AFRICAN DEVELOPMENT BANK GROUP

ELECTRICITY REGULATORY INDEX FOR AFRICA

2019

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Abbreviations

AEDC	Abuja Electricity Distribution Company (Nigeria)
AFUR	African Forum for Utility Regulators
ANARE	L'Autorité Nationale de Régulation du secteur de l'Électricité de Côte d'Ivoire
ANRE	Autorité Nationale de Régulation du secteur de l'Électricité (Morocco)
ARE	Autorité de Régulation Multisectorielle (Mauritania)
AREE	Autorité de Régulation des secteurs de l'Électricité et de l'Eau (Guinea)
ARENE	Mozambican Energy Regulatory Authority
ARSE	Autorité de Régulation du Secteur de l'Énergie (Niger)
ARSE	Autorité de Régulation du Secteur de l'Énergie (Togo)
ARSEE	Agence de Régulation du Secteur de l'Eau potable et de l'Énergie Électrique (Gabon)
ARSEL	L'Agence de Régulation du Secteur de l'Électricité (Cameroun)
BEDC	Benin Electricity Distribution Company PLC (Nigeria)
BERA	Botswana Energy Regulatory Authority
BERA	Botswana Energy Regulatory Authority
BPC	Botswana Power Corporation
BUSA	Business Unity South Africa
CACI	Chambre Algérienne de Commerce et d'Industrie
CAIDI	Customer Average Interruption Duration Index
CCI - Benin	Chambre de Commerce et d'Industrie du Benin
CCI Mali	Chambre de Commerce et d'Industrie du Mali
CCIAD	Chambre de Commerce, d'Industrie et d'Agriculture de Dakar
CCIAG	Chambre de Commerce d'Industrie et d'Artisanat de Guinée
CCIAM	Chambre de Commerce, d'Industrie et d'Agriculture de Mauritanie
CCIMA	Chambre de Commerce, d'Industrie des Mines et de l'Artisanat
CCIT	Chambre de Commerce et d'Industrie de Togo
CEB	Central Electricity Board
CEET	Compagnie Énergie Électrique du Togo
CEO	Chief Executive Officer
CIE	Compagnie Ivoirienne d'Électricité
CREE	Commission de Régulation de l'Électricité et de l'Eau (Mali)
CREG	La Commission de Régulation de l'électricité et du Gaz (Algeria)
CRSE	Commission de Régulation du Secteur de l'Électricité (Senegal)
CZI	Confederation of Zimbabwe Industries
DoE	Department of Energy
EAC	East African Community
EC	Energy Commission
ECB	Electricity Control Board (Namibia)
ECG	Electricity Company of Ghana
ECOWAS	Economic Community of West African State
EDM	Énergie du Mali

EDM	Electricidade de Mozambique
EDSA	Electricity Distribution and Supply Authority (Sierra Leone)
EEA	Ethiopian Energy Authority
EEC	Eswatini Electricity Company
EEHC	Egyptian electricity holding company
EEP	Ethiopian Electric Power
EEU	Ethiopian Electric Utility
EKDC	Eko Electricity Distribution Company (Nigeria)
ENDE EP	Empresa Nacional de Distribuição de Electricidade (Angola)
ERA	Egyptian Electric Utility and Consumer Protection Regulatory Agency
ERA	Electricity Regulatory Authority (Uganda)
ERB	Energy Regulation Board (Zambia)
ERC	Energy Regulatory Commission (Kenya)
EREA	Energy Regulators Association of East Africa
ERERA	ECOWAS Regional Electricity Regulatory Authority
ERI	Electricity Regulatory Index
ERI_{GS}	Electricity Regulatory Index for governance and substance
ESCOM	Electricity Supply Corporation of Malawi Limited
ESERA	Eswatini Energy Regulatory Authority
EUCL	Energy Utility Corporation Limited (Rwanda)
EUT	End User Tariff
EWURA	Energy and Water Utilities Regulatory Authority Tanzania
FASO CCI BF	Chambre de Comme et d'Industrie du Burkina
FCCIM	Fédération des CCI de Madagascar
GCCI	Gambia Chamber of Commerce and Industry
GIS	Geographic Information System
IEA	International Energy Agency
IEDNO	Independent Electricity Distribution Network Operator
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Financial Corporation
IPP	Independent Power Production
IRSE	Instituto Regulador do Sector Eléctrico (Angola)
JEDC	Jos Electricity Distribution PLC (Nigeria)
JIRAMA	Jiro Sy Rano Malagasy (Madagascar)
KAM	Kenya Association of Manufacturers
KEDC	Kano Electricity Distribution Company PLC (Nigeria)
KPI	Key Performance Indicator
KPLC	Kenya Power & Lighting Company Limited
LCCI	Lesotho Chamber of Commerce and Industry
LEC	Lesotho Electricity Company
LEC	Liberia Electricity Corporation

LERC	Liberia Electricity Regulation Commission
LEWA	Lesotho Electricity and Water Authority
MCCI	Mauritius Chamber of Commerce and Industry
MERA	Malawi Energy Regulatory Authority
NAWEC	National Water and Electricity Company Ltd (Gambia)
NECAN	Network and Electricity Consumers Advocacy of Nigeria
NERC	Nigerian Electricity Regulatory Commission
NERSA	National Energy Regulator of South Africa
NIGELEC	Société Nigérienne d'Électricité (Niger)
ONEE	Office National de l'Électricité et de l'Eau Potable (Morocco)
ORE	Office de Régulation de l'Électricité (Madagascar)
PPA	Power Purchase Agreement
PSF	Private Sector Federation (Rwanda)
PURA	Public Utilities Regulatory Authority (Gambia)
PURC	Public Utilities Regulatory Commission (Ghana)
RAERESA	Regional Association of Energy Regulators for Eastern and Southern Africa
RE	Renewable Energy
RERA	Regional Electricity Regulators Association of Southern Africa
RGI	Regulatory Governance Index
ROI	Regulatory Outcome Index
ROIc	Regulatory Outcome Index power consumers
ROIu	Regulatory Outcome Index power utility company
RSI	Regulatory Substance Index
RURA	Rwanda Utilities Regulatory Authority
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SBEE	Société Béninoise d'Énergie Électrique
SCADA	Supervisory Control And Data Acquisition System
SENELEC	Société Nationale d'Électricité du Sénégal
SLEWRC	Sierra Leone Electricity and Water Regulatory Commission
SOMELEC	Société Mauritanienne d'Électricité
SONABEL	Société Nationale d'Électricité du Burkina
SONELGAZ	Société Nationale de l'Électricité et du Gaz (Algeria)
TANESCO	Tanzania Electricity Supply Company
TCCIA	Tanzania Chamber of Commerce, Industry and Agriculture
UNCCI	Uganda National Chamber of Commerce and Industry
URA	Utility Regulatory Authority (Mauritius)
ZACCI	Zambia Chamber of Commerce and Industry
ZERA	Zimbabwe Energy Regulatory Authority
ZETDC	Zimbabwe Electricity Transmission and Distribution Company

Definitions[1]

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 specialized body
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 rules, functions and duties that: drive the performance of the regulated entity toward the objectives set by the regulator; review the effectiveness of these agents to achieve the objectives; and structure the sector (unbundled or vertically integrated).
Electricity Regulatory Index	Refers to the final Electricity Regulatory Index which is obtained by aggregating the results of the Electricity Regulatory Index for Governance and Substance together with results from the 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 costs) in order to provide consumers with the data necessary for making more informed purchase decisions
Independence	Institutional, financial and operational autonomy amongst political authorities, stakeholders and regulators
Legal Mandate	Primary (or secondary) legislation under which the regulatory body was established
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 10 kW to 10 MW), to one or more communities, by providing electricity from small generators using fossil fuel, renewable energy technology or a combination 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
Nascent Regulator	Regulators that have been operational for less than 5 years or have recently been restructured. These institutions often are at early stage of organisational development limited capacity and leverage to develop and implement regulatory instruments and initiatives.
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

[1] The list of definitions is understood within the context of the Electricity Regulatory Index and its assessment – it is not the strict definitions of the terms.

Open Access to Information	A situation in which the primary legislation, licences or contracts, consultation documents, regulators 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 between the off-taker or purchaser of electricity and the privately-owned power producer or Independent Power Producer. A PPA is tailored to the specific application relevant to the parties, and usually defines certain conditions such as the amount of power to be supplied, the negotiated prices, accounting, and penalties for non-compliance.
Predictability	A regulatory environment in which processes and procedures for changing key regulatory documents exist and are known to stakeholder, in addition to well-established public tariff review procedures
Quality of Service Code	The document that enables the regulator to establish the requirements for ensuring 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 sector stakeholders try to influence the decisions of the regulator by using various approaches or means. This is generally considered a regulatory risk that can compromise a regulator's 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 in general
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 that 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 a regulator's duties and functions that affects 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

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 is the second edition of a series of regulatory 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, specifically looking at critical challenges in the regulatory landscape of African countries.

The ERI was prepared under the overall leadership of the Acting Vice President, Power, Energy, Climate Change and Green Growth Complex, Wale Shonibare, with strategic advice and guidance from the senior management team. 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 Development Solutions Institute (DSI), who undertook the development of the Index and interpretation of the Index, as well as Chief Statistician, Nirina Letsara, who provided technical input on the statistical database for the Index. Solomon Sarpong, Nicolas Miyares, and Francine Mbock provided additional technical input and methodological guidance on the Index.

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Foreword

A critical component to the sustainability of the electricity sector of any country or region is an effective, transparent and enforceable regulatory framework that sets out clear rules and standards for sector stakeholders. While African governments have made meaningful progress over the last two decades in instituting or enacting frameworks for electricity sector regulation, the implementation of these frameworks shows mixed results, with limited impact on the sector's sustainability across the continent. So long as electricity sector regulation continues to lag, African governments will struggle to obtain the financing required to meet their energy access and climate objectives and commitments.

Improving electricity sector regulation across the continent is a priority under the African Development Bank's energy strategy. It is a bedrock principle of the New Deal on Energy for Africa, a partnership-driven effort that unifies all Bank initiatives working towards universal access to electricity in Africa. To accelerate progress on regulatory reforms and facilitate more coordinated and targeted actions, the African Development Bank in 2018 launched the Electricity Regulatory Index (ERI) – a comparative, country-by-country, systemic assessment of the conformity of electricity sector regulation in African countries to industry best practices. Over the past year, the results of the first edition of the ERI have catalyzed actions on regulatory reforms amongst participating African governments and the development partners, and informed how the African Development Bank delivers technical assistance, capacity building and other supportive interventions to its regional member countries.

This second edition of the ERI builds on the success of the inaugural edition while also refining its methodology to better capture gaps in regulatory design and implementation. While the Regulatory Outcome Index (ROI) was only measured for utilities in the 2018 edition, the 2019 edition includes consumer perception of regulator performance (through surveys distributed to chambers of commerce and industry associations). This is particularly helpful for ascertaining the priorities of end-users. By capturing their perspective, the ERI now presents a more complete picture of how effective African electricity sector regulators are perceived to be.

With the assistance of partners such as the African Forum for Utility Regulators (AFUR), the Association of Power Utilities of Africa (APUA) and the Regional Electricity Regulators Association of Southern Africa (RERA), the African Development Bank has expanded the coverage of the ERI from the initial fifteen African countries in 2018 to thirty-four in 2019. Over the next several years, the Bank looks forward to achieving the participation of all fifty-four regional member countries in the ERI each year.

The ERI is not simply a source for information and analysis. It is also a diagnostic tool to encourage action among key stakeholders in African electricity sectors. The 2019 edition contains country-disaggregated diagnoses of gaps in electricity sector regulatory frameworks and shortfalls in their implementation, as well as recommendations for addressing these gaps. Over the next year, the African Development Bank, working with regional member country governments and key development partners such as the Kreditanstalt für Wiederaufbau (KfW) and Power Africa (USAID), will use insights from the ERI to help address the identified gaps. We hope to see our collective efforts reflected in the next and subsequent editions of the ERI.

Wale Shonibare
Acting Vice President
Power, Energy Climate and Green Growth Complex
African Development Bank

Executive Summary

This report presents the results of the second edition of the Electricity Regulatory Index (ERI) for Africa, covering thirty-four countries. The first edition was published in 2018, covering fifteen countries. The ERI measures the level of development of the regulatory framework for the electricity sector in African countries – rather than the level of development of the electricity sector itself. It is prepared for two main objectives:

- to diagnose and identify key gaps in electricity sector regulations; and
- to help regulators benchmark their own performance and progress against African peers and international best practices.

The ERI is made up of three pillars, or sub-indices.

- The Regulatory Governance Index assesses how well the regulatory framework supports electricity sector reform, promotes efficiency and meets desired economic, financial, environmental and social objectives. It is concerned with the existence and content of electricity regulations.
- The Regulatory Substance Index, assesses how well the regulatory framework is implemented in practice.
- The Regulatory Outcome Index assesses the outcomes of regulatory processes from the point of view of regulated entities and power consumers, providing insights into how the actions of regulators have affected the performance of the sector.

ERI Survey

The information and data used to calculate ERI scores for each participating country were collected through bespoke surveys distributed to their electricity sector regulators, power utility companies, and power consumers or end-users. Given the difficulties of surveying large populations of power consumers, this group has been represented in this study by national chambers of commerce, manufacturers' associations or equivalent organizations.

The methodology for this year's ERI has been further developed. Various indicators have been improved and the survey questions broadened to improve the quality of responses and to incorporate the perspectives of end-users. The questionnaire was also further refined to provide more nuanced insights into the effectiveness of electricity sector regulation and to better isolate and identify regulatory gaps.

Findings

Across the thirty-four participating African countries, almost all have established the necessary legislative frameworks for their electricity sectors that either envisage or call for the establishment

of independent regulators. However, many countries in the sample nevertheless still fall short on critical aspects of electricity sector legislation and good governance. Most are yet to put in place measures to ensure the independence of their electricity regulators, both from political influence and from the entities that they are required to oversee. Appropriate mechanisms to prevent or mitigate conflicts of interest at the executive levels of electricity sector regulators are also lacking across most of the participating countries.

There are many shortcomings in the implementation of electricity sector regulations. The ERI results demonstrate the need to build up the institutional capacity of regulators so that they can better carry out their mandates. Only five of thirty-four regulators surveyed in this year's ERI have carried out comprehensive analyses of the commercial quality of service of the utilities they are regulating. This seriously impedes their ability to regulate effectively. Just eight regulators, or 24% of the sample, have developed quality of service regulations that include provisions for monitoring the financial, commercial and technical performance of regulated utilities, as well as their progress on connecting new customers and expanding access. Finally, only twelve regulators independently evaluate customer satisfaction with regulated utilities. The above results demonstrate most of the regulators in the sampled countries lack the tools, information and data to properly oversee the entities they are supposed to regulate.

ERI results also show that most regulators in the sample are having a limited effect on the performance of their respective electricity sectors, especially from the perspective of consumers/end-users. Billing complaints in twelve of the thirty-four sampled countries take more than ten days to process. Organizations representing consumers/end-users in half of the sampled countries report that it takes more than 30 days to connect consumers in urban areas. These results clearly demonstrate that regulators still have some way to go in promoting and instituting best practice commercial and technical service standards amongst regulated utilities.

Country rankings

We ranked the 34 participating countries into four performance 'bands', reflecting how well developed their electricity regulatory frameworks are and how well they align with international best practice (see Figure I).

Figure I: Classification of Scores

Color	Score range	Interpretation
	0.800 to 1.000	High level of regulatory development, with most elements of a strong policy, regulatory, legal and institutional framework in place
	0.600 to 0.799	Substantial level of regulatory development, with many elements of a supportive regulatory framework, alongside some weaknesses in legal and institutional structures.
	0.500 to 0.599	Medium level of regulatory development, with basic elements of a supportive regulatory framework, with implementation constrained by legal and institutional gaps and low regulatory capacity.
	0.000 to 0.499	Low level of regulatory development, with few or no elements of a supportive regulatory framework and insufficient or nonexistent legal and institutional structures and regulatory capacity.

Across the board, the average ERI score for 2019 is 0.572. This reflects the fact that all the participating countries have instituted or are in the process of implementing frameworks for regulating their respective electricity sectors, but with regulatory outcomes that are lagging behind the legislation due to weaknesses in regulatory processes and capacities. Uganda obtained the highest ERI score in our 2019 sample with a score of 0.748, while Liberia received the lowest score at 0.267.

None of the countries in this year's ERI were able to achieve an overall score above 0.800, in the green band. This shows the need for more consistent application and implementation of regulations and improved institutional capacity to support sector performance, in order to drive improvements in electricity access and the quality of supply.

Regulatory Governance Index (RGI)

The Regulatory Governance Index (RGI) measures the existence and quality of the regulatory framework. The average RGI score across the sample countries is 0.808. This high score is indicative of the fact that most countries have instituted robust legal and institutional frameworks for electricity sector regulation that are aligned with international best practices. Moreover, all sample countries have established the necessary frameworks for the creation of independent regulators. Nigeria was the best performer on the RGI sub-index, with a score of 0.953. Morocco scored the lowest, with a score of 0.555. Morocco's low RGI score is mostly the result of the low scores it obtained on RGI indicators measuring independence from sector stakeholders, transparency, open access to information and predictability.

The Regulatory Substance Index (RSI)

The Regulatory Substance Index (RSI) measures the capacity of regulatory bodies to carry out the mandates provided to them in the legislation. The average RSI score is 0.511 – substantially below the average RGI score. Kenya, Tanzania, Uganda, Nigeria and Senegal are the top performers in this area. Regulators in these countries have been operational for sixteen years on average, compared to thirteen years for the eleven countries in the next performance band. The bottom five performing countries in this sub-index have had operational regulators for just six years on average. Naturally, regulators that have been operational for longer have had more time to address and familiarize themselves with sectoral issues, as well as build internal capacity within their respective institutions. Many of the regulators in the lower performing countries are yet to implement their regulatory frameworks, or lack basic regulatory tools.

The Regulatory Outcomes Index (ROI)

The Regulatory Outcomes Index (ROI) measures the results of electricity sector regulation on sector performance, from the perspective of key stakeholders in the sector. The average ROI score is 0.505, which falls in the orange performance band. Cameroon obtained the highest ROI score

at 0.698. The sample average score suggests that regulatory implementation and enforcement remains weak in the majority of countries.

The ROI comprises two sub-indices: one for utilities (ROIu) and another for consumers/end-users (ROIc), calculated on the basis of bespoke surveys distributed to regulated utilities and consumer/business organizations. These were then averaged to produce an overall ROI score.

The underlying ROIu and ROIc scores themselves provide interesting insights on how regulatory performance is perceived by the two most important stakeholders in the sector (utilities and consumers). The average ROIu score in the sample is 0.653, which is significantly higher than the sample's ROIc average score of 0.357. Consumers and end-users reported high-levels of dissatisfaction with regulators' ability to hold utilities to account, especially as it relates to the commercial quality of their services.

Recommendations

We set out a number of recommendations for governments and regulators seeking to improve their electricity regulatory frameworks.

Regulatory Governance:

On Independence:

- Introduce staggered terms of appointments for the commissioners and board members of electricity regulators, to improve independence and promote continuity in decision making.
- Involve a range of stakeholders (including parliament and government) in the appointment process, for example through parliamentary scrutiny of candidates proposed by the executive.
- Amend regulations to limit conflicts of interests for the leaders of regulatory bodies – including prohibition on receiving gifts and investing in utilities under regulation, and cooling off periods before taking up posts with utilities under regulation.

On Predictability:

Introduce measures to improve predictability in regulatory decision-making, including:

- Establishing transparent, well-defined decision-making criteria; and
- Setting clear timetables for the review of tariffs, technical standards, grid codes and other regulations.

On Accountability:

- Consider establishing dedicated tribunals to provide speedy and informed resolution of appeals against regulatory decisions.

On Open Access to Information:

- Take action to improve the amount and consistency of information available to stakeholders and the public, including on utility performance against regulatory benchmarks.

Regulatory Substance:

On Nascent Regulators:

- Regional regulatory associations should promote peer review and peer learning mechanisms, to promote harmonization, help nascent regulators learn from more experienced peers, and reduce the gestation period before new regulations become effective.

On Economic Regulation:

- For countries with tariffs below cost-recovery level, the regulator should work with the utility to develop a transitional path or a roll-out plan for the adjustment of existing tariffs to economic cost levels over an agreed period.
- Government should commit to supporting the roll-out plan and meet the financing gap that will arise during the transitional phase.
- Countries yet to undertake a Cost of Service study should do so, with a view to:
    i) Determining the cost recovery and efficient cost of supply for each segment of the electricity supply industry;
    ii) Defining the structure and levels of tariffs, including lifeline tariff mechanism and subsidy administration;
    iii) Determining the cost recovery tariff for the different end-users or customer classes;
    iv) Recommending the roll-out plan for adjustment of existing tariffs to economic and cost recovery cost levels,
    v) Determining the transitional path for unwinding subsidies.

On Commercial and Technical Quality of Service:

- Regulators should develop a performance monitoring framework, with Key Performance Indicators (KPIs) to monitor utility performance, covering at least the following operational areas:
    i) financial performance;
    ii) commercial quality of service;
    iii) commercial performance;
    iv) technical performance;
    v) quality of service delivery;
    vi) operational efficiency.
- Regulators should require utilities to publish on their websites their performance against regulatory targets and key performance indicators, and to produce periodic public reports documenting the reasons for any shortfalls.

On Technical Regulation:

- To promote the development of decentralised energy systems, regulators should introduce a light-touch approach to regulating mini-grids, i.e. using business registration rather than licenses for low-capacity systems.
- Regulators should ask mini-grid developers to propose retail tariffs that are appropriate for their project, as well as tariff structures (i.e. flat rate, energy charge, demand charge, pre-pay, post-pay etc.), for approval by the regulator.
- Developers should be permitted to build cross-subsidization into tariff schedules, such that high-consumption customers can cross-subsidise smaller, low-income customers.
- Mini-grids should be encouraged to use anchor customers (e.g., telecommunications companies, agricultural processors) to help guarantee load and reduce tariffs to low-income households.
- Regulators should develop clear and transparent rules for future development scenarios – for instance, setting out the consequences if the mini-grid is enveloped by the main grid in future, including compensation frameworks as necessary.
- Regulators should prioritise the development of the necessary technical and economic regulation rules for stand-alone systems (such as rooftop solar systems), including feed-in tariffs when surplus electricity is exported to the national grid.

On Regulatory Capacity and Expertise:

- Regulators should prioritise building their own expertise across the engineering, economics, finance and accounting disciplines, amongst others.
- Regulators should be granted full autonomy to recruit skilled staff on merit, with competitive remuneration, and to provide requisite training.

On Publication of Research:

- Regulators should ensure that staff are capacitated and incentivized to generate high-quality, practically-oriented research and analysis, including by supporting them to present papers at international conferences and to publish them in international journals.

Regulatory Outcomes:

On Consumer Satisfaction, Monitoring and Assessment of Utility Performance:

- Regulators should undertake (or require the utility to undertake) customer surveys, covering different customer classes, to better inform regulatory decisions. The results should be used to develop a consumer survey index for each customer class, which can be used to hold the utility accountable for performance lapses.
- Alternatively, regulators could conduct or commission a more limited survey focused on the experience of customers that have lodged complaints.

On Financial Performance of Utilities:

- Regulators should introduce performance agreements with the utilities, with quarterly reporting of results and financial penalties in case of poor performance.
- Regulators should ensure that utilities establish a loss reduction action plan, with priority given to addressing commercial losses (i.e. billing and collection losses).

I. WHAT IS THE ERI?

1.1. Definition

The Electricity Regulatory Index (ERI) is a composite index that measures the level of development of electricity sector regulatory frameworks in African countries against international standards and best practice. It is composed of three pillars:

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

The Regulatory Governance Index (RGI) assesses the extent to which the laws, procedures, standards and policies governing the electricity sector provide for a transparent, predictable and credible regulatory framework that meets international standards. The RGI thus assesses the institutional and legal design of the regulatory framework, within which regulatory decisions are made. It is composed of eight indicators.

The Regulatory Substance Index (RSI) evaluates how well electricity sector regulators are carrying out their mandate and implementing the practices and processes that affect regulatory outcomes. The RSI assesses the content of the regulations and actual decisions implemented by regulators. It includes four indicators.

The RGI and the RSI together assess the effectiveness of the regulatory environment to support electricity sector reforms, promote efficiency and fulfill national objectives.

The Regulatory Outcome Index (ROI) measures, from the perspectives of utility companies and consumers, the degree to which the regulator has a positive or negative impact on the sector. The ROI assesses how regulatory actions and decisions are able to achieve the expected results for the sector. The ROI is calculated from an aggregation of survey responses from the electricity distribution utilities and power consumers. The ROI comprises of six indicators. The main indicators under each pillar of the ERI are contained in Table 1.

Table 1: Main indicators of the ERI 2019 pillars

Regulator		Power Utility company	Power consumers
Regulatory Governance Index (RGI)	**Regulatory Substance Index (RSI)**	**Regulatory Outcomes Index (ROI)**	
		ROIu	**ROIc**
I1: Legal Mandate I2: Clarity of Roles and Objectives I3: Independence I4: Accountability I5: Transparency of Decisions I6: Predictability I7: Participation I8: Open Access to Information	I9: Economic Regulation I10: Commercial quality of service or relationship with customers I11: Technical Regulation I12: Licensing Framework	I13: Financial Performance I14: Technical Quality of Electricity Supplied I15: Commercial Quality of Service I16: Facilitation to Electricity Access	I17: Commercial Quality of Service I18: Obtaining Electricity Connection/Service

The Electricity Regulatory Index for Africa (ERI) is not an assessment of the level of development of the electricity sector of a country. The ERI measures the existence of policy and regulatory frameworks to measure the level of development of country's regulatory environment. Even though robust regulatory regimes catalyze sector development, these frameworks will not translate into sector developments without consistent enforcement and compliance by stakeholders in the midst of other various exogenous factors. While the existence of the requisite regulatory frameworks does not directly translate into strong sector development (e.g. in Nigeria), in a similar vein, a highly developed and vibrant electricity sector in a country does not necessarily indicate the existence of robust regulatory regime (e.g. in Morocco).

1.2. Purpose

Over the past two decades, electricity markets in Africa have been transformed. A critical component of this transformation has been the establishment of national regulatory institutions tasked with independently regulating and overseeing electricity sectors. In 2018, the AfDB commissioned a study to identify key measures of regulatory performance, which then subsequently informed the development of the Electricity Regulatory Index (ERI). The ERI provides national stakeholders with a periodic assessment of their regulatory environment and a means of assessing their own progress against international best practice.

The ERI is also designed to play a role in facilitating investment into Africa's power sector, including from private sector investors and developers. Through its New Deal on Energy for Africa, the AfDB aims to promote universal access to energy in Africa, in accordance with the Sustainable Development Goals. This ambitious target will require a significant increase in private investment into the energy and power sectors. Sound policies and effective regulation are essential in attracting this investment. It falls to regulators to provide the transparency, predictability and effective governance that investors require.

The picture of each country's regulatory environment offered by the ERI should be considered alongside other factors, including macroeconomic and political variables, when assessing the potential for investment in a given country.

1.3. Differences between the ERI 2019 and ERI 2018

The ERI is an innovative way of assessing regulation in the power sector. The inaugural edition in 2018 succeeded in drawing attention to the importance of electricity sector regulation and nuances in practice and performance across the continent. It introduced the concept of using empirical measures to assess the development of electricity sector regulation.

The 2019 edition of the ERI introduces a number of revisions to the survey that forms the basis of the index. It has also broadened the group of survey respondents to include power utilities and consumers.

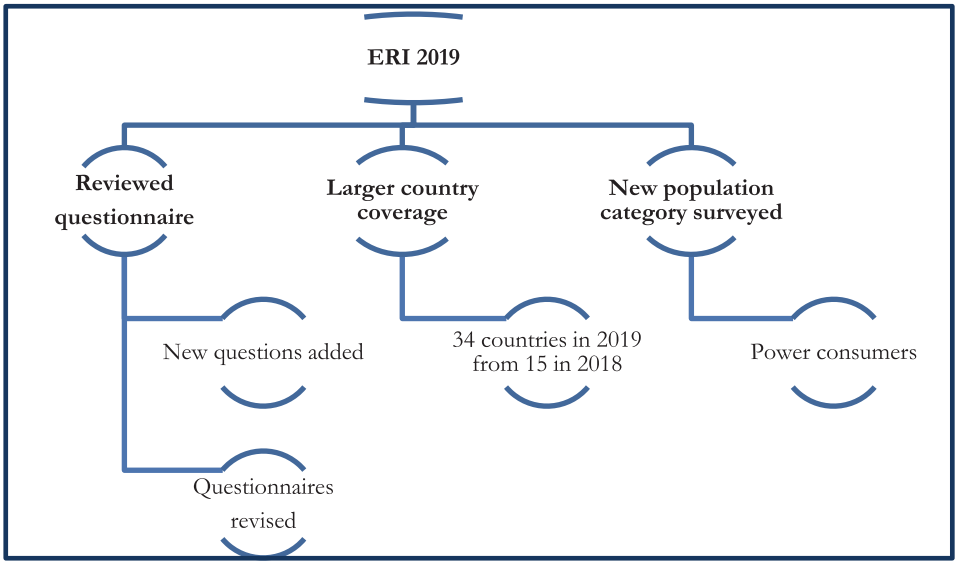
The main changes to the ERI 2019 are shown in figure 1. They include:

- revision of the survey questionnaires;
- an increased number of countries covered, from fifteen in 2018 to thirty-four in 2019;

- an expansion of the ROI by including end-consumers' perspectives, drawn from national chambers of commerce or equivalent industry associations.

More information about the design of the questionnaires and the survey population can be found in Annex 1.

Figure 1: What's new in ERI 2019



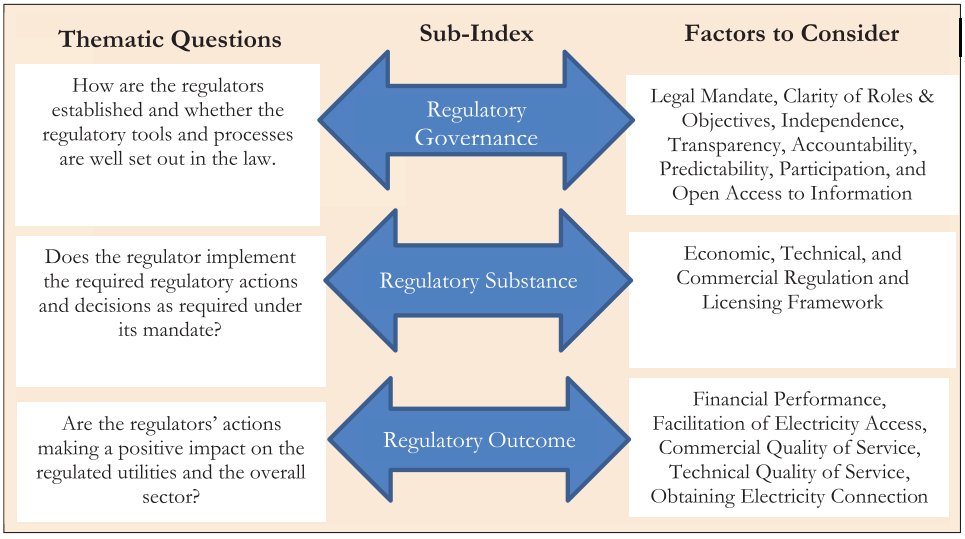
The AfDB is committed to continuously improving the relevance of the ERI indicators and aligning the methodology with emerging trends in the power sector. Our aim is to make the survey as representative as possible. In future years we expect to expand the number of countries covered and include the impact of regulators' decisions on households.

II. METHODOLOGY IN BRIEF

The ERI scores were calculated on the basis of responses to comprehensive surveys distributed to electricity sector regulatory institutions, utilities and power consumers' representatives in forty-nine African countries. Out of the forty-nine countries surveyed, thirty-six submitted responses from the regulatory agencies, and thirty-four responses were also received from regulated utilities. The resulting data and analysis are therefore based upon a sample of thirty-four countries.

Survey questions were framed to capture and assess the 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. Figure 2 outlines these sub-indices.

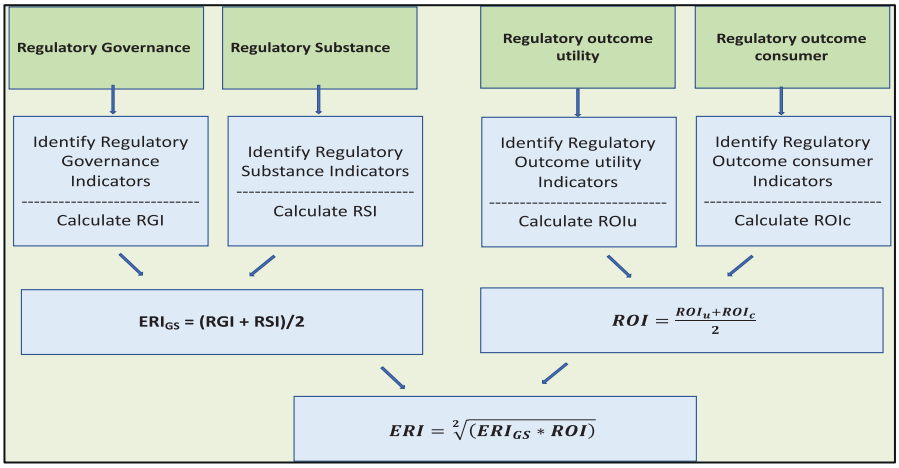
Figure 2: Components of the ERI



The indicators for Regulatory Governance and Regulatory Substance were used to construct the Electricity Regulatory Index for Governance and Substance (ERI_{GS}) using primary data obtained from questionnaires sent to regulators. This preliminary calculation also provides important insights into national regulatory development, without considering the effects of regulatory action on the sector.

A regulatory outcome assessment was also carried out to ascertain the effect of each regulator's decisions and actions on the performance of the power utilities it regulates and, ultimately on the sector. The results of this analysis are captured by the Regulatory Outcome Index (ROI). The ROI was based on primary information obtained from completed questionnaires submitted by power utilities and chambers of commerce. The results from ERI_{GS} and ROI were combined, as indicated in figure 3 below, to determine the Electricity Regulatory Index (ERI).

Figure 3: Calculating the ERI



Based on the responses to the questionnaires, each indicator in the sub-indices is assigned a score between 0.00 and 1.00. A score of 1.00 indicates that the regulator and/or the national regulatory framework conform to international best practices with respect to the relevant indicator. A score of 0.00 signifies a complete lack of alignment 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. The classification of scores for ERI 2019 is illustrated in figure 4 below.

Figure 4: Classification of Scores

Color	Score range	Interpretation
	0.800 to 1.000	**High level of regulatory development** The majority of the elements of a strong policy, regulatory, legal and institutional framework are in place
	0.600 to 0.799	**Substantial level of regulatory development** Many elements of a supportive regulatory framework are established, although with weaknesses that do not permit the regulator to have strong capacity, legal and institutional structures.
	0.500 to 0.599	**Medium level of regulatory development** Basic elements of a supportive regulatory framework are established with limited legal and institutional structures and capacity of the regulator.
	0.000 to 0.499	**Low level of regulatory development** Few or no elements of a supportive regulatory framework are in place. Insufficient or nonexistent legal and institutional structures and capacity of the regulator.

We note that a few African countries lack traditional regulatory frameworks for their electricity framework, choosing instead to use contractual provisions to improve outcomes in the sector. For example, concession contracts and power purchase agreements may set down requirements for commercial quality of service or set multi-year tariff regimes, outside the purview of the regulator.

In such cases, the ERI may understate the country's regulatory performance. An example is Côte d'Ivoire, where the regulator scored poorly on the commercial quality of service indicator, due to a lack of supporting regulations, but was nonetheless rated highly in the consumer survey. Furthermore, where regulatory responsibilities are shared with or controlled by another agency, such as a sector ministry, a rural electrification agency or energy efficiency agenda, this can negatively impact on ERI scores, reducing the correlation between ERI performance and the level of sector development.

A complete description of the methodology used to calculate the ERI can be found in Annex 1.

III. ERI 2019 RESULTS

3.1. Overall Electricity Regulatory Index 2019 Results

The countries that participated in this year's ERI displayed a broad range of development of their regulatory environments and alignment with international best practices. The largest number of countries (14 out of 34) fell into the yellow band, indicating a substantial level of development, while 11 scored in the orange band (medium level of development) and 9 in the red band (low level of development). The average 2019 ERI score was 0.572, which falls within the orange band. Figures 5 and 6 summarise the overall results for ERI 2019.

While no country fell within the green performance band (>0.800), Uganda obtained the highest ERI score in our 2019 sample with a score of 0.748. Liberia received the lowest ERI score at 0.267. Uganda, Tanzania, Kenya, Algeria and Rwanda were the top 5 performing countries, indicating well-developed electricity regulatory frameworks that are being implemented effectively. Among the top 5, Rwanda and Algeria are new entrants to the ERI.

Figure 5: ERI 2019 Ranking

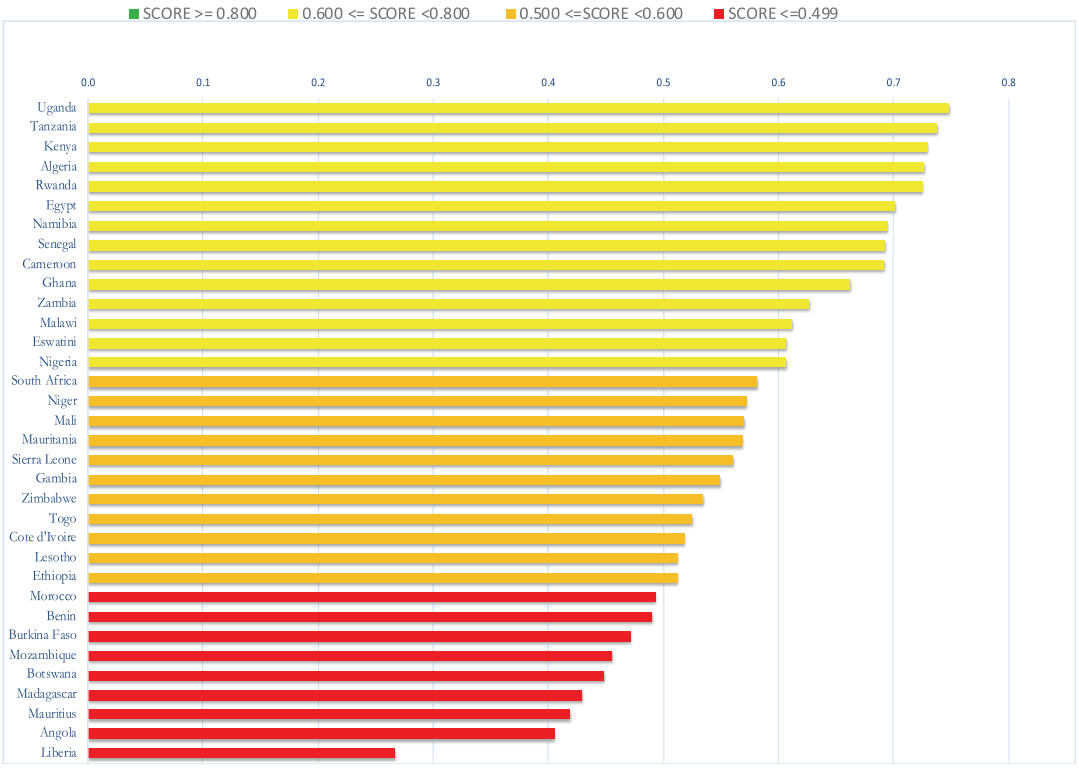
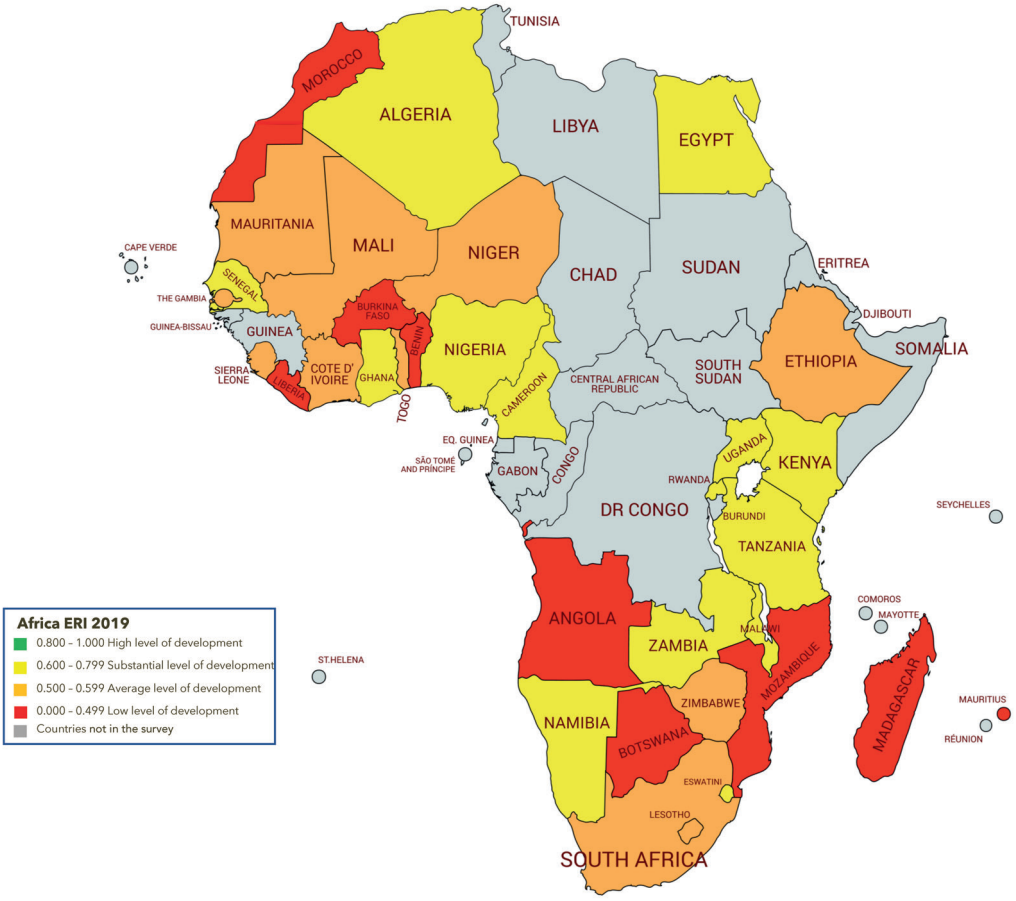
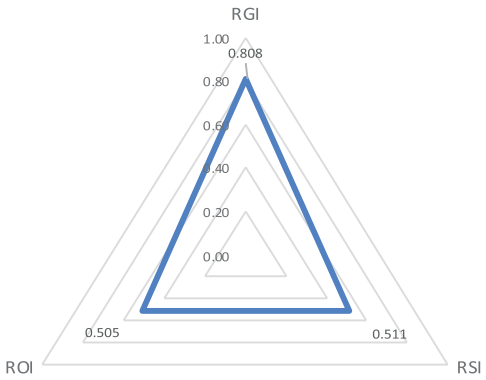


Figure 6: ERI 2019 Africa



The average scores across the three pillars of the ERI – the RGI, RSI and ROI – were 0.808, 0.511 and 0.505, respectively. This is shown in figure 7. The breakdown of country performance by sub-index is shown in figure 8.

Figure 7: Components of the ERI 2019

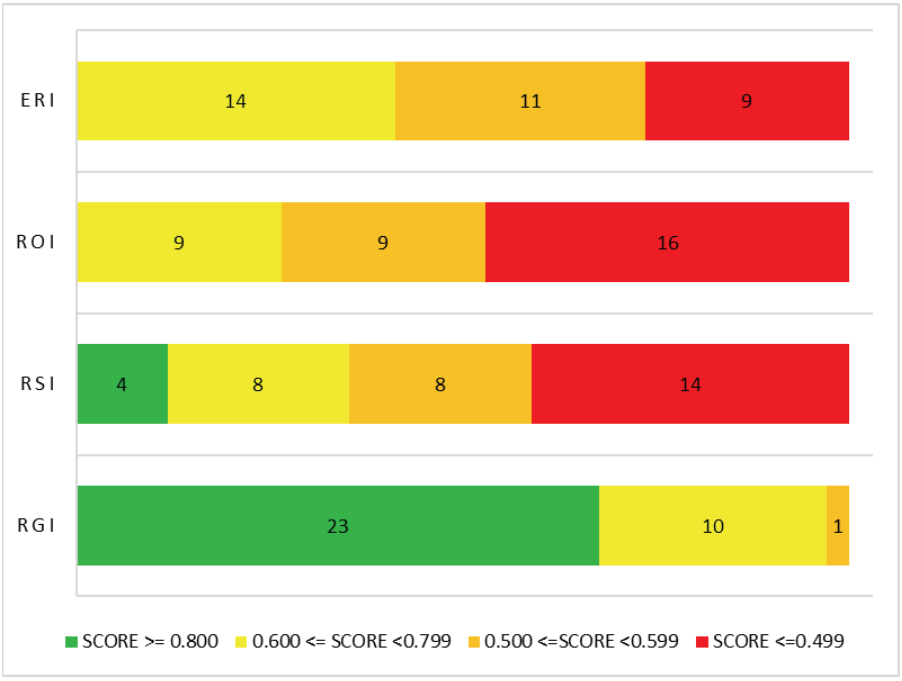


Note: the graph shows the average value of each component of the ERI on the scale of 0-1

Most countries have well-developed governance structures (high RGI scores), demonstrating they have put in place the necessary legal frameworks for the creation of independent regulators as part of sector-wide reforms. Sixty-eight percent of countries surveyed fell within the green performance band on RGI. The RGI was the only one of the three pillars where the average score fell within the green band, showing strong performance overall. However, the ERI results indicated that regulators would benefit from greater independence (in terms of managerial appointments, decision-making and budgetary/financial matters) from government and other stakeholders.

There is significant scope to improve the implementation of regulators' actions and decisions (RSI). The weak performance in RSI for most countries also negatively impacted their performance on ROI. This is particularly true from the perspective of end users **(ROI consumer).** On the RSI, only 12% of countries surveyed fell within the green band, and a rather significant 41% fell in the red band. Most regulators need to improve on their technical and commercial quality of service regulations. In most cases, power consumers are not satisfied with the quality of the service provided by the regulator and the utilities.

Figure 8: Countries' performance by ERI dimension (ROI, RSI and RGI), 2019



The disparity between RGI and RSI scores (0.808 and 0.511, respectively) suggests widespread weaknesses in regulators' capacity to implement regulatory frameworks. Most countries have adopted the necessary laws and regulations, but are yet to put in place an adequate level of capacity to fulfill regulatory mandates, with inadequate implementation in key areas. As a result, they are not meeting their sector objectives and outcomes. Good policies and institutional design must be supported by effective implementation and consistent application of rules and regulations, including monitoring and enforcement, if they are to yield the expected outcomes.

It is worth noting that the regulatory governance score is attributable more to the framers (i.e. policy- makers) of the regulatory acts, than to the decisions and actions of regulators. By contrast, the RSI measures how well regulators are able to discharge the mandates that have been given to them. Their performance is influenced by their level of institutional capacity, how well they mobilise resources and whether they enjoy the requisite level of autonomy from the political sphere.

Importantly, there is a close correlation between the ERI scores and the length of time a regulator has been operational. Forty-one percent of the countries surveyed fell in the yellow performance band in terms of ERI score. These countries had regulators that had on average been operational for sixteen years. Thirty-two percent of the countries surveyed fell within the orange

band. Their electricity regulators had on average been operational for thirteen years. The red band contained the remaining twenty-seven percent and were mostly nascent regulators that have been operational for less than five years or face peculiar challenges, such as conflict and insecurity.

Countries from the third group – i.e. red performance band countries – could benefit from learning from the experiences of countries in the yellow band to improve their regulatory framework within a shorter period of time. This includes knowledge transfer from staff in countries with more established regulators that have gained demonstrated experience in effective regulation (see Box 1).

Box 1: Needs of regulators during early stage development

The ERI 2019 includes nine nascent regulators that have been in operation less than five years or have been recently restructured. This group includes Angola, Benin, Botswana, Burkina Faso, Liberia, Madagascar, Mauritius, Morocco and Mozambique. Regulators in these countries encounter most of the challenges and issues that other regulators in the sample overcame a decade ago.

Their ERI scores are reflective of their stage of organizational development. The institutions are young, not fully operational or dealing with the impact of recent reforms and restructuring. They lack skilled staff with the capacity to develop and deliver regulations, procedures and guidelines for the utilities. They need strong support in developing the tools of electricity regulation, including licensing application and processing frameworks, tariff setting methodologies and guidelines, grid code, and quality of service regulations.

Nascent regulators' scores and rankings should be interpreted cautiously. They will serve to identify areas for improvement in their ongoing operationalization process. They can learn from the experiences of existing regulators and draw from best practice to build a fair, transparent and independent regulator. AfDB, through the ERI 2019, recommends specific efforts and measures to assist nascent regulators in their operationalization process.

The following sections explore the result of each of the ERI 2019 sub-indices and their component indicators.

3.2. The Regulatory Governance Index (RGI)

The Regulatory Governance Index (RGI) measures the institutional and legal framework within which regulators operate. It comprises eight indicators: legal mandate, clarity of roles and objectives, independence, accountability, transparency, participation, predictability and open access to information.

The RGI 2019 demonstrates that electricity regulatory frameworks are well designed in most countries. **Twenty-three of the thirty-four (68%) sample countries scored above 0.800**, with the average RGI score reaching 0.808. Seven countries – Nigeria, Malawi, Senegal, Kenya, Uganda, South Africa and Tanzania – score above 0.9. Figures 9 and 10 show each country's overall performance on the RGI.

Figure 9: 2019 Regulatory Governance Index Map

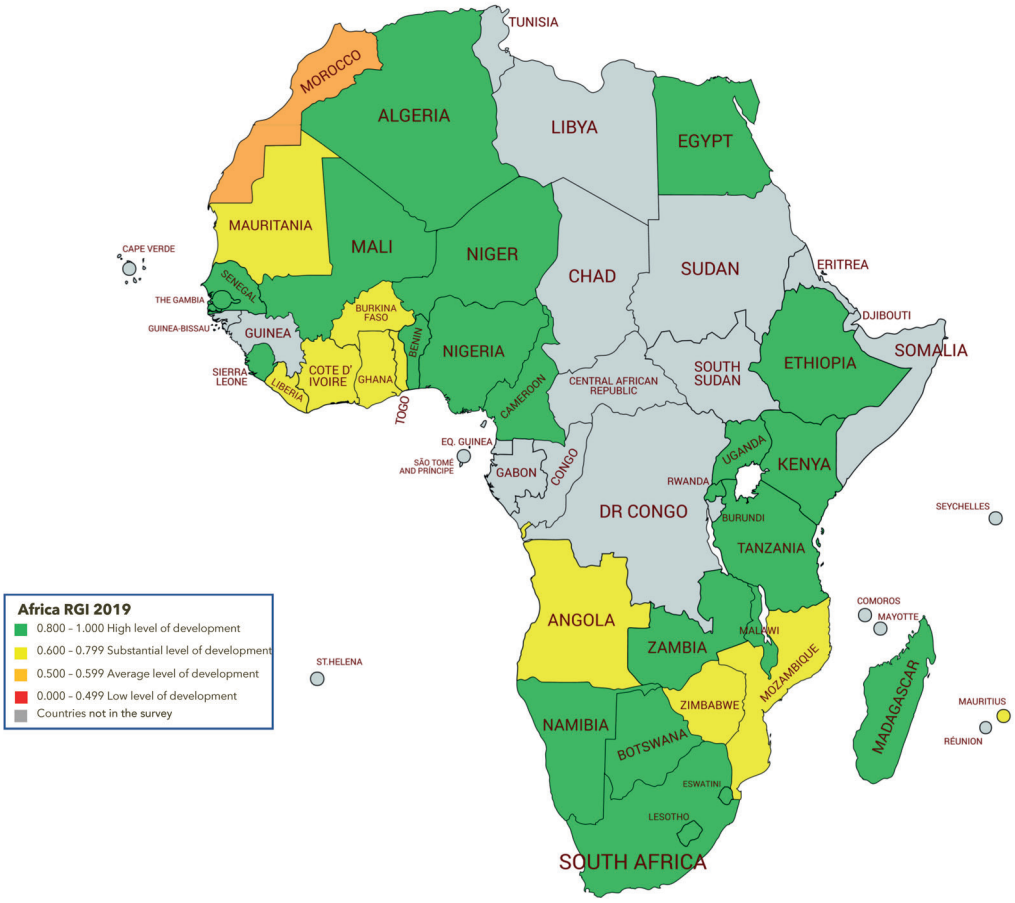
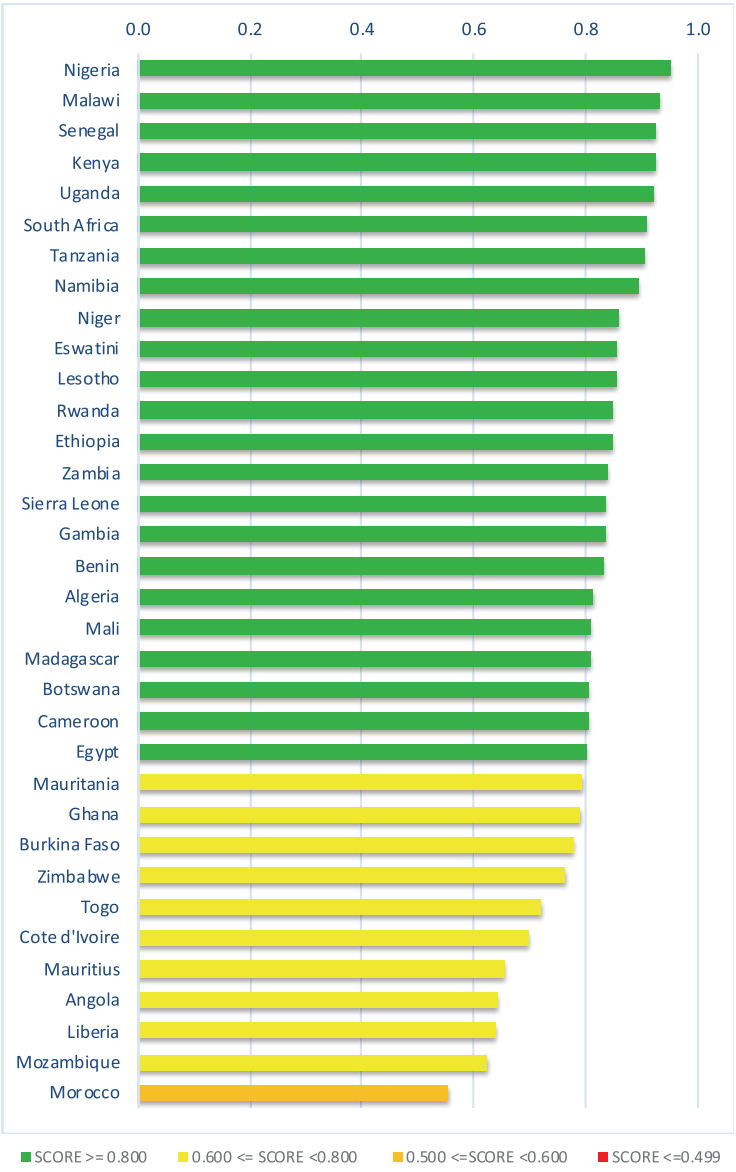


Figure 10: Regulatory Governance Index (RGI) Ranking 2019



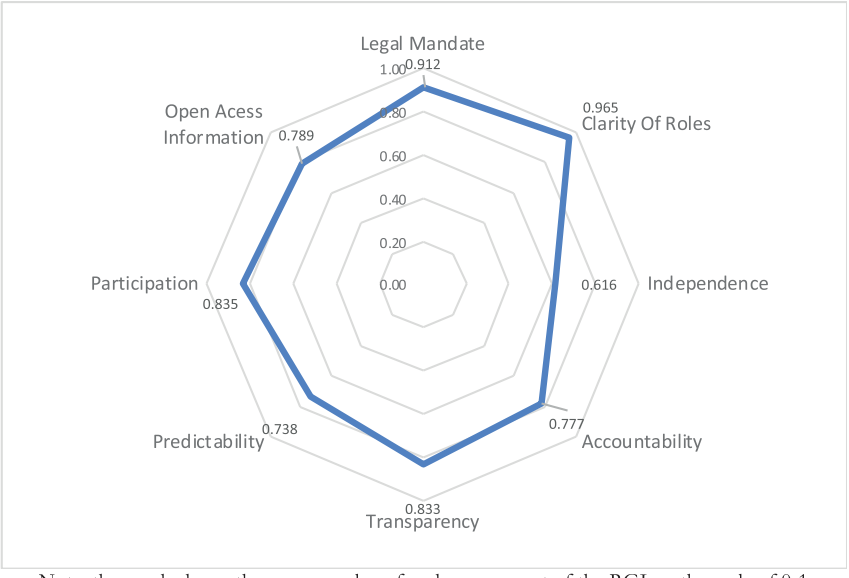
For the most part, the best performing countries have electricity regulators that have all been in existence for several years, and most have reviewed their regulatory frameworks over the years to keep pace with changing global trends and best practices. Most of them are also members of regional regulatory associations, allowing peer-to-peer exchange of information and good practices.

Some nascent regulators were among the green performance band countries in regulatory governance and some older regulators did not make it into the category. Twenty-nine percent of the countries surveyed fell in the yellow band and these countries showed significant weakness and gaps in some RGI indicators, notably regulatory independence from government and industry stakeholders. Only one country fell into the orange band on RGI. It is important to reiterate that these scores generally reflect whether regulators have the appropriate mechanisms or frameworks in place – not whether they are following these in practice.

3.2.1 Breakdown of RGI Results

Performance across the eight indicators of RGI showed that the average score for four of them (legal mandate of regulator, clarity of roles and objectives of regulator, transparency of regulatory decisions and actions and participation of stakeholders in regulatory decisions) fell in the green band. The remaining four indicators (**regulatory independence**, **accountability of the regulator**, **predictability of regulatory decisions and actions**, and **open access to regulatory information**) revealed some weaknesses and fell in the yellow band. Figure 11 shows the average scores for each of the indicators and figure 12 shows the country performance by indicator.

Figure 11: Components' scores in RGI 2019

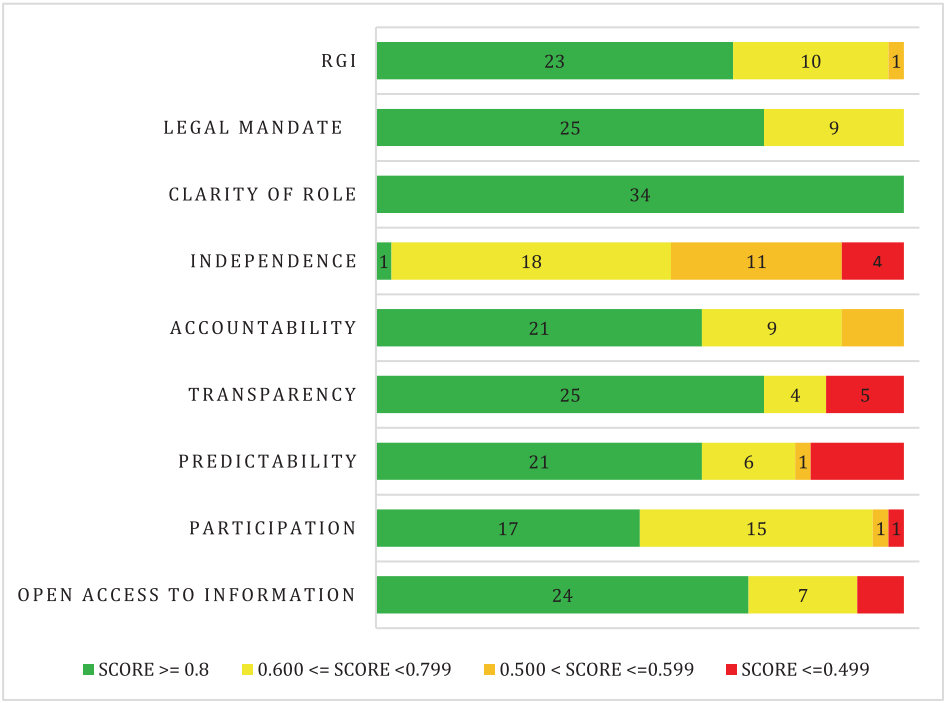


Note: the graph shows the average value of each component of the RGI on the scale of 0-1

The average scores for each RGI indicator reveal areas for improvement. For instance, the **independence** indicator recorded the lowest score, with an average of 0.616. The key issue identified in regulatory independence was governments' increasing involvement in making appointments to the boards of regulatory institutions and playing a decision-making role in tariff-setting. Only one country scored in the green performance band for this indicator. The average score for **accountability** was 0.77, with twenty-one countries in the green performance band. Here the underlying issue was a lack of formal mechanisms in some countries to contest regulator

decisions. On **predictability**, the surveys revealed a lack of clear and transparent procedures for reviewing regulatory documents and decisions, especially on tariffs. On **open access to information**, the surveys identified a gap in the availability of research and consultative papers to stakeholders and the general public. Countries' performance on each indicator is discussed in detail below.

Figure 12: Countries' performance by RGI dimensions 2019



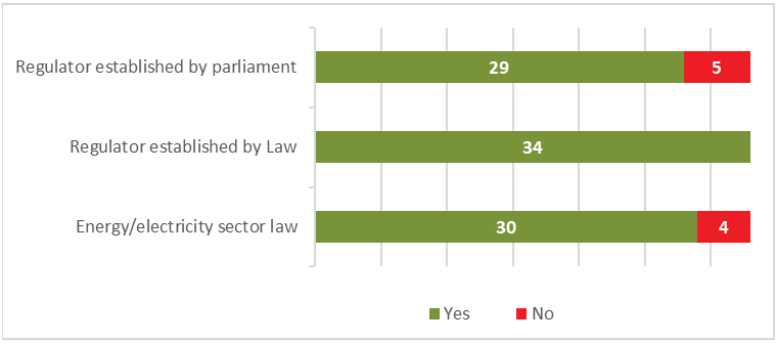
Legal mandate

The **legal mandate** indicator assesses the existence of an electricity sector law and whether the regulator was established by act of parliament or presidential decree. The average score of 0.912 for this indicator was the second highest among the RGI indicators. Regulators in twenty-nine countries (85%) in our sample were established by act of parliament, meeting best practice principles, putting them in the green band (see figure 13). The regulator was established by presidential decree in only four countries (Benin, Morocco, Angola, and Cote d'Ivoire).

Establishing a regulator by an act of parliament alongside robust energy sector laws provides strong safeguards, giving rise to higher credibility and investor confidence. It mitigates the potential for new political leadership in country to make arbitrary changes in the regulatory framework. Laws made by parliament are usually better scrutinized and beneficial than presidential decrees or similar executive instrument. Additionally, when the sector and

regulatory laws are harmonized, operational conflicts are reduced and there is better clarity on the mandate of the regulator.

Figure 13: Legal Mandate Dimensions



Clarity of Roles and Objectives

This indicator sought to assess whether the regulatory functions of the regulator are clearly spelt out in the primary legislation that established the regulator or in other secondary legislations. Clearly defined roles and functions for the regulator help to reduce confusion and overlap between the regulator, the sector ministry and any other agency.

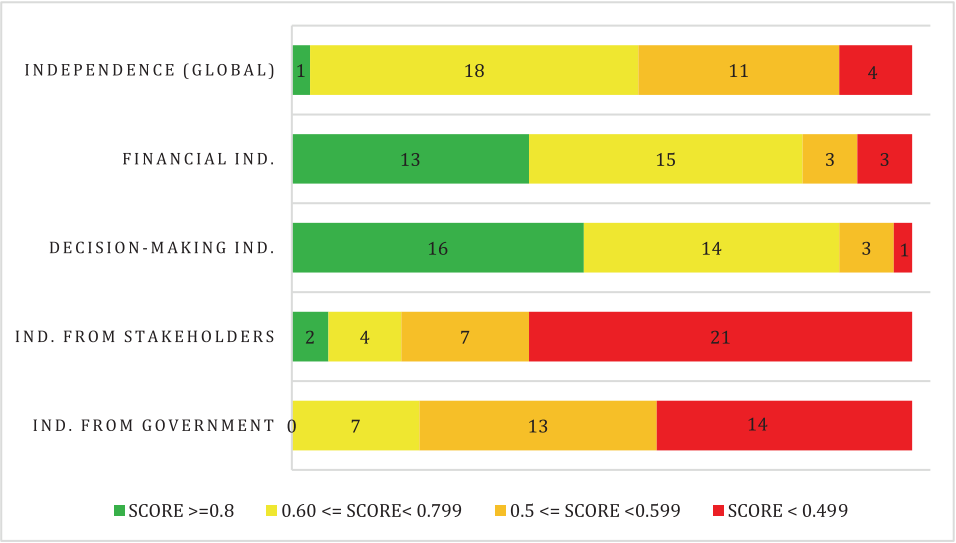
The survey results showed that the **clarity of roles and objectives** indicator recorded the highest score in the RGI and the ERI as a whole, with a near perfect average score of 0.965. Most regulators have their regulatory functions defined in the primary legislation that established them, in accordance with best practice standards. The missions of the regulators are clearly articulated in most countries. In more than 88% of cases, regulators have their roles and powers defined in primary law. In addition, in most countries, the decisions that the regulators are authorized to take are defined in primary law.

Independence

Regulatory independence was assessed through four sub-indicators: **independence from government and legislature**, **independence from stakeholders and market players**, **decision-making independence**, and **financial and budgetary independence**. The ' average score for this indicator was 0.616, which falls within the yellow performance band. It was the lowest score among the RGI indicators. Only one country scored in the green band for this indicator.

The results from this year's ERI for this indicator are set out in figure 14.

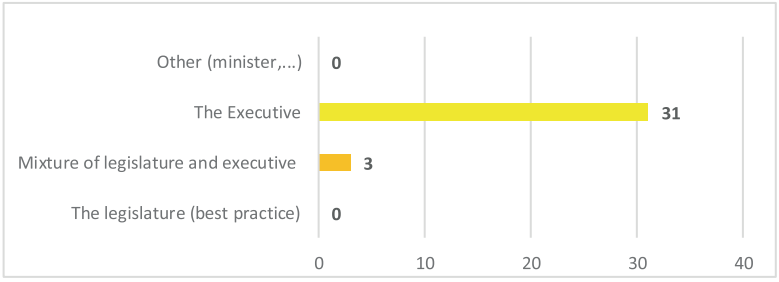
Figure 14: Independence of the Regulator



Lack of regulatory independence, especially from industry stakeholders and governments, is a continuing challenge. It makes the leadership of regulatory bodies more susceptible to short-term political pressures, detracting from their ability to ensure the long-term sustainability of the power sector. This could lead to regulatory capture and loss of credibility.

In 91% of the sample countries, the CEOs of electricity regulators are selected by the executive. In none of the countries surveyed was the CEO appointed by the legislature alone (see figure 15). Out of the sample countries, only Malawi, Zimbabwe and Sierra Leone indicated a mixture of legislature and executive as the appointing authority of the CEO. In these instances, the executive nominates individuals for approval by the legislature. While this does not fully meet international best practice, it does provide a level of robustness and transparency to the process, as candidates can be examined for suitability in a legislative forum.

Figure 15: Appointing authority for the Regulatory CEO



In 79% of the sample, board members or commissioners are also selected by the executive. Morocco was the only country where commissioners are appointed by the legislature. Six other countries indicated that appointment is made by a mixture of legislature and the executive. Executive appointments can compromise the independence of the regulators, as the employment

status of the appointee risks becoming contingent on satisfying the short-term interests of the executive, which may not be aligned with the long-term sustainability of the electricity sector. Executive appointments are often unilateral, without adequate vetting, while appointments through a legislature are debated in an open forum, allowing for greater scrutiny of the independence and technical qualifications of candidates. Only twelve of the sampled countries had staggered the appointment of commissioners, to ensure continuity. Staggered terms of appointment helps to protect institutional memory and continuity in operations.

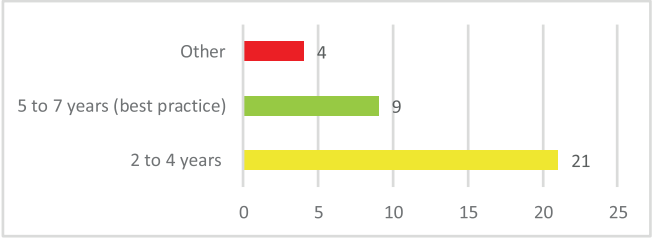
While 88% of participating countries had laws in place to prohibit the CEO of the regulator from simultaneously holding other offices in government or the private sector, 62% had no such prohibition for commissioners. An officer holding several offices would be hard pressed to devote adequate time to each office, and may face conflicts of interest.

While thirty-one countries have provisions in their laws forbidding CEOs and commissioners from having a personal interest in the electricity utility they regulate, in twenty-five cases there was no prohibition on their holding a position as employee or board member in a regulated utility. This increases the likelihood of potential conflict of interest.

Twenty-four countries had no provisions for a 'cooling-off period' for CEOs and commissioners after leaving office – that is, the amount of time that must elapse before they can assume a position in a regulated utility. In international best practice, cooling-off periods are used to ensure that decision makers in regulatory bodies are not incentivized to regulate in the hope of future employment with a utility company.

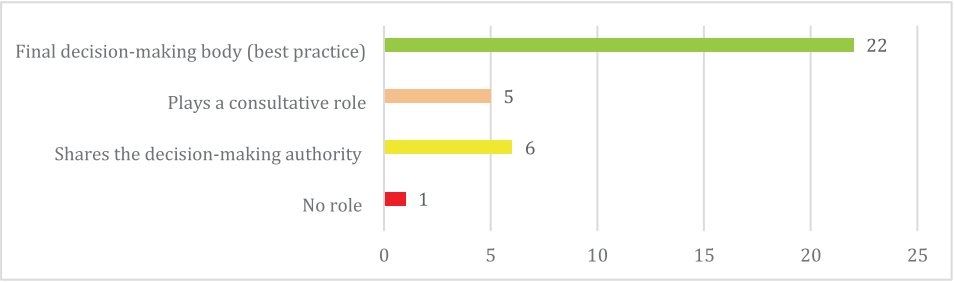
Twenty-nine countries allow the tenures of commissioners or board members to be renewed. Twenty-six countries allow only one renewal, but three allow it more than once. Figure 16 shows the term duration for regulatory commissioners of board members in the sample countries.

Figure 16: Duration of terms of regulatory commissioners or board members



The ERI survey also assessed the role regulators play in making decisions on tariff approval, licensing and conflict resolution between regulated entities and customers. Eighty-six percent of the countries indicated that the regulator is the final decision-maker on tariffs (see figure 17). Eighty percent indicated the regulator is the final decision maker in licensing and conflict resolution issues. The remaining countries indicated either shared decision-making authority or else placed the regulator in a facilitative role.

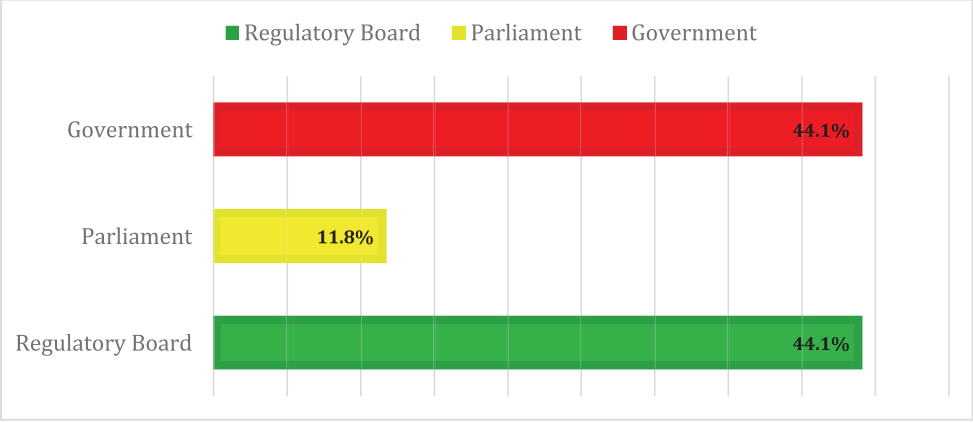
Figure 17: Regulator's role in tariff approval



A regulator requires a sustainable and independent source of funding to implement its activities and initiatives. The commissioners of regulators in fifteen countries are the approving authority for the regulator's budget, in accordance with best practice. In fifteen other countries, regulators require government approval – through the sector ministry or ministry of finance – of their budget. Regulators in a further four countries require parliamentary or legislative approval (see figure 18). None of the sampled countries have given control of the budget to the executive. This is encouraging, as the executive branch is more likely to be exposed to short-term political pressures or lack transparency in decision-making. Debating the regulator's budget in parliament – although often slow – creates more opportunities for public scrutiny, and reduces the scope for executive control of expenditure.

Nevertheless, reliance on government funding compromises the independence of a regulator, while dependence on penalty fees is unsustainable and compromises objectivity. Regulators in thirty-one countries indicated that fees levied on regulated utilities are their source of funding. Two countries, Egypt and Eswatini, indicated that license fees are their source of funding. Only the regulator in Ethiopia indicated government support as its sole source of funding.

Figure 18: Approval Authority of Regulators' Budget



Full independence for the regulator helps to reassure operators in the electricity sector of its objectivity. Furthermore, ensuring an arm's-length relationship between utilities and stakeholders reduces the potential for regulatory capture and improper influence on decision-making. This is further enhanced if the regulator has full control over its own resources and a stable and adequate source of funding.

Accountability

While regulators need a level of independence to take and implement key regulatory decisions, they should be also democratically accountable. The **accountability** indicator assessed whether regulators are required by law to prepare and present annual reports and to whom. It also assessed the existence of an independent appeal mechanism for contesting regulatory decisions. Investors are often more confident if there is a mechanism for resolving disputes between the regulator and operators. The average score for this indicator was 0.777, falling within the yellow performance band. Twenty-one countries scored within the green band. A common constraint on accountability was the lack of a formal mechanism, other than the regular courts, available to aggrieved parties to contest regulatory decisions.

On reporting, the ERI survey results showed that all thirty-four countries have a legal obligation to prepare an annual report. These must be presented to parliament or the sector minister, or in some cases shared solely for information purposes. This is shown in figure 19.

In six of the countries surveyed (18%) – Eswatini, Gambia, Morocco, Nigeria, Uganda and Zimbabwe – annual reports are presented to parliament for formal scrutiny. In twenty-one (62%), they are submitted to the sector minister, while the remaining seven countries share reports with stakeholders for information purposes only. Presenting annual reports to parliament promotes external bi-partisan scrutiny and oversight over the regulators, to counterbalance executive influence. Reports prepared for information purposes are not subject to effective scrutiny.

Figure 19: Purpose and Recipients of Regulators' Annual Report

The **accountability** indicator also surveyed whether countries had an independent mechanism through which stakeholders could contest or challenge the decision of the regulator. International best practice suggests that there should be a first avenue of appeal to a dedicated tribunal, in an expeditious process, rather than requiring resort to the regular courts, which tends to be much slower. In 85% of the countries in the survey sample, there is a dedicated mechanism to challenge regulatory decisions (figure 20).

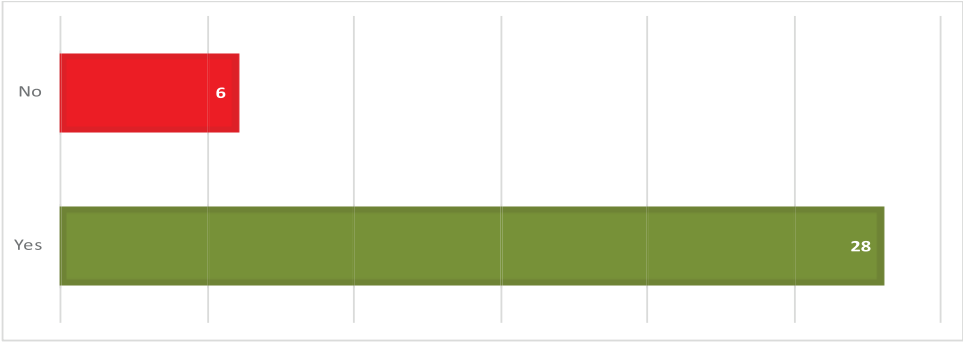
Figure 20: Is there formal mechanism to contest regulatory decisions?

Transparency

For the **transparency** indicator, the ERI survey sought to determine whether regulatory decisions are required by law to be published and made accessible to the public. Transparency in regulatory decisions builds stakeholder confidence and acceptance. The average score for this indicator was 0.833, which falls in the green performance band.

The survey results showed that, in twenty-three (68%) of the countries surveyed, it is mandatory for the regulator to publish regulatory decisions. Regulators in 21% of countries have taken it upon themselves to publish these regulatory decisions on a voluntary basis, even though it is not mandated by law. Regulatory decisions are available to the general public in 82% of the countries surveyed, as shown in figure 21.

Figure 21: Are regulators' decisions accessible to the public?



Participation

The **participation** indicator assesses how regulators involve stakeholders in their decision-making process. Taking account of the views and concerns of industry stakeholders makes regulatory decisions more acceptable, promotes voluntary compliance and increases the likelihood of enforcement. The average score for this indicator was 0.835, falling within the green band performance category. In all countries surveyed, with the exception of Côte d'Ivoire, consultation

with stakeholders is required by law (see figure 22). These public consultations may take the form of *ad hoc* meetings, submission of written comments and public hearings.

Figure 22: Are regulators required by law to consult with stakeholders?

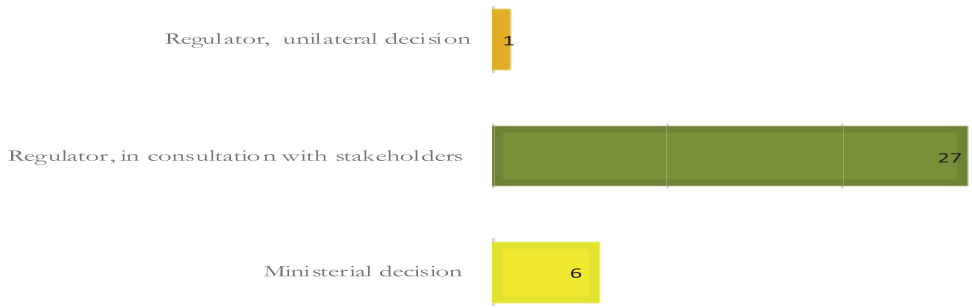
Predictability

For the **predictability** indicator, the ERI survey assessed whether the regulator has a clear and transparent process for reviewing tariffs and other regulatory instruments such licenses. A predictable regulator has clear and transparent mechanisms and processes for reviewing key regulatory decisions that are known to all stakeholders. This provides greater comfort to investors in committing longer-term investments. The average score for this indicator was 0.738, which falls in the yellow band performance category. Twenty-one countries are in the green band.

Clear and transparent procedures – with schedules for reviewing regulatory documents and decisions, especially tariff-related ones – remain a major gap. Even in countries where these procedures have been set down, there remain issues around the independent of regulators to follow them.

Tariff predictability is one dimension of this indicator. Eighteen percent of countries surveyed (including Côte d'Ivoire, Mauritania, Mauritius, Mozambique, Morocco and Togo) indicated that they do not have a clear tariff methodology. Fifteen percent of countries surveyed indicated that, even though they have such methodologies, there are no clear procedures or schedules for major tariff reviews. In 79% of countries, changes in tariff methodology are decided by the regulator in consultation with stakeholders. This is shown in figure 23.

Figure 23: Who takes decisions to review Tariff Methodology



Open Access to Information

For the **open access to information** indictor, the survey examined whether regulators' websites are functional and which types of key regulatory document and information are published there. Open access to information enables regulated utilities and other stakeholders to understand key regulatory issues and processes, contributing to a healthy regulatory regime. Documents such as primary and secondary legislation, tariff methodology, grid codes, license application procedures and research papers should be accessible to the public.

The average score for this indicator was 0.789, falling in the yellow performance band. Twenty-four countries scored in the green band. While key regulatory documents and information (including license application procedures, primary and secondary legislation and tariff methodologies) were published on the websites of most regulators, there were very few research and consultative papers.

Regulators in three of the countries surveyed (9%) had no functioning website. Of those with functioning websites, most had published key regulatory documents. Eighteen percent of regulators in the countries surveyed, including Egypt, Kenya, Malawi, Nigeria, Senegal and South Africa, had all the listed key regulatory documents on their websites. Among key documents, analyses of performance of utilities, research and consultative papers were the least likely to appear on websites.

Table 2: Regulatory Governance Indicators by country

Country	Legal Mandate	Clarity of Roles	Independence	Accountability	Transparency	Predictability	Participation	Open Access Information	RGI
Algeria	1.000	1.000	0.646	0.500	1.000	0.933	0.625	0.813	0.815
Angola	0.667	0.813	0.512	0.500	0.333	0.700	0.938	0.688	0.644
Benin	0.667	1.000	0.634	0.667	1.000	0.933	1.000	0.750	0.831
Botswana	0.667	1.000	0.575	0.833	1.000	0.933	0.750	0.688	0.806
Burkina Faso	1.000	1.000	0.688	0.667	1.000	0.200	1.000	0.688	0.780
Cameroon	1.000	1.000	0.590	0.667	0.667	0.833	0.750	0.938	0.806
Cote d'Ivoire	0.667	0.875	0.557	0.833	1.000	0.400	0.500	0.750	0.698
Egypt	1.000	1.000	0.575	0.750	1.000	0.333	0.750	1.000	0.801
Eswatini	1.000	0.875	0.538	1.000	1.000	0.867	0.750	0.813	0.855
Ethiopia	1.000	1.000	0.477	0.833	0.833	1.000	0.750	0.875	0.846
Gambia	1.000	1.000	0.622	1.000	0.833	0.533	0.938	0.750	0.834
Ghana	0.667	1.000	0.630	0.833	0.667	0.900	0.750	0.875	0.790
Kenya	1.000	1.000	0.708	0.833	1.000	0.867	1.000	1.000	0.926
Lesotho	0.667	1.000	0.622	0.833	0.833	1.000	1.000	0.875	0.854
Liberia	1.000	1.000	0.427	0.667	0.167	0.867	1.000	0.000	0.641
Madagascar	1.000	1.000	0.700	0.667	1.000	0.600	0.625	0.875	0.808
Malawi	1.000	1.000	0.764	0.833	1.000	0.867	1.000	1.000	0.933
Mali	0.667	1.000	0.578	0.667	1.000	1.000	0.688	0.875	0.809
Mauritania	1.000	0.938	0.739	0.500	1.000	0.600	0.688	0.875	0.792
Mauritius	0.667	0.938	0.441	0.500	0.833	0.600	0.313	0.938	0.654
Morocco	0.667	1.000	0.673	0.667	0.167	0.267	0.750	0.250	0.555
Mozambique	1.000	1.000	0.665	0.833	0.333	0.333	0.813	0.000	0.622
Namibia	1.000	1.000	0.571	0.833	1.000	0.867	1.000	0.875	0.893
Niger	1.000	1.000	0.554	0.833	1.000	0.600	1.000	0.875	0.858
Nigeria	1.000	1.000	0.760	1.000	1.000	0.867	1.000	1.000	0.953
Rwanda	1.000	0.813	0.815	0.667	1.000	0.867	0.750	0.875	0.848
Senegal	1.000	0.938	0.640	0.833	1.000	1.000	1.000	1.000	0.926
Sierra Leone	1.000	0.938	0.424	0.833	1.000	0.867	0.750	0.875	0.836
South Africa	1.000	0.938	0.649	0.833	1.000	0.867	1.000	1.000	0.911
Tanzania	1.000	1.000	0.727	0.833	1.000	0.867	1.000	0.813	0.905
Togo	1.000	0.875	0.625	0.833	0.667	0.200	0.750	0.813	0.720
Uganda	1.000	1.000	0.700	1.000	1.000	0.867	1.000	0.813	0.922
Zambia	1.000	0.875	0.590	0.833	0.667	1.000	1.000	0.750	0.839
Zimbabwe	1.000	1.000	0.542	1.000	0.333	0.667	0.750	0.813	0.763
Average	0.911765	0.965074	0.616382	0.776961	0.833333	0.738235	0.834559	0.788603	0.808114

=>0.80	<=0.60 and <0.80	<=0.50 and <0.60	<0.50

3.3. The Regulatory Substance Index (RSI)

The Regulatory Substance Index (RSI) measures the level of implementation of electricity sector regulatory frameworks. It is composed of four indicators: **economic regulation**, **commercial quality**, **technical regulation** and **licensing**.

The average RSI score for all the sample countries was 0.551, which falls in the orange band performance category. Four countries (12%) made it into the green band, while eight (24%) were in each of the yellow and orange bands and fourteen (40%) in the red band. Figures 24 and 25 show the overall result for each country.

The results imply that regulators are constrained by numerous challenges affecting the development and implementation of regulatory instruments and mechanisms, and potentially undermining 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 electricity sector regulators.

Figure 24: 2019 Regulatory Substance Index (RSI) Map

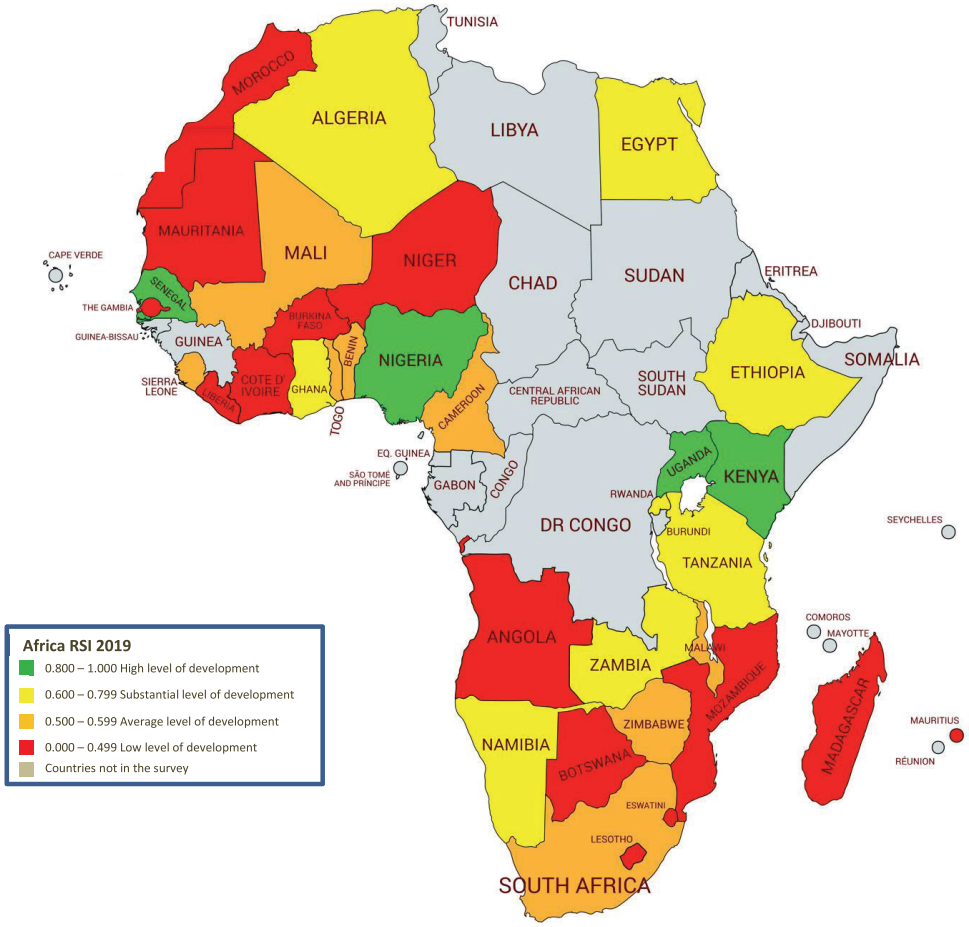
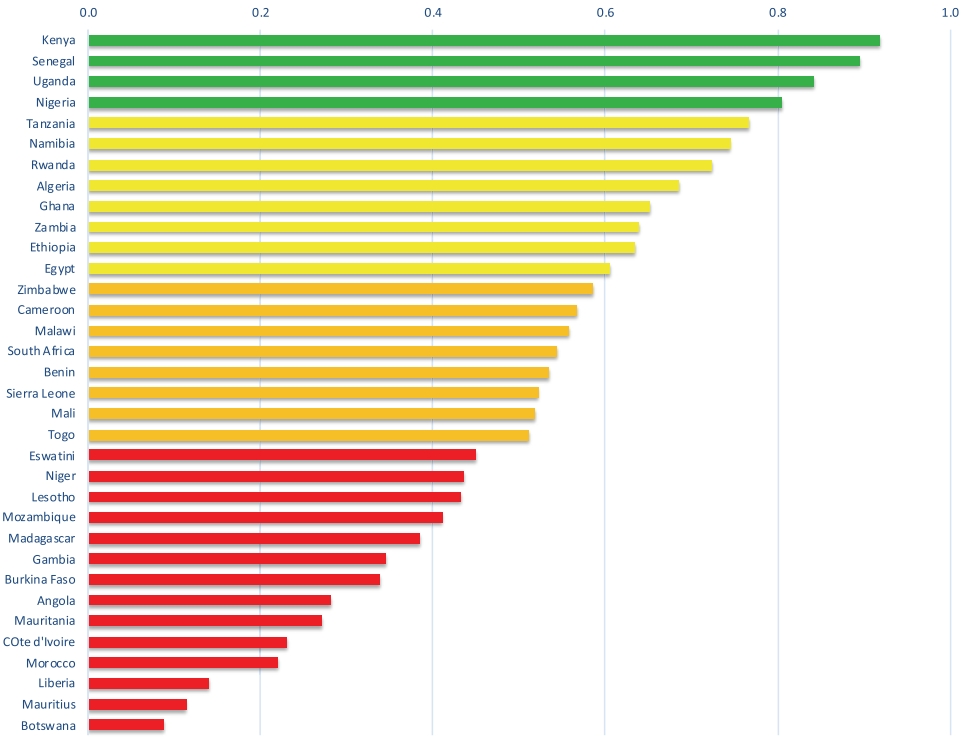


Figure 25: Countries' ranking according to Regulatory Substance Index (RSI)

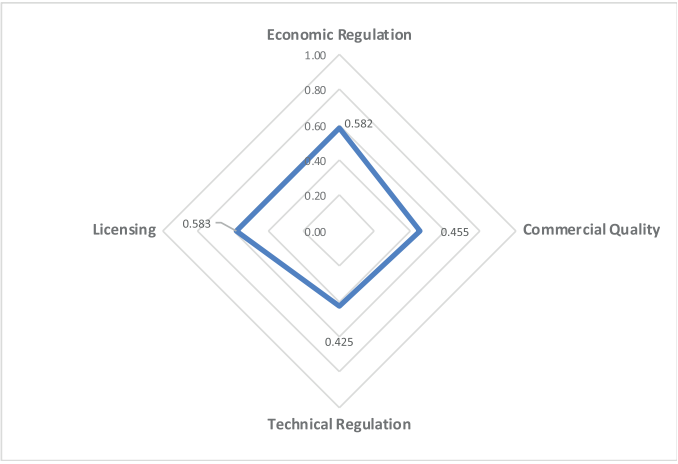


The correlation between the operational age of the regulator and the level of regulatory development is particularly apparent in the RSI, where regulators need time to develop and implement their regulatory frameworks. Countries with well-established regulators generally performed better on indicators of economic regulation. Low performers on this index include Morocco, Mauritania, Liberia, Côte d'Ivoire, Burkina Faso and Togo.

3.3.1 Breakdown of RSI Results

None of the four RSI indicators recorded average scores in the green band category. While the average score in two RSI indicators (**economic regulation** and **licensing frameworks**) fell in the orange band, average scores for the other two RSI indicators (**technical regulation** and **commercial quality of service**) fell in the red band. The scores of the RSI indicators are displayed in figure 26.

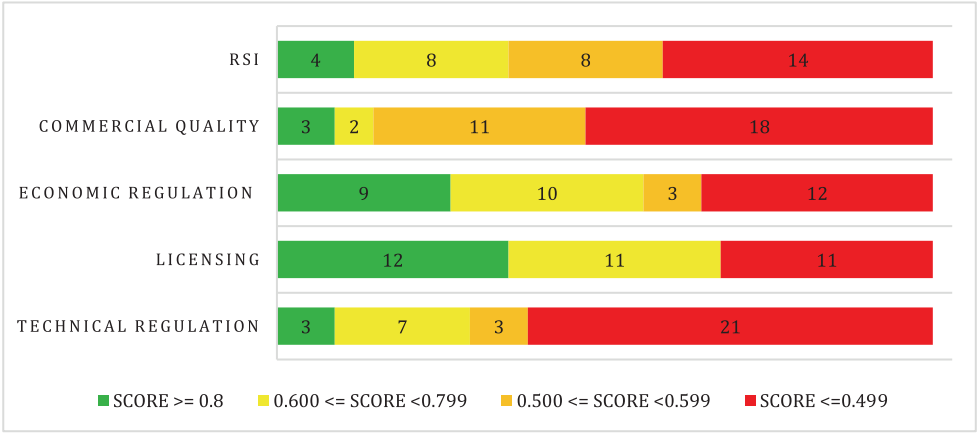
Figure 26: Components of the RSI 2019



Note: the graph shows the average value of each component of the RSI on the scale of 0-1

Figure 27 demonstrates the performance of countries by RSI indicator. The number of countries scoring below 0.500 indicates that there is a significant need for improvement on the four sub-indicators of the RSI.

Figure 27: Countries' performance by RSI dimension, 2019



Among all the RSI indicators, **technical regulation** recorded the lowest average score (0.425), with twenty-one countries (62%) in the red band, while only three countries (9%) fell within the green band. This low score was mainly due to inadequate regulatory frameworks for renewable energy, especially off-grid systems. Liberia, which is rebuilding its power sector following an extended period of fragility, and Mauritius, which is in the early stages of operationalizing an independent electricity sector regulator, had no regulatory framework on renewable energy.

Commercial quality of service was another RSI indicator where the average score fell within the red band, with an average score of just 0.455. Only three countries scored within the green band, while eighteen countries (53%) fell into the red band. The major gap identified under this indicator was the inability of the regulator to carry out a comprehensive analysis of the utilities' performance, discuss them with the utility and publish them.

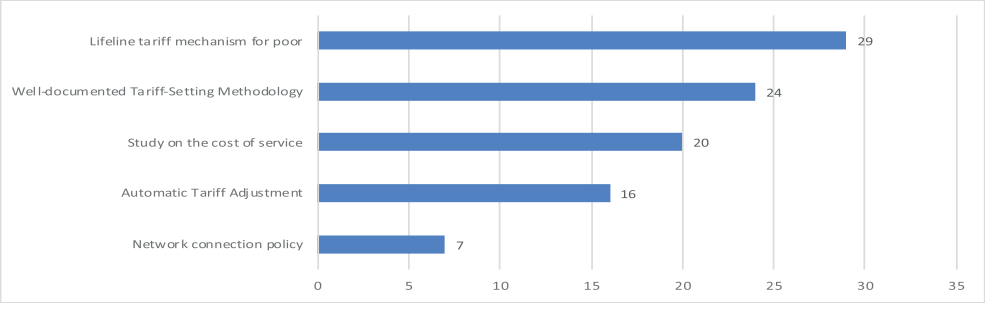
Several countries performed well on indicators measuring the extent to which licensing frameworks have been developed; however, a few countries, notably Morocco and Niger, did not have licensing frameworks at all. In Mauritius, licensing was undertaken by the utility, which is not good practice. Table 3 summarizes results against all six indicators.

Economic Regulation

The **economic regulation** indicator assesses whether the regulator has developed a comprehensive tariff guideline and methodology, with requisite adjustment mechanisms. It considers whether the regulator has the capacity to review the tariff proposed by the regulated utility company. The average score for this indicator is 0.582, falling within the orange performance category.

The survey shows, that while 71% of the countries surveyed had developed tariff-setting methodologies, 38% had no automatic tariff adjustment or tariff indexation mechanism. Three-quarters of countries with developed tariff methodologies had no network connection policy (how and at what cost generators and distributers interconnect) as part of their tariff guidelines or methodology. This is shown in figure 28.

Figure 28: Sub-indicators of economic regulation



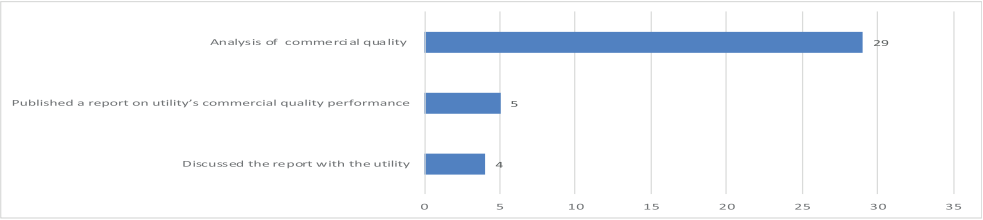
Well-developed economic regulation supports the transparency and credibility of the tariff-setting regime and encourages investors to make long-term investments (see Box 2). It encourages competition and incentivizes investors to make commercially-driven investments. A good economic regulatory regime will also include the development of tariff guidelines for grid-connected renewable energy systems and off-grid systems.

Commercial Quality of Service

The **commercial quality of service** indicator explores the existence and scope of quality of service code or regulations and whether regulators undertake an analysis on the quality of quality of service performance of the utilities and publish the results of such analysis. The regulators' expertise in analyzing the power utility's financial and commercial performance is also examined. The average score for all the countries for this indicator was 0.455, falling in the red performance category.

While regulators in 85% of the countries surveyed have quality of service codes that cover commercial quality of service, only 14% have carried out and published a comprehensive analysis of the utilities' commercial quality of service performance and discussed reports detailing such analyses with the utilities. There were some capacity and expertise gaps in the regulatory institutions of some of these countries to undertake these commercial qualities of service monitoring and analysis. This is shown in figure 29.

Figure 29: Regulators' Actions on Utilities' Commercial Quality of Service Reports



A well-developed 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. As evident in the regulatory outcome section below, regulators with low quality of service sub-indicator also demonstrate low consumer regulatory outcomes.

Box 2. Improving Economic Regulation to Support the Sector's Sustainability

Namibia's Electricity Control Board (ECB) has put in place a strong economic regulatory division with a team of staff clearly mandated to ensure that the economic aspects of the electricity sector, such as tariffs, are handled carefully. The ECB has also taken clear measures to facilitate investment in electricity, such as putting in place an investor portal where all the information regarding the sector is provided, from the license application procedure, laws and regulations, incentives to the resources map.

Additionally, the country is finalizing policy that will see renewable energy being used 100% in all schools and most public institutions. The ECB is working on the associated renewable energy regulatory instruments. Furthermore, when the generation costs reduced, ECB adjusted the annual tariffs downwards by 2.5%

To ensure continued improvements in quality of service, a department has been put in place to enforce quality of service standards. In addition to handling all engineering services required for regulatory quality of service oversight, this department also carries out field inspections.

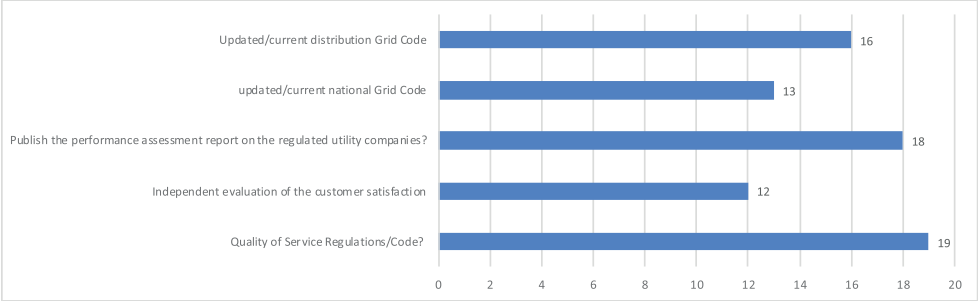
Technical Regulation

The **technical regulation** indicator assesses whether the regulator has defined standards for: technical quality of service, grid connection, the grid code for interconnected power systems, and stand-alone systems. It also assesses the regulation of mini grids, the development and implementation of a regulatory framework for grid-connected renewable energy, as well as the expertise and experience of the regulators' staff on these areas. These elements are key determinants of the quality and sustainability of electricity networks.

Technical regulation is the second-weakest dimension of the RSI, with an average score of 0.425, falling in the red performance band. The absence of developed grid codes, appropriate policy frameworks and technical standards for renewable energy, especially mini-grids and off-grid systems, were the underlying factors for the low scores.

The survey results showed that 44% of the countries surveyed had no technical quality of service codes developed that set appropriate thresholds and benchmarks for utilities performance. Fifty-nine percent of the countries surveyed had no national grid codes that would provide the technical specifications, standards for connection and joint use of the grid and its operations by transmission utilities. The sub-indicators of the technical quality of service are set out in figure 30.

Figure 30: Sub-indicators of Quality of Service Regulation



On off-grid systems (mini-grid and stand-alone systems), most countries demonstrated a lack of appropriate technical standards and regulatory frameworks. Regulators in thirteen countries (38%) have developed technical standards for mini-grids, and in seventeen have developed legal and policy frameworks. Regulators in only five countries (15%) have developed technical standards for stand-alone systems, while eleven countries (32%) have developed legal and policy frameworks for stand-alone and home systems. Most countries lacked connection codes that provide for the connection of mini-grids to the national grid and had no existing programs to promote or incentivize the development of off-grid systems. 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 (see Box 3).

On grid-connected renewable energy, 62% of countries surveyed had no developed rules that guarantee grid access to renewable energy technologies with priority dispatch. In addition, 85% of the countries surveyed have not developed technology-specific model contracts or power purchase agreements (PPAs). Standardized technology-specific contracts are necessary to facilitate and accelerate the deployment of clean, grid-connected renewable energy solutions. The AfDB is currently working with a few of the countries in the sample on independent power producer (IPP) procurement programs that will address this gap.

Given the important role that decentralized power systems will play in the acceleration of access to electricity and transition to green growth, weak performance in this dimension requires swift attention. Implementing frameworks and mechanisms for developing off-grid systems are critical.

Box 3. Adopting New Approaches to Support Electrification in Nigeria

The Federal Government of Nigeria recognizes the need to use both on- and off-grid systems and different energy supply technologies to meet national energy access targets. Distribution Companies (DISCOs) will improve and extend services to areas served by their grid networks, while the Rural Electrification Agency (REA) will focus on off-grid expansion.

In compliance with its role and responsibility, the electricity regulator, NERC, has developed a set of regulatory guidelines, standards, codes and regulations that directly support providers to develop mini-grids in unserved and underserved areas. One key regulation that pertains directly to mini-grids is the Regulatory Commission Regulation for Mini-Grids, 2017.

The mini-grid regulations apply to isolated or interconnected systems with generation capacity of up to 1 MW. The mini-grid is required to have a generator in its network that may be operated by the mini-grid operator or a third party. Although DISCO concessions span all areas in the states in which they are licensed, mini-grids are allowed to operate within certain parameters:

- Mini-grids will not interfere with expansion plans into the designated unserved areas;
- Mini-grids will not serve communities that lay within the five-year expansion plan of the DISCO;
- Mini-grids can be built in geographic locations that are deemed to be unserved areas and have not been assigned to an Independent Electricity Distribution Network Operator (IEDNO) or any other mini-grid service provider.

The permit process is straightforward. Permits are only required for systems above 100 kW. However developers of systems below 100kW may still seek regulatory permits in order to benefit from compensation allowed for under the regulations to mitigate against the risk of DISCO grid network expansion. NERC has defined a regulatory framework that provides options for mini-grid developers, including allowing mini-grid developers to exit their investment with appropriate compensation or continue to earn revenue from their investment, for instance by selling to the DISCO.

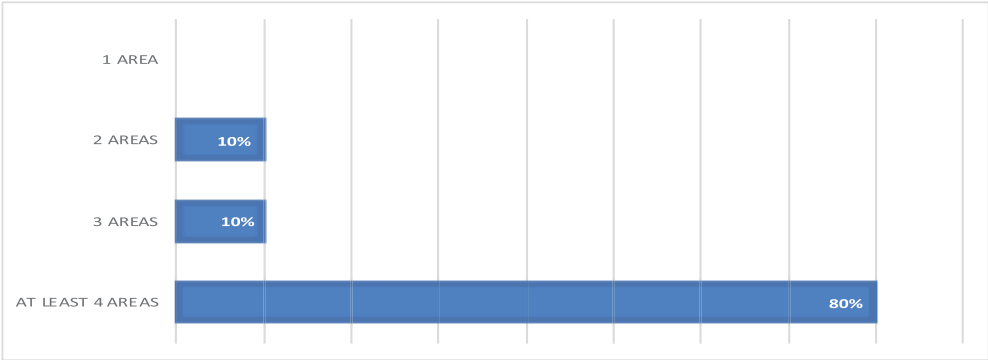
Nigeria's large population and strong economy make it an attractive place to build the sector. The vast but underdeveloped mini-grid market offers revenue potential of ₦2.8 trillion (US$8 billion) annually in Nigeria alone (Mini grid Investment Report: Scaling the Nigerian Market, 2018). NERC's regulations were clearly drafted to promote attractiveness of the market and encourage investments. Based on these frameworks, the country has been able to mobilise significant resources from Development Partners and commercial investors to significantly scale up mini grid deployment.

Licensing Framework

This **licensing framework** indicator assesses whether the regulator has a simplified licensing framework available. The surveys show that many regulators do not have appropriately simplified frameworks that can be flexible and meet the diverse needs of different developers and operators. Licensing frameworks should cover issues related to procedures and guidelines for applications, approval processes, license forms, and a schedule of license fees.

The average score of all the surveyed countries for this indicator was 0.583, falling in the orange performance band. The survey results showed that 80% of the countries have licensing guidelines and frameworks that cover all four principal areas of the licensing framework. Ten percent cover three areas and another 10% cover just two areas. This is shown in figure 31.

Figure 31: Number of Key Areas of Licensing covered by the licensing framework (large and small size generators)



This indicator also captured whether there is a separate simplified licensing framework specifically for off-grid systems. Twenty-two countries have developed license framework covering both grid and off-grid systems, while seventeen countries have developed simplified license framework for off-grid systems.

It is important for regulators to streamline their licensing frameworks for the power sector by developing different models for large and small power plants, especially for isolated mini-grid and stand-alone systems (see Box 4). A different licensing regime for small power plants using light-touch regulation will reduce the regulatory processes involved in obtaining licenses or permits, reducing costs for off-grid operators.

Box 4: Adopting simplified and clear licensing frameworks in Ghana

The Ghana Energy Commission (EC) has developed detailed and clear guidelines as well as sample application forms since 2006. These are available on its website. Prospective investors have information about the requirements for applying, how to submit applications and how long each step will take as well as detailed description of each exhibit required. The EC's licensing and application manual shows ten different categories of licenses covering wholesale supply, brokerage services, generation, transmission and distribution services, import and export operations, and bulk customer permits. The Commission has the power to create licenses for any other market activity in the electricity supply industry, indicating the flexibility of electricity regulation in Ghana. The unique feature of Ghana's licensing framework is the modularity, with clear step by step approaches, which guide investors throughout the duration of developing their projects and allows the regulator to continuously engage with the developer from beginning to completion. It is a four-staged licensing process consisting of:

1. **Provisional License Stage**: This is the first stage of the licensing where the developer submits the project concept (pre-feasibility studies) together with the developer's details to the EC for initial background checks and issuance of a provisional licence, if satisfactory. This licence gives the investor initial confidence to engage with appropriate financiers and other industry stakeholders.

2. **Siting Clearance Stage:** The developer at this stage is required to identify the proposed site for the project but not purchase it. A multi-sectoral committee including: the EC, the grid operator, environmental protection agency, security agencies and the local assembly, pay a visit to the site and based on the preliminary satisfactory reports from each of them, the regulator issues a siting clearance for the developer to go ahead and secure the land. Most projects will require permits from these agencies and this platform is created to act more like a one-stop shop for permits and licence. In the case of grid-connected renewable energy, the grid operator carries out a grid impact simulation to advise on the capacity of the grid to accommodate the proposed capacity of renewable energy at that section of the grid.

3. **Construction Stage:** When the developer has arrived at a financial close and signed an engineering, procurement and construction (EPC) contract, the EC issues a construction permit upon receiving and reviewing the final engineering drawing and copy of the EPC contract.

4. **Operationalisation:** Upon completion and submission of satisfactory commissioning report, the EC finally issues an authorisation to operate, which is the permanent license for the lifespan of the project.

Table 3: Regulatory Substance Indicators (RSI)

Country	Economic Regulation	Commercial Quality	Technical Regulation	Licensing	RSI
Algeria	0.792	0.667	0.614	0.667	0.685
Angola	0.417	0.333	0.374	0.000	0.281
Benin	0.583	0.333	0.305	0.917	0.535
Botswana	0.250	0.083	0.014	0.000	0.087
Burkina Faso	0.250	0.357	0.410	0.333	0.338
Cameroon	0.583	0.583	0.098	1.000	0.566
Cote d'Ivoire	0.417	0.238	0.268	0.000	0.231
Egypt	0.667	0.500	0.587	0.667	0.605
Eswatini	0.563	0.357	0.211	0.667	0.449
Ethiopia	0.604	0.571	0.692	0.667	0.634
Gambia	0.646	0.571	0.164	0.000	0.345
Ghana	0.646	0.417	0.543	1.000	0.651
Kenya	0.833	0.857	0.983	1.000	0.918
Lesotho	0.417	0.357	0.287	0.667	0.432
Liberia	0.167	0.357	0.040	0.000	0.141
Madagascar	0.750	0.042	0.412	0.333	0.384
Malawi	0.750	0.357	0.457	0.667	0.558
Mali	0.833	0.286	0.123	0.833	0.519
Mauritania	0.250	0.250	0.170	0.417	0.272
Mauritius	0.167	0.286	0.000	0.000	0.113
Morocco	0.000	0.500	0.382	0.000	0.220
Mozambique	0.450	0.357	0.168	0.667	0.410
Namibia	0.813	0.821	0.676	0.667	0.744
Niger	0.833	0.500	0.410	0.000	0.436
Nigeria	0.833	0.714	0.672	1.000	0.805
Rwanda	0.833	0.429	0.634	1.000	0.724
Senegal	0.833	0.857	0.894	1.000	0.896
Sierra Leone	0.438	0.357	0.297	1.000	0.523
South Africa	0.667	0.571	0.271	0.667	0.544
Tanzania	0.833	0.571	0.827	0.833	0.766
Togo	0.271	0.500	0.608	0.667	0.511
Uganda	1.000	0.571	0.798	1.000	0.842
Zambia	0.667	0.571	0.487	0.833	0.640
Zimbabwe	0.750	0.357	0.569	0.667	0.586
Average	0.582475	0.455357	0.424832	0.583333	0.511499

=>0.80	<=0.60 and <0.80	<=0.50 and <0.60	<0.50

3.4. Regulatory Governance and Substance index (ERI_{GS})

The ERI_{GS} is calculated by averaging the aggregate scores on the RGI and RSI. The results are shown in Table 4. The RGI and the RSI together assess the effectiveness of a regulatory environment to support electricity sector reforms, promote efficiency and fulfill national objectives. This preliminary calculation also provides important insights into national regulatory development, without recourse to the effects of the regulatory actions and decisions on the sector

Seven countries achieved a score above 0.80 on the ERI_{GS} and six countries scored below 0.50. Figures 32 and 33 shows the sample countries based on their ERI_{GS} scores. Kenya, Tanzania, Uganda, Senegal, Namibia, Rwanda and Nigeria remain the best performers, indicating good performance in each of the RSI indicators.

Table 4: Electricity Regulatory Index for Governance and Substance Indicators (ERIGS)

Country name	RGI	RSI	ERIgs
Algeria	0.815	0.685	0.750
Angola	0.644	0.281	0.462
Benin	0.831	0.535	0.683
Botswana	0.806	0.087	0.446
Burkina Faso	0.780	0.338	0.559
Cameroon	0.806	0.566	0.686
Cote d'Ivoire	0.698	0.231	0.464
Egypt	0.801	0.605	0.703
Eswatini	0.855	0.449	0.652
Ethiopia	0.846	0.634	0.740
Gambia	0.834	0.345	0.590
Ghana	0.790	0.651	0.721
Kenya	0.926	0.918	0.922
Lesotho	0.854	0.432	0.643
Liberia	0.641	0.141	0.391
Madagascar	0.808	0.384	0.596
Malawi	0.933	0.558	0.745
Mali	0.809	0.519	0.664
Mauritania	0.792	0.272	0.532
Mauritius	0.654	0.113	0.383
Morocco	0.555	0.220	0.388
Mozambique	0.622	0.410	0.516
Namibia	0.893	0.744	0.819
Niger	0.858	0.436	0.647
Nigeria	0.953	0.805	0.879
Rwanda	0.848	0.724	0.786
Senegal	0.926	0.896	0.911
Sierra Leone	0.836	0.523	0.679
South Africa	0.911	0.544	0.727
Tanzania	0.905	0.766	0.836
Togo	0.720	0.511	0.616
Uganda	0.922	0.842	0.882
Zambia	0.839	0.640	0.739
Zimbabwe	0.763	0.586	0.674

=>0.80	<=0.60 and <0.80	<=0.50 and <0.60	<0.50

Figure 32: Countries' rankings according to Regulatory Governance and Substance Index (ERI_{GS})

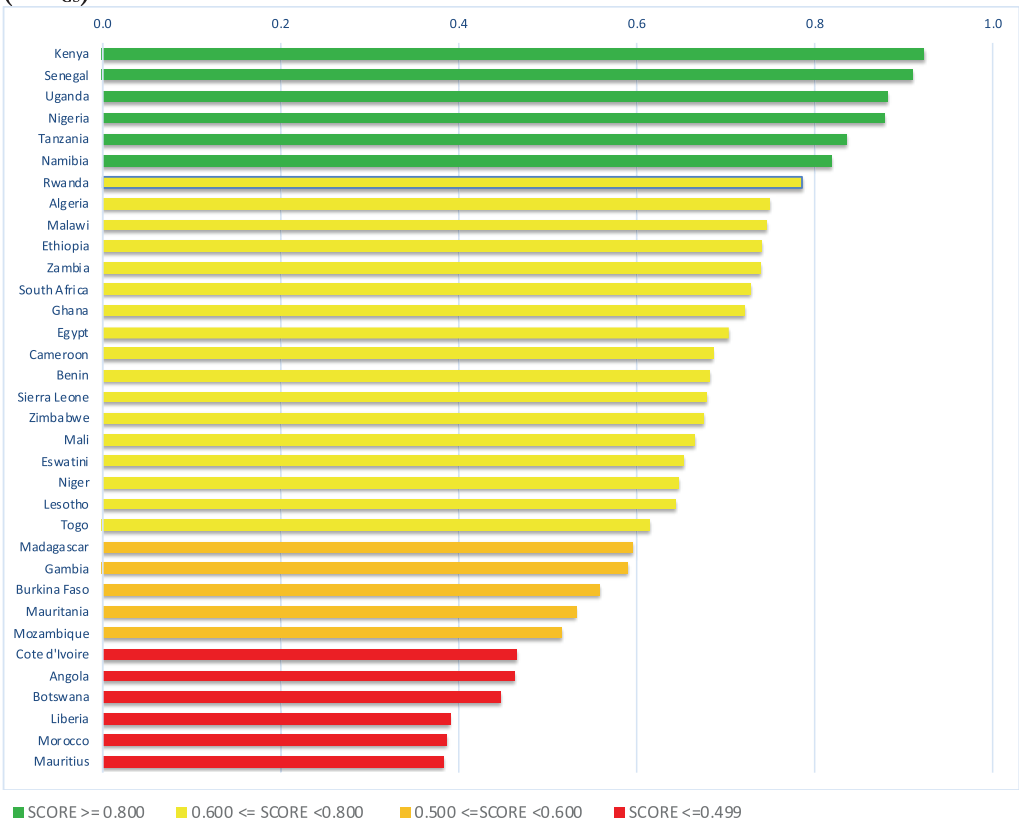
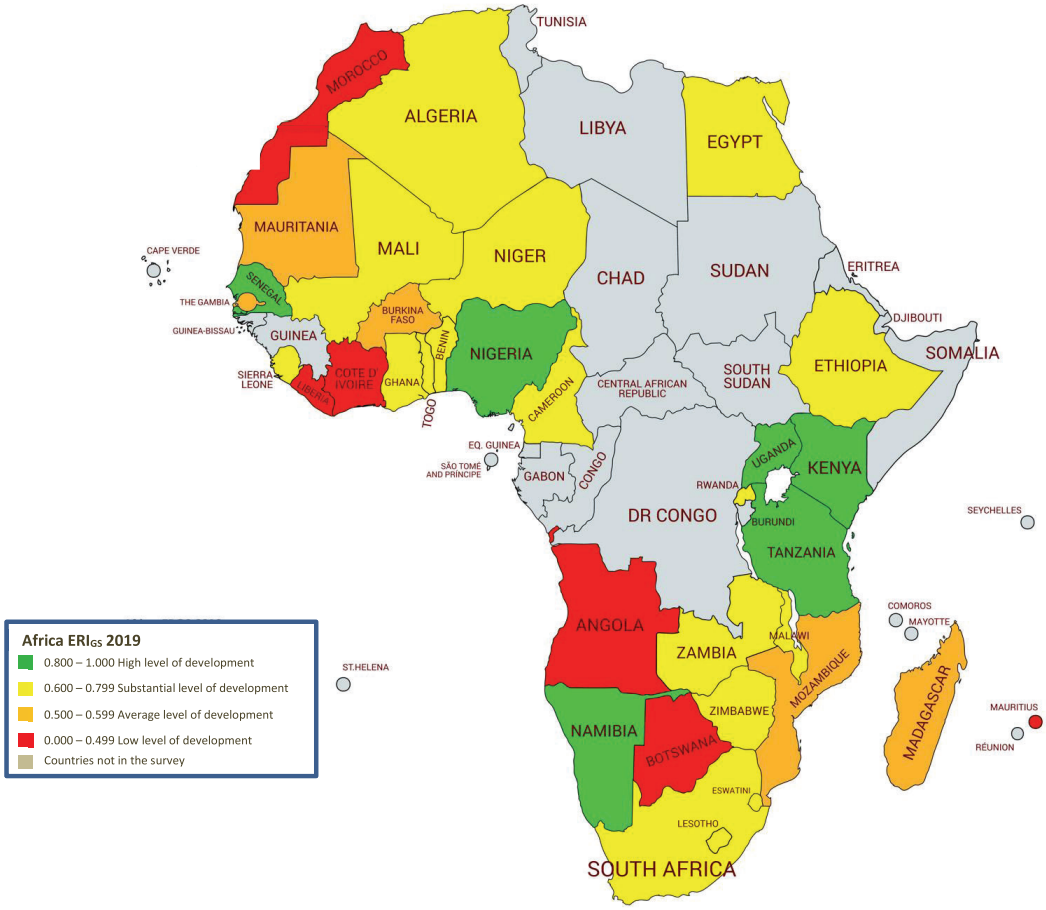


Figure 33: 2019 ERI$_{GS}$ Map



3.5. The Regulatory Outcome Index (ROI)

The Regulatory Outcome Index (ROI) assesses the outcome of the regulatory actions and decisions on the sector from the perspective of the distribution utilities and consumers, who were represented by the chambers of commerce. The overall ROI is calculated by taking the average ROI scores for utilities (ROIu) and for consumers (ROIc).

The average ROI score was 0.505, which is in the orange band. No country made it into the green band on ROI. The best nine performing countries (26%) in ROI were in the yellow band, while sixteen countries (47%) were in the red band. Figures 34 and 35 demonstrate the overall scores on the ROI.

Figure 34: 2019 Regulatory Outcome Index (ROI) Map

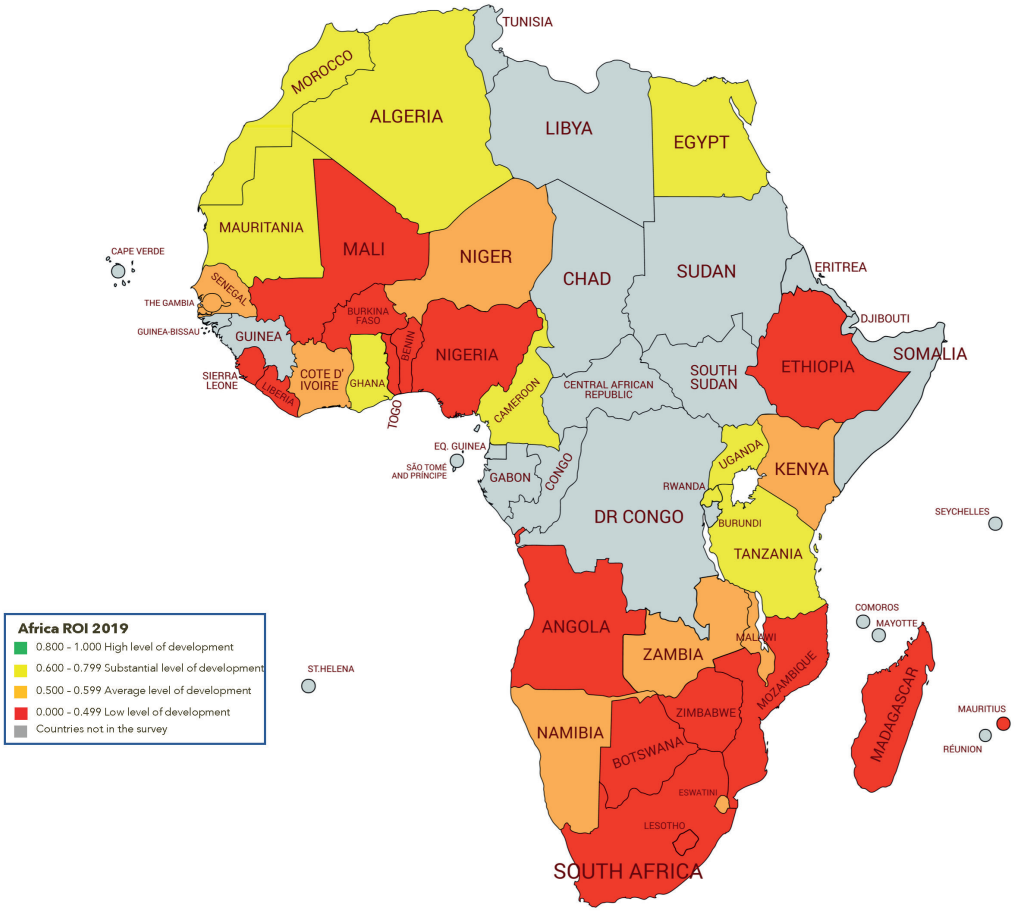
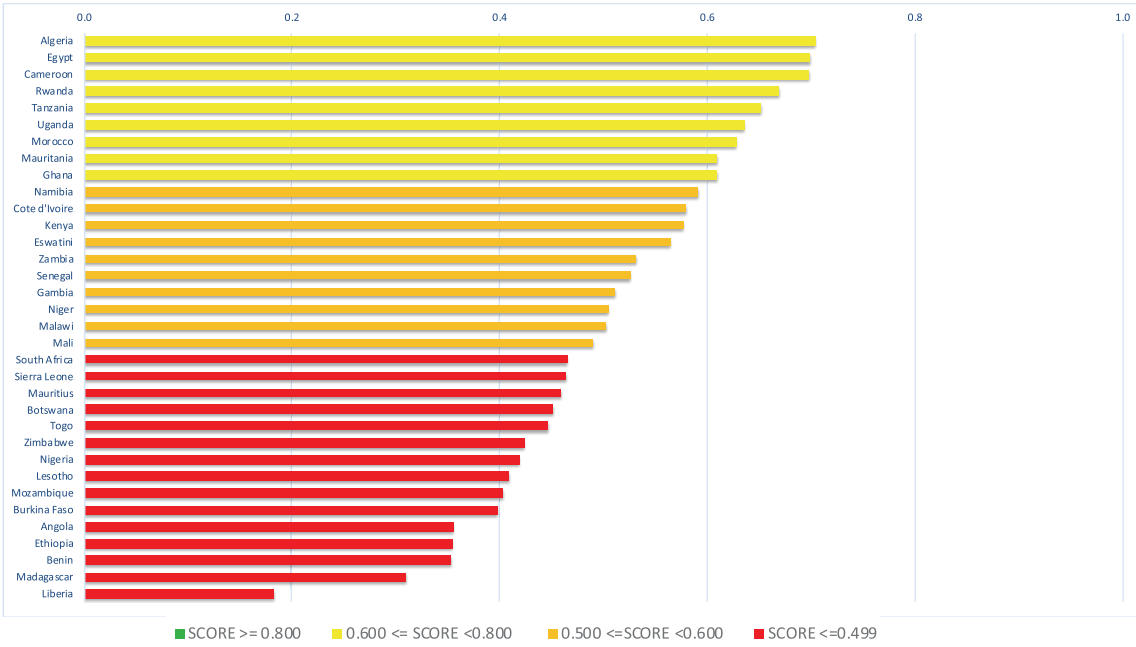


Figure 35: Countries' ranking according to Regulatory Outcome Index



The average regulatory outcome index score from the utilities' assessment (ROIu) was generally higher than the score from the consumers' assessment (ROIc). While nine countries scored in the green band on the ROIu, no country did on the ROIc. In comparison, twenty-six countries scored in the red band on the ROIc, but only seven countries did on the ROIu. This indicates low levels of end user satisfaction in almost all countries. Table 5 shows the ROI scores for all countries in the sample.

Table 5: Regulatory Outcome Indicators (ROI)

Country	ROIu	ROIc	ROI
Algeria	0.908	0.470	0.689
Angola	0.611	0.100	0.356
Benin	0.567	0.139	0.353
Botswana	0.377	0.525	0.451
Burkina Faso	0.646	0.150	0.398
Cameroon	0.747	0.650	0.698
Cote d'Ivoire	0.385	0.775	0.580
Egypt	0.899	0.470	0.684
Eswatini	0.630	0.500	0.565
Ethiopia	0.584	0.125	0.354
Gambia	0.448	0.575	0.511
Ghana	0.719	0.470	0.595
Kenya	0.953	0.200	0.577
Lesotho	0.484	0.333	0.409

Country	ROIu	ROIc	ROI
Liberia	0.365	0.000	0.182
Madagascar	0.229	0.389	0.309
Malawi	0.630	0.470	0.550
Mali	0.380	0.600	0.490
Mauritania	0.802	0.417	0.609
Mauritius	0.510	0.406	0.458
Morocco	0.632	0.720	0.676
Mozambique	0.557	0.220	0.389
Namibia	0.819	0.361	0.590
Niger	0.761	0.470	0.616
Nigeria	0.662	0.175	0.419
Rwanda	0.797	0.542	0.669
Senegal	0.803	0.250	0.526
Sierra Leone	0.552	0.470	0.511
South Africa	0.604	0.325	0.465
Tanzania	0.953	0.350	0.652
Togo	0.719	0.175	0.447
Uganda	0.870	0.400	0.635
Zambia	0.813	0.220	0.516
Zimbabwe	0.797	0.050	0.423

Classification of scores

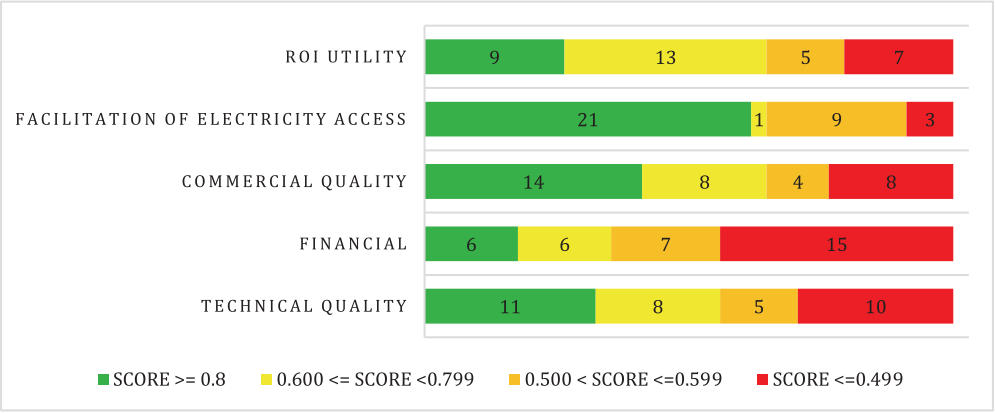
=>0.80		<=0.60 and <0.80		<=0.50 and <0.60		<0.490	

3.5.1. Breakdown of Results for the Regulatory Outcome Index for Utilities (ROIu)

The regulatory outcome index, from the utilities perspective, was assessed along four indicators: **financial performance**, **commercial quality of service**, **technical quality of service** and **facilitation of electricity access**. The average score for ROIu was 0.653, which falls within the yellow band. Nine countries reached the green band, and the top five performers on this indicator were Kenya, Tanzania Algeria, Egypt and Uganda. Seven countries were in the red band. Countries' performance on the ROIu and its indicators is demonstrated in figure 36.

Financial performance was identified as a major challenge to regulators. Twenty-six countries (76%) acknowledged that their existing end-user tariffs did not cover their cost of operation. Lack of a regulatory mechanism to deal with electricity theft in most countries was another major bottleneck.

Figure 36: ROI utility by indicator and number of countries



Financial Performance

On the **financial performance** indicator, the ERI survey assessed utilities' financial health, including the ability to cover the cost of operation and the regulatory mechanisms in place to ensure sustainable, cost-reflective tariffs. The average score for this indicator was 0.527, which falls within the yellow performance band.

The survey results for this indicator showed utilities generally demonstrated weak financial performance, highlighted by the lack of implementation of regulators' frameworks. Even though 88% of the utilities confirmed they undertake a cost of service study (figure 37), 66% indicated that the existing end-user tariffs was not in accordance with their cost of operation (figure 38), which suggests that the regulator is not applying the findings of the cost of service study.

Figure 37: Is there a Cost of Service Study carried out by the utility?

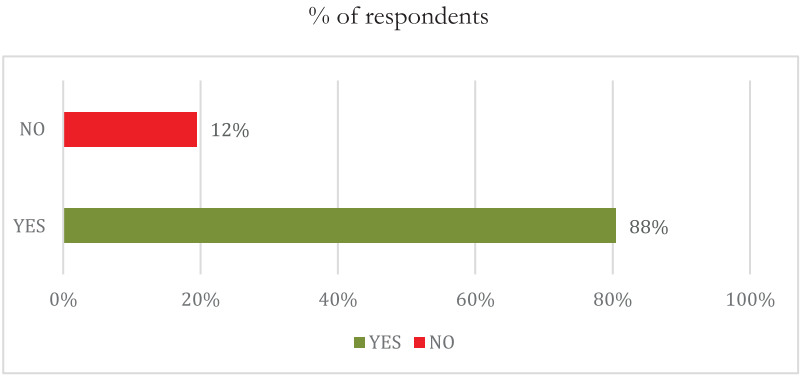
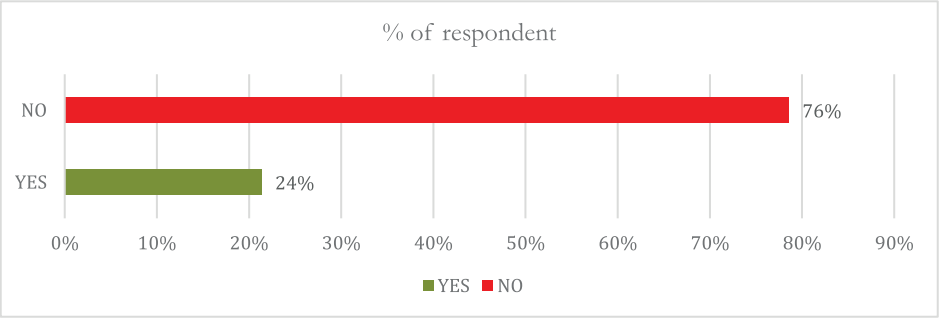
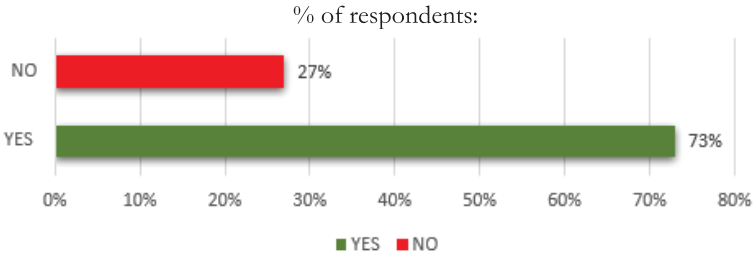


Figure 38: Is the Average end-user tariff in accordance with the utility's cost of service?



While 73% of utilities reported that the regulator had formulated a procedure and a schedule for reviewing end-user tariffs (figure 39), in half of the countries the regulator does not follow this procedure. Seventy-five percent of utilities responded that there is no regulatory mechanism for dealing with electricity theft, and 56% had a collection rate below 80%.

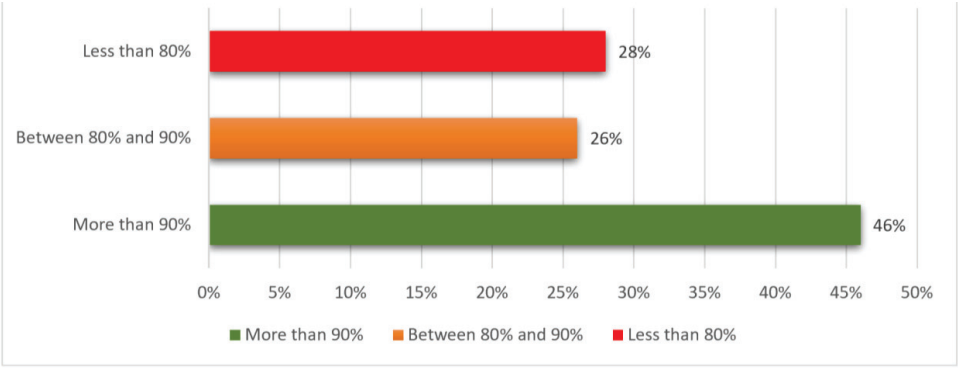
Figure 39: Is there a Loss Reduction Target Agreed with the Regulator?



Regulators need to agree on a loss reduction target with the utilities and put in place incentives to encourage the utilities to achieve them. If the utilities are left unchecked and only penalized through tariffs for not achieving expected loss targets, a vicious cycle of higher losses and poor financial health takes root. Seventy-three percent of the utilities surveyed reported having agreed on a loss reduction target with the regulator.

There is scope for improvement in collection and revenue recovery rates. Seventeen countries have collection rates above 90%. This is shown in figure 40. Some of them, including Cameroon, reported a collection rate of 95%, which is the benchmark for an acceptable collection rate. However, 54% of utilities in the sample reported recovery rates below 90%. Combined with high distribution losses, a country with a distribution efficiency of 80% and an 80% rate recovery will have an operational efficiency of 64%. The use of prepaid meters and smart meters, as well as enforcing disconnection for non-payment, can help improve recovery rates.

Figure 40: Average collection rate (for the last three years)



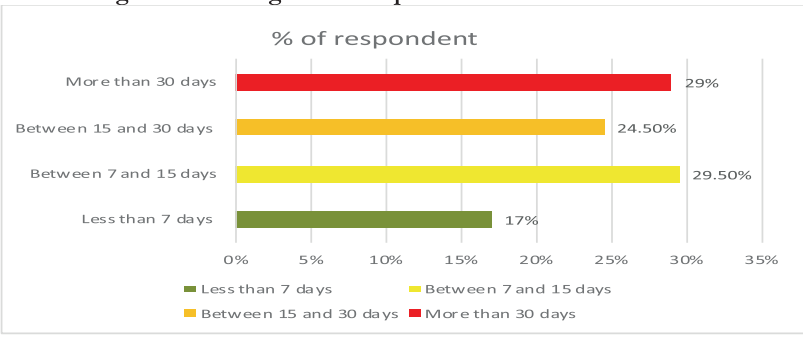
Commercial Quality of Service

The survey assessed the level of **commercial quality of service** of the utility, in respect of the regulatory mechanisms in place, to ensure it meets pre-determined threshold criteria and benchmarks. Commercial quality of service indicators surveyed include the average time required to provide service connection to a residential consumer, respond to a billing- and supply-related complaint, and restore a connection upon payment of outstanding bills after disconnection.

The average score for this indicator was 0.670, which falls within the yellow performance band. Responses from the utilities surveyed indicated that legislative or regulatory instruments have set performance thresholds for most of the sub-indicators for commercial quality of service. However, some utilities have not met the performance thresholds for most of these sub-indicators, which suggests that regulators need to put in place stronger regulatory mechanisms and incentives to drive performance.

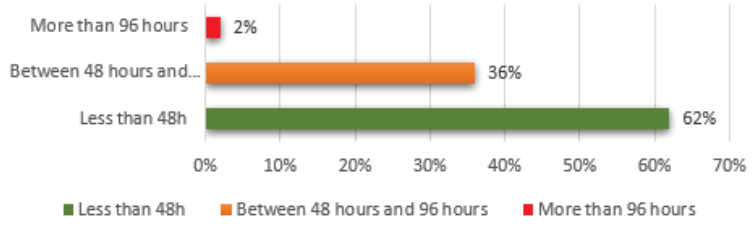
Only eight power utilities responded that they are able to set up a new connection in less than seven days, while 29% admitted that they take more than thirty days (see figure 41). Long delays in connecting customers are a barrier to electricity access and may incentivize consumers to resort to illegal means of energy access, which would only result in further losses incurred by the utility.

Figure 41: Average Time to provide a Service Connection



Sixty-two percent of power utilities respond to a complaint about a power shortage in less than 48 hours. This is shown in figure 42.

Figure 42: Number of Hours to Respond to Supply-Related Complaints



Technical Quality of Service

System Average Interruption Frequency Index (SAIFI) and System Average Interruption Duration Index (SAIDI) were used as the two key sub-indicators to assess the technical quality of service performance of the utilities. SAIDI is the average total duration of outages over the course of a year for each customer. SAIFI is the average number of service interruptions experienced by a customer in a year, including planned and unplanned outages, as well as load shedding.

The average score for the technical quality of service indicator was 0.643, which falls in the yellow performance band. The survey suggests regulators are not effectively monitoring the utilities on SAIDI and SAIFI. While utilities in 86% of the countries surveyed calculate their SAIDI and SAIFI, only 46% utilise regulatory thresholds and benchmarks on these indicators.

While it is encouraging that utilities in a majority of countries surveyed employ SAIDI and SAIFI indicators, setting binding targets and benchmarks should be a priority for effective regulation. They are an important tool for accountability to the customers and guides utilities to improve performance over time. The lack of regulatory thresholds and benchmarks on these indices affects the effectiveness of the regulators' monitoring role over the utilities performance on them. The utilities' responses on SAIDI and SAIFI are shown in figures 43-46.

Figure 43: Does the Utility Calculate its SAIDI?

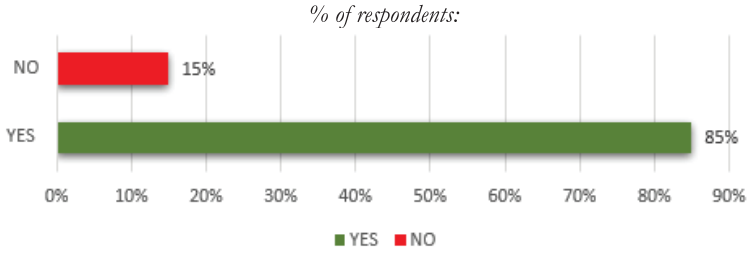


Figure 44: Is there a threshold set by the Legislative or Regulatory Instrument on the SAIDI?

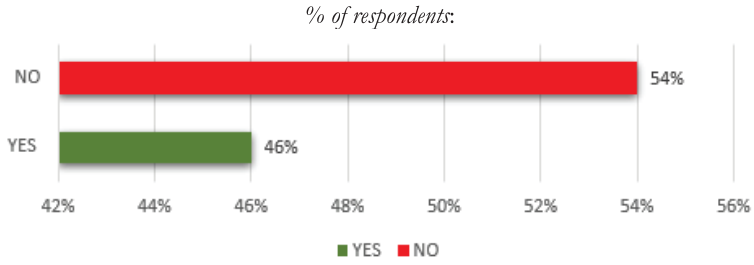


Figure 45: Does the Utility Calculate its SAIFI?

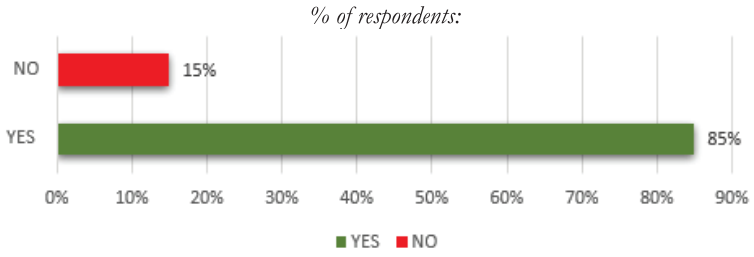
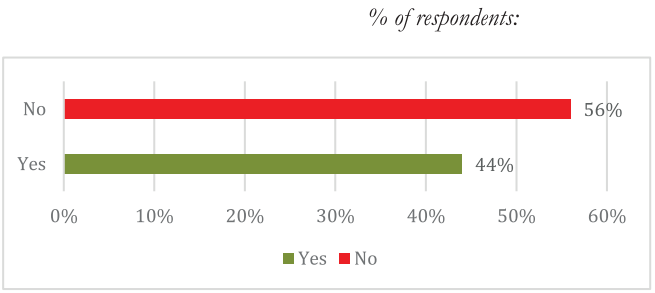


Figure 46: Is there a Threshold set by Legislative or Regulatory Instrument on the SAIFI?



While the majority of African countries have now adopted SAIDI and SAIFI to measure quality of technical service, the calculation methodology varies from one country to another, which complicates comparison of data. Some countries have global annual values of SAIFI and SAIDI, while others have separate SAIFI and SAIDI values for urban and rural areas. Furthermore, the elements taken into account for the computation of these indicators differ from country to country. For example, some exclude all planned interruptions and load shedding, considering only unplanned outages. Additionally, while most countries record medium voltage (MV) outage, the calculation of low voltage (LV) outages is excluded.

Table 6 shows country performance on the SAIDI and SAIFI measures against the thresholds set. The table shows variability in the performance and thresholds set. It is necessary to standardize the method of calculation and accurately determine the number of customers affected by interruptions

to allow an objective comparison. In the African context, the first step should be to focus on outages related to MV network, before scrutinizing LV outages. The reporting relationship between the utility and the regulator must be effective, for the improvement of the reliability of the data.

Table 6: SAIDI and SAIFI threshold

Countries	Annual SAIDI (Hours/customer)	Annual SAIFI (Number of outages/year)	Threshold SAIDI	Threshold SAIFI
Zimbabwe	72	110	NA	100
Ghana	135.6	58.9	48	6
Rwanda	30.2	211	17	25
Kenya	60	13.3	12	12
Tanzania	75	61.8	NA	NA
Zambia	43	4	36	8

The regulator should regularly monitor the technical quality of electricity supplied to consumers. This can be achieved through periodic reporting by the utility, preferably on a quarterly basis, and through the implementation of an automated outage management system.

Facilitation of Electricity Access

Regulatory mechanisms are critical drivers of electrification – especially in rural areas, where utilities are not financially incentivised to extend their services. The economic and social benefits for rural electrification need to be supported by the right tariff incentives, which also encourage utilities to embark on rural electrification. On this indicator, the ERI survey assessed the existence of appropriate regulatory incentives in place to facilitate electrification activities of utilities to rural areas.

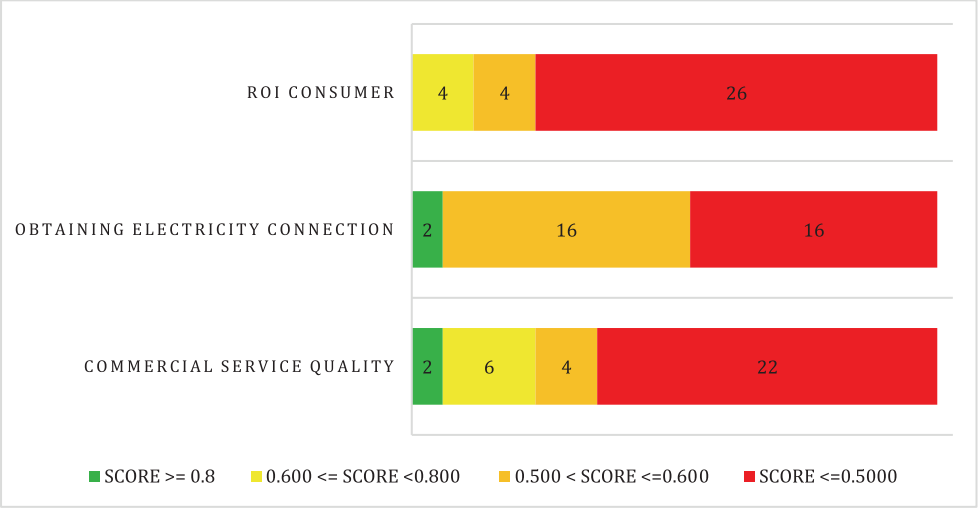
The average score on the **facilitation of electricity access** indicator was 0.772, which falls within the yellow performance band, with 79% of the countries surveyed falling within the green band. Twenty-four countries achieved the maximum score of 1 on this indicator. Eighty-eight percent of countries indicated they have implemented policies or regulatory mechanisms aimed at enhancing access to electricity, and 68% indicated that the regulator takes into account the need for investment in rural electrification when setting tariffs. Many countries have created bodies responsible for rural electrification, which demonstrates a high level of commitment to electrification.

5.4.2. Breakdown of Results for the Regulatory Outcome Index for Consumers (ROIc)

The Regulatory Outcome Index from the consumers perspective was assessed using two indicators: **commercial quality of service** and **obtaining an electricity connection**. The average score for ROIc was 0.357, which falls within the red band performance category. No country fell within the green band. Twenty-two countries (65%) fell in the red band and only four countries (12%) classified in the yellow band (Côte d'Ivoire, Cameroun, Morocco and Mali). Countries' performance on the ROIu and its indicators is demonstrated in figure 47.

Consumers, represented by Chambers of Commerce, were more critical of regulatory performance, expressing dissatisfaction with the regulators' inability to hold the utility to account on ensuring good commercial quality of service. Consumers also expressed dissatisfaction with the regulators' inability to regularly engage with them and educate them on their rights, as well as procedures to get their grievances addressed.

Figure 47: ROI consumer by indicator and number of countries

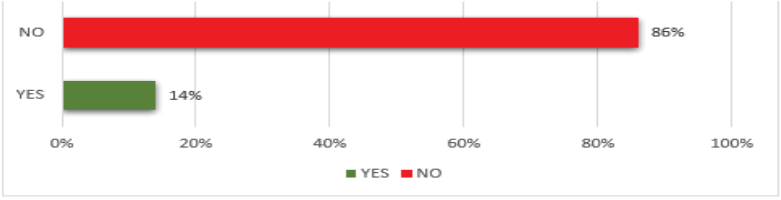


Commercial Quality of Service

The ERI survey showed that most customers considered the **commercial quality of service** to be unsatisfactory. The average score for this indicator was 0.435, which falls within the red performance band, and only two countries (Cameroon and Uganda) had scores falling within the green band. Consumers expect the regulator to hold the utilities to account in ensuring high quality of service delivery.

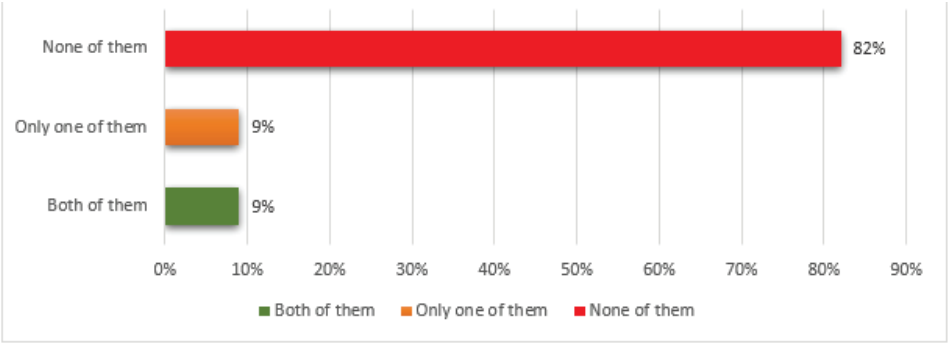
Customer feedback is an important element of improving both utility and regulator performance. However, the majority of countries do not implement a customer satisfaction survey to enable the utility ascertain or gauge the level commercial quality of service delivered. This is shown in figure 48.

Figure 48: Has the utility recently implemented a customer satisfaction survey?



The results of our survey of end users' also indicated a lack consumer education and weakness on the part of regulators to protect consumers' interest. Seventy-one percent of consumers indicate that they have not been informed by the regulator nor the utility about their rights and obligations nor the procedure for complaints and investigations. Eighty-two percent of business consumers indicate they have never seen a regulator report on the duration and frequency of outages. This is shown in figure 49.

Figure 49: Does the Regulator publish a report on the duration and frequency of outages?



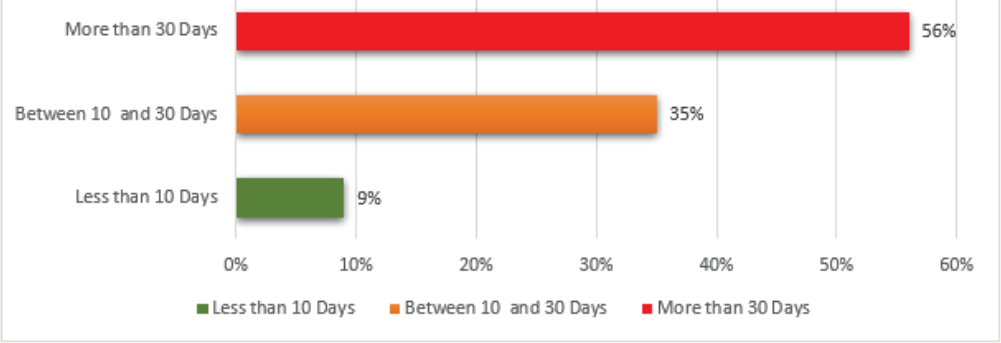
Côte d'Ivoire achieved the highest score in commercial quality of service, demonstrating a high level of customer satisfaction. This was not achieved through regulatory laws and codes but through quality of service KPIs in the concession contract of the utility. So although Côte d'Ivoire's regulator scored low for not having quality of service regulation, consumers endorsed the high level of service quality actually delivered by the utility. The utility introduced a number of mechanisms to address customer concerns, including setting up a 24/7 call center, having connected terminals for customer requests and complaints, developing a computerized database management related to the customers, and opening around 100 customer reception centers across the country.

Consumers should be empowered by the regulator through regular engagements and education to be able to hold the utility accountable and answerable to the consumers. Educated consumers can act as agents of the regulator in monitoring the performance of the utilities. Regulators should also endeavour to undertake customer satisfaction surveys, to help them respond to customer needs.

Obtaining Electricity Connections and Service

Consumers displayed high levels of dissatisfaction the number of days it takes to obtain electricity connection. In 56% of countries, it takes more than 30 days to obtain an electricity connection. This is shown in figure 50. This can exacerbate low levels of electricity access. It can also be detrimental to investment decisions and thus hinder economic activity.

Figure 50: How many days does it take to obtain electricity connection in urban areas?



There is a discrepancy between data reported by utilities and consumers. While only 9% of business consumers reported that fewer than 10 days was needed to obtain an electricity connection, 17% of utilities claimed to have reached this target.

Electricity access and quality of service can only be improved if they are accurately measured. Consumer management systems and network or outage management systems can play a role here, enabling regulators and utilities to take appropriate action and improve their ROI scores.

IV. RECOMMENDATIONS

The ERI 2019 aims to measure the level of development of electricity regulatory frameworks across Africa and identify areas for improvement. The following policy recommendations suggest ways in which policy makers and regulators in Africa can address the gaps identified from the ERI study and improve on their regulatory frameworks and electricity sector outcomes. These recommendations are also expected to contribute to enhancing the performance of regulators as well as improving stakeholder and investor confidence in the regulatory frameworks and countries.

Improving Regulatory Governance

Enhancing Decision-Making Independence of Regulators from the Executive

The ERI results revealed that in about 79% of the countries surveyed, the appointment of board members is vested in the executive. This approach for appointing commissioners or board members has the potential to affect the decision-making independence of regulators and makes it difficult to depoliticize tariff-setting decisions. With the current approach of appointment used in most of the countries, regulatory independence usually falls victim to direct or subtle political pressures from governments who attempt to prevent the implementation of regulatory decisions they think could be politically damaging.

Action or Intervention

Staggered terms of appointments for commissioners/board members should be built into the legislation that established the regulatory authority. This approach could mitigate the influence of one government on the overall composition of the commission. It will also ensure continuity of expertise within the authority thereby enhancing the credibility of regulator's decisions among stakeholders to bolster confidence in the regulatory system.

In addition, the appointment process should be designed to involve several parties (e.g. both parliament and government). Commissioners appointed by the head of the government (i.e. president or prime minister), with the approval of the legislative body, enhances an arm's-length relationship and limits the scope for interference from the executive.

Enhancing Operational Independence of Regulators from Regulated Industry

The results of the survey showed that most of the primary laws or Regulatory Acts that established the regulatory authorities did not make provisions to prevent CEOs and commissioners from holding positions in the utilities before, during and immediately after their tenure to safeguard regulatory independence from stakeholders. One of the main ethical challenges for regulators includes what is

known as the "revolving door," which occurs when the regulator's decisions are influenced by future employment concerns or past employment relationships. The financial interests of a regulator could also raise ethical challenges if these are related to the financial performance of the utility.

Action or Intervention

This problem can be mitigated by adopting codes or amending Regulatory Acts to include a provision on conduct that restricts future employment. This could involve prescribing a cooling-off period after a regulator's tenure, prohibiting the receiving of gifts, limiting the regulator's personal investments and restricting the regulator from being involved in decisions where the regulator cannot maintain fairness. These actions will ensure that regulatory decisions are impersonal, impartial, guided by values and reasoning and without conflict of interest.

Enhancing Regulatory Accountability

The existence of an effective appeal mechanism bolsters regulatory accountability. Review and appeal procedures are necessary to ensure that regulatory decisions are made in accordance with the regulatory commitments expressed in law. Most of the countries in the survey have adopted two formal levels of appeals. The first level is to refer the issues back to the regulatory authority itself, where stakeholders can ask the regulator to reconsider a decision by reviewing and varying its own decisions. The second level is to use the court system. The results of the ERI survey revealed that most of the countries are yet to establish a third level which is a specialist independent expert body or specialist energy tribunal that can review or overturn the regulator's decisions.

Action or Intervention

African countries could consider establishing dedicated energy tribunals or specialist appeal institutions to speed up the appeal process. The right to appeal must be balanced against the need for expeditious decision-making, as reviews and appeals using the court system may increase delays. Delays in the appeal process can disincentivize long-term decisions by investors. Specialist energy tribunals also ensure that complex regulatory issues are decided by a body with appropriate technical expertise.

Enhancing Predictability of the Regulatory Process

Regulators need to appreciate the long-term nature of assets and related investment decisions. Therefore methodologies, guidelines and implementation schedules of regulations that affect the tariffs and tariff structure, as well as the approach for determining the cost structure of utilities, must be developed ex ante by regulators. This will enable the utilities to confidently plan for the future and be assured that there is consistency in the regulatory process and their investments will not be threatened by unexpected changes in the regulatory environment.

Action or Intervention

Regulators must develop key mechanisms ex ante for providing predictability in their decision-making. This includes through the establishment of transparent, well-defined decision-making criteria, as well as the provision of clear timetables for the review of tariffs, technical standards and grid codes and other regulations. The principle of predictability is particularly important in the utility sector, which is characterized by long term investment horizons.

Improving Open-Access to Information

Open-access to information promotes accountability and enhances transparency of the regulatory process. Increased access to information will enable stakeholders to understand the regulatory process and rationale for regulatory decisions. While most of the regulators surveyed provided access to a number of key regulatory documents and information through their functional websites, there were weaknesses identified with respect to a lack of analytical reporting on utility performance and providing rationale behind regulatory decisions.

Action or Intervention

Regulators should improve the amount and consistency of information available to stakeholders. This includes:

- Information to enable stakeholders to understand the rationale behind decisions.
- Periodic utility performance updates as measured against regulatory benchmarks.

Improving Regulatory Substance

Improving Performance of Nascent Regulators

The results showed a generally weak performance by nascent regulators in developing and implementing the requisite regulatory instruments. Regulators that have been operational for less than 5 years are yet to build the requisite capacity and leverage to develop and implement the regulatory instruments and initiatives, which usually have long lead-time and gestation periods.

Action or Intervention

Regional regulatory authorities and associations could support nascent regulators by establishing peer review and peer learning mechanism, to support knowledge sharing. Peer learning with more established regulators can help nascent regulators shorten the gestation periods of their regulatory frameworks. It also facilitates harmonization of regulatory frameworks within the regions and enhances regional trade.

Enhancing Economic Regulation for Sector Financial Viability

The results of the study revealed that 87% of the countries surveyed had undertaken Cost of Service (CoS) tariff studies, but that their existing tariffs are still below cost-reflective tariff levels. A CoS tariff study should at a minimum recommend cost-recovery tariffs for the generation, transmission and the

distribution segments of the electricity sector. These tariffs are usually determined based on benchmarks such as loss levels and revenue collection rates. Additionally, the study should recommend cost recovery tariffs for various end-users or customer classes (i.e. domestic, commercial, industrial). The lack of information on underlying drivers of tariffs among countries within a region and a harmonized mechanism for comparing them inhibits harmonization of tariffs methodologies and adoption of common approaches to tariff among member countries.

Action or Intervention

For countries where current tariffs are below cost-recovery level, the regulator should work with the utility to develop a transitional path or a roll-out plan for the adjustment of existing tariffs to economic cost levels over an agreed period. As part of the process, the government should commit to the plan and agree to meet the financing gap to the utility that will arise during the transitional phase. This should be done vis-à-vis any cross subsidies between customer classes that may be decided by the regulator.

In designing the transitional path, the regulator should be mindful of the implications of steep tariff increases on consumers and to the political environment. Therefore, regulators could define separate transitional paths or "speeds" for the different tariff categories or customers classes for attaining cost recovery tariffs.

Countries that are yet to undertake the CoS should take the necessary steps to do that with the view to achieving the following outcomes:

- Determining the cost recovery and efficient cost of supply for each segment of the Electricity Supply Industry;
- Defining the structure and levels of tariffs, including life-line tariff mechanism and subsidy administration;
- Determining the cost recovery tariff for the different end-users or customer classes;
- Recommending the roll-out plan for adjustment of existing tariffs to economic and cost recovery cost levels,
- Determining the transitional path for unwinding subsidies.

Studies and regular publication of reports on harmonized comparison of tariffs and tariff frameworks among regional member countries, highlighting the various underlying drivers of tariffs, should be pursued along the regional block. This will provide very useful information on areas of convergence and divergence in tariff approaches in the various countries in a region to catalyze and drive country efforts at adoption of best practices and methodologies from their peers. Regular publication and update of such reports will enhance transparency in tariff regimes.

Improving Commercial Quality of Service Regulations

All regulatory authorities are required to continuously monitor and evaluate the operational performance of regulated utilities. The regulator does this by defining the parameters to be used to assess, monitor and evaluate the performance of the utilities. The results from the study showed that most of the countries fail to carry out a comprehensive analysis of utility performance and publish the results on their websites.

Action or Intervention

Regulators must develop a Performance Monitoring Framework that identifies the Key Performance Areas (KPAs) for which Key Performance Indicators (KPIs) can be developed to monitor the utility performance. The performance monitoring framework should at a minimum cover the following operational areas for which KPIs must be developed:

- Financial;
- Commercial Quality of Service;
- Commercial Performance;
- Technical Performance;
- Quality of Service Delivery;
- Operational Efficiency;

Additionally, the regulator should compel utilities to publish on their websites, their performance against regulatory targets and produce a six-monthly report for the public with commentary on its inability to meet any of the performance targets. The utilities must provide annual updates on performance for the key performance indicators.

Strengthening Technical Regulations of Off-Grid Systems

The ERI has highlighted the need for countries to develop the necessary policy and regulatory frameworks to catalyze off-grid systems, such as mini-grid and autonomous stand-alone systems. Mini-grids and other off-grid systems in most of the countries surveyed are still facing constraints and challenges related to policy, regulation and financing.

Action or Intervention

Regulators should adopt a light-touch regulatory approach to licensing mini-grid systems. This is because applying for and issuing licenses imposes costs for both the licensee and the regulator. In that regard, the regulator could set a capacity threshold in MW, below which licenses would not be required. For smaller capacities, projects may be allowed to register their businesses rather than apply for a license. Registration would allow the regulator and other government agencies to know that the mini-grid exists and is providing service.

On the issue of mini-grid tariffs, regulators could ask the mini-grid developers to propose retail tariffs that are appropriate for their project, as well as tariff structures (i.e. flat rate, energy charge, demand charge, pre-pay, post-pay), all subject to regulatory approval. Developers should be permitted to build cross-subsidization into tariff schedules such that high-

consumption customers can cross-subsidize smaller, poorer customers. The mini-grids should also be encouraged to use anchor customers (telecommunications companies, agricultural processors etc.) to help guarantee load and reduce the tariff to poor households.

In order to encourage investment in mini-grids, the regulator should develop ex ante rules that account for future development scenarios, for instance if the mini-grid is enveloped by the main grid in future, and incorporate compensation frameworks as necessary. This will mitigate the risk to investors and give comfort to mini-grid developers that when the main grid reaches or envelops their service area, their customers will not be taken away from them and undermine their investment.

Regarding the promotion of autonomous stand-alone systems, regulators need to develop the necessary technical rules for connection and other economic regulations that will enable power utilities to pay a generation export tariff to stand-alone, small-scale low-carbon generators (such as solar roof tops) when electricity is exported to the national grid.

Building Regulatory Capacity and Expertise

According to the results from the study, the absence of adequate capacity and expertise in some of the countries has affected the performance of the regulators. Regulatory bodies must have sufficient knowledge of the industry to be able to make independent decisions and judgments. Regulators require economic skills and access to specialist skills, good industry knowledge, as well as knowledge of the range of regulatory instruments available. They also need to have experts with quantitative and analytical skills in order to carry out the tariff and performance analysis of the utilities.

From the technical perspective, the regulator needs experts and technical expertise to be able to analyze issues related to engineering-based asset management, system reliability, technical and security of supply. The lack of adequate capacity and expertise can reduce the trust, confidence and consistency of regulatory decisions thereby increasing the risk of regulatory failure.

Action or Intervention

Since utility regulation cuts across various disciplines ranging from engineering, economics, finance, and accounting among others, it is imperative that the regulatory authority builds a stock of knowledge within the regulatory body to ensure that informed decisions can be made. Operational independence requires that regulators have the required capacity and expertise to make judgments without undue influence from stakeholders.

Regulators need to be granted the full autonomy to recruit staff with the requisite skills and expertise and have the freedom to plan training for its staff and offer attractive remuneration in order to retain these skills within the regulatory authority. Failure to provide this operational autonomy may lead to regulators being staffed by under qualified and underpaid staff. The ERI survey revealed that in some countries remuneration levels are generally determined to

follow civil service rules, which may inhibit regulators from attracting the necessary competent technical staff required.

Absence of Publication of Research Works and Results

Though the results indicate that most regulators publish their key documents on their websites, it also emerged that research and consultative papers were absent from about 60% of the websites surveyed. It is important to emphasize that one of the key objectives of the ERI study is to enable regulators to identify the gaps in their regulatory environments and be able to compare their performance with their peers. This can be achieved if regulators publish key findings and observations and the methodology they adopted to resolve important regulatory issues.

Action or Intervention

In order to incentivize regulatory staff to devote enough time for developing practical studies and papers of publishable quality, the regulatory authority should commit to sponsor the authors to present the papers at international conferences and ensure that the paper is published in international journals and on other websites such as that of AFUR, AUC etc.

Enhancing Regulatory Outcomes

Consumer Satisfaction, Monitoring and Assessment of Utility Performance

The results from the study indicate that consumers in the countries surveyed were generally not satisfied with the performance of the regulator in enforcing the required actions to compel the utility to improve on the quality of services delivered. The study revealed the absence of strong customer voice as a key missing link for holding service providers accountable. This could be one of the underlying reasons for the generally low performance of the utilities. Therefore, apart from publishing documents and reports, the utilities must periodically collect and publish data on public perceptions of their services.

Action or Intervention

Regulators could undertake a Consumer Survey that covers a reasonable sample size for all the customer classes (i.e. domestic/residential, commercial and industrial) This will help them to identify problems and challenges confronting each customer class at different voltage levels and make informed decisions. The disaggregated results should be used to develop a Consumer Survey Index (CSI) for each customer class. Regulators will then be able to hold the utility accountable for any performance lapses related to each customer class. The regulator can also compel the utility to undertake the survey based on approved Terms of Reference using an independent consulting firm. The utility will then submit the final report to the regulator for necessary actions to be taken. Alternatively, a limited survey could focus on the experience of those who have had cause to complain, to ascertain how their concerns were dealt with. This work should be carried out by independent researchers and results submitted to the regulator.

Improving financial performance. Thirteen countries in the sample have utilities with distribution losses of over 20%. Regulators have an important role to play in terms of developing and implementing loss reduction strategies with the utilities. Priority should be given to reducing commercial losses and implementing legislation to reduce electricity theft.

Action or Intervention

Regulators should introduce performance agreements with the utilities, with quarterly reporting on results against the action plan. This should also include a set of financial penalties in case of low performances. Regulators should ensure that utilities establish a loss reduction action plan, with priority given to addressing commercial losses (i.e. billing and collection losses).

Action Plan: Snapshot of Areas of Recommended Interventions

	Areas of Intervention: Short Term (1–2 years)												
	Legal, Policy and Frame-works for Off-Grid Systems	Tariff Guidelines and Methodology	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	Loss Reduction Action Plan	Consumer Survey	Peer Reviews
Algeria				X		X						X	
Angola	X	X				X		X			X	X	X
Benin	X	X	X	X			X						
Botswana	X	X	X							X		X	X
Burkina Faso		X		X	X	X			X			X	
Cameroon		◎ X	◎ X	◎			◎		◎	◎ X	X		
Cote d'Ivoire	X	◎ X	◎ X	◎		◎ X	◎	◎	◎ X	◎ X	X	X	
Egypt		X		**X**		X			X				
Eswatini		X	X							X			
Ethiopia		X									X	X	X
Gambia	◎ X	X	◎ X	◎**X**	◎	◎**X**	◎	◎	◎	X	X	X	
Ghana	X	X		◎ X		◎		◎	◎	◎	X		
Kenya	◎			X		◎		◎		◎		X	
Lesotho	◎ X	X		◎**X**			**X**					**X**	X
Liberia		X	X		X					X	X	X	X
Madagascar		X								X	X	X	X
Malawi		X			◎	◎		◎	◎				
Mali	X		X							X		X	
Mauritania		X	X		X					X	X	X	
Mauritius	X	X	X		X					X		X	X
Morocco	X	X			X				X				X
Mozambique		X	X			X			X	X	X		X
Namibia	◎ X			◎	◎			◎	◎	◎		X	
Niger													
Nigeria				◎ X	◎			◎	◎	◎	X	X	
Rwanda				X								X	
Senegal	◎ X		◎	◎ X	◎			◎	◎			X	
Sierra Leone		X									X		
South Africa	◎ X	X		◎	◎			◎	◎			X	
Tanzania				X				◎					
Togo		◎ X		◎ X	◎ X	◎ X	◎	◎	◎ X			X	
Uganda				X					◎			X	
Zambia		X											
Zimbabwe		X		◎		◎	◎	◎	◎	◎		X	

Note: ◎ : recommended in ERI 2018 | X recommended in ERI 2019

Action Plan: Snapshot of Areas of Recommended Intervention 2019 (cont'd)

	Areas of Intervention: Medium Term (3 - 5 years)					
	Establish Specialized Bodies for Challenging Regulator Decisions	Amend Electricity Law/Regulatory Act for Decision Making Independence	Amend Electricity Law/Regulatory Act for Operational Independence	Amend Electricity Law/Regulatory Act for financial Independence	Develop and Adopt MEPs and Energy Labelling	Long term Capacity Building Tariff Setting
Algeria	X		X	X		
Angola	X	X	X	X		
Benin			X			
Botswana		X	X	X		
Burkina Faso		X	X			X
Cameroon	◎ X	X	X	◎ X		◎
Cote d'Ivoire	◎ X	X	X		◎	◎ X
Egypt			X	X		X
Eswatini		X	X	X		
Ethiopia			X	X		
Gambia	◎ X	X	X	◎	◎	
Ghana	◎ X		X			◎
Kenya			X	◎ X		
Lesotho		X	X	◎	◎	◎
Liberia			X	X		
Madagascar		X	X			
Malawi	◎ X		X	◎	◎	◎
Mali		X	X	X		
Mauritania		X	X			
Mauritius		X	X	X		
Morocco			X	X		
Mozambique			X	X		X
Namibia	◎ X		X	◎	◎	◎
Niger		X	X	X		
Nigeria	◎ X	X	X		◎	◎
Rwanda			X			
Senegal	◎ X		X	◎ X	◎	
Sierra Leone		X	X	X		
South Africa	◎ X		X	◎ X		
Tanzania			X	X	◎	
Togo	◎ X	X	X	◎	◎	
Uganda		X	X	◎ X	◎	X
Zambia		X	X	X		
Zimbabwe	◎ X		X	◎ X		◎

Note: ◎ : recommended in ERI 2018 | X recommended in ERI 2019

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ANNEX 1: DETAILED METHODOLOGY OF ERI 2019

ASSESSING THE 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 national political, economic, environmental and social objectives (Smith 1997; Stern and Holder 1999; Brown et al. 2006).

The first pillar, the Regulatory Governance Index (RGI), assesses the level of development of a country's regulatory framework and the extent to which the laws, procedures, standards, and policies governing this electricity sector, provide for a transparent, predictable and credible Regulator that works at par with international best practices. It defines the framework within which decisions are made. It is composed of 8 indicators.

The second pillar, the Regulatory Substance Index (RSI), evaluates the extent to which the electricity sector regulators carry out their mandate and implement the regulatory practices and processes. It is composed of 6 indicators.

These two pillars help assess the effectiveness of regulations. However, 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. The ROI measures, from the perspectives of the power utility companies and the power consumers, the degree to which the electricity sector regulations and regulators' action have positively or negatively impacted the performance of the sector.

Two surveys, one for the regulated power utilities and another one for the power consumer, were conducted to assess whether regulators were supporting the achievements of their objectives to develop the sector. As a result, a ROI for power utility (ROIu) and a ROI for consumer (ROIc) were calculated.

Based on the above, the indicators for the three pillars to develop the Electricity Regulatory Index are as follows:

Regulator		Power Utility company	Power Consumers
Regulatory Governance Index (RGI)	**Regulatory Substance Index (RSI)**	**Regulatory Outcomes Index (ROI)**	
		ROIu	**ROIc**
I1: Legal Mandate I2: Clarity of Roles and Objectives I3: Independence I4: Accountability I5: Transparency of Decisions I6: Predictability I7: Participation I8: Open Access to Information	I9: Economic Regulation I10: Commercial quality of service or relationship with customers I11: Technical Regulation I12: Licensing Framework	I13: Financial Performance I14: Technical Quality of Electricity Supplied I16: Commercial Quality of Service I17: Facilitation to Electricity Access	I18: Commercial Quality of Service I19: Obtaining an Electricity Connection/ Service

SOURCE OF DATA

Questionnaire design

The data for this study were collected via three surveys of: the regulators, the power utilities and power consumers. The goal of these surveys was to develop an ERI in which different aspects of the regulatory governance and substance, as well as the outcomes of regulatory decisions, produced an aggregate score reflecting the level of development of the electricity sector regulatory framework. These surveys were formulated in a way that focused on the practical aspects of electricity regulation. The questions were designed to be evidence-based and avoid subjective responses. 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.

The first questionnaire collected primary data on regulatory governance and substance from the regulators. The questions were based on the fourteen indicators described in the report. The questionnaire had three main sections. The first section related to identification of the regulator. The second and third sections were used to collect data to calculate the RGI and RSI. It was longer and more robust that the one used in the development of the ERI 2018, but the questions were designed to be straightforward and easy to respond to.

Two additional questionnaires were developed for the power utility companies and the power consumers to measure the outcomes of regulatory activities on power utility performance. One of these questionnaires was targeted at power utilities to determine the outcomes of regulators decision-making on the regulated entities. It is also aimed to enhance our understanding of the utilities' perception towards regulator activities and how such activities impact their performance.

The third questionnaire assessed the outcomes of the regulatory framework from the perspective of the final power consumer. While this group includes both households and private sector firms, this year's ERI focus only on the latter due to the challenge and costs associated with finding a

representative sample of households. For this year's survey, relevant chambers of commerce or manufacturer associations have been used as to obtain the view of the private sector in each of the sample countries

Survey Population

The survey population is constituted by two main groups: the regulators and the beneficiaries. The beneficiaries include the power utility companies, the private sector and households.

The regulator in each African country is the primary target of the study. Across the continent there are a total of forty-nine regulators. Five countries (Comoros, Djibouti, Bissau, Tunisia and Somalia) do not have formal regulators. We received a response form thirty-six regulators. Thirty-four regulators were used in the final analysis as the power utility in Gabon and Guinea did not reply to the questionnaire. In a country with more than two regulators, they may have either jointly completed the questionnaire to account for different regulatory functions or completed out one questionnaire each. In the latter case, the questionnaires are merged by the using the average score from the responses. We did not include responses to the questionnaire where the ministry office in a given country acts as the regulator.

Power utility companies are the first beneficiaries included in the survey. They are surveyed to assess the outcomes of the regulator's activities. At least one power utility company is surveyed in each country where a regulator is also surveyed. Out of the thirty-six countries contacted to fill out the power utility questionnaire, thirty-four countries responded. In countries where multiple power utility companies exist, all were surveyed. The ROI for utilities is then calculated for each utility and aggregated into a single utility ROI for the country.

Private sector firms and households are the second beneficiary group included in this study. They are the main end users of electricity. They are instrumental in assessing the outcomes of the regulatory framework. Due to a lack of representative national consumer association in all of the countries surveyed for this study, we decided to exclude households from the analysis of the ERI 2019. To survey the views of the private sector, particularly those consuming a large amount of electricity for their production, and avoid the challenges associated with developing a representative sample group in each country, we sought to work through representative groups. We selected the chamber of commerce, or equivalent, in each country. We acknowledge the limitations of this approach but assessed it to be the best for this initial assessment.

Launching of the survey

In order to conduct the ERI study effectively, two stakeholder workshops were organized: the first in Abidjan, from 13-14 February 2019 for French speaking countries, and the second in Johannesburg, on 21 and 22 February 2019, for English and Portuguese speaking countries, respectively. The aim of these workshops was to review the questionnaires, validate the methodology and to collect data from the countries present at these workshops. It provided an opportunity to discuss and fine-tune the methodology with all major stakeholders before embarking upon the survey data collection phase. It also aimed to ensure that respondents had the

same level of understanding of the questions, thus ensuring the completed questionnaires could be considered reliable, credible and robust.

Data collection

To increase the response rate, three methods of data collection were used: online, e-mail, and paper or phone interviews. The main method was an online platform via a secure website. To guarantee the confidentiality of responses, each of the selected interviewees were granted a username and password to access the online questionnaire. Thus, only the person with the given username and password could access the survey online and answer the questionnaire directly.

Thirty-six regulators responded and submitted completed questionnaires, a response rate of 78.6%. Thirty-four power utilities returned completed questionnaires, and finally, the power consumers returned twenty-six complete questionnaires. The ERI was calculated based on the responses from thirty-four countries.

ELECTRICITY REGULATORY INDEX (ERI) 2019 CONSTRUCTION AND SCORING

ERI Construction

The Electricity Regulatory Index (ERI) was constructed as a composite index comprising of data from the Regulatory Governance Index (RGI), the Regulatory Substance Index (RSI) and the Regulatory Outcome Index (ROI), all of which were gathered from responses to a questionnaire distributed to regulators, power utilities and power consumers 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**: Design of survey questionnaire to obtain information from the regulatory institutions, power utilities and chambers of commerce;
- **Step 3:** Determination of the 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 and chambers of commerce questionnaires;
- **Step 6:** Aggregation of results of ERI_{GS} and ROI to calculate the ERI.

Scoring process

Each question response in the survey was given a score ranging from between 0.00 and 1.00 where 0.00 was the worst possible score, while 1.00 was the best. The answers provided by the respondents to survey questions relating to regulatory governance and regulatory substance were

coded relative to best practice in the electricity sector and took into account the practical challenges and requirements needed to bring African countries up to international best practice. Scores from each of the indicators were calculated using an arithmetic average formula. In a few cases, the aggregation uses the maximum function or is conditional on answers from the questionnaire. All questions used for the calculation of the ERI are coded with equal weight.

Given the technical nature of electricity regulation a significant amount of time was dedicated to verification of the data and the responses provided. Verification was done through review of legal and operational documents, website content, interviews with regulators and detailed working knowledge of the sector and industry.

Missing variables

As per the methodology established in 2018, a country must submit a questionnaire from a regulator and the power utility company to be considered in the ERI 2019. During the data collection and analysis, two types of missing variables were identified. The first type was missing answers in a completed questionnaire. The second type was when no questionnaire for the power consumer was submitted. As only twenty-six countries completed questionnaires for power consumers, we have missing data in eight countries.

Missing data can be treated by two statistical methods, each with their own limitations. The first method is to ignore the missing data while doing the calculation. This tends to produce a higher average score to those that responded to the question. The second method is to estimate a value for the missing data.

For the utility questionnaire in the computation of the ROI, any missing data was ignored for the calculation. For the consumer survey data, as eight countries did not submit questionnaires at all, the estimation was based on the information from responses to similar questions from the utilities on the utility questionnaires.

RGI, RSI and ERIGS 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.

The ERI for Governance and Substance (ERIGS) was determined by using a simple average of the combined RGI and RSI scores, using this arithmetic:

$$ERI_{GS} = (RGI + RSI)/2$$

An illustration of the scoring and calculation of the RGI, RSI and ERIGS for Algeria and Tanzania follows.

Sample Calculation of RGI

The eight indicator scores used to derive the RGI are shown in the table below

Country	Legal Mandate	Clarity of Roles	Indepen-dence	Accoun-tability	Transpa-rency	Predictability	Participation	Open Access Information
Algeria	1.000	1.000	0.646	0.500	1.000	0.933	0.625	0.813
Tanzania	1.000	1.000	0.739	0.833	1.000	0.867	1.000	1.000

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

$$\boldsymbol{RGI} = \frac{1.000 + 1.000 + 0.646 + 0.500 + 1.000 + 0.933 + 0.625 + 0.813}{8} = \mathbf{0.815}$$

For Tanzania, the RGI was calculated as follow:

$$\boldsymbol{RGI} = \frac{1.000 + 1.000 + 0.727 + 0.833 + 1.000 + 0.867 + 1.000 + 0.813}{8} = \mathbf{0.905}$$

Sample calculation of RSI

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

Country	Economic Regulation	Commercial Quality	Technical Regulation	Licensing
Algeria	0.792	0.667	0.614	0.667
Tanzania	0.833	0.571	0.827	0.833

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

For Algeria:

$$\boldsymbol{RSI} = \frac{0.792 + 0.667 + 0.614 + 0.667}{4} = \mathbf{0.685}$$

For Tanzania:

$$\boldsymbol{RSI} = \frac{0.833 + 0.571 + 0.827 + 0.833}{4} = \mathbf{0.766}$$

Sample calculation of ERIGS:

The ERIGS is calculated by using a simple average of the scores of the RGI and RSI as follows:

For Algeria:

$$ERI_{GS} = \frac{0.815 + 0.685}{2} = \mathbf{0.750}$$

For Tanzania:

$$ERI_{GS} = \frac{0.905 + 0.766}{2} = \mathbf{0.836}$$

ROI Computation

The Regulatory Outcome Index (ROI) was determined based on the responses provided by the power utility companies and the power consumers. The calculation of the ROI was done in two main steps:

- the calculation of the ROI for the power utility companies and the ROI for chambers of commerce; and
- the calculation of the ROI for the country as a whole.

The scoring principle adopted for the ROI for power utility (ROIu) took into account the possibility of two or more power utility companies from the same country submitting completed questionnaires. This was the case for Nigeria and Ethiopia. The ROIu for each power utility was calculated and the average of these constituted the ROIu at the country level. The ROI value is calculated as the simple average of the score of each ROIu and ROIc.

$$ROI = (ROIu + ROIc)/2$$

An illustration of the scoring and calculation of the ROI for Algeria and Tanzania follows.

Sample calculation of ROI

The ROI utility indicator scores for Algeria and Tanzania are shown in the table below:

ROI utility indicator scores

Country	Financial Performance	Technical Quality	Commercial Quality Service	Facilitation of Electrification
Algeria	0.813	0.944	0.875	1.000
Tanzania	0.938	1.000	0.875	1.000

The ROIu is calculated by taking a simple average of the four indicator scores.

ROIu for Algeria:

$$ROI_U = \frac{0.813 + 0.944 + 0.875 + 1.000}{4} = \mathbf{0.908}$$

ROIu for Tanzania:

$$ROI_U = \frac{0.938 + 1.000 + 0.875 + 1.000}{4} = \mathbf{0.953}$$

The ROI consumer indicator scores for Algeria and Tanzania are shown in the table below.

ROI consumer indicator scores:

Country	Commercial Quality Service	Obtaining Electricity Connection/ Service
Algeria	0.500	0.500
Tanzania	0.700	0.000

The ROIc for each country is calculated using a simple average of the two indicators.

ROIc for Algeria:

$$ROI_c = \frac{0.500 + 0.500}{2} = \mathbf{0.500}$$

ROIc for Tanzania:

$$ROI_c = \frac{0.700 + 0.000}{2} = \mathbf{0.350}$$

The ROI value is calculated using a simple average of the ROIu and ROIc score. The ROI scores for the two countries are calculated below.

ROI for Algeria:

$$ROI = \frac{ROI_u + ROI_c}{2} = \frac{0.908 + 0.500}{2} = \mathbf{0.704}$$

ROI for Tanzania:

$$ROI = \frac{ROI_u + ROI_c}{2} = \frac{0.953 + 0.350}{2} = \mathbf{0.652}$$

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 and the power consumers. It was calculated by using the geometric average of ERI_{GS} and ROI results. The geometric average was used given using a simple average would, in principle, have meant that more weight was assigned to the ROI than the RGI and RSI. The use of the geometric mean—which

involves multiplying the two variables— "normalized" the weights assigned and ensured that no variable dominated the weighting. The calculation is as such:

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

Sample Calculation of ERI

The ERI is calculated Algeria and Tanzania as follows:

ERI for Algeria

$$\boldsymbol{ERI = \sqrt{ERI_{GS} * ROI} = \sqrt{0.750 * 0.704} = 0.726}$$

ERI for Tanzania

$$\boldsymbol{ERI = \sqrt{ERI_{GS} * ROI} = \sqrt{0.836 * 0.652} = 0.738}$$

ERI scores are 0.726 for Algeria and 0.738 for Tanzania

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 traffic light color coding system below, with green representing the highest score and red the lowest. It should be noted that the classification and color code have been changed this year from the ERI 2018.

Color	Score range	Interpretation
	0.800 to 1.000	High level of regulatory development, with most elements of a strong policy, regulatory, legal and institutional framework in place
	0.600 to 0.799	Substantial level of regulatory development, with many elements of a supportive regulatory framework, alongside some weaknesses in legal and institutional structures.
	0.500 to 0.599	Medium level of regulatory development, with basic elements of a supportive regulatory framework, with implementation constrained by legal and institutional gaps and low regulatory capacity.
	0.000 to 0.499	Low level of regulatory development, with few or no elements of a supportive regulatory framework and insufficient or nonexistent legal and institutional structures and regulatory capacity.

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; macroeconomic 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 taken alone is not sufficient 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.

Regulatory outcomes

The Regulatory Outcome Index is an important component of the ERI as it measures the impact of the regulators' actions and decisions on the sector. This year's ERI calculation includes the perspective of power utilities and power consumers. A good assessment of the outcomes of the regulators should be completed using surveys from representative private firms and a group of representative households. However, given the complexity and time requirements to undertake such surveys, the chambers of commerce (and in some cases, manufacturers' organizations) were used as a proxy for power consumers, as they are present in most of the African countries. The advantage of using the chambers of commerce is that they can easily summarize the view of their members.

Questionnaire Design

The questionnaires for the regulators, power utilities and power consumers were designed taking into account the feedback and suggestions from respondents during the stakeholder validation process. Best efforts were engaged to ensure all survey questions were clear and unambiguous.

ANNEX 2: LIST OF RESPONDENTS

No	Country	Institution
1	Algeria	La Commission de Régulation de l'électricité et du Gaz CREG Société Nationale de l'Électricité et du Gaz SONELGAZ Chambre Algérienne de Commerce et d'Industrie CACI
2	Angola	Instituto Regulador do Sector Eléctrico IRSE Empresa Nacional de Distribuição de Electricidade ENDE EP
3	Benin	L'Autorité de Régulation l'Électricité au Bénin ARE Benin Société Béninoise d'Énergie Électrique SBEE Chambre de Commerce et d'Industrie du Benin CCI - Benin
4	Botswana	The Botswana Energy Regulatory Authority BERA Botswana Power Corporation BPC Business Botswana (former BOCCIM)
5	Burkina Faso	Autorité de Régulation du Sous-secteur de l'Électricité du Burkina Faso ARSE Burkina Faso Société Nationale d'Électricité du Burkina SONABEL Chambre de Comme et d'Industrie du Burkina FASO CCI BF
6	Cameroon	L'Agence de Régulation du Secteur de l'Électricité ARSEL ENEO Cameroun Chambre de Commerce, d'Industrie des Mines et de l'Artisanat CCIMA
7	Cote d'Ivoire	L'Autorité Nationale de Régulation du secteur de l'Electricité de Côte d'Ivoire ANARE Compagnie Ivoirienne d'Electricité CIE Chambre de Commerce et d'Industrie de Côte d'Ivoire
8	Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency Egypt ERA Egyptian electricity holding company EEHC
9	Eswatini	Eswatini Energy Regulatory Authority ESERA Eswatini Electricity Company EEC Business Eswatini
10	Ethiopia	Ethiopian Energy Authority EEA Ethiopian Electric Power EEP Ethiopian Electric Utility EEU Ethiopian Chamber of Commerce and Sectoral Association
11	Gabon	Agence de Régulation du Secteur de l'Eau potable et de l'Énergie Électrique ARSEE Gabon
12	Gambia	Public Utilities Regulatory Authority PURA National Water and Electricity Company Ltd NAWEC Gambia Chamber of Commerce and Industry GCCI
13	Ghana	Public Utilities Regulatory Commission PURC Energy Commission EC Electricity Company of Ghana ECG
14	Guinea	Autorité de Régulation des secteurs de l'Électricité et de l'Eau AREE Chambre de Commerce d'Industrie et d'Artisanat de Guinée CCIAG
15	Kenya	Energy Regulatory Commission-Kenya ERC Kenya Power & Lighting Company Limited KPLC Kenya Association of Manufacturers KAM
16	Lesotho	Lesotho Electricity and Water Authority LEWA Lesotho Electricity Company LEC

No	Country	Institution
		Lesotho Chamber of Commerce and Industry LCCI
17	Liberia	Liberia Electricity Regulation Commission LERC Liberia Electricity Corporation LEC Liberia Chamber of Commerce
18	Madagascar	Office de Régulation de l'Électricité ORE Jiro Sy Rano Malagasy JIRAMA Fédération des CCI de Madagascar FCCIM
19	Malawi	Malawi Energy Regulatory Authority MERA Electricity Supply Corporation of Malawi Limited ESCOM
20	Mali	Commission de Régulation de l'Électricité et de l'Eau CREE Énergie du Mali SA EDM Chambre de Commerce et d'Industrie du Mali CCI Mali
21	Mauritania	Autorité de Régulation Multisectorielle ARE Mauritanie Société Mauritanienne d'Électricité SOMELEC Chambre de Commerce, d'Industrie et d'Agriculture de Mauritanie CCIAM
22	Mauritius	Utility Regulatory Authority URA Central Electricity Board CEB Mauritius Chamber of Commerce and Industry MCCI
23	Morocco	Autorité Nationale de Régulation du secteur de l'Électricité ANRE Office National de l'Electricité et de l'Eau Potable ONEE-Branche Electricité
24	Mozambique	Mozambican Energy Regulatory Authority ARENE Electricidade de Mozambique EDM
25	Namibia	Electricity Control Board ECB NAMPOWER Namibian Manufacturers Association
26	Niger	Autorité de Régulation du Secteur de l'Énergie ARSE Niger Société Nigérienne d'Électricité NIGELEC
27	Nigeria	Nigerian Electricity Regulatory Commission NERC Jos Electricity Distribution PLC JEDC Benin Electricity Distribution Company PLC BEDC Kano Electricity Distribution Company PLC KEDC Eko Electricity Distribution Company PLC EKDC Ikeja Electric PLC Port Harcourt PLC Enugu Disco Abuja Electricity Distribution Company AEDC Kaduna Electric Ibadan Electricity Distribution Company PLC Network and Electricity Consumers Advocacy of Nigeria NECAN

No	Country	Institution
28	Rwanda	Rwanda Utilities Regulatory Authority RURA Energy Utility Corporation Limited EUCL Private Sector Federation PSF
29	Senegal	Société Nationale d'Électricité du Sénégal SENELEC Commission de Régulation du Secteur de l'Electricité CRSE Chambre de Commerce, d'Industrie et d'Agriculture de Dakar CCIAD
30	Sierra Leone	Sierra Leone Electricity and Water Regulatory Commission SLEWRC Electricity Distribution and Supply Authority EDSA
31	South Africa	National Energy Regulator of South Africa NERSA ESKOM Business Unity South Africa BUSA
32	Tanzania	Energy and Water Utilities Regulatory Authority EWURA Tanzania Electricity Supply Company UNESCO Tanzania Chamber of Commerce, Industry and Agriculture TCCIA
33	Togo	Autorité de Réglementation du Secteur de l'Électricité ARSE Togo Compagnie Énergie Électrique du Togo CEET Chambre de Commerce et d'Industrie de Togo CCIT
34	Uganda	Electricity Regulatory Authority ERA UMEME Uganda National Chamber of - Commerce and Industry UNCCI
35	Zambia	Energy Regulation Board ERB ZESCO (formerly known as Zambia Electricity Supply Corporation Limited) Zambia Chamber of Commerce and Industry ZACCI
36	Zimbabwe	Zimbabwe Energy Regulatory Authority ZERA Zimbabwe Electricity Transmission and Distribution Company ZETDC Confederation of Zimbabwe Industries CZI

About this Publication

The 2019 edition of the Electricity Regulatory Index – produced and published by the African Development Bank (AfDB) – is the second in a series of knowledge products covering issues relating to the development of effective and investor-friendly regulatory frameworks overseeing the electricity sectors in African countries. The Electricity Regulatory Index (ERI) for Africa is a 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.

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