The second one was designed for the power utilities aimed to determine the impact and outcomes of regulatory actions on the utilities' performance. Power utilities were selected since they are the main stakeholders impacted by regulator activities.

The questionnaire to the regulators was based upon the twelve indicators described in the report related to regulatory governance and regulatory substance, while the questionnaire to the power utilities was based on four indicators. The aim was to develop an ERI in which different aspects of regulatory governance and substance, as well as the outcome of regulatory decisions on utility performance, were used to produce an aggregate score reflecting the level of development of the electricity sector regulatory framework. The questions in the survey were structured to focus on the practical aspects of electricity regulation. Additionally, the questions were designed to be evidence-based to reduce the risk of questionnaire response bias.

Pilot Phase

In order for the Bank to conduct the ERI study effectively, a pilot phase was conducted to collect information and feedback from regulators and power utilities on the methodology and the questionnaire. This first phase of the study involved the selection of seven countries to pre-test the questionnaire and the analytic tools. The following regulatory authorities participated in the pilot phase study: Electricity Control Board (Namibia), Autorité Nationale de Régulation du secteur de l'Electricité (Côte d'Ivoire), Agence de Régulation du Secteur de l'Electricité (Cameroon), Electricity Regulatory Authority (Uganda), Energy and Water Utilities Regulatory Authority (Tanzania) and the Nigerian Electricity Regulatory Commission (Nigeria), and the Utilities Regulatory Authority (Rwanda).

As part of the pilot phase and based on the information provided by the participants, a preliminary report was produced and two workshops (one for anglophone countries and one for francophone countries) were organized to validate the methodology and process.

Based on the feedback received from regulators and power utilities following the successful completion of the pilot study, several changes and/or decisions were made before the expanded phase was launched. These included:

- Refining the questionnaire design;
- Including an impact analysis component in the study; and
- Increasing the number of participating countries in the survey.

Expanded Phase

During the expanded phase of the study, questionnaires were sent to regulators and power utilities in over twenty-five countries. Twenty-one regulators responded and submitted completed questionnaires, representing a response rate of eighty-four percent. Out of the power utilities, fifteen returned the completed questionnaires, representing a response rate of sixty percent.

The ERI was calculated based on the responses from regulators and power utilities from fifteen countries including Cameroon, Cote d'Ivoire, Gambia, Ghana, Kenya, Lesotho, Malawi, Namibia, Nigeria, Senegal, South Africa, Tanzania, Togo, Uganda, and Zimbabwe. The list of the respondents from regulators and utilities included in this edition of the ERI are listed below.

- Cameroon
  - Agence de Régulation du Secteur de l'Electricité de Cameroun (ARSEL)
  - ENEO Cameroun S.A.
- Côte d'Ivoire
  - Autorité Nationale de Régulation du secteur de l'Electricité de Côte d'Ivoire (Anaré)
  - Compagnie Ivoirienne d'Electricité (CIE)
- Gambia
  - Public Utilities Regulatory Authority (PURA)
  - National Water & Electricity Company (NAWEC)
- Ghana
  - Energy Commission (EC)
  - Public Utilities Regulatory Commission (PURC)
  - Volta River Authority (VRA)
  - Electricity Company of Ghana
- Kenya
  - Energy Regulatory Commission (ERC)
  - Kenya Power (formerly known as KPLC)
- Lesotho
  - Lesotho Electricity and Water Authority (LEWA)
  - Lesotho Electricity Corporation
- Malawi
  - Malawi Energy Regulatory Authority (MERA)
  - Electricity Supply Corporation of Malawi Ltd (ESCOM)

- Namibia
  - Electricity Control Board (ECB)
  - NamPower
- Nigeria
  - Nigerian Energy Regulatory Commission (NERC)
  - Transmission Company of Nigeria (TCN)
  - Abuja Electricity Distribution Company (AEDC)
  - Benin Electricity Distribution Company (BEDC, Benin)
- Senegal
  - Commission de Régulation du Secteur de l'Électricité (CRSE)
  - Société nationale d'électricité du Sénégal (SENELEC)
- South Africa
  - National Energy Regulator of South Africa (NERSA)
  - ESKOM
- Tanzania
  - Energy and Water Utilities Regulatory Authority (EWURA)
  - Tanzania Electric Supply Corporation (TANESCO)
- Togo
  - Autorité de Réglementation du Secteur de l'Électricité (ARSE)
  - Compagnie d'Energie Electrique du Togo (CEET)
- Uganda
  - Electricity Regulatory Authority (ERA)
  - Umeme Limited
- Zimbabwe
  - Zimbabwe Energy Regulatory Authority (ZERA)
  - Zimbabwe Electricity Transmission & Distribution Company (ZETDC)

Electricity Regulatory Index Construction and Scoring

ERI Construction

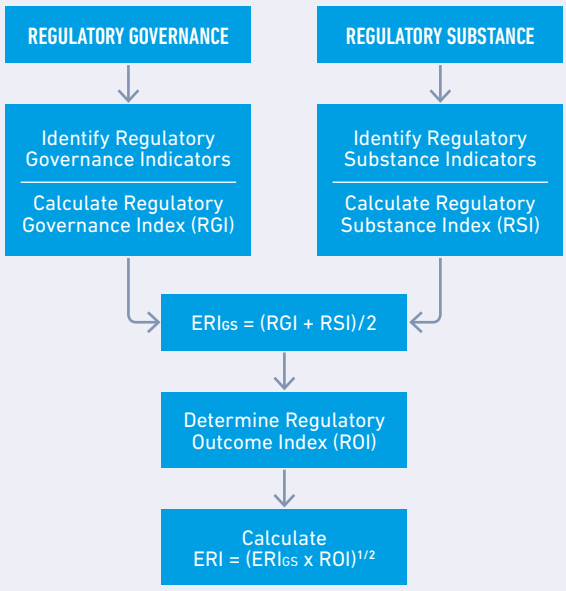
The Electricity Regulatory Index (ERI) was constructed as a composite index comprising data from the Regulatory Governance Index (RGI), the Regulatory Substance Index (RSI), and the Regulatory Outcome Index (ROI), all of which was gathered from responses to a questionnaire distributed to regulators and power utilities in the sample. In determining the ERI, the following steps were used:

- **Step 1:** Identification of indicators and sub-indicators for regulatory governance and regulatory substance;
- **Step 2:** Designing a survey questionnaire to obtain information from the regulatory institutions;
- **Step 3:** Determination of RGI and RSI;
- **Step 4:** Aggregation of results from RGI and RSI to calculate ERI_{GS};
- **Step 5:** Determination of the Regulatory Outcome Index (ROI) from the power utility questionnaire; and
- **Step 6:** Aggregation of results of ERI_{GS} and ROI to determine the ERI.

Scoring Process

All sub-indicators were first allocated scores to generate the total scores for each of the main indicators. In generating the indicator scores, all answers were given a value ranging between 0.00 and 1.00, with 1.00 representing the best score and 0.00 representing the worst score. In the event that there were three possible answers, the values 1, 0.50 and 0 were assigned to the responses. In case of four possible answers, values 0, 0.33, 0.67 and 1 were assigned, while for five possible outcomes the values 0, 0.25, 0.50. 0.75 and 1 were assigned. And, when six outcomes were possible, the values 0, 0.20, 0.40, 0.60, 0.80 and 1 were assigned. In situations where there were two regulatory commissions for the electricity sector such as in Ghana, if the two respondents answered the same questions but were awarded different marks based on their specificities and particular situation, the average of the allocated scores was assigned as the country score.

METHOD FOR DETERMINATION OF EFFECTIVE ERI



The answers provided by the respondents were coded relative to best practice regulation in the electricity sector for the two pillars of the regulatory framework, namely regulatory governance and regulatory substance. In allocating the scores to each question, various regulatory options were considered to reflect practical scenarios and problems which are likely to arise in electricity sector regulation and which need to be addressed to move the frontier of regulation in Africa towards best practice.

Electricity Regulatory Index Computations

RGI, RSI and ERI$_{GS}$ Computation

The Regulatory Governance Index (RGI) and the Regulatory Substance Index (RSI) were calculated as the simple average of the allocated sub-indicator scores based on the scoring allocation methodology, with the minimum and maximum scores set at 0.0 and 1.0 respectively. An illustration of the scoring and calculation of the RGI and RSI for Cameroon and Lesotho follows.

Sample Calculation of RGI

The eight indicator scores used to derive the RGI are as follows:

RGI Indicator Scores:

Country	Legal Mandate	Clarity of Role	Independence	Accountability	Transparency	Predictability	Participation	Open Access
Cameroon	1.0000	1.0000	0.5694	0.6042	0.6667	0.5000	0.6000	0.8000
Lesotho	0.6667	0.7778	0.5875	0.5000	1.000	1.000	0.5250	0.4000

For Cameroon, the RGI was calculated using a simple average of the scores for the eight indicators:

$$\frac{1.0000 + 1.000 + 0.5694 + 0.6042 + 0.6667 + 0.5000 + 0.6000 + 0.8000}{8}$$

$$RGI = 0.7175$$

For Lesotho the RGI was calculated as follows:

$$\frac{0.6667 + 0.7778 + 0.5875 + 0.5000 + 1.0000 + 1.0000 + 0.5250 + 0.4000}{8}$$

$$RGI = 0.6821$$

Sample Calculation of RSI

The RSI indicator scores for the two countries are shown in the below table.

RSI Indicator Scores:

Country	Economic Regulation	Technical Regulation	Commercial Quality	Licensing Framework
Cameroon	0.5993	0.4550	0.5000	0.4375
Lesotho	0.3560	0.3200	0.3000	1.0000

The RSI for each country is calculated using a simple average of the scores for the four indicators as follows:

For Cameroon:

$$\frac{0.5993 + 0.4550 + 0.5000 + 0.4375}{4}$$

$$RSI = 0.4979$$

For Lesotho the RGI was calculated as follows:

$$\frac{0.3560 + 0.3200 + 0.3000 + 1.000}{4}$$

$$RSI = 0.4940$$

The ERI for Governance and Substance (ERI_{GS}) was determined by combining the results of RGI and RSI into one composite index as shown below. The ERI_{GS} was calculated by applying equal weights to RGI and RSI, with the weights α=1/2 and β=1/2.

$$ERI_{GS} = (\alpha \times RGI) + (\beta \times RSI)$$

Where:

ERI_{GS} = Electricity Regulatory Index (Governance & Substance)
α = Weight for RGI = 1/2
β = Weight for RSI = 1/2
RGI = Regulatory Governance Index
RSI = Regulatory Substance Index

Sample Calculation of ERI_{GS}

The results from the illustration above are used to derive the ERI_{GS} using the above formula as follows:

For Cameroon:

$$\frac{0.7175 + 0.4979}{2}$$

$$ERI_{GS} = 0.6077$$

For Lesotho:

$$\frac{0.6821+0.4940}{2}$$

$$ERI_{GS} = 0.5881$$

ROI Computation

The Regulatory Outcome Index (ROI) was determined based upon the responses provided by the power utilities to the questionnaire eliciting their feedback with respect to the impact of regulatory decisions on the performance of the power utilities. The questionnaire to the power utilities was designed mainly to enhance our understanding of the utilities' perception towards regulator activities and how such activities impact their performance. The calculation of ROI was used to "adjust" the ERI_{GS} and to obtain the ERI. The ERI thus takes into account the impact of regulator performance on power utilities.

The ROI investigated the regulatory impact on the main areas of the utility business and was measured by the following indicators: financial performance, technical quality of electricity supplied, commercial quality of service, and electricity accessibility. The fifth indicator which sought to measure the perception of regulatory independence wasnot factored into the computation of the ROI. This is because the perception by the power utilities of regulator independence tends to be subjective, making it difficult to include the responses on perception in the ROI calculation. This argument is reinforced by the fact that perception is not technically a direct measure of the impact of regulatory decisions on power utility performance. Although the result for the Perception Indicator was not included in the ROI calculation, an analysis was

carried out on the Perception Indicator and the findings were included in the main ERI study report to provide a broader analysis of the ERI.

The scoring principle adopted for each question took into account the possibility of two or three distribution utilities from the same country submitting two or three completed questionnaires. In addition to two or three distribution utilities submitting the questionnaires, there could also be generation and transmission utilities from the same country similarly submitting completed questionnaires answering the same set of questions. In order to rationalize this issue, the following scoring principle was adopted:

i. The electricity supply industry is disaggregated into the following three segments: generation, transmission, and distribution/sales.

ii. Each segment was allocated a score of 1/3 such that:
1/3 (Generation Utility Allocated Score) + 1/3 (Transmission Utility Allocated Score) + 1/3 (Distribution Utility Allocated Score) will generate a score not exceeding 1.00

iii. In the event that "n" power distribution utilities from the same country submit "n" completed questionnaires, the ***total score allocation*** can be determined as follows:
Total score for the Distribution Utilities = (1/n) x Σ(Distribution Utility Score)

In any instance in which two or three utilities from two or three different segments of the electricity sector submitted completed questionnaires and all utilities answered the same questions but with different responses, the total score for the country was calculated as a simple average of the allocated marks. If only one vertically integrated company responded to all the questions, the total country score was based on the allocated score for the responses provided by the vertically integrated utility (as one utility).

Electricity Regulatory Index

The ERI was determined by aggregating the results of ERI_{GS} calculated for each regulator and the Regulatory Outcome Index (ROI) determined from the responses of the power utilities. It was calculated by aggregating the results of ERI_{GS} and ROI using the geometric mean.[1] The geometric mean was used to calculate the ERI given the use of simple average—which involves adding the two variables—would in principle, have otherwise meant that more weight would have had to be assigned to ROI than ERI_{GS}. The use of the geometric mean—which involves multiplying the two variables—"normalized" the weights assigned and ensured that no variable dominated the weighting.

$$ERI = \sqrt{(ERIGS \times ROI)} = (ERIGS \times ROI)^{1/2}$$

Where:

ROI = Regulatory Outcome Index

Sample Calculation of ROI and ERI

The ERI is calculated for Cameroon and Lesotho using the above equation as follows:

The ROI indicator scores for Cameroon and Lesotho are shown in the table below.

ROI Indicator Scores:

Country	Financial	Commercial Quality	Technical Quality	Electricity Accessibility
Cameroon	0.2000	1.0000	0.8750	0.6667
Lesotho	0.8667	0.3750	0.0000	0.3333

The ROI for the two countries are derived as a simple average of the indicator scores as follows:

1 The geometric mean is the nth root of the product n numbers. For a set of numbers a_1, a_2, $a_3 \ldots a_n$, the geometric mean is calculated as $\sqrt[n]{a_1 \times a_2 \ldots a_n}$

ROI for Cameroon:

$$\frac{0.2000 + 1.0000 + 0.8750 + 0.6667}{4}$$

ROI for Cameroon = 0.6854

ROI for Lesotho:

$$\frac{0.8667+0.3750+0.0000+0.3333}{4}$$

ROI for Lesotho = 0.3938

The ERI_{GS} results for the two countries are as follows:

Cameroon = 0.6077

Lesotho = 0.5881

The ERI is calculated for each country as follows:

For Cameroon:

$(0.6854 \times 0.6077)^{1/2} = 0.6454$

For Lesotho:

$(0.3938 \times 0.5881)^{1/2} = 0.4812$

ERI scores are 0.6454 for Cameroon and 0.4812 for Lesotho.

Classification of Scores

The results from the regulatory governance, regulatory substance and regulatory outcome indices, and their corresponding sub-indicators have been categorized into the below traffic light color coding system, with green representing the highest score and red the lowest.

Score Range	Color	Interpretation
0.7501–1.0000		**High level of development**; largely aligned with international best practice
0.5001–0.7500		**Well developed**; however, regulator or framework still displays a number of insufficiencies not aligned with international best practice
0.2501–0.5000		**Average level of development**; regulator or framework displays numerous insufficiencies not aligned with international best practice
0.000–0.2500		**Low level of development**; regulator or framework is insufficient and largely not aligned with international best practice

Application of Methodology: Pilot Phase and Lessons Learnt

During the pilot phase study, the questionnaires went through extensive stakeholder consultation and validation processes. The pilot phase study provided the opportunity to discuss the methodology used with all major stakeholders, as well as the basis for fine tuning the methodology before conducting the current expanded phase of the study. The stakeholder dialogue process was aimed at ensuring that respondents had the same level of understanding of the questions so that the completed questionnaires could be considered reliable, credible and robust. In that regard, two stakeholder workshops were organized: the first one in Johannesburg, from 29–31 January 2018, and the second in Abidjan, from 13–14 February 2018, for anglophone and francophone countries, respectively.

The workshops enabled the AfDB team to interact with regulators and power utilities on the structure and methodology for the ERI study. One key issue which was highlighted by the Bank's team at the workshops was that the survey should be evidence-based. For example, the respondents were requested to indicate where relevant reports had been published so that the validity and veracity of responses could be checked. These checks and balances were expected to ensure a fairly high reliability of responses. Additionally, in order to minimize response bias and ensure that the responses would reveal the truthfulness of regulator performance, delegates were urged to work in teams at their work places when completing the questionnaires.

One key lesson learned from the pilot phase study was the suggestion by stakeholders during the presentation of preliminary findings at the AFUR conference in Kigali, Rwanda in November 2017 to include the outcome of regulatory decisions in the ERI calculation. It is in this regard that the second set of questionnaires for the power utilities was developed to measure the impact of regulatory activities and decisions on power utility performance using the ROI. The second set of questionnaires was targeted at power utilities as they are the stakeholders most directly affected by regulator actions and decisions.

Limitations

Interpreting the Results

Interpreting the ERI results and impact on investment and development of the power sector must be done with caution since the ERI only gives an indication of the quality of the regulatory framework and not on how much investment is likely to occur under any current national regulatory environment. Investment in the power sector is affected by other factors or risks that are exogenous to the regulator and hence beyond its control. These factors include, but are not limited to: policy decisions by the government;degree of political stability; security environment risks; macro-economic factors, including foreign exchange risks, interest rate risks, as well as capital market risks; laws regarding repatriation of investor profits; and national legal systems. Even though it has an impact, the ERI alone is not enough to explain the investments and developments in the power sector. Sector outcomes can be influenced by economic trends and events that are local, regional and global. It is therefore important that in interpreting the results, it should be recognized that the performance of the regulatory framework is only one of a number of factors that determine the overall sector performance.

Methodology

The calculation of the main indicator scores from the sub-indicator scores was based on a simple arithmetic average. This use of simple average assumes that all sub-indicators are equally weighted. In practice, regulators and power utilities expend more effort and their budgets on certain sub-indicators than others. This limitation also holds for the determination of RGI and RSI for the regulators, as well as the ROI for the power utilities. These indexes were computed from the main indicators using the simple average approach. The same limitation applies to the calculation of ERI_{GS}, which comprises RGI and RSI, where the two variables (i.e. RGI and RSI) were equally weighted. In regulatory practice, the split between RGI and RSI, or the effort required by regulators to align performance in the areas of regulatory governance and regulatory substance with international best practice, are not the same.

This problem can be addressed by generating different weights for each of the sub-indicators using mathematical techniques such as Principal Component Analysis (PCA), Exploratory Factor Analysis and Confirmatory Factor Analysis. It should be noted, however, that the use of

PCA, Factor Analysis and other linear algorithms are based on the following assumptions: i. the dimensionality of data can be efficiently reduced by linear transformation, and ii. most information is contained in those directions where input data variance is maximum. In practice, these conditions are not always fulfilled. The second disadvantage is attributed to the fact that the directions maximizing variance do not always maximize information which is used as the basis for determining the weights.

It is also imperative to note that one of the main objectives of the ERI is to be able to undertake trend analysis based upon national regulator performance over time. To do this, base period weights for each of the Regulatory Governance and Regulatory Substance Indicators must be established for calculating the ERI. The use of the PCA, Factor Analysis or other complex techniques implies that new weights must be generated each time the study is carried out in the future. This approach defeats the aim of tracking and trending the evolution of performance of the regulators in Africa. In the light of this realization, the simple arithmetic average method, which is easy to understand and reasonably robust, was used for the score aggregation.

Questionnaire Design

The questionnaires for the regulators and power utilities were designed taking into account the feedback and suggestions from respondents during the stakeholder validation process. Despite efforts made to ensure all survey questions were clear and unambiguous, all ambiguities were not eliminated in the survey questionnaires. Some respondents provided different interpretations to some of the questions and therefore provided inadequate or incomplete responses. Where this was observed, the affected questions were made non-scoring. Moving forward, data collectors will be used in the respective countries to guide the respondents in completing the questionnaires and screen them prior to submission.

Research Sample Size

The first edition of the ERI covers only fifteen member countries of the African Forum for Utility Regulators that completed and submitted both questionnaires for regulators and power utilities. This reduced the size of the research sample, thus limiting the ability to make broad-based analyses and recommendations for the entire African continent. However, the report does highlight initial observations from which further engagement and discussions can develop. In order to address this problem and ensure that a larger number of countries will participate in future studies, it is recommended that regional workshops for completing the questionnaires are held for each regional economic community. At these workshops, invited countries would be asked to complete and submit the questionnaires along with any available electronic supporting documents related to the questions before the end of the workshop. Any additional documents can then be submitted later to the ERI project team.

Accounting for Impact

The importance of accounting for impact has been illustrated based on the calculation and analysis of the ERI results. The Regulatory Outcome Index was limited to responses from the regulated power utilities as they are the most exposed to actions taken by the regulator. However, there are other stakeholders who also feel the impact of regulatory decisions. Future editions of the ERI will expand this analysis to include other stakeholders, including consumers and/or civil society, to determine the true impact of the regulator on the sector and identify key areas of influence.

9 ANNEX TWO: LIST OF RESPONDENTS TO THE ERI SURVEY QUESTIONNAIRES

- Cameroon
  - Agence de Régulation du Secteur de l'Electricité de Cameroun (ARSEL)
  - ENEO Cameroun S.A.
- Côte d'Ivoire
  - Autorité Nationale de Régulation du secteur de l'Electricité de Côte d'Ivoire (Anaré)
  - Compagnie Ivoirienne d'Electricité (CIE)
- Gambia
  - Public Utilities Regulatory Authority (PURA)
  - National Water & Electricity Company (NAWEC)
- Ghana
  - Energy Commission (EC)
  - Public Utilities Regulatory Commission (PURC)
  - Volta River Authority (VRA)
  - Electricity Company of Ghana
- Kenya
  - Energy Regulatory Commission (ERC)
  - Kenya Power (formerly known as KPLC)
- Lesotho
  - Lesotho Electricity and Water Authority (LEWA)
  - Lesotho Electricity Corporation
- Malawi
  - Malawi Energy Regulatory Authority (MERA)
  - Electricity Supply Corporation of Malawi Ltd (ESCOM)
- Mali
  - Commission de Régulation de l'Electricité et de l'Eau (CREE)
- Mauritania
  - Autorité de Régulation Multisectorielle de Mauritanie
- Namibia
  - Electricity Control Board (ECB)
  - NamPower
- Niger
  - Autorité de Régulation du Secteur de l'Energie (ARSE)
- Nigeria
  - Nigerian Energy Regulatory Commission (NERC)
  - Transmission Company of Nigeria (TCN)
  - Abuja Electricity Distribution Company (AEDC)
  - Benin Electricity Distribution Company (BEDC, Benin)
- Rwanda
  - Rwanda Utilities Regulatory Authority (RURA)
- Senegal
  - Commission de Régulation du Secteur de l'Électricité (CRSE)
  - Société nationale d'électricité du Sénégal (SENELEC)
- South Africa
  - National Energy Regulator of South Africa (NERSA)
  - ESKOM
- Tanzania
  - Energy and Water Utilities Regulatory Authority (EWURA)
  - Tanzania Electric Supply Corporation (TANESCO)
- Togo
  - Autorité de Réglementation du Secteur de l'Électricité (ARSE)
  - Compagnie d'Energie Electrique du Togo (CEET)
- Uganda
  - Electricity Regulatory Authority (ERA)
  - Umeme Limited
- Zambia
  - Energy Regulation Board (ERB)
- Zimbabwe
  - Zimbabwe Energy Regulatory Authority (ZERA)
  - Zimbabwe Electricity Transmission & Distribution Company (ZETDC)

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About this Publication

The 2018 edition of the Electricity Regulatory Index – produced and published by the African Development Bank (AfDB) – is the first in an upcoming series of knowledge products covering issues relating to the development of effective and investor-friendly regulatory frameworks overseeing the electricity sectors in African countries. This report introduces the Electricity Regulatory Index (ERI), a new composite index that measures the level of development of the electricity sector regulatory frameworks of African countries against international standards and best practice. ERI scores, which are calculated from responses to a bespoke questionnaire distributed to African electricity sector regulators, power utilities, and other critical electricity sector stakeholders, provide important insights on the strengths and weaknesses of electricity sector regulators and the overall regulatory frameworks in which they operate. The ERI will be updated periodically, the results of which will be released in each edition of this Index.

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AFRICAN DEVELOPMENT BANK GROUP

African Development Bank Group

Avenue Joseph Anoma - 01 B.P. 1387 Abidjan 01, Côte d'Ivoire
Phone: (+225) 20 26 10 20 • Fax: (+225) 20 21 31 00

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