Electricity Regulatory Index

for Africa 2020

AFRICAN DEVELOPMENT BANK GROUP

Disclaimer

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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'Electricité de Côte d'Ivoire
ANRE	Autorité Nationale de Régulation du secteur de l'Electricité (Morocco)
ARE	Autorité de Régulation Multisectorielle (Mauritania)
AREE	Autorité de Régulation des secteurs de l'Electricité et de l'Eau (Guinea)
ARENE	Mozambican Energy Regulatory Authority
ARSE	Autorité de Régulation du Secteur de l'Energie (Niger)
ARSE	Autorité de Régulation du Secteur de l'Energie (Togo)
ARSEE	Agence de Régulation du Secteur de l'Eau potable et de l'Energie Electrique (Gabon)
ARSEL	L'Agence de Régulation du Secteur de l'Electricité (Cameroun)
BEDC	Benin Electricity Distribution Company PLC (Nigeria)
BERA	Botswana Energy Regulatory Authority
BPC	Botswana Power Corporation
CAIDI	Customer Average Interruption Duration Index
CEB	Central Electricity Board
CEET	Compagnie Energie Electrique du Togo
CEO	Chief Executive Officer
CIE	Compagnie Ivoirienne d'Electricité
CREE	Commission de Régulation de l'Electricité et de l'Eau (Mali)
CRSE	Commission de Régulation du Secteur de l'Electricité (Senegal)
DSM	Demand-side management
EAC	East African Community
EC	Energy Commission (Ghana)
ECB	Electricity Control Board (Namibia)
ECG	Electricity Company of Ghana
ECOWAS	Economic Community of West African States
EDM	Energie du Mali
EDM	Electricidade de Mozambique

EDSA	Electricity Distribution and Supply Authority (Sierra Leone)
EEA	Ethiopian Energy Authority
EEC	Eswatini Electricity 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	Electricity Regulatory Authority (Uganda)
ERB	Energy Regulation Board (Zambia)
EPRA	Energy and Petroleum Regulatory Authority (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
GHG	Green House Gas
HVAC	Heating, Ventilation and Air Conditioning
IEDNO	Independent Electricity Distribution Network Operator
IPP	Independent Power Producer
IRSE	Instituto Regulador do Sector Eléctrico (Angola)
JEDC	Jos Electricity Distribution PLC (Nigeria)
JIRAMA	Jiro Sy Rano Malagasy (Madagascar)
KEDC	Kano Electricity Distribution Company PLC (Nigeria)
KPI	Key Performance Indicator
KPLC	Kenya Power & Lighting Company Limited
LEC	Lesotho Electricity Company
LEC	Liberia Electricity Corporation
LERC	Liberia Electricity Regulation Commission

LEWA	Lesotho Electricity and Water Authority
MEPS	Minimum Energy Performance Standards
MERA	Malawi Energy Regulatory Authority
NAWEC	National Water and Electricity Company Ltd (Gambia)
NERC	Nigerian Electricity Regulatory Commission
NIGELEC	Société Nigérienne d'Electricité (Niger)
ONEE	Office National de l'Electricité et de l'Eau Potable (Morocco)
ORE	Office de Régulation de l'Electricité (Madagascar)
PPA	Power Purchase Agreement
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
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'Energie Electrique
SENELEC	Société Nationale d'Electricité du Sénégal
SLEWRC	Sierra Leone Electricity and Water Regulatory Commission
SONABEL	Société Nationale d'Electricité du Burkina
TANESCO	Tanzania Electricity Supply Company
URA	Utility Regulatory Authority (Mauritius)
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
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 like mini grids but operate at a smaller size and of 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

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.

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 five years or have recently been restructured. These institutions often are at an 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.
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
Quality of Service Delivery (Commercial and Technical)	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.

Regulatory Capture	A situation in which the regulated utilities or any of the sector stakeholders 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 (over 100 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

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The ERI was calculated from answers to a comprehensive survey administered to national regulators and utilities across the African continent. Special appreciation goes to all participants in this year's edition of the Index.

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Foreword

Wale Shonibare

Director
Energy Financial
Solutions, Policy &
Regulations

We are pleased to share this third edition of the Electricity Regulatory Index for Africa (ERI) in 2020. Through the ERI, the Bank has been consistent in its resolve to highlight the key areas of electricity regulation that need reforms, outline appropriate interventions and encourage action among stakeholders to address them. The ERI has now become a widely acclaimed continental tool for analyzing the regulatory environment. It is a valuable source of information for sector analysis and for monitoring the evolution of regulatory frameworks across the continent. Under the African Union Commission (AUC) and the European Union (EU) Technical Assistance Facility's initiative on monitoring the harmonization of electricity markets in Africa, the ERI is recognized as a key source of information. The ERI will continue to provide key information to help the AUC/EU monitor the progress on harmonization of regulatory and market frameworks in Africa.

The ERI has prompted action among stakeholders. This includes forging key collaboration to act on ERI recommendations. Guided by the ERI, some surveyed countries have taken steps to address some of the identified gaps in their regulatory frameworks over the years. The Bank has also established key collaboration with development partners (including USAID/Power Africa), for the implementation of ERI recommendations. The African Development Bank is collaborating with the World Bank to elevate the ERI to a global dimension by applying the ERI methodology and principles in other continents beyond Africa. This will ultimately allow global comparison and benchmarking of regulatory frameworks.

2020 has been a challenging year globally, and all sectors have felt the impact of Covid-19, including the electricity sector. Pandemic related restrictions impacted electricity demand (increased residential demand and decreased industrial/commercial demand). This resulted in shortfalls in the projected revenues of utilities. To address these challenges, regulators in collaboration with governments and utility companies, implemented tariff relief schemes to alleviate the hardship on consumers. Regulators will be required to play an even more critical and central role post-Covid to ensure that the sector recovers with minimal and controlled impact on consumers and utilities.

Regarding the development of the ERI 2020, despite the pandemic related challenges, regulators and utilities from a total of thirty-six (36) countries participated in this year's assessment. This includes (7) new entrants. The Bank is on course to cover all African countries where there are autonomous regulatory institutions, with gradual entry of new participants in subsequent ERI editions.

The ERI 2020 recorded significant improvement in key regulatory indicators in some countries. There was improvement in licensing frameworks of countries and this has provided transparent processes for investors' entry into the electricity sectors of those countries. Many countries have developed and implemented legal and policy frameworks for renewable energy. This includes frameworks that provide guaranteed access to the grid for renewable energy and developed model technology and specific power purchase agreements for renewable energy to guide utilities and investors. More countries have also built requisite regulatory capacities in key areas of economic and technical regulation.

The ERI provides practical insights on regulatory developments and issues in participating countries. It is a credible source of regulatory information. We invite development partners and other sector stakeholders to adopt it as a reference tool for engagement with the regulatory sectors of participating countries and to collaborate with the African Development Bank for coordinated implementation of the ERI recommendations.

Executive Summary

This report presents the results of the third edition of the Electricity Regulatory Index (ERI) for Africa, covering thirty-six countries. The first edition was published in 2018 and covered fifteen countries. Thirty-four countries participated and were assessed in ERI 2019. The ERI is made up of three pillars or sub-indices: the Regulatory Governance Index (RGI); the Regulatory Substance Index (RSI); and the Regulatory Outcome Index (ROI).

ERI Survey

The information and data used to calculate the ERI 2020 scores for each participating country were collected through bespoke surveys distributed to their electricity sector regulators and power utility companies. The methodology for this year's ERI has been further developed, based on the two previous editions. Various indicators have been improved by broadening the survey questions to improve the quality of responses and to incorporate the perspectives of private sector distribution utilities.

Country Scores and Rankings

The 36 participating countries were ranked into four performance 'bands', reflecting how developed their electricity regulatory frameworks are and to what extent they align with international best practice (see Figure I). The Regulatory Governance Index (RGI) assesses the level of development of the legal and institutional set up of the regulatory framework of a country. It is concerned with the existence and content of electricity sector regulations.

Color/ Score range	Interpretation
0.800 to 1.000	High level of regulatory development
0.600 to 0.799	Substantial level of regulatory development
0.500 to 0.599	Medium level of regulatory development
0.000 to 0.499	Low level of regulatory development

Figure I: Classification of Scores

The Regulatory Substance Index (RSI) assesses how the regulator has operationalized the mandate bestowed on it by the RGI in developing and implementing key regulatory instruments and frameworks for the sector

The Regulatory Outcome Index assesses the outcomes of regulatory decisions, actions and processes on the sector from the perspective of regulated entities. It offers insights into how the actions of regulators have affected the performance of the sector.

Country	RGI[1]	RSI[2]	ROI[3]	ERI[4]	Rank
Uganda	0.925	0.945	0.686	0.801	1
Namibia	0.817	0.782	0.721	0.759	2
Tanzania	0.904	0.926	0.568	0.721	3
Zambia	0.690	0.687	0.622	0.655	4
Kenya	0.828	0.888	0.468	0.633	5
Zimbabwe	0.698	0.723	0.561	0.631	6
Niger	0.724	0.581	0.571	0.611	7
Nigeria	0.900	0.790	0.417	0.594	8
Angola	0.749	0.674	0.494	0.593	9
Ethiopia	0.657	0.674	0.519	0.587	10
Rwanda	0.805	0.848	0.407	0.580	11
Senegal	0.866	0.799	0.379	0.561	12
Sierra Leone	0.750	0.511	0.498	0.561	13
Benin	0.778	0.718	0.404	0.550	14
Malawi	0.698	0.635	0.453	0.550	15
Ghana	0.703	0.794	0.401	0.548	16
Cameroon	0.558	0.522	0.509	0.525	17
Togo	0.587	0.685	0.422	0.518	18
Eswatini	0.770	0.535	0.393	0.506	19
Lesotho	0.702	0.476	0.420	0.497	20
Côte d'Ivoire	0.746	0.453	0.412	0.497	21
Mali	0.708	0.498	0.323	0.441	22
Burundi	0.597	0.193	0.478	0.434	23
Guinea	0.606	0.302	0.393	0.422	24
Madagascar	0.659	0.527	0.260	0.393	25
Mozambique	0.642	0.412	0.277	0.382	26
Dem. Rep. of Congo	0.401	0.357	0.375	0.377	27
Burkina Faso	0.697	0.278	0.286	0.373	28
Botswana	0.681	0.305	0.228	0.336	29
Gambia	0.572	0.526	0.197	0.329	30
Liberia	0.644	0.239	0.184	0.285	31
Mauritius	0.691	0.444	0.135	0.277	32
Central African Republic	0.549	0.321	0.159	0.263	33
Gabon	0.508	0.253	0.165	0.250	34
Rep. of Congo	0.373	0.306	0.167	0.238	35
Chad	0.578	0.034	0.184	0.238	36
Mean	**0.688**	**0.545**	**0.393**	**0.486**	

Table I: ERI 2020 Country Scores and Rankings

1 Regulatory Governance Index

2 Regulatory Substance Index

3 Regulatory Outcome Index

4 Electricity Regulatory Index

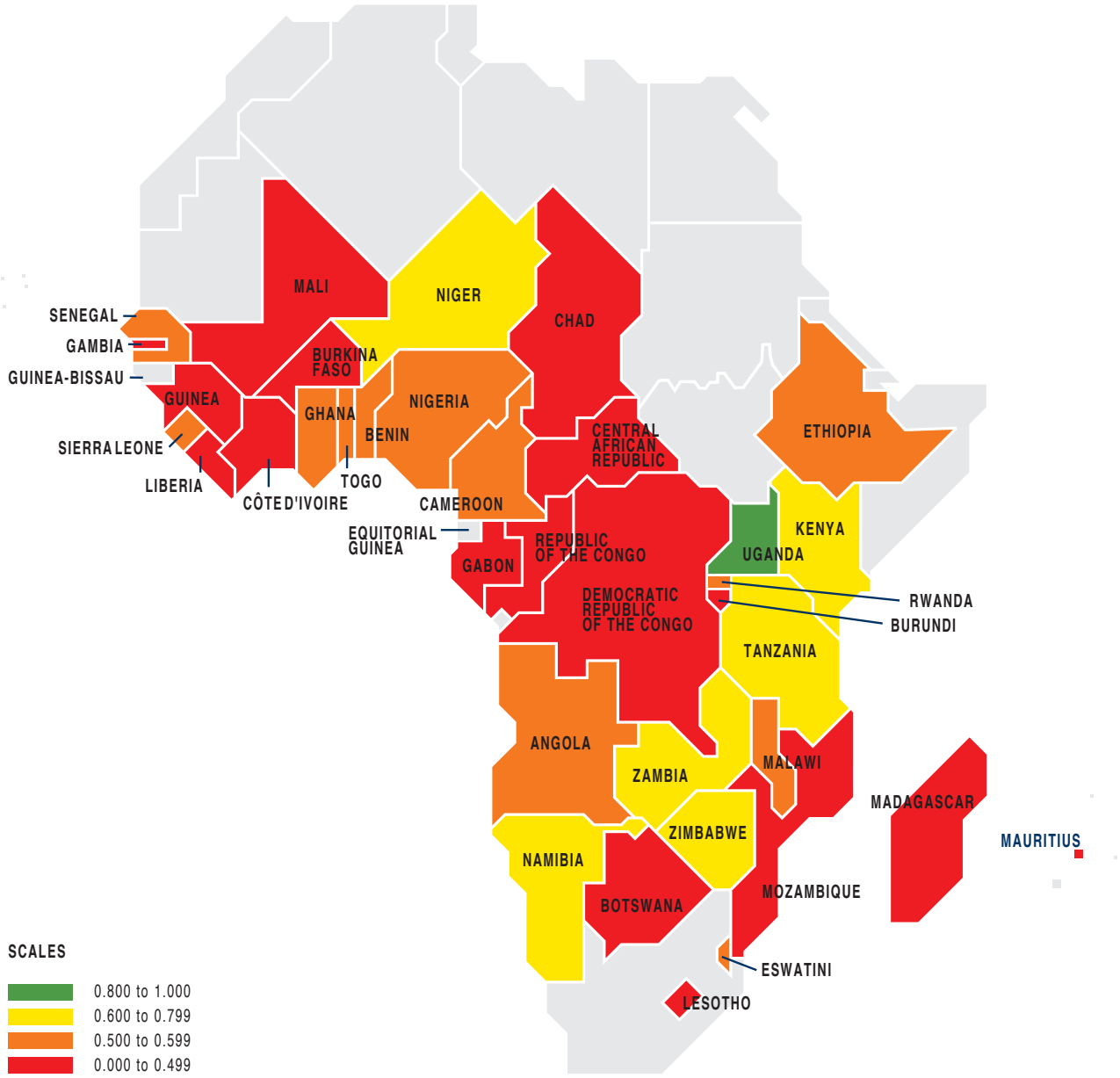


Figure II: 2020 Electricity Regulatory Index Map

Changes in Methodology and Score Swings in ERI 2020

The ERI methodology has evolved and strengthened over the years. Questions were elaborated and a few new additional questions were included in the ERI 2020 survey. Seven new entrants (countries) made their way into the ERI 2020 sample. The relative positions or rankings of participating countries were therefore impacted. Unlike 2019, chambers of commerce (representing consumers) were not included in the ERI 2020 because responses were received from only 25 countries. The exclusion of chambers

of commerce in the final ERI construction increased the impact of the utility's response in the overall ERI score. In addition, there were changes in regulatory frameworks as a result of development and or implementation of regulatory instruments between the 2019 and the 2020 ERI publications. There were thus significant changes in country scores and swings in ranking in ERI 2020 compared with ERI 2019.

Angola:  	Advanced from 33rd position (out of 34 countries) in the ERI 2019 to 9th position (out of 36 countries) in ERI 2020. Angola made significant improvements in its regulatory framework, especially in institutional capacity, framework for renewable energy and off-grid systems (mini-grid and standalone systems).
Ethiopia:  	Rose from 25th position in the ERI 2019 to 10th position in the ERI 2020. Significant improvements and achievements over the period, include approval of quality of service standards and tariff methodology. Ethiopia is also far advanced in the development of a national grid code
Niger:  	Rose from 16th position in ERI 2019 to 7th position in ERI 2020. Improvements in the regulatory framework especially in the areas of licensing frameworks, mini-grid and off-grid systems as well as open access to information.
Zimbabwe:  	Advanced from 21st position (out of 34 participants) in ERI 2019 to 6th position (out of 36 participants) in the ERI 2020. Zimbabwe made achievements in institutional capacity, frameworks for renewable energy and tariff processes.
Rwanda:  	Declined from 5th position in ERI 2019 to 11th position in ERI 2020. The weak performance was mainly the result of the weakness identified in the utility assessment (ROI), driven by low scores in financial performance and competitiveness and quality of service sub indicators. The regulator has not undertaken a cost of service study (CoSS) and has not approved the CoSS undertaken by the utility, which is currently being used internally by the utility. Tariffs set are therefore not cost reflective, and utility receives government subsidies to make up the shortfall. Other factors include the lack of procedures and schedule for major tariff reviews, and the absence of regulatory ceilings on quality of service indices (SAIDI and SAIFI).
Senegal:  	Declined from 8th position in ERI 2019 to 12th position in ERI 2020, mainly due to weak performance in ROI, specifically with regard to financial performance and competitiveness and quality of service sub indicators. The regulator has not approved the cost of service study undertaken by the utility, and the recommendations are not being implemented. Furthermore, despite the considerable energy loss (between 10 to 20%), there is no loss-reduction target enforced. The utility reported tracking its performance in quality of service. However, the results are not discussed with the regulator nor are any thresholds enforced.

Biggest Improvements and Declines in 2020

Key Findings

The results of ERI 2020 show the following:

1. **The electricity regulatory frameworks of African countries included in the sample, assessed by ERI, are at a low level of development** (average ERI of 0.486). Although the RGI and RSI indices are relatively high, (average of 0.688 and 0.545 respectively), the average overall ERI was low because of a low average ROI score of 0.393. The distribution of scores across the major regulatory indicators shows that although some elements of supportive regulatory frameworks have been established across the continent, major weaknesses remain in the capacity of the regulators to enforce the rules of the country regulatory frameworks.

2. **The top performing country in this year's ERI is Uganda.** Along with Uganda (0.801), Namibia (0.759), Tanzania (0.721), Zambia (0.655) and Kenya (0.633) are the top five performers of the ERI 2020. These countries have well-developed electricity regulatory frameworks, and their regulators can exert the necessary regulatory oversight and authority on the regulated entities and the sector for measurable outcomes.

3. **Most countries have well-developed governance structures signified by relatively high average Regulatory Governance Index (RGI) scores.** This demonstrates that they have put in place the necessary legal frameworks in the primary legislation that created the independent regulators as part of sector-wide reforms. Seventy-five percent (75%) of countries surveyed fell within the green and yellow performance bands on RGI. Despite the better performance on RGI compared to RSI and ROI, it was observed that:
   - Political authorities had significant influence on regulatory authorities. In 90% of the countries surveyed, the executive holds the power to appoint board members and heads of regulatory institutions, and this has the potential to subject the regulator to subtle and direct political pressure to skew key regulatory decisions towards the political inclination of the government in power.
   - While most countries (67%) have legislations to deal with conflict of interest for commissioners and heads of the regulatory institutions while in office, few (31%) have adequate mechanisms to regulate the situation immediately after the term of office as regulators.
   - Only five (14%) countries have specialized bodies that can adjudicate over regulatory issues brought by aggrieved regulated entities. This impacts on the accountability of the regulator to stakeholders. The latter must resort to laboriously long judicial processes to handle grievances in a highly technical regulatory environment. The independence of the regulator is desirable only to the extent that the regulator is accountable to stakeholders.

4. **Although improvements were noted in some critical areas, including institutional capacity, there is still scope to further improve on other indicators of the Regulatory Substance Index (RSI), particularly with respect to tariff setting procedures and quality of service regulations.** It was observed that:
   - In strengthening institutional capacity, some regulators (especially in Angola and Zimbabwe) have demonstrated remarkable staff capacity improvement in such areas as engineering, economics, finance, and modelling. They achieved this by committing resources to strategic recruitment and training.
   - Regulatory development in tariff frameworks and processes remains weak. About 53% of the regulators surveyed still operate without a well-documented tariff methodology. Of those who have tariff methodologies, many of them do not have in their methodologies, procedures and schedules for major tariff reviews as well as indexation and automatic tariff adjustment mechanisms.
   - Quality of service (QoS) regulatory frameworks are weak. Twenty (or 55%) of the countries surveyed have not developed any country-level QoS regulations. Of those with QoS regulations, many of them do not have clear cut ceilings and thresholds on some key QoS indices such as SAIDI and SAIFI. The utility companies have generally been left to use their discretion on limits of indices, with no incentives or penalties being implemented in most countries to drive the utilities to ensure adequate supply reliability. Nigeria's Service Reflective Tariff scheme is an innovative mechanism to incentivize and drive utilities towards delivering the desired quality of service. Under the scheme, different consumer categories subscribe to defined minimum hours of electricity supply in a day and pay commensurate tariffs.

5. **Under the ROI, only eight (22%) of countries surveyed scored above 0.500, suggesting a general disconnect between development and implementation of regulatory frameworks and their relationship with desired sector outcomes from the perspective of the utilities.** The average score of the ROI (utility) of 0.393, indicates that regulatory decisions and actions have not translated into sector outcomes. The inability of the regulator to follow tariff review schedules, develop, approve and implement the findings of appropriate CoSS, are some observed bottlenecks in tariffs that have affected sector and utility sustainability.
   - Most (69%) of the countries surveyed have regulatory mechanisms in place to facilitate electricity access especially to rural customers. However, in 21 of the 36 countries surveyed, it was found that the utility is not involved in funding rural electrification but rather the Government, Non-Governmental Organizations (NGOs) and consumers.

- Utilities in most countries (56%) are unable to cover their cost of operation from tariffs set by the regulator, and there are no agreed transitional paths or roll-out plan towards cost reflectivity in most of these instances.

Recommendations

The following actions are recommended for consideration by governments and regulators seeking to improve their electricity regulatory frameworks.

Improving Regulatory Governance

Independence from government -- Some regulatory acts should be amended to provide for longer, fixed-term non-renewable appointments for commissioners of between five to seven years. This will allow for an arm's length relationship with government and limit opportunities for executive interference without questioning the executive's constitutional powers to make appointments to public institutions.

Independence from the regulated sector -- Regulations on conflict of interest should be established and strictly enforced to control professional nomadism between the regulator and regulated entities. This includes the determination of mandatory cooling off periods before a person can migrate from the regulator to the regulated and vice-versa.

Financial independence -- All regulatory agencies should be financially independent of government funds. They should preferably depend on fees and levies at levels approved by the legislature. Budgets of regulatory authorities should not require annual approvals or validation from government, but post-expenditure audits must be carried out at the end of the financial year and submitted to the legislature to ensure the sound and proper management of funds by the regulatory authority. The board of the regulatory authority should set the salaries of regulatory staff. These salaries should be set at the same level or better than those of operators, as this will avoid any risk of capture by utility companies.

Strengthen regulatory accountability -- To strengthen the accountability of the regulator, the primary legislation that established the regulators should be amended. Alternatively, appropriate secondary legislations should be enacted to back the setting up of a third-tier adjudication body or specialized tribunal. This is in countries where such secondary legislations do not exist to provide an independent route for regulated entities to contest regulatory decisions when aggrieved.

Increase predictability -- Predictable tariff methodologies should be put in place to permanently guide the regulator's action on tariffs. Tariffs must be set based on procedures and time schedules known to all electricity companies and consumers alike. There should be a clear indication of expenditures and costs that are not allowed to be passed through tariffs. This should be known in advance to guide investors to make and commit to long-term investment plans

Improving Regulatory Substance

Enhance economic regulation -- The pricing methodology should be developed by the regulator based on formulas, procedures and schedules set in advance and known to stakeholders. Vulnerable and low-income consumers should be considered in determining prices and tariff structures. The regulator should require financial audits of the utility companies in a form that ensures that inefficient costs of utilities are not passed on to consumers. Regulatory accounting should be introduced to enhance the use of financial audits for specialized regulatory purposes. This is because such accounts are developed based on activity-based costing principles, and are thus helpful in determining the elements that build up to create the regulated cost-base. This helps determine which costs are allowable in calculating revenue-requirements. One of the functions of cost of service studies should be the development or updates to such accounts.

Regulators should require utilities to publish on their websites, their own performance indicators against set regulatory targets and KPIs, and to produce periodic public reports documenting reasons for any underachievement.

Develop technical regulations -- In countries where quality of service (QoS) regulations have not been developed, the regulator should take immediate steps to develop comprehensive QoS regulations, covering all aspects of reliability indices, setting appropriate ceiling and thresholds. In situations where QoS regulations is not being enforced because the distribution network is weak, a roll-out plan should be agreed between the regulator and utility towards the set QoS standards. Periodic consumer satisfaction surveys (with a maximum two year interval) should be an enforceable KPI for the utilities.

Strengthen institutional capacities -- To ensure sustainable capacity development, regulatory staff should be kept abreast of ever-changing trends in the dynamic energy sector. Regulators should undertake comprehensive skills or capacity needs assessments and develop a consistent training program to match it. Remuneration of regulatory staff should be at par or above that of regulated entities to avoid losing these highly skilled staff to other sector institutions.

Enhancing Regulatory Outcomes

Financial Performance and Competitiveness -- The regulations put in place must ensure that utility companies have tariffs that cover their prudent operating costs through the conduct of regular cost of service studies, in collaboration with the operators and implementing the findings. In situations where tariffs are not cost reflective, a transitional path towards cost reflectivity should be agreed between regulator

and utility for implementation. In addition, regulations should be put in place to frame the mechanisms of energy purchase contracts or power purchase agreements (PPAs). They should be competitively procured and triggered by well-defined demand-supply forecast and planning indicators.

Commercial and Technical Quality of Service Delivery -- Regulators should develop a comprehensive performance monitoring framework, with key performance indicators (KPIs) to monitor utility performance. The KPIs should cover financial performance, commercial and technical quality of service performance, quality of service delivery and operational efficiency. Regulators should require utilities to publish on their websites, their own performance indicators against set regulatory targets and KPIs, and to produce periodic public reports documenting reasons for any underachievement.

Facilitating Electricity Access -- Governments, Non-Governmental Organizations (NGOs) and consumers (individuals and communities) are key drivers of electricity access and rural electrification. Appropriate regulatory frameworks and mechanisms should be put in place to allow for the reimbursement of funds granted to individuals, NGOs or communities for the development of off-grid energy services for electrification.

69% of the countries surveyed have regulatory mechanisms in place to facilitate electricity access especially to rural customers. However, in 21 of the 36 countries surveyed, it was found that the utility is not involved in funding rural electrification but rather the government, NGO's and consumers.

1. What is the Electricity Regulatory Index?

1.1. Definition

The Electricity Regulatory Index 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 the following three pillars:

- Regulatory Governance Index
- Regulatory Substance Index
- 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 is made up of seven indicators. The RGI and the RSI together assess the effectiveness of the regulatory environment to support electricity sector performance, promote efficiency and fulfill national objectives.

The Regulatory Outcome Index (ROI) measures, from the perspectives of distribution utility companies and/or consumers, the degree to which the regulator has a positive or negative impact on the sector. The ROI assesses how regulatory actions and decisions can 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. Given the limited responses from consumers in the 2020 assessment, the ERI 2020 has included only results from the utility outcome index in its final calculation. The ROI for utility comprises three sub-indicators. Table 1 contains the main indicators under each pillar of the ERI.

The ERI for Africa is not an assessment of the level of development of the electricity sector of a country. As defined earlier, the ERI measures the existence of policy and regulatory frameworks to measure the level of development of a 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 among other various exogenous factors. While the existence of the requisite regulatory frameworks does not directly translate into strong sector development, similarly, a highly developed and vibrant electricity sector in a country does not necessarily indicate the existence of a robust

Regulatory Authority		Power Utility Company
Regulatory Governance Index	**Regulatory Substance Index**	**Regulatory Outcome Index**
1: Legal Mandate **2:** Clarity of Roles and Objectives **3:** Independence **4:** Accountability **5:** Transparency of Decisions **6:** Predictability **7:** Participation **8:** Open Access to Information	**9:** Economic Regulation **10:** Technical Regulation **11:** Licensing Framework **12:** Institutional Capacity **13:** Renewable Energy Development **14:** Mini-grid and Off-grid systems **15:** Energy Efficiency Development	**16:** Financial Performance and Competitiveness **17:** Quality of Service Delivery (Commercial and Technical) **18:** Facilitation to Electricity Access

Table 1: Main Indicators of the ERI 2020 Pillars

regulatory regime. The performance of the sector depends on numerous factors in addition to the regulatory regime.

1.2. Purpose

Electricity markets in Africa have undergone considerable transformation over the last two decades. In many cases, they have evolved from state-owned, state-controlled and state-funded monopolies to open structures that enable private sector participation and competition, which ultimately result in better and efficient service delivery to the consumer. 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 African Development Bank commissioned a study to identify key measures of regulatory performance. This subsequently informed the development of the 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. It is also designed to play a role in facilitating investment into Africa's power sector, including investment from private sector actors and developers.

Through its New Deal on Energy for Africa, launched in 2016, the African Development Bank is promoting universal access to energy in Africa. This is in keeping with the UN Sustainable Development Goals. This ambitious target requires a significant increase in private

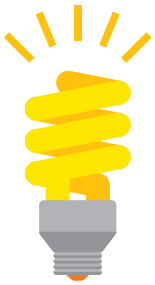
investment in the energy and power sectors. Sound policies and effective regulation are essential to attract such investment. Regulators are to provide the transparency, predictability, and effective governance that investors require, while at the same time protecting the consumer.

1.3. Evolution of the ERI 2018 to 2020

The ERI has evolved considerably from 2018 when only 15 countries participated. In 2019, 34 countries participated, growing to 36 in 2020.

The 2018 inaugural edition was successful in drawing attention to the significance of electricity sector regulation. It introduced the concept of an index that empirically measures the level of development of electricity sector regulation in Africa. The 2019 edition incorporated some revisions to the survey format. This made for broadening data collection and expanding the number of stakeholders to include both power utilities and consumers. ERI 2020 was designed to go further to solicit even more detailed responses from stakeholders.

The main changes between ERI 2019 and ERI 2020



An increase in the number of indicators from 15 in 2019 to 18 in ERI 2020, including separate sections on renewable energy, mini-grid and energy efficiency development.

Revision of the regulatory surveys to include specific sections on institutional capacity, renewable energy, mini-grid and off-grid systems and energy efficiency development

Expansion of the utility survey to include sections to solicit information on

- Private sector participation in distribution in Africa
- Developments in the electricity supply industry in Africa, which could affect the operations of distribution utilities

More countries covered, from **34 in 2019 to 36 in 2020** (including seven new entrants to the sample)

2. Methodology in Brief

The African Development Bank is committed to continuously improving the relevance of the ERI indicators and aligning the methodology with emerging trends in the power sector. The Bank's aim is to make the survey as representative as possible. 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 1 outlines these sub-indices.

The ERI scores were calculated based on responses to comprehensive surveys distributed to electricity sector regulatory institutions, utilities and power consumers' representatives in 44 African countries with confirmed regulatory authorities. Out of the 44 countries surveyed, 41 submitted responses from the regulatory agencies, and 36 responses were also received from regulated utilities. The resulting data and analysis are therefore based on a sample of 36 countries, for which the complete sets of data were available.

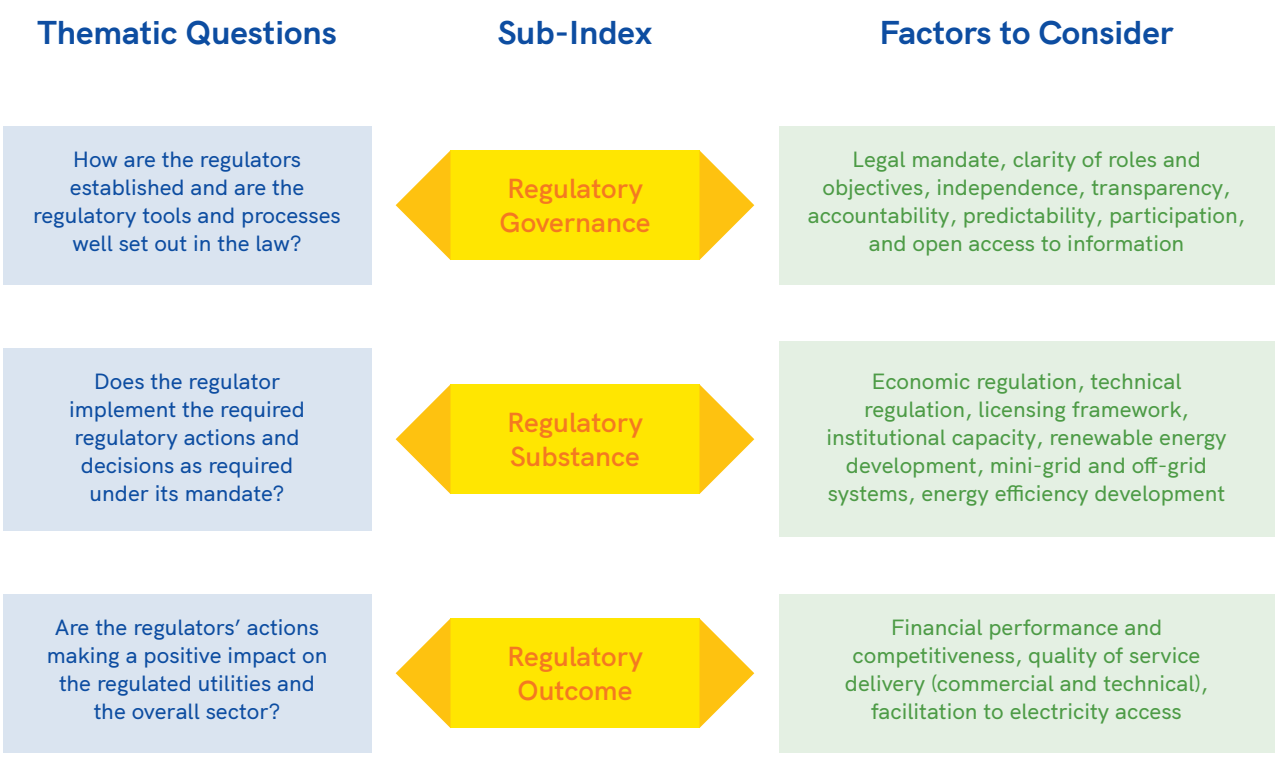
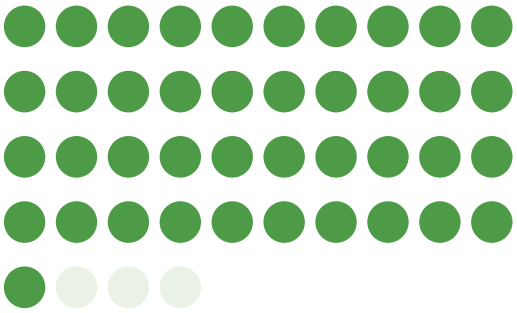


Figure 1: ERI Components

The indicators for Regulatory Governance and Regulatory Substance were used to construct the ERI 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 that it regulates and, ultimately on the sector. The Regulatory Outcome Index (ROI) captures the results of this analysis. The ROI was based on primary information obtained from completed questionnaires submitted by power utilities. The results from ERI_{GS} and ROI were combined, as indicated in figure 2 below, to determine the ERI.



Out of the 44 countries surveyed, 41 submitted responses from the regulatory agencies, and 36 responses were also received from regulated utilities. The resulting data and analysis are therefore based upon a sample of 36 countries, for which the complete sets of data were available.

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

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

Where:

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

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

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

Where:

ROI = Regulatory Outcome Index

Figure 2: Calculating the ERI 2020

Based on the responses to the questionnaires, each indicator in the sub-indices is assigned a score between 0.000 and 1.000. A score of 1.000 indicates that the regulator and/or the national regulatory framework conform(s) to international best practice with regard to the relevant indicator. A score of 0.000 signifies a complete lack of alignment with international best practice. The RGI, RSI and ROI sub-indices are calculated based on a simple average of their underlying indicators. Given this, cumulative scores of the RGI, RSI and ROI, as well as the overall ERI score, also range from 0.000 and 1.000, with the same implications given above. Figure 3 below illustrates the classification of scores for ERI 2020.

Color/ Score range	Interpretation
0.800 to 1.000	**High level of regulatory development** Most 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. There are insufficient or nonexistent legal and institutional structures and capacity of the regulator.

Figure 3: Classification of Scores

Limitations

The questionnaires for ERI 2020 were completed online and respondents had the opportunity to ask questions or seek clarifications only by email and/or telephone. Although this was not the optimum solution and it did slow down the process considerably, the respondents and the African Development Bank managed to complete the process with all 36 countries.

Due to Covid-induced lockdowns in many countries, all offices were closed, and some respondents did not have access to vital documents. Five countries – Algeria, Egypt, Mauritania, Morocco and South Africa – which participated in ERI 2019, did not patriciate in this year's edition of the ERI.

Annex 1 contains a complete description of the detailed methodology used to calculate the ERI.

3. Improvements and Declines in ERI 2020

As the ERI methodology has evolved and strengthened over the years and as new entrants (countries) make their way into the ERI sample, the relative positions or rankings of participating countries have been impacted. Unlike 2019, the chambers of commerce (representing consumers) were not included in the ERI 2020. The questionnaires were also more detailed, with a few more questions added to each questionnaire. Changes in regulatory frameworks resulted in improvements and declines in relative rankings of returning participating countries. This is believed to be because of the development and or implementation of regulatory instruments and frameworks between the 2019 survey and the current ERI publication.

3.1. Most Improved in 2020

3.1.1. Angola

Angola advanced from 33rd position in the ERI 2019 to 9th position in the ERI 2020. Significant improvements were observed in the regulatory framework of Angola, especially in the area of institutional capacity, framework for renewable energy and off-grid systems (mini-grid and standalone systems).

- Institutional Capacity - In addition to consistent training for key staff in specific areas of regulation, the regulator in Angola has made strategic recruitment of personnel with key expertise to augment its staff. With this recruitment, the regulator, which in 2019 had inadequate capacity in key areas of economic and technical regulation, now has adequate capacity in all areas except legal, where they still have inadequate capacity.
- Renewable Energy - Unlike in 2019, Angola has developed a legal/policy framework for renewable energy development in 2020. This is its situation in 2020. In addition, Angola now has an approved model power purchase agreement for mini hydros. There is also an on-going process to finalise and approve a similar model power purchase agreement for other renewable energy technologies. The regulator has a manual (separate from a grid code), which is a binding and gazetted legal instrument that guarantees renewable energy access to the grid.
- Off-Grid (Mini-Grid and Stand-alone systems) - Unlike in 2019, in 2020, the regulator indicated the existence of connection codes specifying technical standards for connecting mini-grid to the national grid, as well as standards for stand-alone and individual home systems.

3.1.2. Ethiopia

Ethiopia recorded a significant movement in rank from 25th position (out of 34 participants) in the ERI 2019 to 10th position (out of 36 participants) in ERI 2020. Some key regulatory initiatives, undertaken by the regulator in the one-year period, indicate how Ethiopia is accelerating towards liberalizing its electricity market.

The regulator in Ethiopia updated and finalized some key regulatory instruments over the past year, including the Quality of Service Standards approved in 2019 and the tariff methodology approved in 2020. Ethiopia is also far advanced with the development of a national grid code to establish the requirements, procedures, practices and standards that will govern the development, operation, maintenance and use of the high voltage transmission system in the country.

3.1.3. Niger

Niger jumped from 16th (out of 34 participants) in ERI 2019 to 7th position (out of 36 participants) in ERI 2020. A few regulatory initiatives have led to improvements in the regulatory framework, especially in the areas of licensing frameworks, mini-grid and off-grid systems and open access to information.

- Licensing framework and mini-grid & off-grid systems - In May 2020, in a council of ministers meeting, the Nigerien government adopted a decree determining the terms and conditions for concluding delegation and licensing agreements in the electricity sector. The new decree reinforces the provisions of decrees # 2016-514 and 2016-519 on the licensing framework.
- Open-access to information - The regulator recently revamped its website in terms of periodicity of publication/updates and the types of information and documents available to visitors. The website is regularly updated, and relevant regulatory documents are uploaded on it.

3.1.4. Zimbabwe

Zimbabwe advanced from 21st position (out of 34 participants) in ERI 2019 to 6th position (out of 36 participants) in ERI 2020. Some regulatory initiatives and actions have led to improvements in the country's regulatory framework, especially in the areas of institutional capacity, framework for renewable energy and tariffs.

- Cost Reflective Tariffs - Other than during the first half of 2020 when tariffs were not adjusted for large currency depreciation (under the automatic adjustment formula) and the impact on consumers, tariffs in Zimbabwe are cost reflective. The regulator, the Zimbabwe Energy Regulatory Authority (ZERA) confirms this. The utility was temporarily unable to recover its cost of operation from the tariff during the early part of the year. Nevertheless, the regulator is implementing a program of gradual migration back to cost reflective levels through tariff adjustments of 50% within three months (from September 2020 to December 2020).
- Institutional Capacity - ZERA has invested a lot of resources in training existing staff over the past year in key regulatory areas and recruited a few experts to join its team, thereby adequately strengthening staff capacity.
- Renewable Energy - Renewable energy sources are "self-dispatching" in 2020, compared with the situation in 2019. Most renewable energy projects are connected in the distribution network and automatically synchronise, if grid voltage is available. This guarantees unimpeded

access to the grid and priority dispatch for renewable energy sources. The utility has developed a model power purchase agreement that is given to independent power producers and prospective developers. The regulator approves all signed power purchase agreements and recognizes the price adjustment clauses in the tariff. New model power purchase agreements are being developed to incorporate the tendering process, which has now been adopted as a mechanism for procuring renewable energy generation.

3.2. Declining Performers in 2020

3.2.1. Rwanda

Rwanda ranked 5th out of the 34 participants in ERI 2019 but declined by six positions in the 2020 edition to rank 11th out of 36 participants. The country's drop in placement is due to its relative positioning in the ranking, as some countries improved their performance significantly and moved up. It is also due to the outcomes of regulatory decisions and actions on the energy sector from the perspective of the utility.

- Cost of service and cost reflectivity - The regulator has not undertaken a cost of service study (CoSS) on the operations of the utility. It has not approved the CoSS currently being used internally by the utility. Tariffs set are therefore not cost reflective, and the utility receives government subsidies to make up the shortfall.

- Procedures and schedule for major tariff reviews - The ERI 2020 survey shows that there is no outlined procedure or schedule for major tariff reviews in Rwanda.
- Quality of Service (Ceiling on SAIDI/ SAIFI) - The quality of service regulation of Rwanda covers the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI). However, it falls short of setting a definite ceiling on these to guide the utility or compel it to make efforts to operate below the ceiling. No measurable regulatory outcome was observed for this indicator, as the utility uses its discretion to determine limits of SAIDI and SAIFI within which they operate.

3.2.2. Senegal

Senegal came 8th out of the 34 participants in ERI 2019. However, it declined by four positions in the 2020 edition to rank 12th out of 36. Senegal's drop in rank was mainly due to the ROI indicator and specifically the sub-indicators of **financial performance and competitiveness and quality of service.**

- Financial performance and competitiveness – Although a cost of service study is said to have been carried out by the utility, the recommendations of this study have not been approved or implemented by the regulator. The tariff is not cost-reflective and does not cover the cost of operations of the utility. Despite the considerable energy loss (between 10 to 20%), there is no loss-reduction target enforced. There is no regulatory mechanism to deal with electricity theft.
- Quality of service (monitoring of SAIDI/ SAIFI) - Although the utility calculates these indicators to measure performance, the results are not discussed with the regulator and are not enforced.

4. ERI 2020 Results

4.1. Overall Electricity Regulatory Index 2020 Results

Overall, ERI 2020 shows that the electricity regulatory frameworks of African countries included in the sample have an average low level of regulatory development (average ERI of 0.485). They show that although some elements of a supportive regulatory framework are established, major weaknesses remain in regulators' capacity to implement their own regulatory frameworks or enforce their own regulations. While the level of development of the Regulatory Governance (RGI) and Regulatory Substance (RGS) frameworks are high, the outcome (ROI) in terms of utility performance is still extremely low.

Uganda is the top performing country in ERI 2020. It obtained a score of 0.801. Other performers and scores were: Namibia (0.759), Tanzania (0.721), Zambia 0.655 and Kenya (0.633). These are the top five performers of ERI 2020. These countries have well-developed electricity regulatory frameworks, and their regulators can exert the necessary regulatory authority on the regulated entities.

There are seven new ERI entrants, including both mature and nascent regulators. The countries and the number of years that each has had operational regulators are: Burundi (6 years) Central African Republic (12 years), Chad (1 year), Democratic Republic of Congo (4 years), Republic of Congo, (12 years), Gabon, (9 years), and Guinea (1 year).

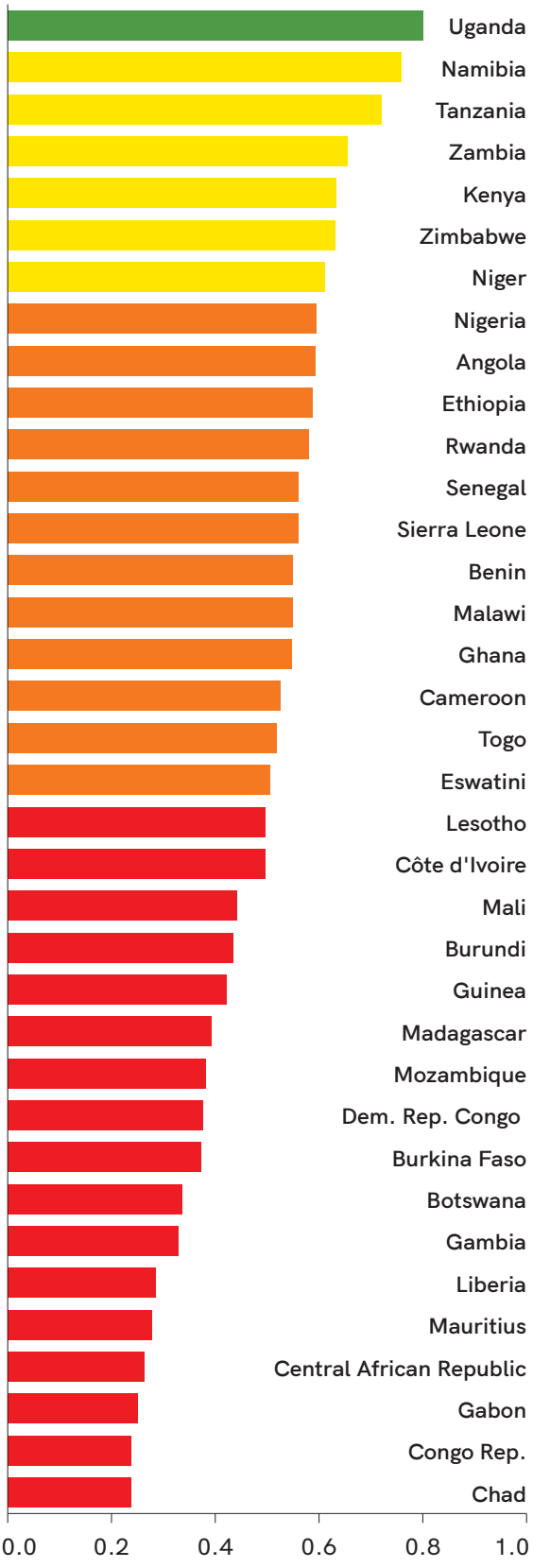


Figure 4: ERI 2020 Ranking

4.1.1. Nascent Regulators

Eleven countries with nascent regulatory institutions (which have been operating for five years or less) participated in the survey. Table 2 shows the performance of the countries with nascent regulators in RGI, RSI and ROI as well as their ranking in RGI and ERI.

Nascent regulatory institutions performed credibly well in RGI but scored low in RSI and ROI. This result indicates that countries that have recently established regulatory institutions are able to learn from the experience of those that have been operating electricity regulatory regimes. This is based on sector reforms implemented since the late 1990s. Regarding RSI, most countries in the sample were in the weak performance band, with only Benin, Niger, and Sierra Leone scoring over 0.500. These results suggest that nascent regulators could jump to the top of the regulatory ladder by learning from their peers in the various sub-regions of Africa and through a vigorous capacity building program.

Country Name	Years in Operation	RGI	RSI	ROI	ERI-2020 Rank
Chad	1	0.556	0.034	0.184	35
Mauritius	4	0.689	0.097	0.135	32
Liberia	3	0.625	0.239	0.184	31
Guinea	1	0.584	0.302	0.393	25
Botswana	2	0.637	0.305	0.228	30
Dem. Rep. of Congo	1	0.399	0.357	0.375	26
Mozambique	3	0.619	0.412	0.277	28
Sierra Leone	5	0.749	0.511	0.498	12
Niger	3	0.702	0.581	0.571	8
Benin	5	0.758	0.729	0.404	16

Table 2: Performance of Countries with Nascent Regulatory Institutions

The average scores across the three pillars of the ERI – the RGI, RSI and ROI – were 0.688, 0.545 and 0.393, respectively. Figure 5 shows the breakdown of country performance by sub-index.

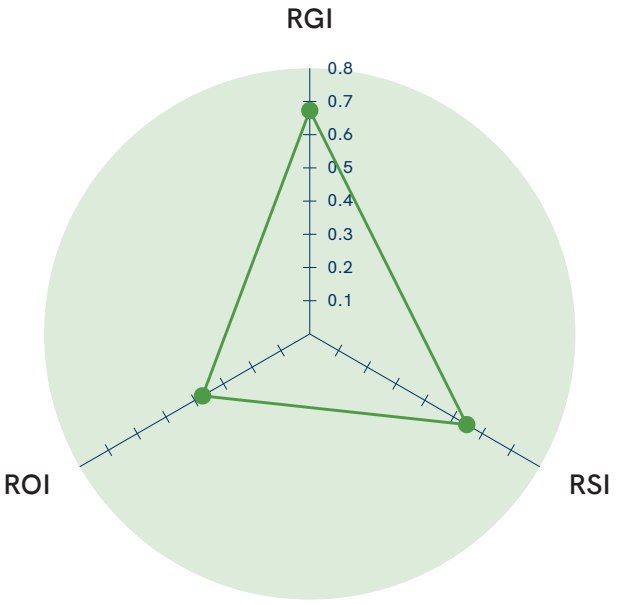


Figure 5: Country Performance across ERI Pillars
Note: The graph shows the average value of each component of the ERI on the scale of 0-1.

Review of the distribution of country performance across the ERI pillars reveals that a majority of the participating countries achieved a well-developed regulatory framework. Seventy-five percent of the countries surveyed fell within the green and yellow performance bands on RGI. The RGI was the only one of the three pillars where the average score fell within the yellow band, demonstrating that they have put in place the necessary legal frameworks in the primary legislation to create independent regulators as part of sector-wide reforms.

Overall, the ERI results indicate that there is still scope to improve the implementation of regulators' actions and decisions (RSI) and to improve on their regulatory outcomes (ROI) in the sector. The weak performance in RSI for most countries also negatively impacts their performance on ROI. Only eight countries crossed the 0.500 score line, suggesting a disconnect between regulatory framework development and effectiveness of the framework on the regulated utilities.

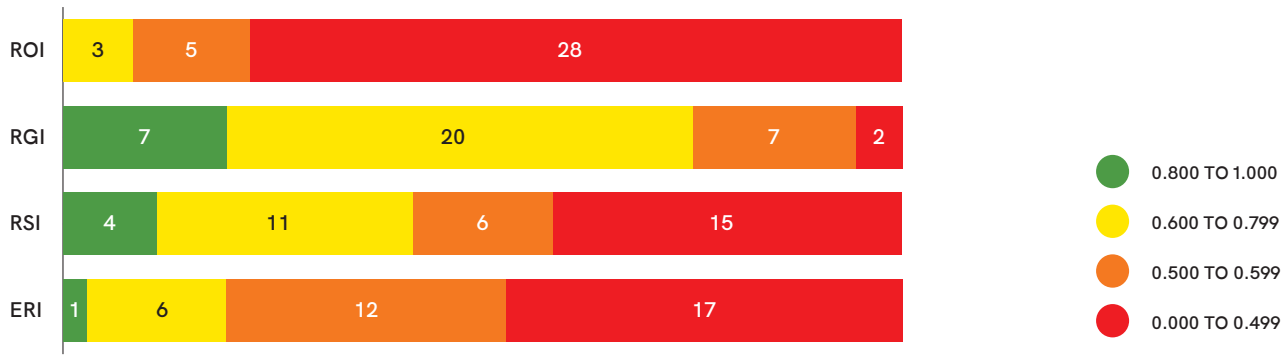


Figure 6: Distribution of Country Performance by bands across ERI Pillars

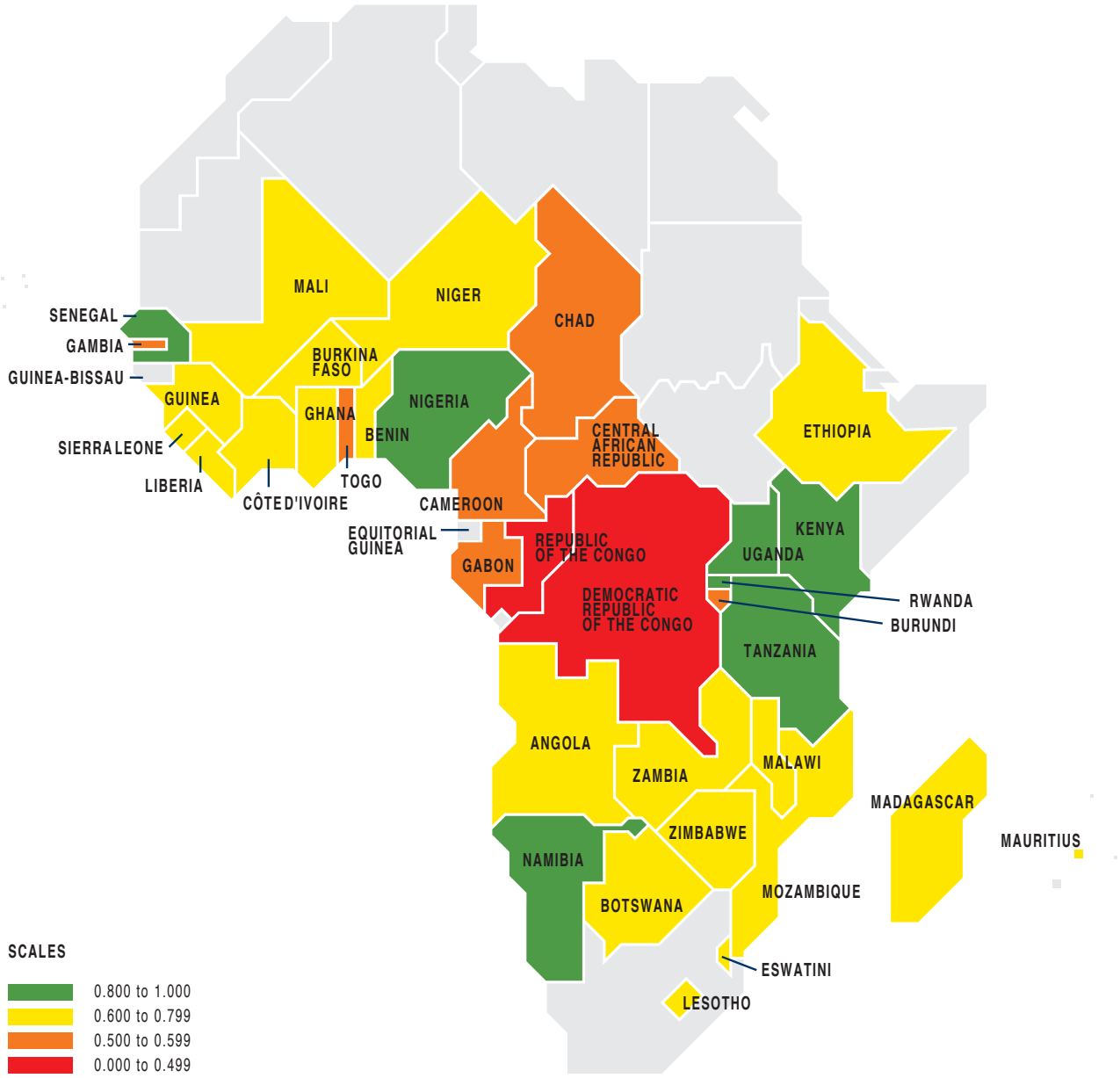


Figure 7: 2020 Regulatory Governance Index (RGI) Map

4.2. The Regulatory Governance Index

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. These indicators can be broadly divided into two groups: external RG indicators and internal RG indicators.

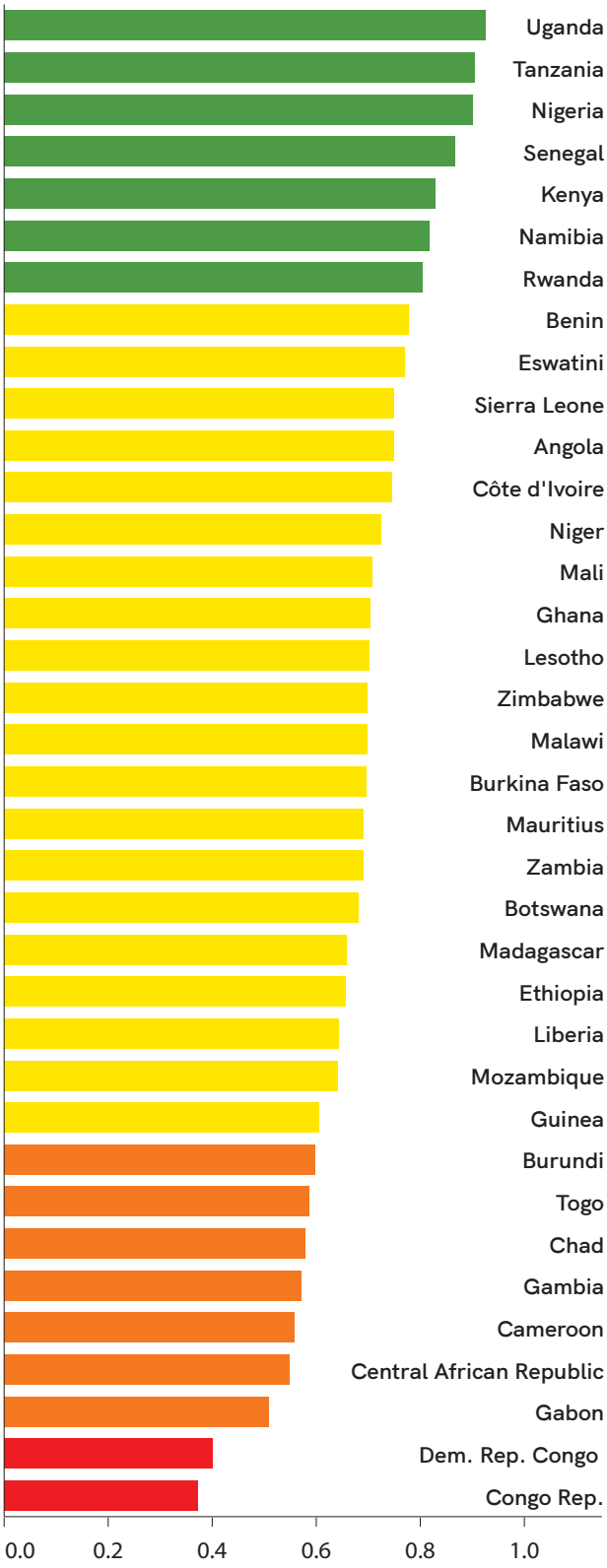


Figure 8: Country Ranking According to the Regulatory Governance Index

4.2.1. External Regulatory Governance

External Regulatory Governance structure refers to the institutional and legal design of the regulatory system that defines the framework within which the regulator performs its functions and makes decisions as an independent regulator. These are determinations that were made by other entities prior to the establishment of the regulatory institution and are outside the control or influence of the regulator. The regulatory authority has no authority to change the external regulatory governance framework on its own. It can, however, propose changes to the Executive or Legislature. The external regulatory governance factors include legal mandate, clarity of roles and objectives, independence and accountability of the regulator.

4.2.2. Breakdown of External RGI Results

Legal Mandate

Legal Mandate is the most important indicator that establishes the "raison d'etre" of the regulator. It measures the force behind the institution. Specifically, it assesses how the institution was established – by legislature through parliament or other legislative body or by another governmental act (order, decree). Of the 36 countries surveyed, the regulatory institutions were established by the Legislature in 28 countries, meeting best practice criteria. The institutions in Angola, Ethiopia, Gabon, Central African Republic, Democratic Republic of Congo and Mali were established by a governmental order or decree.

Figure 9: Country Performance Across External RGI Indicators

Establishing a regulator by an act of the legislature alongside robust energy sector laws provides strong safeguards, ensures higher credibility and boosts investor confidence. It mitigates the potential for new political leadership in a country to enact arbitrary changes in the regulatory framework. Ghana and Lesotho each scored 0.500 under legal mandate because according to the responses, the two countries do not have energy or electricity laws for the regulation of the energy or electricity sector. Institutions were established by specific acts, which give them the mandate, among other functions, to regulate the energy/electricity sector.

Clarity of Roles and Objectives

Clarity of roles and objectives is the highest scoring indicator in the RGI, with an average score of 0.970. This indicator explores where the main regulatory functions of the regulators are defined, and where four key decision-making functions relating to licensing, determination of tariffs, control of the regulated functions and conflict resolution are defined. The results show that more than 85% of the countries have their roles and powers defined in primary legislation, and meet best practice criteria. In addition, most countries have the decisions that the regulators can enact defined in the primary law. Clearly defined roles and functions of the regulator remove possible sources of confusion and overlap between the regulator, the sector ministry and any other agency.

The functions and objectives of the regulator and utilities should also be spelt out clearly to stakeholders. The regulation of the electricity sector in Ghana is performed by two regulatory institutions which split the licensing and tariff functions contrary to best practice where one institution controls both. In another unusual regulatory framework, respondents indicated that the obligations of the regulated utilities are not formally set out in any regulatory documents in Chad, Gabon and Congo Republic.

Independence

Regulatory independence is assessed through four sub-indicators: (1) independence from government and the legislature; (2) independence from stakeholders and market players; (3) decision-making independence; and (4) financial and budgetary independence.

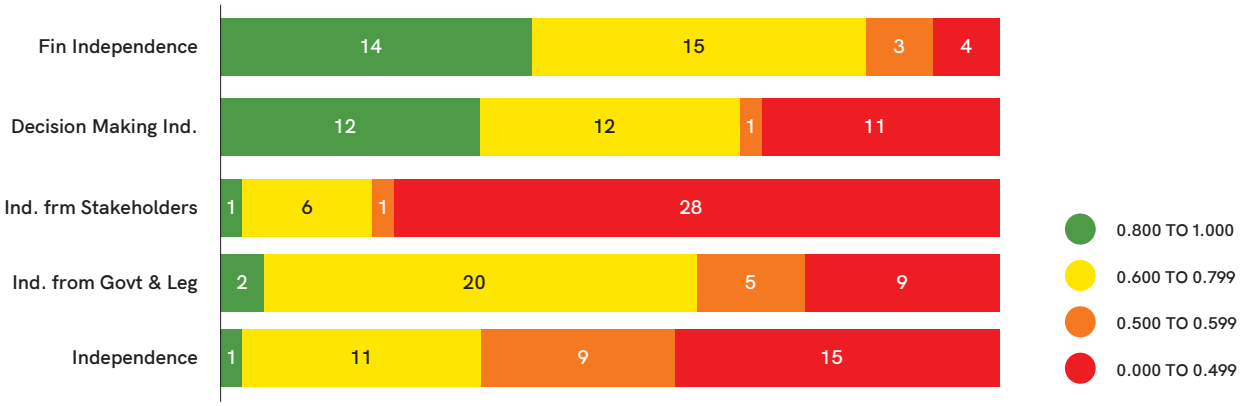


Figure 10: Country Performance across Independence Dimensions

Lack of independence, especially from stakeholders and governments, was identified as a continuing challenge for regulators. This makes the leadership of regulatory institutions more susceptible to short-term political pressures, which detracts from its ability to ensure the long-term sustainability of the relevant country's electricity sector. This could lead to regulatory capture and loss of credibility for the regulator.

In 92% of the sample countries, the executive appoints the board and commissioners. In Senegal, Niger and Ethiopia, the appointment is by a mixture of the executive and the legislature. Chairpersons of the boards are selected by the Executive except in Mali and Togo, where board members select the chairperson. The chief executives of electricity sector regulators are selected by the executive except in eight countries – Namibia, Sierra Leone, Uganda, Zambia, Liberia, Malawi, Mali and Mauritius. In these countries, the board appoints the chief executive. There is no regulator whose chief executive is appointed by the legislature. Out of the sample countries, only Malawi, Zimbabwe and Sierra Leone indicated a mixture of legislature and executive as the appointing authority of the chief executive of the regulatory body.

Staggering the terms of the commissioners to allow for institutional memory and transfer of regulatory knowledge to new commissioners is recognized as best practice. In 17 of the 36 countries surveyed, the terms of office of commissioners are staggered. Most countries indicated having laws that prohibit the chief executive of the regulator from holding other offices in government or the private sector. Twenty-three respondents indicated that they had provisions in their laws that forbade chief executives and commissioners from having interest in the regulated electricity utility.

The survey also assessed the role that regulators play in making decisions on tariff approval, licensing and conflict resolution between regulated entities and customers.

Fifty-eight percent of the countries indicated that the regulator is the final decision maker on tariffs. Fifty percent of respondents indicated the regulator is the final decision maker in licensing. The remaining countries indicated that

the regulator either shared the decision-making authority or plays a facilitative role. Licensing, tariff determination and conflict resolution issues are issues that must be handled only by the regulator without interference. Wherever interferences exist the regulator would not be fully capable of discharging its regulatory duties in an unbiased manner.

A regulator requires a sustainable and independent source of funding to run the institution and implement its activities and initiatives. Fourteen percent of respondents indicated that the regulator relies on government budget sources to run the institution while 84% relied on a combination of fees and levies to operate. The commissioners of regulatory institutions in 15 countries are the approving authority for the regulator's budget, which is in accordance with best regulatory practice. Regulators in 15 other countries require government approval, through the sector ministry or ministry of finance, for their budget. Regulators in a further six countries require approval by parliament or the legislature.

Funding from government compromises the independence of the regulator, while dependence on penalty fees is unsustainable and could compromise the objectivity of the regulator. Regulators in 31 countries indicated that fees levied on regulated utilities are part of their source of funding.

Total independence of the regulator reassures the operators in the electricity sector of the regulator's objectivity. It also ensures an "arm's length" relationship with utilities, reducing the stakeholders' ability to influence the decisions of the regulator. The performance of the participating countries across the eight indicators of RGI showed that the only two indicators whose average scores fell within the green band were legal mandate of the regulator and clarity of roles and objectives of the regulator.

Accountability

Regulators are duty-bound to report regularly on their activities to stakeholders. Mechanisms should be in place to help ensure that regulators behave in accordance with the legal mandate to which they were established. These mechanisms should also be able to hold regulators accountable if they deviate from their mandate. Investors are often more confident if there is an independent appeal mechanism for resolving disputes between the regulator and operators.

The assessment shows that all 36 regulators prepare and present annual reports to stakeholders, through various agencies. With the exception of Côte d'Ivoire, Liberia and Gabon (and in the case of the PURC in Ghana), where the regulator presents annual reports directly to the legislature, all other regulators present their annual reports to the executive, who then present the report to the legislature and other stakeholders. Through information and communication technology, (ICT), reports are also released to the public through websites.

Another dimension of accountability is the possibility to contest or challenge the decision of the regulator. In 94% of the

countries in the survey sample, there is a formal mechanism to challenge the regulatory decisions of the regulator.

4.2.3. Internal Regulatory Governance

Transparency, participation, predictability and open access to information are the indicators that show the degree of control maintained by the regulator, and that is capable of promoting good regulatory governance. The indicators that constitute internal RGI are well developed in more than half of the regulatory institutions surveyed, with a significant number falling in the green and yellow bands. Open access to information, and predictability appear to be enhanced with the adoption and use of ICT for information dissemination and communication between the regulator and the public. The regulatory frameworks of many of the countries with regard to the internal RG indicators are well developed but transparency needs to be further enhanced.

4.2.4. Breakdown of Internal RGI Results

Transparency

The transparency indicator assesses whether the decision-making process of the regulator is shared with, or accessible is by its stakeholders. Overall, most of the regulators in the survey sample are transparent in their decision-making process. However, there is room for improvement.

Sixty-four percent of the regulators surveyed are obliged to publish all regulatory decisions taken by the regulator, including the rationale behind decisions. It should be mandatory for all regulators to publish and make accessible to stakeholders all regulatory decisions including the rationale behind those decisions. This will help the regulator gain the necessary stakeholder confidence, legitimacy and acceptance.

Participation

The participation indicator assesses how the regulator involves its stakeholders in their decision-making process. Stakeholder consultation is mandatory in 64% of the countries surveyed. The regulator considers the stakeholders' inputs before taking a regulatory decision. Public consultation is achieved through ad-hoc meetings, submission of written comments and public hearings.

Figure 11: Country Performance across Internal RGI Indicators

Stakeholder consultation is mandatory in 64% of the countries surveyed. The regulator considers the stakeholders' inputs before taking a regulatory decision.

Predictability

The predictability indicator assesses whether the regulator has a clear and predictable transparent process to take regulatory decisions regarding reviews to electricity tariffs and issuance of licences, among other things. Twenty-two out of thirty-six countries, or nearly 61%, reported that they have documentation that is published, and that regulatory documents can be changed through consultation with stakeholders. The rest of the countries do not have tariff methodologies. This can hamper investor confidence in their electricity sectors. A predictable regulatory environment with clear mechanisms and processes helps ensure gradual change in regulatory methods and practices. This will assure investors and encourage them to commit to longer-term investments.

Open Access to Information

Thirty-one of the 36 countries surveyed have public websites where key regulatory documents such as those dealing with primary legislation, licenses, consultations, tariff guidelines and methodology are published. The results show that less than 11% of the countries surveyed do not update the information on their websites regularly (at least once in a month). Open access to information reassures consumers and investors that the regulator follows clear guidelines in its decision-making processes. It also adds to predictability and contributes to the creation of a healthy regulatory regime.

4.3. The Regulatory Substance Index

The Regulatory Substance Index (RSI) measures the level of implementation of regulation. It is composed of seven indicators: (1) economic regulation; (2) technical regulation; (3) licensing frameworks; (4) institutional capacity; (5) renewable energy development; (6) mini-grid and off-grid systems; and (7) energy efficiency development.

The average RSI score for all the sample countries was 0.545, which falls in the orange band performance category. Four countries made it into the green band, while 11 were in the yellow and six in the orange band. Fifteen countries are in the red band. Uganda ranked first in RSI, scoring 0.945 while Chad trailed with a score of 0.034. The average RSI score is lower than the RGI average of 0.654, which shows that the regulators still have a lot to do to improve in the performance of their mandate.

The results imply that regulators are constrained by many challenges affecting the development and implementation of regulatory instruments and mechanisms. These are factors that can potentially undermine 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.

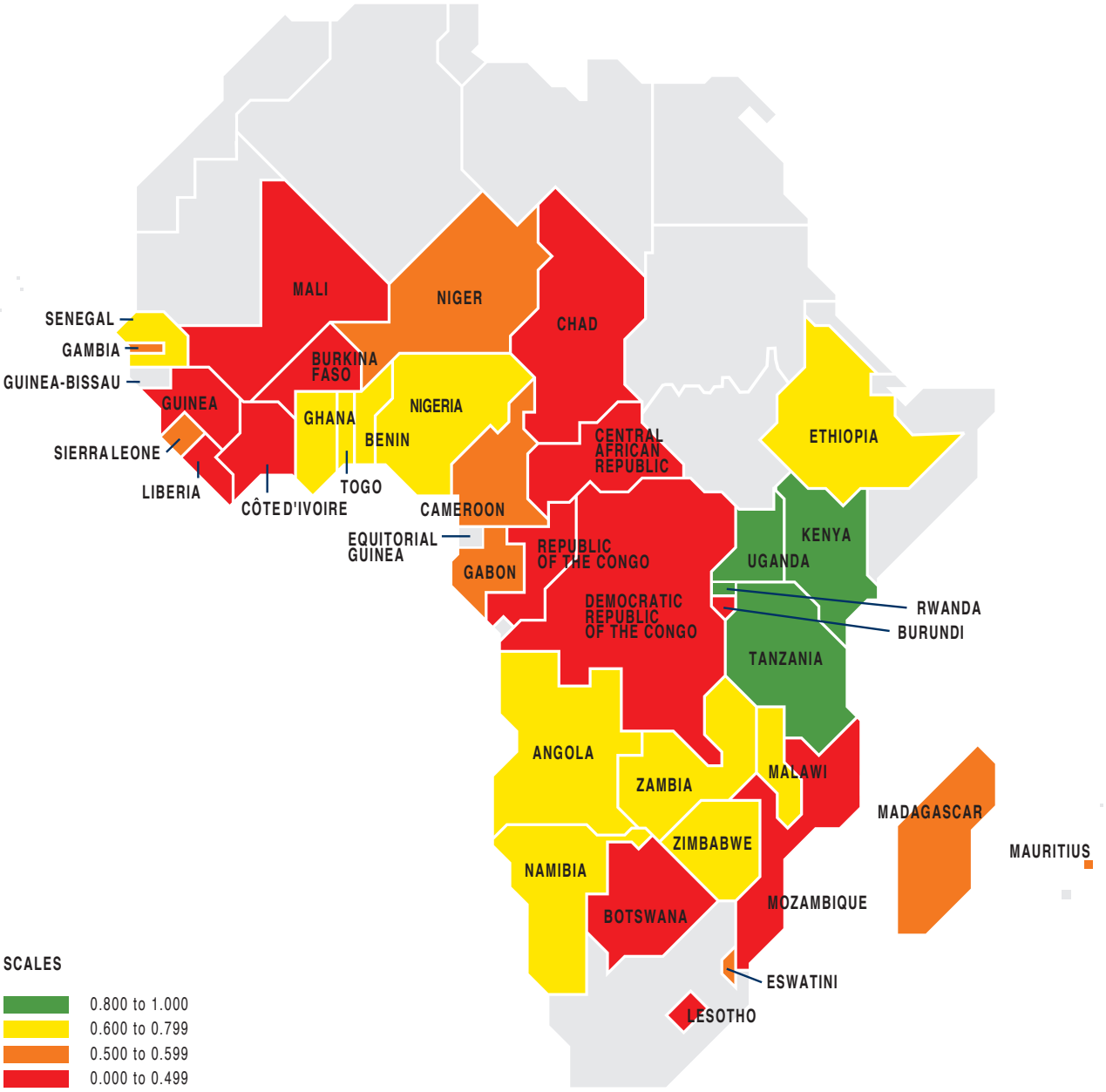


Figure 12: 2020 Regulatory Substance Index Map

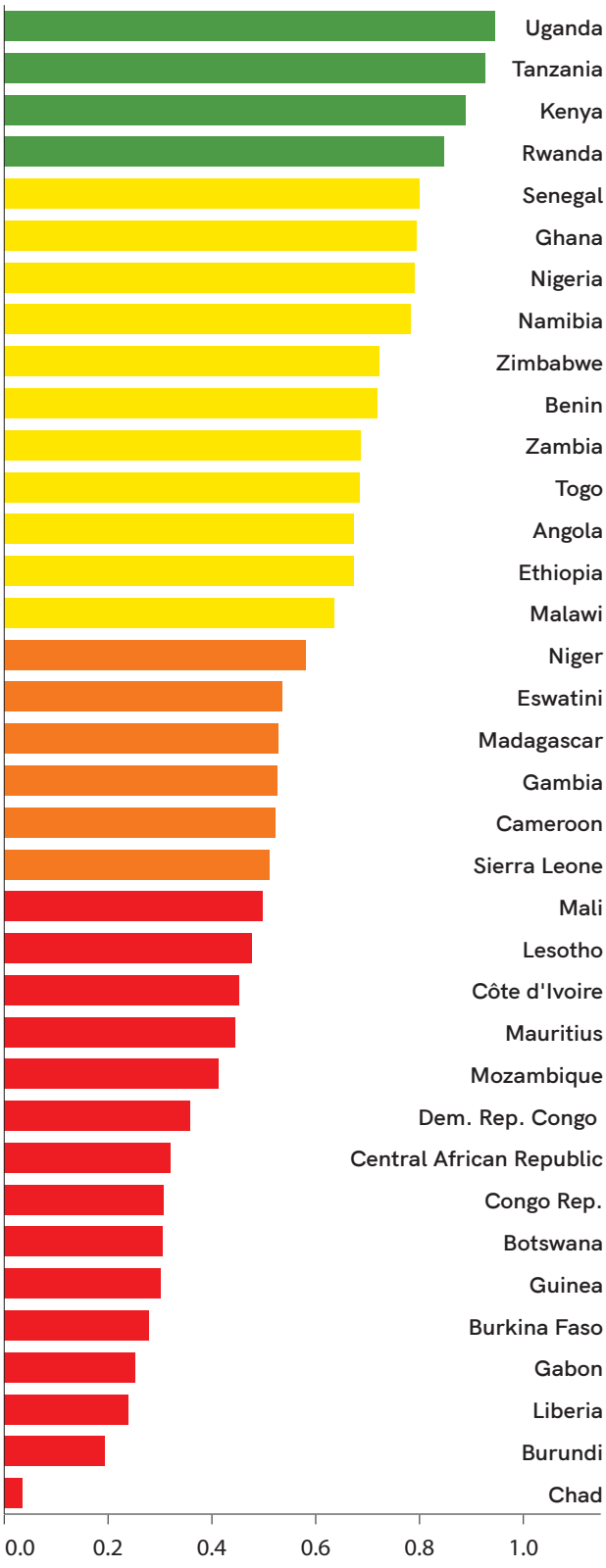


Figure 13: Country Ranking According to the Regulatory Substance Index

4.3.1 Breakdown of RSI Results

Figure14 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 sub-indicators of the RSI.

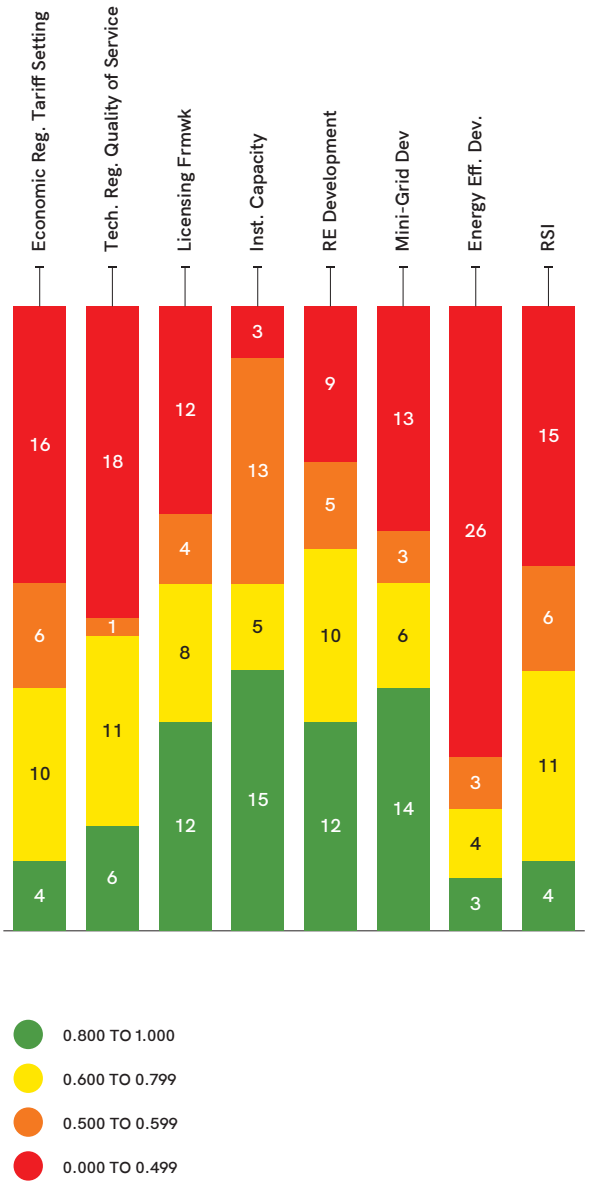


Figure 14: Country Performance by RSI Indicators

Economic Regulation: Tariff Setting

The economic regulation indicator assesses whether the regulator has developed a comprehensive tariff guideline and methodology, with the appropriate schedules for major and minor tariff reviews. It also gives advance notice to the regulated entities as to the information and reports that will be required of them periodically. The guidelines also give an indication of what kind of cost and expenditures are allowed through the tariffs at any time. Well-developed economic regulation supports transparency and credibility of the tariff setting regime and encourages investors to make long-term investments. Well-developed economic regulation also incentivizes investors to make more commercially driven investments and encourages competition in the electricity sector. A good economic regulatory regime will also include the development of tariff guidelines for grid-connected renewable energy systems and off-grid systems.

The results of the survey show that the mean score was 0.534. Seven countries (Gambia, Kenya, Namibia, Eswatini, Tanzania, Uganda and Zimbabwe) responded that they had cost reflective tariffs. This indicates that a robust tariff setting framework is operational in each country. Only four countries (Uganda, Tanzania, Kenya and Benin) came in the green zone, because while Gambia had not conducted a cost of service study for the past 10 years, Zimbabwe had no network connection policy in place. On the opposite side, 16 countries were found to be in the red zone. While 50% of respondents indicated that they had developed tariff-setting methodologies, no cost of service studies had been conducted in 14 countries. In addition, only 30% of countries surveyed had a network connection policy as part of their tariff methodology or guideline.

Technical Regulation

The technical regulation indicator assesses whether the regulator has defined standards for the following: technical and commercial quality of service; frequency and duration of outages; time for the provision of grid connection and restoration of supply; conditions and technical requirements for grid connection; the grid code for interconnected power systems and codes for the distribution system. The Quality of Service Standards details the attendant penalties if the rules are broken.

National grid codes provide the technical specifications and standards for connection and joint use of the grid and its operations by transmission utilities. Only 19 countries have developed national grid codes.

Fifty percent of respondents obtained scores above 0.500. with six falling in the green band and 11 in the yellow band. The average score, however, was low at 0.506. This indicates the need for the regulators to develop the necessary regulatory frameworks and build capacity for technical regulation. Eighteen countries appeared in the red score band.

Licensing Framework

This indicator assesses whether the regulator has developed licensing frameworks for the

power sector and the types of systems that the framework covers. As renewable energy and off-grid systems gain acceptability and prominence, it is important to develop procedures that will seamlessly enable integration of mini-grids and stand-alone systems into the national electricity grid for power supply and exchange. The survey shows that many regulators do not have the appropriate simplified frameworks that can be flexible and meet the diverse needs of different developers and operators. Six countries (Chad, Burundi, Burkina Faso, Gabon, Guinea and Liberia) are in the early stages of preparing their licensing frameworks.

This indicator also assessed whether there is a separate simplified licensing framework specifically for off-grid systems. Nineteen countries do not have simplified license frameworks 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. A different licensing regime for small power plants using light-handed regulation will reduce the regulatory processes involved in obtaining licenses or permits. It will also further reduce the cost of regulation for off-grid operators. However, a waiver of the requirement for a license must be avoided, as this could lead to a proliferation of sub-standard equipment, undermine accurate data collection, and jeopardize energy planning.

As renewable energy and off-grid systems gain acceptability and prominence, it is important to develop procedures that will seamlessly enable integration of mini-grids and stand-alone systems into the national electricity grid for power supply and exchange.

Institutional Capacity

The Institutional Capacity indicator assesses whether the regulator has the capacity to assess, evaluate and conduct economic, econometric and technical analysis of the electricity supply system to aid in proper evaluation, regulation, planning and tariff setting. The economic regulation dimension of institutional capacity assesses the expertise and experience of the regulator's staff on financial, economic, technical and legal analysis issues. Generally, the capacity of the regulatory institutions was reported to be above average. The average score was 0.685, in the yellow band. Fourteen countries came in the green zone, with Zimbabwe, Uganda, Tanzania, Senegal, Rwanda, Namibia, Malawi, Kenya and Gambia, scoring the maximum of 1.000. Zimbabwe is noted to have improved its institutional capacity through recruitment and training since the last survey in 2019.

Box 1: Institutional Capacity – Improved regulatory Staff Capacity for Angola, Liberia and Zimbabwe

Regulation is a specialized field that cuts across various disciplines. Key among them are engineering, economics and finance and accounting. Regulatory authorities are required to build adequate capacities across different disciplines and retain a stock of expertise with adequate industry knowledge and experience to be able to analyze the sector and utilities to make informed decisions. The expertise available to the regulator should be above those of the regulated entities. This allows the regulator to be assertive and execute its oversight responsibility over the sector without regulatory capture.

The ERI assesses adequacy of regulatory capacity (in terms of level of skills and number at the senior staff level) in key functional areas of regulatory practice. Generally, there is inadequate regulatory capacity for most regulatory institutions, especially the nascent regulators in areas such as financial analysis, economic analysis, engineering analysis, econometric modelling, financial modelling, tariff modelling, technical performance analysis, quality of service performance analysis and in 2020, expertise for legal issues in regulation.

Angola, Liberia and Zimbabwe indicated that they had inadequate (one or two experts) to no capacity (no expert) in most of the above-mentioned areas in 2019. The 2020 survey shows that they have since built adequate staff capacity (at least three experts) in most of those areas. They achieved this through a combination of targeted and consistent training with strategic recruitment to fill those gaps.

In Angola, the regulator, Instituto Regulador dos Serviços de Electricidade e de Água (IRSEA), indicated inadequate capacity in all the key areas mentioned in 2019. Angola now has adequate capacity in all the areas except legal expertise, where the capacity is inadequate. In addition to consistent training, which continues, the Angolan regulator, which also regulates the water sector, recruited more staff for the water department. This released some capacity to the electricity sector.

In 2019, the Liberia Electricity Regulatory Commission (LERC), a nascent regulator, highlighted that it had no capacity in economic regulation areas, and inadequate capacity in the technical performance and quality of service analysis. However, there has been consistent training under the Millennium Challenge Corporation (MCC) compact program, coupled with strategic recruitment and learning from consultants engaged to develop and build the Liberia regulatory framework under a twinning arrangement. With this support, LERC has developed adequate capacity in all the indicated areas except tariff modelling, where there is no internal capacity. Their capacity building started in 2018 and went through a two-year incubation period to 2020.

Like the case of Angola, the Zimbabwe Energy Regulatory Authority (ZERA) cited having inadequate regulatory capacity in all the functional areas listed in 2019. However, through strategic recruitment and targeted continuous professional development, the regulator in Zimbabwe has built adequate regulatory capacity (at least with three experts) in all the listed functional areas.

Renewable Energy Development

Renewable energy is gradually but steadily entering the mainstream power supply industry in many countries. It is suitable for providing electricity to isolated and difficult to reach areas. Grid-connected renewable energy is growing in many of the sample countries. 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.

Only five countries have developed technology-specific model contracts or power purchase agreements for renewable energy solutions. Standardized technology-specific contracts are necessary to facilitate and accelerate the deployment of clean, renewable energy solutions. The African Development Bank is currently working with a few of the countries in the sample on independent power production procurement programs, which will address this gap.

Of the 36 countries surveyed, eight of them are yet to develop a legal framework or policy document for renewable energy. Eleven countries are yet to assess the renewable energy potential in their respective countries. However, 12 countries have developed model PPAs for renewable energy. The average score was encouraging at 0.665 in the yellow band. Eleven countries appeared in the green band. Of these, Zimbabwe, Tanzania, Eswatini, Kenya and Ghana have well developed frameworks for the advancement of renewable energy. Each of these countries scored the maximum of 1.000. Burundi has the least developed framework.

Mini-grid and Off-grid Systems

The lack of appropriate technical standards and regulatory frameworks for off-grid systems were among the reasons why most countries performed below average. This indicator assesses the regulation of mini grids, the development and implementation of a regulatory frameworks for grid-connected renewable energy, as well as the expertise and experience of the regulators' staff in these areas. These elements are key determinants of the quality and sustainability of electricity networks, particularly in countries with gaps in access rate to electricity.

The average score was 0.569 in the orange band. Thirty out of 36 countries have developed national programs to support mini-grid systems and 22 have developed an integrated plan that will incorporate mini-grids as part of national electrification efforts.

Regulators in 50% of the countries surveyed have developed technical standards for stand-alone systems, while 19 countries have developed licensing and certification programs for installers of stand-alone and mini-grid systems.

Energy Efficiency Development

The average score for energy efficiency is low at 0.330. This is due to the absence of frameworks for energy efficiency, especially minimum energy performance standards (MEPS) and labels for electrical appliances

and mechanisms for monitoring and reporting on greenhouse gases. MEPS and labels frameworks are operational in 14 countries for at least refrigerators and heating, ventilation and air conditioning (HVAC) equipment. Twenty respondents indicated that they have adopted national energy efficiency action plans or similar strategies for energy efficiency. while 26 countries indicated they have developed action plans to reduce technical and commercial network losses.

4.4. Regulatory Governance and Substance Index

The Electricity Regulatory Index for Governance and Substance (ERI_{GS}) is calculated by averaging the aggregate scores on the RGI and RSI. Figure 15 and Table 5 show the country rankings and results. 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 insight into national regulatory development, without recourse to the effects of the regulatory actions and decisions on the sector.

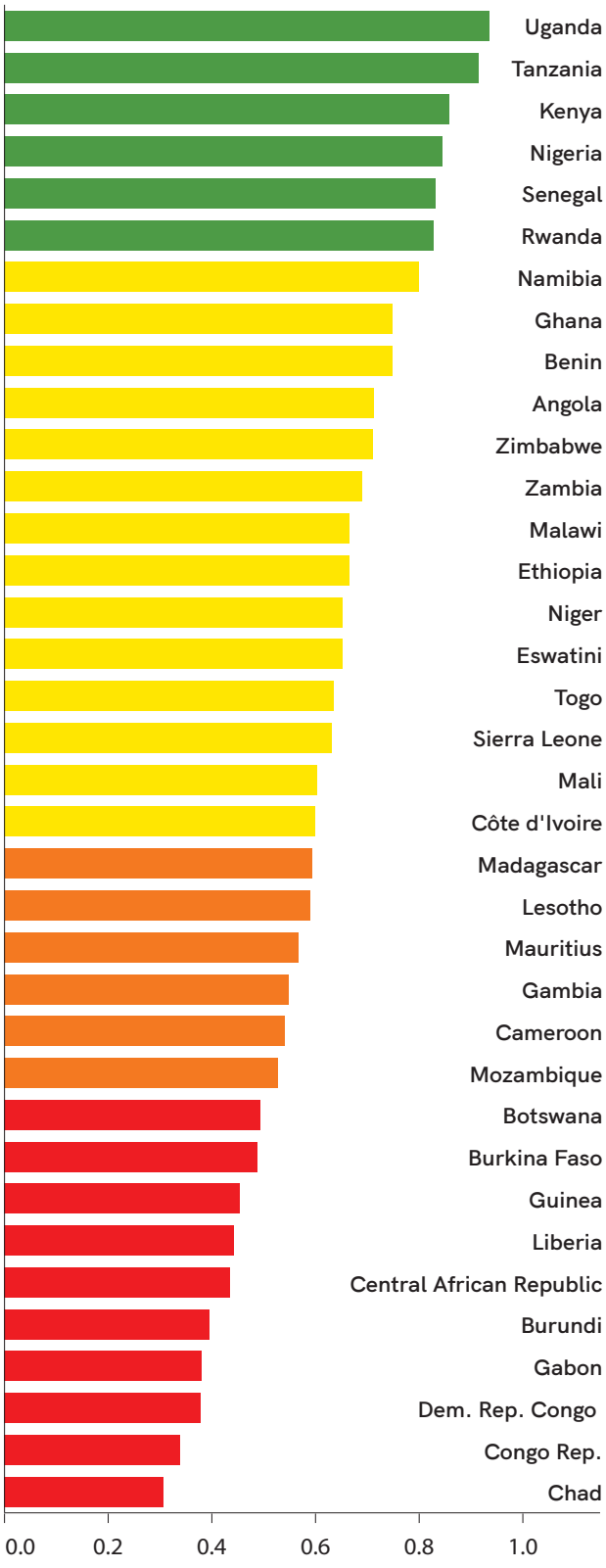


Figure 15: Country Rankings According to the Regulatory Governance and Substance Index

Country Name	RGI	RSI	ERI-GS	Rank
Uganda	0.925	0.945	0.935	1
Tanzania	0.904	0.926	0.915	2
Kenya	0.828	0.888	0.858	3
Nigeria	0.900	0.790	0.845	4
Senegal	0.866	0.799	0.832	5
Rwanda	0.805	0.848	0.827	6
Namibia	0.817	0.782	0.799	7
Ghana	0.703	0.794	0.748	8
Benin	0.778	0.718	0.748	9
Angola	0.749	0.674	0.712	10
Zimbabwe	0.698	0.723	0.710	11
Zambia	0.690	0.687	0.689	12
Malawi	0.698	0.635	0.666	13
Ethiopia	0.657	0.674	0.665	14
Niger	0.724	0.581	0.653	15
Eswatini	0.770	0.535	0.652	16
Togo	0.587	0.685	0.636	17
Sierra Leone	0.750	0.511	0.631	18
Mali	0.708	0.498	0.603	19
Côte d'Ivoire	0.746	0.453	0.600	20
Madagascar	0.659	0.527	0.593	21
Lesotho	0.702	0.476	0.589	22
Mauritius	0.691	0.444	0.567	23
Gambia	0.572	0.526	0.549	24
Cameroon	0.558	0.522	0.540	25
Mozambique	0.642	0.412	0.527	26
Botswana	0.681	0.305	0.493	27
Burkina Faso	0.697	0.278	0.488	28
Guinea	0.606	0.302	0.454	29
Liberia	0.644	0.239	0.442	30
Central African Republic	0.549	0.321	0.435	31
Burundi	0.597	0.193	0.395	32
Gabon	0.508	0.253	0.381	33
Dem. Rep. of Congo	0.401	0.357	0.379	34
Republic of Congo	0.373	0.306	0.339	35
Chad	0.578	0.034	0.306	36
Mean	**0.688**	**0.545**	**0.617**	

Table 3: Electricity Regulatory Index for Governance and Substance Results by Country

Box 2: Improvement in Regulatory Framework – Benin

The regulator in the Republic of Benin, has taken action to improve the electricity regulatory framework and is on the path towards resiliency in regulation. The table below shows the progress that Benin has made in scores within a year after participation in ERI 2019. Based on the recommendations made to the country in 2019, the regulator has improved the regulatory framework and developed some mechanisms that depend directly on the regulator. The new ranking now confirms that Benin has improved. Although a nascent regulator, Benin has made significant progress worth mentioning (under regulatory governance and substance).

Benin	2019			2020		
	RGI	RSI	ERI_{GS}	RGI	RSI	ERI_{GS}
Scores	0.779	0.503	0.641	0.778	0.718	0.748
Ranking	17	17	16	8	12	11

- Out of 15 indicators evaluated (RGI and RSI) Benin obtained:
  - six indicators at high level of development of regulatory framework
  - three indicators at substantial level of development of regulatory framework

Over the past year, Benin has completed the following initiatives:

- Open access to Information: there is now a website; a dedicated IT staffer has been recruited to manage the website, which is updated at least once a week in accordance with best practice.
- Economic Regulation (tariff-setting): there is now a tariff methodology and the regulator has developed a network connection policy as part of its tariff.
- Quality of service: the regulator has developed a quality of service code. A survey to assess the level of satisfaction of consumers has been conducted by the regulator; the grid code has also been developed.
- Mini Grid and Standalone System: a framework to develop mini grid and standalone systems has been elaborated and the country has developed a program to promote the mini grid and standalone system.

4.5. The Regulatory Outcome Index

The Regulatory Outcome Index (ROI) for utilities measures how the regulator's actions and decisions impacts the utility and consequently the sector. It is comprised of three indicators: (1) Financial Performance and Competitiveness; (2) Quality of service Delivery (commercial and ttechnical); and (3) Facilitating Electricity Access. No country made it into the green zone but three countries (Namibia, Uganda and Zambia) came into the yellow band. Five other countries (Niger, Tanzania, Zimbabwe, Ethiopia and Cameroon) came in the orange zone, while the bulk of the countries (28) were in the red zone. The poor performance of countries can be attributed to an equally poor performance in the Quality of Service Delivery (Technical and Commercial) indicator. The average ROI score was 0.393, which falls within the red band. Figure 16 below demonstrates country performance on ROI and its indicators.

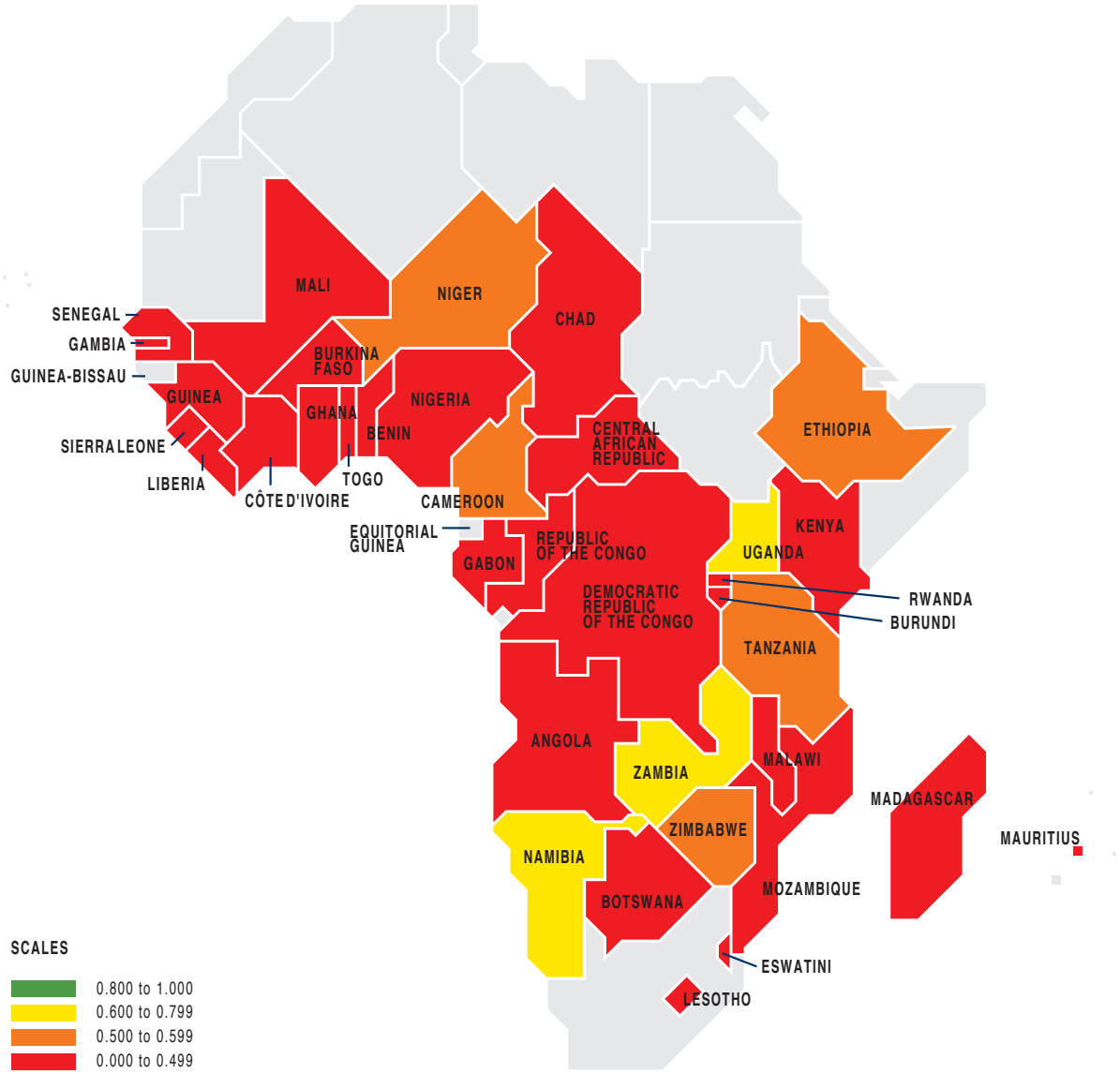


Figure 16: 2020 Regulatory Outcome Index Map

4.5.1. Breakdown of Results for the Regulatory Outcome Index for Utilities

The regulatory outcome index, from the utilities perspective (ROIu), was assessed along three indicators: (1) financial performance and competitiveness; (2) quality of service delivery (commercial and technical); and (3) facilitation to electricity access.

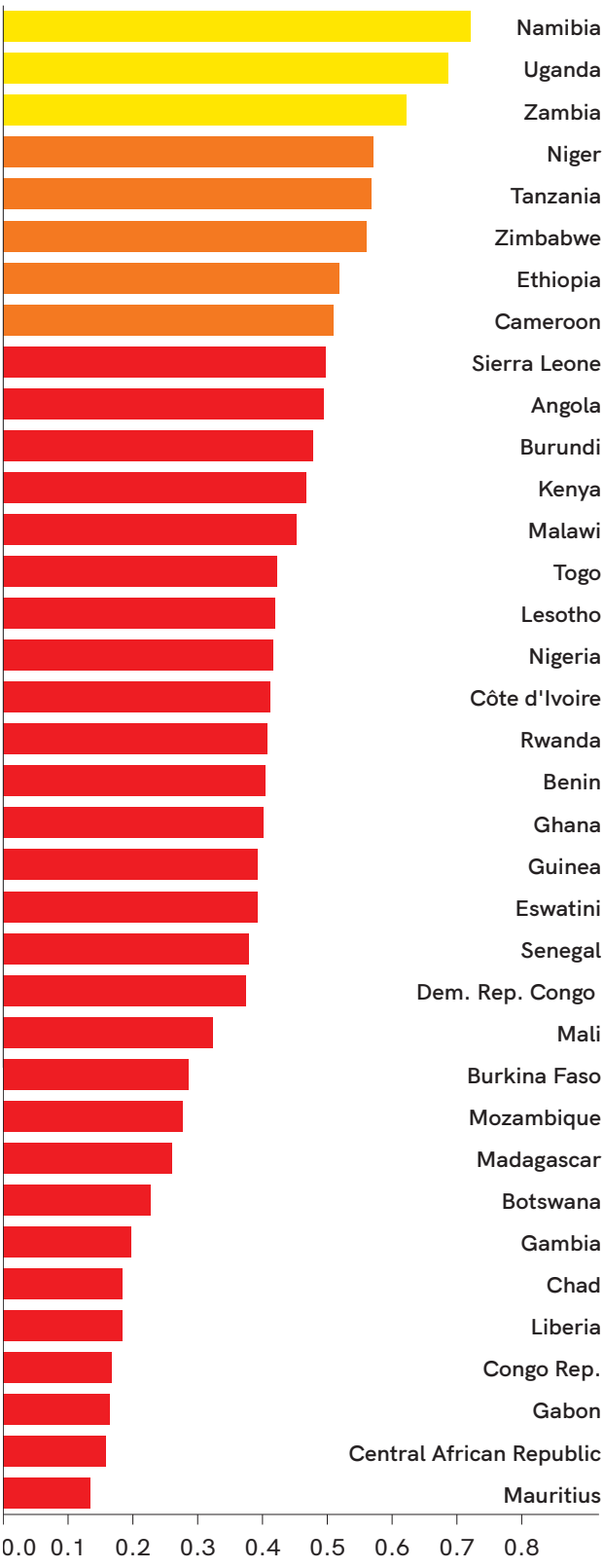


Figure 17: Country Ranking According to Regulatory Outcome Index

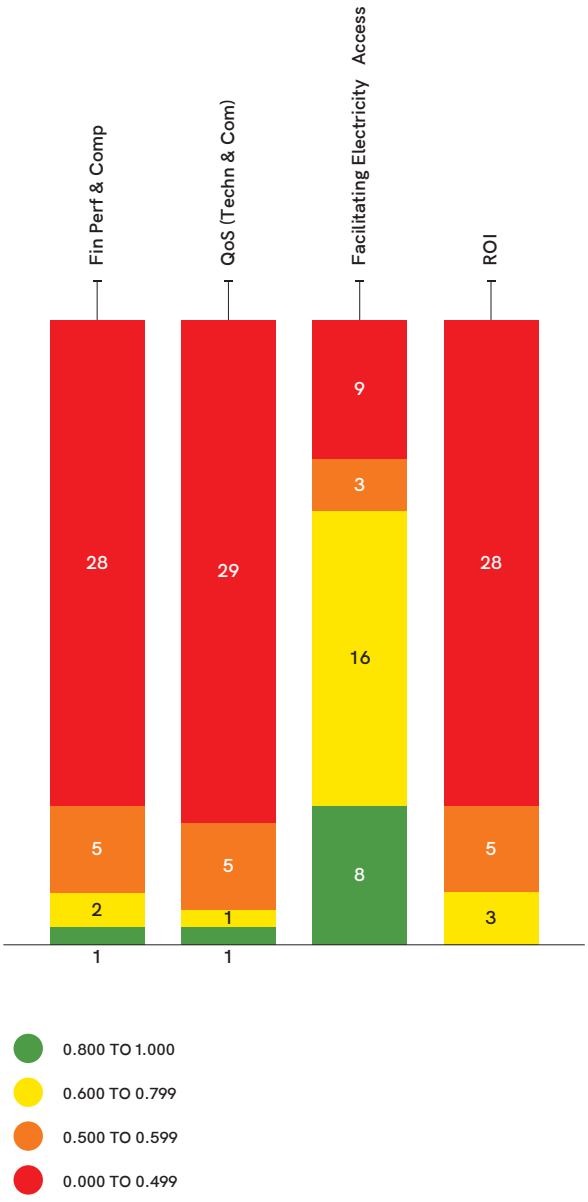


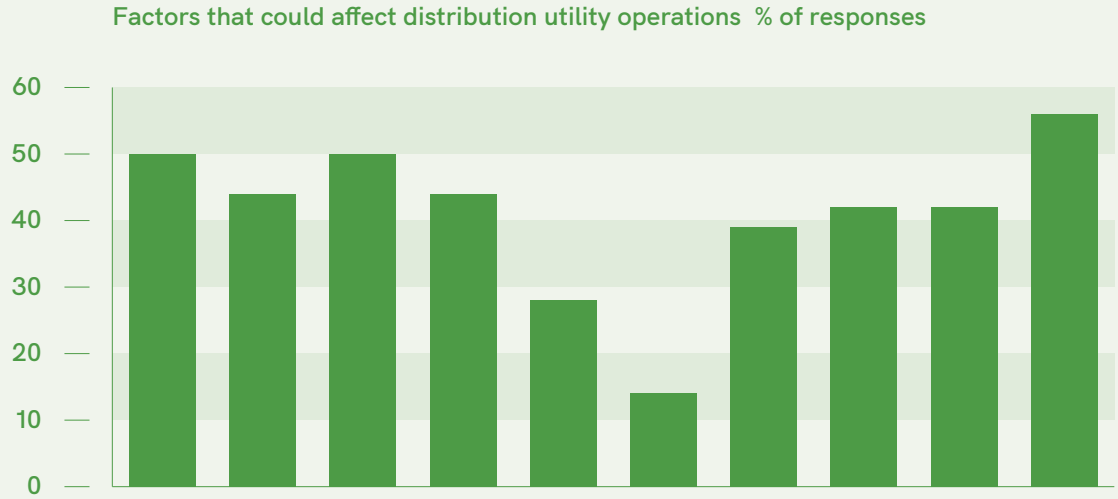
Figure 18: Country Performance by ROI Indicators

Box 3: Regulatory Regime for improved Utility Performance in Namibia

Namibia obtained the highest score in ROI with a score of 0.721 when the average score was 0.393. The electricity utility, Nampower, was established and became operational in 1964, while the regulator, the Electricity Control Board, was established in 2000. There has been good cooperation between the utility and the regulator in Namibia. Key attributes of the country's regulatory regime that have contributed to Namibia's high performance are the following:

- Power purchase agreements are approved by the regulator.
- Price adjustments in PPAs are recognised by the regulator.
- There are transparent procedures for determining end-user tariffs.
- The regulator follows procedures and tariff schedules in the tariff methodology.
- The utility and the regulator have agreed on a loss target of less than 10%.
- The regulator has developed a regulatory mechanism to deal with electricity theft, and the utility has its own mechanism to deal with theft.
- The utility recovers all its costs through the tariffs.
- It is a regulatory requirement for the utility to conduct periodic technical audits to establish the true state of affairs of its facilities.
- It is a regulatory requirement for the utility to calculate its SAIFI and SAIDI parameters.
- SAIFI and SAIDI values are published as required by regulation.
- SAIFI and SAIDI ceilings are factored in the tariffs.
- Consumers are compensated if the SAIDI and SAIFI values exceed the regulated ceiling.
- Funds spent on rural electrification by individuals and NGOs are recovered through the tariffs.

Box 4: Perspectives from Distribution Utility Operators on Threats to their Operations



1. Environmental and climate change policies restricting GHG emission in the electricity sector
2. Change from centralised/grid supply to distributed generation
3. Increased generation from renewable energy
4. Demand-side management (DSM) and high penetration of energy-efficient appliances
5. A rregulatory regime that allows large consumers to buy RE direct from captive generators
6. Carbon taxes
7. Promoting stand-alone renewable energy generation systems
8. Promoting grid-interactive consumer generators who are capable of selling electricity into the grid
9. Net metering and other disruptive technologies
10. High cost of electricity from existing PPAs restricting expansion in consumption from the grid

Electricity distribution utilities in the 36 countries surveyed were asked to list the factors that in their opinion could affect electricity distribution operations in their various countries. Fifty-six percent mentioned the high cost of electricity from existing PPAs that restrict expansion in consumption as the factor that could affect their operations. Fifty percent said environmental and climate change policies could restrict GHG emission in the electricity sector.

Also mentioned as potential threats were increased generation from renewable energy and the promotion of grid-interactive consumer generators, capable of selling electricity into the grid (43%) and demand-side management and high penetration of energy-efficient appliances (50%). Forty two percent cited net metering and other disruptive technologies as factors that could affect distribution utility operations.

All of the above shows that distribution monopolies will soon become obsolete, and that utilities can no longer sign expensive PPAs and pass the costs on to consumers. With the low prices of renewable energy systems, consumers who can pay for the high-priced grid electricity can now opt to compliment grid electricity with renewable energy, which in many cases can be obtained cheaper than electricity from oil fired thermal power plants.

Financial Performance and Competitiveness

The financial sustainability of a power distribution utility determines whether the electricity sector will be able to meet demand, provide a satisfactory quality of service and increase access to more consumers. Financial performance and sustainability are affected by the cost of service and by operational inefficiencies, like the level of technical and commercial losses and supply reliability. This is measured by the frequency and duration of outages and responsiveness of the utility to customer calls and complaints. Poor service delivery by the distribution utility has the potential of reducing financial flows into the system. Furthermore, in this era where the cost of renewable energy technologies has fallen and continues to fall, many customers who can afford to pay more for electricity can install renewable systems and either get off the grid or reduce electricity purchases from the utility. Financial performance is the weakest dimension of the ROI, which has an average score of 0.393. No country came in the green zone. Namibia, Uganda and Zambia, are the only three in the yellow zone.

Although 22 respondents report having carried out a cost of service study within the last five years, only 13 of these report having implemented the cost of service study report. Only nine countries report that the current tariff is in accordance with the utility's cost of operation. Another nine report that a transitional path has been agreed between the regulator and utility to achieve a cost reflective tariff over time.

Despite reports that the regulator has formulated a transparent procedure for reviewing end-user tariff levels in 22 countries, the procedure is reported to be followed in only nine countries. Although the regulator in 15 countries has formulated a schedule for reviewing end-user tariffs, the schedule is followed in only six countries, namely Uganda, Namibia, Lesotho, Côte d'Ivoire, Burundi and Botswana).

The regulator has an important role to play in supporting and monitoring the actions taken by the utility, including setting of distribution loss reduction objectives. Tariffs are a soft spot in political circles in Africa, and politicians are often inclined to keep tariffs low, sometimes to the detriment of the financial health of the electricity sector. The oldest regulator in the survey sample (Zambia) has been in existence for 25 years. Utilities have existed for more than 50 years, with some dating back to the 1920s. These utilities have been operating without the regulators for a greater part of their operating lives. It is therefore imperative that the regulators put in justifiable regulations and cooperate with the utilities to implement them to meet consumer satisfaction requirements.

Governments should dissociate themselves from the utilities to enable the regulators to perform their regulatory functions. There is room for improvement on collection and recovery rates. Only two utilities have a collection rate above 90%. Nineteen have collection rates of between 70-90% while eight others collect between 50 and 70%.

Box 5: Service Reflective Tariffs in Nigeria - Transitional Path to Cost-reflective Tariffs and Improved Quality of Service Delivery

The ERI 2020 reveals gaps in quality of service delivery frameworks of most countries. Most (53%) do not have quality of service regulations or codes. Of those who do, only 17% of those regulations set ceilings on key service reliability indices such as SAIDI-SAIFI with appropriate penalties for non-compliance by utilities. Most countries have suspended the application of the penalties indefinitely on the assumption that the network is too weak to enable the utility to comply with the SAIDI/SAIFI limits and also systems are not in place to accurately monitor and measure these indices.

In 89% of the countries surveyed, regulators do not factor these SAIFI and SAIDI indices into tariffs to incentivize the utilities to reinforce the network to improve service reliability. Consumers are therefore left at the mercy of the discretional powers of the utility when it comes to service reliability. Exclusion of reliability indices in tariffs deny the utilities the needed funds and incentives to improve the network for improved service reliability. This introduces a vicious tariff cycle that is incommensurate with service delivery. Many consumers are sensitive to electricity supply reliability, especially industrial and commercial consumers, who have zero tolerance for supply outages because of their profitability and viability. These consumers are often willing to pay commensurate tariffs to incentivize the utilities to deliver high quality of service. To address this, in August 2020, the Nigeria Electricity Regulatory Commission (NERC) introduced service reflective tariffs. These are tariffs where consumers are categorized into tariff bands. Each band pays a tariff that is commensurate with a guaranteed minimum hours of electricity supply per day. NERC arrived at this measure when during its public hearing in different franchise areas for tariff review, it observed that, some end-users were willing to pay higher tariffs if the distribution companies could guarantee them some fixed hours of supply.

Under this tariff scheme, minimum hours of supply are specified for five different tariff bands –tariff band A to tariff B and E. Each tariff band has different tariff classes within it. Consumers in tariff band "A" pay the highest tariffs and are guaranteed the highest number of hours of supply per day (a minimum of 20hrs/day). This reduces gradually to tariff band "E" where consumers pay the least tariffs and are guaranteed the least number of hours of supply (a minimum of four hours of electricity supply per day). Utilities are penalized for failure to meet the guaranteed hours of supply

#	Tariff Band	Guaranteed minimum hours of supply/day
1	A	20
2	B	16
3	C	12
4	D	8
5	E	4

This is an innovative two-pronged transitional path towards cost-reflective tariffs. It is an incentive to ensure reliability of supply (reducing SAIDI). While it incentivizes more customers to gradually migrate into higher supply reliability bands and pay commensurate tariffs, it provides the needed revenue and obligates reinforcement of the network over time. This ensures guaranteed and reliable service delivery to the respective bands and eventually to all. In terms of reliability specifically, the service-reflective tariffs address the duration of outages (SAIDI) but not the frequency of outages (SAIFI). Consumers may enjoy the guaranteed hours but with a high number of interruptions or flickers lasting a few minutes. It therefore does not eliminate the need for developing and implementing appropriate quality of service regulations.

The use of prepaid meters and smart meters, in addition to enforcing disconnection for non-payment, can help improve revenue recovery. However, indiscriminate deployment of pre-paid meters could drive vulnerable consumers into bypassing the meter.

Quality of Service Delivery (Commercial and Technical)

The results of the indicator show the average time required to: provide a service connection to a residential consumer; respond to a billing complaint; and restore a connection upon payment of outstanding bills after disconnection. It also assesses the average number of hours that it takes to respond to supply-related complaints. Long delays in connection time are a barrier to electricity access and have the potential to increase illegal access, which will increase the losses to the utility company. Dire improvements are therefore needed in this area. Twenty-one countries have a ceiling on the number of days that the utility takes to provide electricity connection to consumers after payment of the required fees.

The measurement of technical quality of service relies on the two internationally recognized indicators – SAIDI and SAIFI. 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. This includes planned and unplanned outages, as well as load shedding. SAIFI and SAIDI are regulatory indices that must be established by the regulator. Scores above 100 hours per year for SAIDI and 100 outages per year for SAIFI are considered highly problematic.

The average score for this indicator is very low at 0.208. Fourteen countries obtained zero scores under this parameter. This indicates that a great number of countries in the sample are still confronted with a high number of outages and of long duration. In 15 countries, it is a regulatory requirement for the utility

to periodically conduct technical audits of its facilities to establish the true situation at the facilities. In eight countries, it is a regulatory requirement for the utility to calculate its SAIFI and SAIDI parameters. Regulatory ceilings exist for SAIFI and SAIDI in 12 countries. In four countries (Zambia, Tanzania, Namibia and Burundi) SAIFI and SAIDI values are factored into the tariffs. Financial sanctions are imposed on utilities that fail to meet the requirements in seven countries. Consumers are compensated if the SAIDI and SAIFI values exceed the regulated ceiling in five countries (Zambia, Tanzania, Namibia, Uganda and Ghana). The rest apply penalties. Uganda applies both penalties and compensation to affected consumers and provides a good example of regulatory demand for responsible utility behavior.

Network reliability is an important element that is taken into consideration by industrial developers in their decision to invest in a country. Despite high uptake of the SAIFI measure, half the number of regulators do not set a target for the improvement of reliability and availability of the electricity network. While most African countries have now adopted SAIDI and SAIFI to measure their quality of technical service, the calculation methodology varies from one country to another. Some countries exclude load shedding and planned events, while others take them into account.

The technical quality of electricity supply to consumers should be regularly monitored by the regulator through periodic reporting by the utility, usually on a quarterly basis. This requires the implementation of an outage management system with automated data collection facilities. In addition to the SAIDI and SAIFI, the Customer Average Interruption Duration Index (CAIDI) should form part of the quality of service performance reports submitted to the regulator.

Facilitation of Electricity Access

Access to electricity is an important aspect of human and economic development, crucial for poverty reduction and industrialization. African governments are committed to increasing electricity access rates, particularly in rural and underserved areas. However, there are still just under 600 million people who are living without electricity in Sub-Saharan Africa.

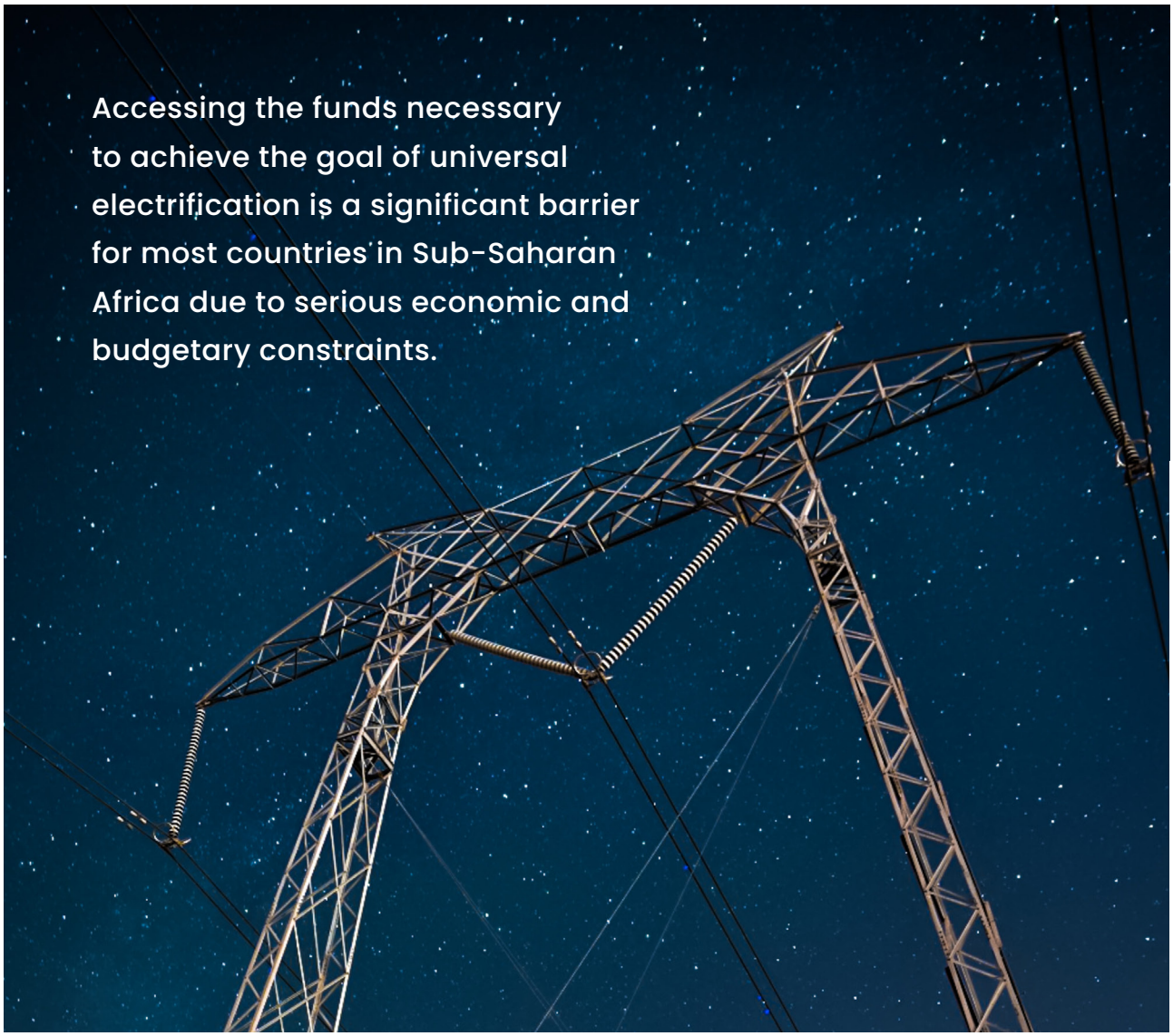
The average score for this indicator is the highest of the three ROI indicators, at 0.606. Twenty-eight countries achieved a score of 0.500 or higher. Eight countries achieved a score of 0.800 – 1.000.

Respondents from 11 countries (Eswatini, Tanzania, Burkina Faso, Cameroon, Central African Republic, Chad, Congo Republic, Gabon, Gambia, Liberia and Madagascar) indicated that they did not have regulatory mechanisms in place aimed at enhancing access to electricity. Twenty-three countries take into tariff consideration the cost incurred in electrification by governments, NGOs and the utility. Thirteen regulators provide for the refund of costs incurred by individuals, NGOs in rural electrification.

Accessing the funds necessary to achieve the goal of universal electrification is a

significant barrier for most countries in Sub-Saharan Africa due to serious economic and budgetary constraints. In addition, most of the electricity companies in the region are insolvent and cannot expand access without budgetary support provided by their respective governments. This support is often unavailable. As a result, expanding access to electricity in Sub-Saharan Africa will require significant support from international development partners and institutions, as well as the private sector.

Regulatory reforms should, therefore, be designed to reduce barriers to investment and to attract both the foreign and domestic private sectors to provide electricity access to rural and isolated communities. This could be through mini-grids and stand-alone systems. Examples of incentives could be mechanisms to buy out investments in mini-grids, when grids are extended to off-grid areas before affected mini-grid developers/investors have recouped their investments.



Box 6: Consumers Assessment of Regulatory Impact

Given the limited number of responses to the survey, the consumer assessment was not included in the 2020 ERI, however a review of the responses provided some important insights on the views of consumer groups regarding the impact of regulatory actions on the electricity sector. Consumer groups from 25 countries participated in an assessment of the impact of the regulator's actions and decisions on the power consumer. The consumer survey assessed two indicators: electricity supply and billing and quality of service delivery. The overall results of the assessment revealed a very low level of regulatory development with regard to impact on consumers in the sector. Based on the ERI performance bands, only two countries (Ghana and Burkina Faso) appeared in the yellow band, four countries (Côte d'Ivoire, Democratic Republic of Congo, Cameroon and Lesotho) scored in the orange zone, while the remaining 19 countries were in the red zone.

Electricity Supply and Billing

The power of the consumer to negotiate terms of supply of electricity is recognized in 12 countries where there is legislation that allows large consumers to negotiate terms of electricity supply directly with the utility under special arrangements. In eight of the 12 countries, the law allows large consumers to negotiate, in addition to the terms of supply, on prices. Apart from the Republic of Congo, Guinea, Rwanda and Burundi, consumers report that the electricity rates and its components are well communicated to the full understanding of consumers. The regulatory mechanisms in the Democratic Republic of Congo and Burkina Faso allow large consumers to import electricity from other suppliers in other countries in the sub-region through a regional transmission grid. In all the countries except seven (Liberia, Guinea, Botswana, Zambia, Madagascar, Nigeria, and Lesotho) there are regulatory mechanisms that allow the consumers to install or procure electricity from renewable sources if that is cheaper, to compliment purchases from the utility.

Quality of Service Delivery

In 13 countries, the regulator informs consumers of their rights and obligations while utilities in 12 countries are obliged to produce and publish consumer charters to inform consumers of their rights and obligations. Consumers in 15 countries report that they participate in consultations with the regulator and utilities before major decisions are taken.

Regulators in 12 countries have developed conciliatory platforms for dispute resolution between utilities and consumers. In 14 countries, there are regulatory requirements on the number of days over which the utility is obliged to provide connection service to consumers after the required fees have been paid. Pre-financing of connection materials (poles, wires etc.) is allowed in 19 countries but reimbursement is done only in five countries (Gambia, Nigeria, Benin, Côte d'Ivoire and Ghana). Consumers in Ghana and Côte d'Ivoire are paid a lump sum while in the rest of the countries, reimbursement is made over time through utility bills. Compensation is paid for equipment that is damaged due to electricity outages or because of poor quality of supply in 12 countries.

Consumer satisfaction surveys have been conducted within the last five years in Ghana and Lesotho by the regulator, and in Uganda and Cameroon by the utility.

On a scale of 0-10, (10 indicating highly positive, 5 neutral and 0 highly negative) the consumer groups were asked if they would have invested in their respective countries if they had prior

knowledge of the performance of the electricity sector, in terms of tariffs, reliability of supply, and customer relations of the electricity service provider relative to the consumer's cost of operations. The average response of 3.56 indicates widespread dissatisfaction among consumers.

Overall, the results highlight that consumers are not satisfied with the level of service that they are receiving from the utilities. The regulatory framework is gradually evolving towards an electricity market and recognizing the rights of the consumer to choose suppliers and negotiate prices. With the advancement in renewable energy technologies and regulatory mechanisms that allow interconnectivity, utilities are coming under pressure to improve their services and reduce prices or lose the patronage of major consumers who are critical for utility survival.

5. Recommendations

The ERI seeks to measure the level of development of electricity regulatory frameworks across Africa and identify areas for improvement. On this basis, it allows for a better understanding of the sector, its challenges and opportunities for improvement. The survey offers an opportunity for African countries to compare their electricity sector regulatory frameworks with international best practice. This is to enable actions that can improve the local investment climate. A well-established regulatory environment that addresses the needs of investors, operators and consumers alike will attract the investments that Africa still lacks in the electricity sector and satisfy consumer needs.

The following policy recommendations highlight ways in which policy makers and regulators in Africa can address the gaps that the ERI study has identified. They allow for the authorities to improve on their regulatory frameworks and electricity sector outcomes.

These recommendations are also expected to help enhance the performance of regulators as well as improve stakeholder and investor confidence in the regulatory frameworks and countries. The recommendations are formulated to allow for corrective actions, as well as to help fill in the gaps identified in line with internationally recognized best practice.

5.1. Improving Regulatory Governance

5.1.1. Independence from Government

The survey showed that in over 90% of the countries sampled, the power to appoint board members and heads of regulatory institutions is vested in the executive to whom they report. In eight of the countries in the sample, the regulatory law allows the executive arm of government to overturn regulatory decisions of the regulator. These remove the core of the decision-making independence from the regulators, as the latter are subjected to subtle and direct political pressure to skew key regulatory decisions towards the political inclination of the government in power.

Recommendation 1

To maintain a cordial arm's length relationship with government and limit opportunities for executive interference without questioning the executive's constitutional powers to make appointments to public institutions, authorities may wish to amend some regulatory acts: first to remove the provisions that allow the executive to overturn regulatory decisions of the regulator; and to make provision for a longer and fixed non-renewable term of office for commissioners. These could be terms of between five to seven years. This would be with an inbuilt staggering mechanism of terms for different commissioners to ensure that

institutional memory is maintained. This will also do away with the existing situation in most countries, where commissioners' terms of office run in tandem with the government that appointed them. This minimises the influence of the government over the entire composition of the board at any point in time. The non-renewable term will ensure that commissioners are not influenced by future employment concerns in their decision making. The terms of engagement of chief executive officers (CEOs) of regulatory authorities should include guaranteed tenure and golden parachutes to minimise political intrusion and interference.

5.1.2. Independence from the regulated sector

Most countries have legislations to deal with conflict of interest for commissioners and heads of regulatory institutions while in office. However, few have adequate mechanisms to regulate nomadism, where key personnel of the regulatory institution can move to regulated entities immediately after their term of office as a regulator. This raises ethical issues and affects the integrity of regulatory decisions with future implications. This is because of the tendency for decisions taken to be oriented to give some leverage to the decision makers as soon as they change their reference point.

Recommendation 2

The regulatory acts should be amended or subsidiary legislations and codes passed to prescribe adequate cooling off-periods (a minimum of three years) for commissioners and top personnel after their term in office. This will ensure that decisions taken by the regulator are devoid of any future personal interests.

5.1.3. Financial independence

The results of the ERI 2020 survey show that political authorities have significant influence on the finances of regulatory authorities. Some of the laws that created or established the regulatory institutions do not clearly indicate sources of funds for the institutions. Sometimes these laws subject the institutions to subsidies from the state budget and subject the regulatory authority's budget to approval by the executive. This is after the board has approved its budget, thus limiting its action and independence. In some cases, even the salary levels of regulatory staff are set by the executive, exposing the regulatory authority staff to potential regulatory capture.

Recommendation 3

It is recommended that all regulatory agencies be funded independent of direct government budgetary funds. Funding should be done preferably from fees and levies at levels approved by the legislature. Budgets of regulatory authorities should not require annual approvals or validation from government. However, post-expenditure audits should be carried out at the end of the financial year to ensure good management of funds by the regulatory authority. Salaries of regulatory authority staff should be set by the board of the regulatory authority at the same level or higher than those of operators. This will avoid any capture of the latter by power companies.

5.1.4. Strengthen Accountability of the Regulator

The independence of the regulator is desirable only to the extent that the regulator will be accountable to stakeholders – government/

state and the regulated entities. An independent regulator that has been given the needed arm's length in operational status should subject its operations to scrutiny through the submission of an annual report for review, preferably to the legislature. There should also be a third-tier independent route (a special tribunal outside the regulator but not up to the level of the regular courts) for regulated entities who feel aggrieved by the regulator's decision to contest it. The survey found that only five out of the 36 countries surveyed had specialized bodies that could adjudicate over regulatory issues brought by aggrieved regulated entities. While almost all the regulators have an obligation to prepare annual reports, only four regulators present this report to the legislature for scrutiny. The remaining 13 disseminate their annual reports for information purposes only, while 19 submit it to the executive.

Recommendation 4

The primary legislation of regulators should be amended, or appropriate secondary legislations enacted to back the setting up of a third-tier adjudication body or specialized tribunal. This could be a body outside the regular regulatory channels and courts with requisite expertise to review and address appeals made by regulated entities. Resorting to the regular judicial processes and courts results in extensive delays in dispatching such highly technical issues. This is a disincentive for investors who are considering committing long-term investments.

5.1.5. Improving Predictability of Regulatory Decisions and Actions

The ERI 2020 survey found that a significant number of regulators surveyed (about 53%) still operate without a well-documented tariff methodology. Of those who have tariff methodologies, a significant number of those methodologies do not have procedures and schedules for reviewing tariffs, tariff indexation and automatic tariff adjustment mechanisms. The majority also did not have a predictable mechanism for disallowing into the tariff, costs considered by the regulator to be unreasonable. These gaps do not assure stakeholders of the needed consistency in the regulatory process to enable them to plan confidently. Potential investors are also not incentivized to commit to long-term investment with such unpredictability in the regulatory processes.

Recommendation 5

Regulators may wish to consider developing appropriate tariff methodologies outlining procedures and schedules for major and minor tariff reviews. This could include tariff indexation or automatic tariff adjustment mechanisms. Regulators should also consider elaborating in the tariff methodology or any appropriate regulatory instruments and guidelines, a predictable mechanism for allowing or disallowing certain costs that might be considered unreasonable. They could be allowed or disallowed in the tariffs and outline ex-ante procedures and processes for reviewing key regulatory instruments.

5.2. Improving Regulatory Substance

5.2.1. Develop economic regulation

Tariff determination/computation remains an essential link in economic regulation. It is critical for the survival of the power sector. The ERI 2020 survey showed a weak regulatory development in the tariff framework and processes of participating countries. In addition to the gaps in tariff methodology mentioned under the predictability indicator, the survey found that in 30 of the 36 countries surveyed, the regulators confirmed that tariffs are not cost-reflective. Utilities in these countries receive subsidies from government and also defer required investments in the network. In 28 of the 30 countries without cost-reflective tariffs, there is no transitional path or roll-out plan that has been agreed between the utility and the regulator to attain a cost-reflective tariff over a specified period. Undertaking cost of service studies and implementing the findings of such studies is fundamental to attaining cost-reflective tariffs. However, regulators in 14 countries surveyed have neither undertaken cost of service studies nor approved similar studies undertaken by the utility for implementation.

The type of power purchase agreements signed between distribution utilities and generation companies with price adjustment clauses are key factors for the sustainability of the utilities and the sector. If the power purchase agreements and price adjustment clauses are not scrutinized by the regulator to ensure that they align with the tariff methodology, then unreasonable costs will be passed on to consumers. This will happen especially in situations where the regulator recognizes the prices in the PPA or these costs impact negatively on the debt and financial sustainability of the utility. It could equally be in situations where the regulator does not recognize the price adjustment mechanisms in the PPA, with attendant liabilities siting with the utility.

Recommendation 6

In countries where tariffs are not cost-reflective, the regulator should develop and agree with the utility an implementable transitional path or roll-out plan to attain cost-reflective tariffs. This would take only reasonable costs incurred into consideration. 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 customer classes for attaining cost-reflective tariffs. Countries that are yet to undertake cost of service studies (CoSS) should take immediate steps to undertake them and implement the findings in accordance with the roll-out plan. Those with over five years cost of service studies should update them for implementation. As much as possible, all power purchase agreements should be procured through open and transparent competitive bidding processes.

Regulators should supervise the development of model power purchase agreements for

different types of generation technologies. This includes conventional generation sources with mandatory regulatory clauses to guide investors and utilities in negotiating their PPAs. In addition, regulators should develop and publish procedures for approving or giving no objection to PPAs signed between distribution utilities and power generators. They should recognise the price adjustment mechanism in them for tariff purposes. Through this, the regulator can monitor all PPAs in the sector and thus avoid over-subscription and badly negotiated PPAs. This would prevent passing inefficient cost to consumers.

5.2.2. Develop Technical Regulations (Quality of Service)

The survey results show that the quality of service regulatory framework is weak in participating countries. Supply reliability in terms of frequency and duration of supply interruptions have not been comprehensively addressed in existing quality of service regulations. Utilities have generally been left to use their discretion on limits of these indices. Neither incentives nor penalties are being implemented to drive the utilities to ensure adequate supply reliability. Out of the 36 countries surveyed, 20 (55%) have not developed any country-level quality of service (QoS) regulations. Most of the quality of service indicators are set through contractual agreement with utilities. Of those with QoS regulations, most of them have no set ceiling for SAIDI and SAIFI and no accompanying penalties for non-compliance. Only in four countries are SAIDI/SAIFI values factored into tariffs.

There are a few countries where there are QoS regulations with prescribed penalties for non-compliance on SAIDI and SAIFI. In some of these countries, the regulators have agreed with the utility to suspend the application of the prescribed penalties due to weak distribution networks. This is where the utilities are deemed incapable of meeting the QoS standards. Without the development and enforcement of these indices, the consumer will always be short-changed and the economy will always be the ultimate loser. Half of the countries surveyed had not developed grid and distribution codes to govern the transmission and distribution networks respectively.

Only 10 of the countries surveyed (28%) have carried out a customer satisfaction survey over the last five years. A customer satisfaction survey enables the assessment of the quality of the service delivered by the utility from the customer's perspective. It is an excellent source of information to improve the service rendered and to carry out an efficient regulatory impact assessment.

Recommendation 7

In countries where QoS regulations have not been developed, the regulator should take immediate steps to develop comprehensive QoS regulations, covering all aspects of reliability indices, including SAIFI, SAIDI, and CAIDI. This should also include implementable incentives and penalties. In situations where the state of the distribution network is weak, the regulator should not just suspend implementation but develop and agree with the utility an implementable transitional path that may

include flexible mechanisms. The "service reflective tariffs" being implemented in Nigeria provides a good example of this. Essentially, what is needed is a roll-out plan with graduated milestones for attaining the required reliability standards. The regulator should be mindful of the implications of immediate full implementation. Penalties or fines should be used to instigate good service but not as a repressive element or source of revenue.

Countries without grid codes should develop them in tandem with distribution and metering codes. This should be done bearing in mind the need for open access rights and regional harmonisation of the grid codes to facilitate cross-border electricity trade.

Although tariff methodologies in most African countries are cost-based (RoR), innovative ways should be developed to factor into tariffs the appropriate quality of service standards to incentivise utility performance and provide consumers value for the money they pay. Until existing grids become robust enough to deliver the reliability standards, the service reflective tariffs used in Nigeria (where different tariffs are tagged to different reliability indices) can be adopted as a transitional measure. They can be fine-tuned and implemented in many countries, especially for industrial customers willing to pay for certain levels of reliability of supply.

It is also recommended that countries carry out customer satisfaction surveys every two years to keep track of the commercial and technical quality of the service received by the consumer. This will better inform the process.

5.2.3. Strengthen institutional capacities

The survey showed that some regulators (both nascent and mature) have demonstrated a remarkable improvement in the level and adequacy of capacity of staff available for various key disciplines including engineering, economics, finance, and modelling. Liberia, Angola, Zimbabwe demonstrated a significant improvement in the stock of regulatory capacity that they have built over the one-year period since ERI 2019 was produced. While taking their existing staff through specialised training, they also recruited experts to augment their team. However, most regulators, especially the nascent ones, still lack the requisite capacities in key regulatory disciplines and will need a consistent mechanism to build capacities.

Recommendation 8

To ensure sustainable capacity development, regulatory staff should be kept abreast of ever-changing trends in the dynamic energy sector. Regulators should undertake comprehensive skills or capacity needs assessments and develop a consistent training program to match it. The program should include peer-to-peer learning, attachments and mentoring, among other things. Regulators should implement these programs in collaboration with the regional regulatory associations and bodies.

While building capacity, regulators should broaden their sources of income and seek the needed autonomy over the control of their resource. This will allow them to remunerate staff attractively and provide good staff working conditions and packages, preferably

above that of the utility and other regulated entities. This will help them better recruit, train, maintain and retain highly skilled personnel. Of the three regulators with highly improved capacity development mentioned earlier, only one has the salary level of its staff at par with the utilities. For the others, the salary levels of the regulators are below that of the utility, putting them in a precarious position where their highly trained staff can easily be poached by regulated entities.

5.2.4. Develop Renewable Energy

The results of the survey show that several countries are still lagging in the development of electricity production from renewable sources. This segment is not sufficiently regulated. In some countries the assessment of the potential of renewable energy has not yet been carried out, while in others, only the legal frameworks have been drawn up. The world is now oriented towards sustainable development, which in the electricity sector, goes hand in hand with renewable energy and mini grids. It is an association that is difficult to separate.

Recommendation 9

It is recommended that incentive policies be established for the development of renewable energy. Increasing access to electricity, especially in rural areas, can only be achieved by optimising renewable energy solutions. To support this development, appropriate network codes to allow interconnection with national networks must be developed together with the corresponding tariff plans. Regulatory frameworks should be developed for mini-grids and stand-alone systems in terms of standards for installation, connection, sale of mini-grid energy, licensing, and the sale of energy.

5.2.5. Develop energy efficiency

The survey results show that only nine out of 36 countries surveyed were able to obtain an above average score. This shows the low level of development of regulations for energy efficiency. However, almost all countries have signed the Paris Agreement on Climate Change. There is a delay in the implementation of all related commitments.

Recommendation 10

Where policies and regulations have been put in place, they should be implemented. Where they are not yet in place, they must be developed, adopted and implemented. Africa continues to allow imports of used, obsolete and discarded electrical appliances. These appliances, which come from European second-hand markets, contain gases, harmful to the atmosphere. Each country should commit in the short-term to draw up a master plan for energy efficiency to benefit from the enormous cost, health and environmental benefits, while at the same time preventing the dumping of used and obsolete appliances on African countries. This commitment should be accompanied by various incentives for each sub-sector of the economy: industry, including the power industry, households, services, trade and businesses, and enforcement agencies. Energy efficiency in utility operations results in less fuel use for generation, less transmission and distribution losses and overall cost of service and consequent lower consumer tariffs.

5.3. Enhancing Regulatory Outcomes

5.3.1. Financial performance and competitiveness

The results of the survey showed only eight (22%) out of 36 countries scored above or equal to the average score on Financial Performance and Competitiveness of the utility. This reflects the weak coordination abilities of the regulators with regards to governing the regulated activities of operators in the electricity sector.

Recommendation 11

The regulations and regulatory practices must ensure that utility companies have tariffs that cover their prudent operating costs, through the conduct of regular Cost of Service Studies, in collaboration with the operators and implementing the findings. In situations where tariffs are not cost reflective, a transitional path towards cost reflectivity should be agreed between the regulator and utility for implementation. In addition, regulations and mechanisms should be put in place for energy purchase contracts or power purchase agreements (PPAs), which must be competitively procured, triggered by well-defined demand-supply forecast and planning indicators.

5.3.2. Commercial and technical quality of service

The results of the survey showed that in a majority of countries, indicators to monitor utility performance and quality of service were either not fully developed or not implemented regularly.

Recommendation 12

Regulators should develop comprehensive performance monitoring framework with key performance indicators (KPIs) to monitor utility performance. The KPIs should include benchmarks for financial performance, technical and commercial quality of service performance, quality of service delivery and operational efficiency. Regulators should require utilities to publish on their own websites, their own performance indicators against set regulatory targets and KPIs, and to produce periodic public reports documenting reasons for any underachievement. The ceiling of those indicators must be set and used in tariff calculation to let utilities take the quality of service delivery into account at all times.

5.3.3. Facilitating access to electricity

The majority (69%) of participating countries have regulatory mechanisms in place to facilitate electricity access. These regulatory mechanisms include enacting regulations and codes that set limits to days required to connect customers who apply and pay for electricity services. It entails imposing levies on consumers through tariffs to extend the grid to rural areas and promoting off-grid and stand-alone systems to complement grid extensions. However, in 21 of the 36 countries surveyed, it was found that the utility is not involved in funding rural electrification. Rather it is government, NGO's, and consumers themselves that do this.

Recommendation 13

It is widely acclaimed that the involvement of consumers (collectively or individuals), NGOs and industries in pre-financing electricity extension is key to accelerating access to electricity to many consumers more broadly.

This is especially the case in peri-urban and rural areas. Regulators should elaborate appropriate regulations and codes, effective reimbursement mechanisms for these pre-financiers to incentivise such initiatives. Where utilities are involved, provision should be made, through the tariffs, to recover investments and to provide for repair and maintenance of the systems.

5.4. Regional Dimensions

Facilitating regional electricity trade to allow for sharing of energy resources between the more endowed and the less endowed countries is the primary objective of regional regulatory bodies and associations and the power pools. In addition to the hard infrastructure like regional grids, which are required to facilitate electricity trade across borders, there are also soft interventions. An example of this is the establishment and building capacity of independent regulators to develop robust regulatory frameworks for the sector. While the regulatory frameworks are harmonized at the regional level, the soft initiatives are fundamental to regional and continental harmonisation of electricity markets. Regional regulators are the principal actors who can ensure effective collaboration with national regulators to pursue the soft initiatives. The African Union is pursuing electricity market harmonisation, as are the various other regional bodies, as the continent focuses on removing bottlenecks to cross-border trade. While acknowledging the tremendous roles played by regional regulatory bodies and associations, the observations made from the ERI 2020 are that some more work remains to be done.

5.4.1. Establishment of Regulators and Building Regulatory Capacities

The ERI target is to cover all countries in Africa by 2022. However, this target may take a bit longer as more than five countries in Africa still do not have independent regulators that can participate in the ERI. Of those countries with regulators, a significant number are nascent regulators who are yet to build the necessary capacity and needed regulatory instruments to fully assert their control over the sector. Others have their acts developed but these acts have not yet been passed by their legislatures. As such, they do not yet have the needed legal authority and mandate to work. The survey also found that capacity gaps exist in many regulatory institutions, especially the nascent ones spread across the regions. The distribution of both high and low performers in the ERI across the regions offers a unique opportunity for peer learning and knowledge transfer.

Recommendations (role of regional regulators)

Regional regulators should facilitate the establishment of regulatory bodies in countries within their region where they do not exist. This can be approached from the level of council of energy ministers in the various regions. The Regional Electricity Regulators Association of Southern Africa (RERA) in the SADC region, and the ECOWAS Regional Electricity Regulatory Authority (ERERA) in West Africa have played commendable roles in getting a high percentage of their members to establish regulators.

Only Comoros in the SADC sub-region and Guinea Bissau in the ECOWAS sub-region are yet to establish regulatory bodies in their respective economic blocks. East and Central Africa have a couple of countries without regulatory authorities. Regional regulators should institutionalize peer-to-peer review mechanisms and mentoring programs for nascent regulators at the regional level. This will catalyse the capacity building process and dampen the learning curve for the usually long gestation periods required to develop robust regulatory regimes. Peer learning and mentoring will be useful to help get nascent regulators underway. Although the African Forum for Utility Regulators (AFUR), the Regional Electricity Regulators Association of Southern Africa (RERA) and the Regional Association of Energy Regulators for Eastern and Southern Africa (RAERESA) have all initiated some form of peer review mechanism, they need to be supported to formalise and institutionalise these mechanisms.

5.4.2. Developing and harmonising regulatory frameworks and Instruments for regional trade

The existence of some key regulatory instruments and frameworks in the countries and their harmonisation within the region are key elements for facilitating electricity trade across borders within a region. While it is desirable to harmonise most regulatory frameworks, some are considered more essential to safe and reliable operation of the grid and hence cross-border trade. Three of these essential instruments or frameworks monitored by the ERI 2020 include the existence of (i) national transmission grid codes; (ii) network connection policies; and (iii) regulatory mechanisms for ancillary service pricing. While the grid code defines the technical requirement for access and operation of the grid, the network connection policies outline the underlying contractual arrangements for accessing the grid by all generation technologies. Ancillary service pricing ensures that essential services by generators, essential for grid stability, are adequately priced. These are services other than the MWh of electricity supplied. The ERI 2020 results show that of the 36 countries surveyed, 23 (64%) do not have national grid codes. Meanwhile, 29 countries (81%) do not have a developed or validated network connection policy and 20 (56%) do not have a regulatory mechanism for ancillary service pricing.

Recommendation (role of regional regulators)

Regional regulators should develop a framework/template at the regional level to guide these countries in developing their grid codes, network connection codes and policies and ancillary service pricing in a harmonised manner. They should be developed in alignment with the regional power-pool protocols. A transitional roll-out plan should be developed for countries that have these frameworks, so they can update them to align with the regional template. Adapting country specifics to the regional framework will accelerate the rate of development of harmonised frameworks in the region.

Action Plan: Snapshot of Recommended Short-term Interventions (1-2 years)

	Publication of rationale behind regulatory Decisions	Develop Tariff Methodology	Undertake Cost of service study	Develop Simplified licensing framework for off-grid and small size systems	Develop National Grid Code	Develop and implement Quality of service Regulation or code	Develop Model Technology Specific PPA
Angola	■	■	■	■			
Benin	■		■		■		■
Botswana	■	■	■	■	■		■
Burkina Faso	■	■	■	■	■	■	■
Burundi		■		■	■	■	■
Cameroon	■	■		■		■	■
Central African Republic		■	■		■	■	■
Chad	■	■	■	■	■	■	■
Congo (DRC)	■	■	■		■	■	■
Congo (Rep.)	■	■	■		■	■	■
Côte d'Ivoire		■	■	■	■	■	■
Eswatini				■			
Ethiopia	■	■			■		■
Gabon	■	■	■	■	■	■	■
Gambia		■	■	■	■	■	■
Ghana				■			
Guinea	■	■		■	■	■	■
Kenya							
Lesotho				■			■
Liberia		■	■	■	■	■	■
Madagascar	■		■		■	■	■
Malawi						■	
Mali		■	■		■	■	■
Mauritius		■	■	■	■	■	■
Mozambique		■		■	■	■	■
Namibia				■			
Niger	■				■	■	■
Nigeria							
Rwanda			■				■
Senegal				■			
Sierra Leone			■		■	■	■
Tanzania							
Togo	■	■	■	■	■		■
Uganda							
Zambia	■		■				
Zimbabwe		■		■			

	Develop Legal and policy framework for renewable energy	Develop Technical standards for mini-grids	Develop Technical Standards for Standalone Systems	Develop Energy efficiency legislation or policy	Develop Loss reduction target/Action plan	Develop Network Connection Policy	Build Capacity in areas Tariff in of setting	Build Capacity in areas of Utility performance Analysis	Undertake Customer Satisfaction surveys
Angola		■		■		■			■
Benin				■			■	■	
Botswana		■	■		■	■	■	■	■
Burkina Faso		■	■	■	■	■	■	■	■
Burundi	■	■	■	■		■	■	■	■
Cameroon		■	■	■					
Central African Republic	■	■	■	■	■	■	■	■	■
Chad	■	■	■	■		■	■	■	
Congo (DRC)	■	■	■	■				■	■
Congo (Rep.)		■	■	■	■	■		■	■
Côte d'Ivoire					■	■	■	■	■
Eswatini		■	■		■		■		■
Ethiopia			■				■	■	
Gabon		■		■	■	■	■	■	■
Gambia				■	■	■			■
Ghana		■				■	■		■
Guinea	■	■			■	■		■	■
Kenya					■	■			■
Lesotho	■			■		■	■	■	■
Liberia	■	■	■	■	■	■			■
Madagascar		■	■		■	■	■	■	■
Malawi	■		■	■		■			■
Mali			■	■	■		■	■	■
Mauritius		■	■		■	■	■	■	■
Mozambique			■	■	■		■	■	■
Namibia				■					
Niger								■	
Nigeria				■		■			
Rwanda						■			■
Senegal					■	■			■
Sierra Leone			■			■	■	■	■
Tanzania					■	■			
Togo				■		■			
Uganda						■			
Zambia				■		■			■
Zimbabwe				■		■			■

Action Plan: Snapshot of Recommended Medium-Term Interventions (3-5 years)

	Create Specialised and Independent Mechanisms/ Bodies to Contest the Regulator's Decisions	Modify the electricity law or adopt regulatory texts to enhance regulatory independence (vis-à-vis the executive and stakeholders) by making provision for:			Develop and Adopt Labeling System for Electrical Equipment	Set and Enforce ceilings on SAIDI and SAIFI as Quality of Service Indicators
		Staggering of Terms of Commissioners	Cooling off Period after Term of Office	Independent Source of Funding through Levies		
Angola	▼	▼	▼		▼	
Benin	▼	▼	▼		▼	▼
Botswana	▼			▼	▼	▼
Burkina Faso	▼		▼		▼	▼
Burundi	▼	▼	▼		▼	▼
Cameroon	▼	▼	▼		▼	▼
Central African Republic	▼	▼	▼		▼	▼
Chad	▼	▼			▼	▼
Congo (DRC)	▼	▼	▼		▼	▼
Congo (Rep.)	▼	▼	▼	▼	▼	▼
Côte d'Ivoire	▼					
Eswatini	▼		▼	▼	▼	▼
Ethiopia		▼	▼	▼	▼	▼
Gabon	▼	▼	▼	▼	▼	▼
Gambia	▼		▼		▼	▼
Ghana	▼		▼			
Guinea	▼				▼	▼
Kenya			▼			▼
Lesotho			▼		▼	▼
Liberia	▼		▼		▼	▼
Madagascar	▼	▼	▼		▼	▼
Malawi	▼				▼	▼
Mali	▼		▼		▼	▼
Mauritius	▼		▼		▼	▼
Mozambique	▼	▼		▼	▼	▼
Namibia	▼	▼	▼			▼
Niger	▼	▼	▼		▼	
Nigeria	▼				▼	▼
Uganda		▼				
Rwanda	▼				▼	▼
Senegal	▼					▼
Sierra Leone	▼	▼	▼		▼	▼
Tanzania						
Togo	▼	▼	▼			▼
Zambia	▼	▼	▼	▼	▼	
Zimbabwe	▼	▼	▼		▼	▼

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Annex 1: Detailed Methodology of ERI 2020

The Electricity Regulatory Index (ERI) measures the level of development and implementation of regulations in the electricity sector in a country. The survey assesses the impact of the enabling environment, particularly regulatory frameworks, with regard to sector performance. ERI 2020 follows on from the first two surveys which took place in 2018 and 2019.

The insufficiency or absence of regulation in the electricity sector in Africa has been identified as a factor that hinders the development of African countries. The ERI, therefore, is a compass that shows the path that must be followed to attract the favor of investors. The results of the survey should remind each country of its duty in the development or implementation of regulations to make the electricity sector efficient and allow national populations across Africa to derive all the benefits.

The objectives pursued by the ERI 2020 survey include the following:

- Establish the ERI role as an important benchmarking and diagnostic tool for review of regulation in the electricity sector in Africa
- Consolidate and highlight the shortcomings and challenges in regulation in the electricity sector
- Encourage the countries to support the establishment and implementation of efficient regulatory frameworks that will ultimately support the growth and viability of the electricity sector
- Refine and enhance the survey tools and methodology to improve the level of information and data collected under the ERI
- Increase the coverage of the sample countries participating in the Survey

Assessing the Regulatory Framework

According to relevant literature, an effective regulatory framework can be deconstructed 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 practice. It defines the framework within which decisions are made. This index is composed of eight 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. This index is composed of seven 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 sector beneficiaries (power utility companies and consumers), the degree to which the electricity sector regulations and regulators' action have positively or negatively impacted the performance of the sector. Given the limited responses from the representatives of power consumers, for ERI 2020, only the ROI for utility companies was calculated.

Based on the above, the indicators for the three pillars to develop the ERI are as follows:

Regulatory Governance Indicators

Indicator 1: Legal Mandate

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

Indicator 2: Clarity of Roles and Objectives

A best practice regulatory model is one that clearly spells out the functions of the regulator in the primary law or any other relevant document. It removes any possible sources of confusion

Regulatory Authority		Power Utility Company
Regulatory Governance Index	**Regulatory Substance Index**	**Regulatory Outcome Index**
1: Legal Mandate **2:** Clarity of Roles and Objectives **3:** Independence **4:** Accountability **5:** Transparency of Decisions **6:** Predictability **7:** Participation **8:** Open Access to Information	**9:** Economic Regulation **10:** Technical Regulation **11:** Licensing Framework **12:** Institutional Capacity **13:** Renewable Energy Development **14:** Mini-grid and Off-grid systems **15:** Energy Efficiency Development	**16:** Financial Performance and Competitiveness **17:** Quality of Service Delivery (Commercial and Technical) **18:** Facilitation to Electricity Access

Figure A: Main Indicators of ERI 2020 Pillars

between the roles of the regulator, the sector ministry, or any other agency. The functions and objectives of the regulator and of regulated entities must be set out clearly and made known to stakeholders. The functions to be carried out by the regulator, as opposed to those to be performed by the ministries or other bodies, should also be clearly established to avoid overlap.

Indicator 3: Independence

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

Indicator 4: Accountability

A best practice regulatory model helps ensure that the necessary mechanisms are in place to guarantee that regulators behave in accordance with the legal mandate that established them and are held accountable if they do not. This can be done by either putting in place a legal framework that provides stakeholders with appropriate mechanisms to challenge regulatory decisions. Regulators can be held accountable through requirements that they explain the rationale for their decisions, as well as by formal and informal mechanisms that allow for their decisions to be appealed and/or challenged. Since the regulator's decisions affect the decisions of utilities, investors are often more confident if there is an appeal mechanism for resolving disputes between the regulator and operators.

Indicator 5: Transparency of Decisions

Transparency of regulatory decisions is important for regulated utilities and other stakeholders. This is so that they are aware of key issues and factors considered by the regulator upon arriving at various decisions. A regulator's transparency shows through requirements that they publish and disseminate their decisions and the rationale behind them. A regulator is more likely to gain the necessary stakeholder confidence, legitimacy and acceptance if it maintains a high degree of openness and transparency in its decision-making process.

Indicator 6: Predictability

A predictable regulatory environment helps ensure a gradual or evolutionary change in regulatory methods and practices to meet changes in circumstances in an orderly and consistent manner. In order to achieve this, the regulator must develop clear mechanisms regarding the process to be followed when making and subsequently implementing any

changes. Regulatory decisions should, to the extent possible, be consistent with previous decisions. The principles of consistency and predictability will assure investors that there will not be unexpected changes to the regulatory environment. This will encourage them to commit to longer-term investments.

Indicator 7: Participation

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

Indicator 8: Open Access to Information

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

Regulatory Substance Indicators

Indicator 9: Economic Regulation

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

Indicator 10: Technical Regulation

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

Indicator 11: Licensing Framework

It is important for regulators to streamline the licensing framework for the power sector by developing separate frameworks for large and small power plants and networks, especially isolated mini-grids and stand-alone systems.

A different licensing regime for small power plants using light-handed regulation will reduce the regulatory processes involved in obtaining licenses or permits. It will also further reduce the cost of regulation to off-grid operators. Care must be taken to ensure accountability of operators.

Indicator 12: Institutional Capacity

A regulator must have highly qualified and well-trained staff who are able to collect data and conduct all economic and technical analysis on the performance of the regulated utilities. Specifically, the regulator must have qualified people who are capable of conducting: financial analysis, economic analysis, engineering analysis, econometric modelling, financial modelling, tariff modelling, resolving legal issues in regulation, determining grid connection and access technical requirements, and assessing quality of service performance of operators.

Indicator 13: Renewable Energy Development

Renewable energy in different forms are available in different countries. It is however important that the electricity regulator also regulate the renewable sector to avoid uncoordinated and unplanned fuel substitution. Such unplanned fuel substitution could render some electricity generation and transmission assets stranded. A separation of regulation and implementation of functions in the renewable energy sector is important to avoid conflict of interest.

Indicator 14: Mini-grid and Off-grid Systems

Mini-grids and off-grid systems are becoming particularly important for the provision of electricity access for both temporary and permanent supply of electricity. They provide a least cost electrification pathway to electricity in sparsely populated countries. The responsive regulatory frameworks provide for the development of standardized grid-ready mini-grids. This provides for seamless integration into the national grid whenever the gird is extended to areas served by mini grids. It also provides for the sale of electricity from plants that could have been stranded upon connection of mini-grid facilities to the grid. Establishing a proper mini-grid regulatory framework involves developing technical codes, standards, rules and procedures for interconnecting mini-grids and off-grid systems to the power system so that the system can function as one. There are quality standards for stand-alone and individual home systems. Autonomous/individual home system installers are licensed and certified.

Indicator 15: Energy Efficiency

The source of electricity notwithstanding, the efficient use of it is part of global efforts to reduce energy resource waste and combat climate change. Energy waste in distribution networks also leads to increase of cost of electricity to consumers. Regulatory measures that are applicable include the linking of loss levels with tariffs and the establishment of targets for utilities to be achieved over time. End-use efficiency reduces pressure on distribution equipment, and it reduces the cost to consumers. The development and

enforcement of MEPS and labels for electrical appliances is critical to ensure that the market is protected from the dumping of obsolete and inefficient appliances.

Regulatory Outcomes Indicators

Indicator 16: Financial Performance and Competitiveness

Regulators are required to continuously monitor the financial performance of utilities to determine their financial positions, as well as their financial sustainability. The financial position of a utility company depends largely on whether the total tariff revenue from electricity sales is adequate to cover the utility's total operation and maintenance expenses. This is within the limits of reasonable losses, as well as its debt service obligations. As per best regulatory practice, the financial position of a utility company is assessed against the following key indicators:

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

Indicator 17: Quality of Service Delivery (Commercial and Technical)

Regarding monitoring the commercial quality of service, best regulatory practice requires the utility to report on the quality of customer service provided to electricity consumers through the following: (i) Connection of electricity: time taken to respond to customer requests for new connections, as well as the time for a connection to be made; (ii) Customer care: punctuality of appointment with customers; time taken to respond to customer complaints and response time to queries on disputed bills and account queries; and (iii) Metering and billing: time taken for reconnection or restoration of power due to non-payment after payment is made, as well as the time given to post-paid meter users from receipt of a notice-to-pay until disconnection. The regulator should regularly monitor the technical quality of electricity supplied to consumers. This can be done through periodic reporting by the utility, usually on a quarterly basis. The aim is to know whether the utility company is making efforts to reduce the nuisance associated with the number of times (or frequency) of outages, as well as the duration of the outages. Under best regulatory practice, the quality of service performance report submitted to the regulator should cover the (i) System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI) and the Customer Average Interruption Duration Index (CAIDI).

Indicator 18: Facilitating Electricity Access

Regulators are required to continuously assess the social impact of utility performance on

the population through regular reporting by the utility. The objective is to find out if the utility is implementing the government policy in enhancing access to electricity. The aim of the exercise is also to find out if the utility company is implementing the regulator's affordable tariff and connection policies.

Source of Data

Questionnaire Design

The data for this study was collected via a series of three surveys directed to regulators, power utilities and 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. The first questionnaire collected primary data on regulatory governance and substance from the regulators. The questions were based on the fifteen indicators described in the report. A regulatory annex questionnaire was also designed to collect additional sector-wide information. 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 and consumer well-being.

Survey Population

The survey population was selected from two main groups: regulators and beneficiaries. The beneficiaries included the power utility companies, the private sector and households. The regulator in each African country was the primary target of the study. Forty-four countries were targeted but responses were received from forty-two regulators. In countries with more than one regulator, each entity completed one set of questionnaires to account for its regulatory function.

Power utility companies were the first beneficiaries included in the survey. They were surveyed to assess the outcomes of the regulator's activities. At least one power utility company was surveyed in each country where a regulator was surveyed. Out of the 44 countries contacted to fill out the power utility questionnaire, utilities from thirty-six countries responded. In countries where multiple power utility companies exist, they were requested to participate individually.

Survey Launching and Administration

The official launch of the online platform took place on March 30, 2020. Email invitations to the ERI 2020 Survey were sent during the week of March 30, targeting 45 countries[1] with a closing date of April 29.

To provide a country-specific snapshot of each participating country's performance, country notes were prepared on all the participating countries as part of ERI 2020.

Data collection

The African Development Bank developed an

1 Individual emails were sent to over 300 addresses

online ERI survey platform for respondents to complete all the questionnaires for ERI 2020. This platform contains all the ERI designed questionnaires. Each institution (regulatory institutions, electricity companies, chambers of commerce and consumer associations) targeted by the surveys officially nominated its focal point responsible for gathering all required documents and filling out the questionnaire on its behalf. 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.

Data collection began in late April 2020 when some respondents started submitting their responses online and continued until mid-July 2020. Regulators from 42 countries, distribution utilities from 37 countries and consumer groups from 25 countries submitted completed responses. Following a review of the survey data, the ERI 2020 was constructed using data from 36 countries with completed regulatory and utility surveys.

Data validation

Data validation was conducted to remove all discrepancies that were observed in responses from the same country from different respondents and from the same respondent, taking into consideration responses from the 2019 and 2020 surveys.
The goal was to identify any discrepancies that appeared in the responses given in 2019 and in 2020 on the same questions. The verification exercise revealed differences according to the respondent group and by country. A record of the gaps was made for each country. Notes that were prepared based on the responses were sent back to the countries for confirmation and for proof of responses to be provided.

The ERI team held virtual workshops during which respondents from each country had an opportunity to respond to queries or provide clarification to statements or provide proof where necessary. At the end of the validation workshops with the countries, the team proceeded to readjust the answers given to questions that had been addressed.

Data processing

The data collected in the regulatory questionnaire was built around 15 indicators. This was assessed to construct the governance and substance (RGI and RSI) sub-indices.
In a country with more than one regulator, respondents either jointly completed the questionnaire to account for different regulatory functions or each respondent completed one questionnaire separately. In the latter case, the responses were consolidated by using of the average score from responses to the same questions. The data received from the responses of the power utility was used to build the Regulatory Outcome Index (ROI). Where a country has many utilities, the ROI for utilities is calculated for each utility and aggregated into a single utility ROI for the country.
The section below on ERI Index construction and scoring describes the detailed process involved in generating the indicators.

ERI 2020 Construction and Scoring (Scoring Methodology)

ERI Construction

The ERI was constructed as a composite index comprised 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 countries. 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) for the power utility
- **Step 6:** Aggregation of results of ERI_{GS} and ROI to calculate the ERI

Scoring process

The response to each question in the survey was given a score ranging from between 0.000 and 1.000 where 0.000 was the least possible score and 1.000 was the highest. The answers provided by the practical survey questions relating to regulatory governance and regulatory substance were coded relative to best practice in the electricity sector. Taken into account were the challenges and requirements needed to bring African countries up to international best practice. In a few cases, the aggregation used the maximum function or was conditional on answers from the questionnaire. Verification was done through review of legal and operational documents, website content and direct interviews with regulators, utilities and consumers.

The survey also included "proof" questions, which were scored in the same way as the main question. The scores obtained for the two questions were multiplied and it was the result of this multiplication that was taken into account in the calculation of the score of the sub-indicator or of the indicator. Example: if the score of the main question was 0.5 and the score of the proof question was 1, the result was 0.5 x 1 = 0.5. It was this result that contributed to the overall calculation of the score of the indicator or sub-indicator.

The score of an indicator or a sub-indicator was calculated as an arithmetic average of all the scores obtained from the questions contained in the indicator or the sub-indicator. The result gave, for each indicator, a score between 0 and 1. If an indicator had sub-indicators, after having determined the scores for each sub-indicator, the scores were added and the arithmetic mean was calculated.

RGI, RSI and ERI_{GS} Computation

The Regulatory Governance Index (RGI) and the Regulatory Substance Index (RSI) were calculated as the simple average of the allocated sub-indicator scores, based on the scoring allocation methodology, with the minimum and maximum scores set at 0.000 and 1.000 respectively.

The ERI for Governance and Substance (ERI_{GS}) was determined by using a simple average of the combined RGI and RSI scores, using the arithmetical formula below:

An illustration of the scoring and calculation of the RGI, RSI and ERI for Rwanda and Senegal is shown below.

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

Sample Calculation of RGI

The table below shows the results obtained for Rwanda and Senegal for regulatory governance.

	Rwanda	Senegal
Legal Mandate	1.000	1.000
Clarity of roles	1.000	1.000
Independence	0.754	0.740
Accountability	0.497	0.277
Transparency	1.000	1.000
Predictability	0.400	1.000
Participation	0.792	0.892
Open Access to Information	1.000	1.000

For Rwanda

RGI= (1.000+1.000+0.754+0.497+1.000+0.400+0.792+1.000)/8 =0.805

For Senegal

RGI= (1.000+1.000+0.740+0.277+1.000+1.000+0.892+1.000)/8 =0.863

Sample calculation of RSI:

The table below shows the RSI indicator score results for Rwanda and Senegal for regulatory substance.

	Rwanda	Senegal
Economic regulation	0.615	0.692
Technical Regulation	0.857	0.686
Licensing Framework	1.000	0.667
Institutional Capacity	1.000	1.000
Renewable Energy Development	0.667	0.833
Mini grid and Off-Grid Systems	1.000	1.000
Energy Efficiency Development	0.800	0.714

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

For Rwanda

RSI=(0.615+0.857+1.000+1.000+0.667+1.000+0.800)/7 =0.848

For Senegal

RSI=

(0.692+0.686+0.667+1.000+0.833+1.000+0.714)/7

=0.799

Sample calculation of ERI_{GS}

The ERI_{GS} is calculated by using a simple average of the scores of the RGI and RSI as follows:

Rwanda

ERI_{GS}=(RGI+RSI)/2=(0.805+0.848)/2=0.827

Senegal

ERI_{GS}=(RGI+RSI)/2=(0.863+0.799)/2=0.831

ROI Computation

The Regulatory Outcome Index (ROI) was determined based upon the responses provided by the power utilities to the questionnaire. It sought to elicit the respondents' feedback regarding the impact of regulatory decisions on the performance of the power utilities. The questionnaire to the power utilities was designed mainly to enhance our understanding of the utilities' perception of the regulator's actions and how such actions impact their performance. The calculation of ROI was used to "adjust" the ERI_{GS} and to obtain the ERI. The ERI thus considers the impact of regulator performance on power utilities.

The scoring principle adopted for each question considered the possibility of two or three distribution utilities from the same country submitting two or three completed questionnaires. To rationalise this issue, the following scoring principle was adopted. In any instance where two or three utilities submitted completed questionnaires and all utilities answered the same questions but with different responses, the total score for the country was calculated as a simple average of the allocated marks. If only one vertically integrated company responded to all the questions, the total country score was based on the allocated score for the responses provided by the vertically integrated utility (as one utility).

ERI Computation

The ERI was determined by aggregating the results of ERI_{GS} calculated for each regulator and the ROI determined from the responses of the power utilities. It was calculated by aggregating the results of ERI_{GS} and ROI using the geometric mean. The calculations were done, having already in hand, the results of regulatory governance and regulatory substance in ERI_{GS} and that of the regulatory effect on electricity companies and electricity consumers through the calculation of ROI. This index was calculated by aggregating the results obtained in each case using the geometric mean according to the formula:

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

Where

ROI = Regulatory Outcome Index

Sample Calculation of ROI and ERI

The results obtained for Rwanda and Senegal at the level of utilities were as follows

	Rwanda	Senegal
Financial performance and competitiveness	0.404	0.261
Quality of service	0	0
Facilitate Access to electricity	0.750	0.875

The ROI calculation for each country was done as follows:

For Rwanda

ROI = (0.404+0+0.750)/3 = 0.407

For Senegal

ROI = (0.261+0+0.875)/3 = 0.379

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

Rwanda = 0.827

Senegal = 0.831

The ERI was calculated for each country as follows:

For Rwanda:

$$ERI = \sqrt{(ERI_{GS} * ROI)} = \sqrt{(0.827 * 0.407)} = 0.580$$

For Senegal:

$$ERI = \sqrt{(ERI_{GS} * ROI)} = \sqrt{(0.827 * 0.407)} = 0.561$$

ERI scores were:

Rwanda: 0.580

Senegal: 0.561

Classification of Scores

The classification of countries according to the sub-indices or the ERI index was done on the basis of the colors, which indicated the level of regulation attained by a country. It was subdivided into four levels to which were assigned the colors expressing the level of development of the regulatory framework of the country.

Color/ Score range	Interpretation
0.800 to 1.000	**High level of regulatory development** Most of the elements of a strong policy, regulatory, legal and constitutional framework are in place
0.600 to 0.799	**Substantial level of regulatory development** Establishment of several elements of a favorable regulatory framework although presenting shortcomings which do not allow the regulator to have strengthened capacities and institutional and legal structures
0.500 to 0.599	**Medium level of regulatory development** Existence of basic elements of a regulatory framework. However, the regulator's capacity is limited due to the weak evolution of institutional and legal structures
0.000 to 0.499	**Low level of regulatory development** Few elements or absence of a regulatory framework in place. Non-existence or insufficiency of institutional or legal structures limiting the capacities of the regulator

Variations in Rankings and Scores between 2019 and 2020

The survey results showed significant shifts in rankings of countries that participated in ERI 2019 and ERI 2020. Some statistical factors that were observed to have resulted in the variations in scoring and ranking between ERI 2019 and ERI 2020 included the following:

- Increased number of overall questions in each survey from 2019 to 2020
- Increased number of indicators as compared to those in 2019
- Increased number of nascent regulators – with generally weaker performance/ scores
- Variation in the survey sample – five countries from 2019 did not participate in 2020 and seven new countries participated for the first time

The figure below highlights indicators that appeared in ERI 2019 compared with ERI 2020.

2019	2020
Regulator Indicators	**Regulator Indicators**
• Legal mandate • Clarity of roles and objectives • Independence • Accountability • Transparency of decisions • Predictability • Participation • Open access to information • Economic regulation • Commercial quality of service • Technical regulation • Licensing framework	• Legal mandate • Clarity of roles and objectives • Independence • Accountability • Transparency of decisions • Predictability • Participation • Open access to information • Economic regulation • Technical regulation • Licensing framework • Institutional capacity • Renewable energy development • Mini-grid and off-grid systems • Energy efficiency development
Utility Indicators	**Utility Indicators**
• Financial performance • Commercial quality of service • Technical quality of service • Facilitating electricity access	• Financial performance and Competitiveness • Quality of service delivery (commercial and technical) • Facilitating electricity access

Figure B: Comparison of Indicators between 2019 and 2020

Poor Performance in Regulatory Outcome Index - Most countries had the lowest scores on the Quality of Service indicator. For this edition of the ERI, to level up and benchmark against international best practice, the methodology of scoring SAIDI and SAIFI indicators was used to measure the level of quality of service to the consumer. SAIDI and SAIFI relate to the final user-level, thus incentivizing the utilities to try to satisfy the consumer. It was observed that electricity utilities do not systematically use SAIFI and SAIDI to assess the quality of service that they provide to consumers. They are sometimes calculated, but only for information purposes. Utility companies in many countries are not bound to monitor or improve them, and this has been the case over the years. As a result, this indicator scored very low, thus lowering the scores of the power utilities and ultimately the scores of the countries.

Variation in the Sample of Surveyed Countries – For 2020, , the classification was based on 36 countries. However, some countries that scored well in previous editions were not part of the 2020 survey. Algeria, Egypt, and South Africa, for example, which performed well in the previous editions, were not considered in the scoring and ranking in ERI 2020. This was because the questionnaires were completed either only by the regulator or the utility but not both. At the same time, countries like Angola and Zimbabwe, both of which carried out reforms in their regulatory framework, performed better. This resulted in significant changes in the overall ranking. Even though the level of the regulatory framework is still substantial or higher in some countries, the factors mentioned above affected the overall ranking.

Limitations

Methodology

The ERI is built around indicators and sub-indices. There is an inequality in the weight of the sub-indices under each main indicator based on the number of sub-indices. Given the methodology for the ERI, the construction of the main indicators will also have more impact on the overall ERI score. The ROI, which assesses the electricity companies and on consumers, was reduced only to the electricity utility response in 2020. The impact of the ROI scores on the overall ERI has been very significant in shifting the overall score and rank of countries. Future surveys will consider harmonization of the weights of each sub-index in the construction of the ERI.

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. It does not indicate 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 insufficient 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, the performance of the regulatory framework be recognized as only one of a number of factors determining overall sector performance.

Questionnaire Design

The questionnaires for the regulators, power utilities and power consumers were designed considering previous surveys and the depth of information being sought. Given different legal and institutional sector frameworks, not all regulators fully completed the questionnaire, as the questions were related to areas that were not part of their mandates. This was most evident under the indicators on renewable energy and energy efficiency development – as most countries have established separate agencies to handle these fields.

Survey Sample

The aim of the survey in 2020 was to cover all African countries in which an electricity sector regulatory authority has been set up. Out of 54 countries, 45 have already established regulatory authorities. The survey was launched among these 45 countries. However, only 42 countries reacted at the level of regulators, 37 at the level of utilities, while consumer groups from only 25 countries responded to the questionnaires. Hence the limit in the sampling for the calculation of ERI, which was 36 countries, to allow at least regulatory governance, regulatory substance and regulatory outcome effect.

Survey Administration in the context of Covid-19

The Covid-19 pandemic impacted the ERI 2020 administration. Many countries locked down and offices of some institutions were closed for at least three months from March 2020. All staff of regulatory authorities, power companies and consumer associations in almost every country were sent home. The African Development Bank had to provide necessary support and guidance on the questionnaires virtually. This placed serious limitations on communication, which had to be by e-mail or other electronic communication methods.

The questionnaires for 2020 were completed online and respondents had the opportunity to ask questions or seek clarifications from the Bank. Although this is not the optimum solution, the respondents and the Bank managed to complete the process with 36 countries, though at a slower pace than would normally have been the case. All the respondents are to be commended for their efforts, which made the exercise successful.

Annex 2: Detailed Index Results

Regulatory Governance Index Results by Country

Country	Legal Mandate	Clarity of Roles	Independence	Accountability	Transparency
Uganda	1.000	1.000	0.822	0.777	1.000
Tanzania	1.000	1.000	0.790	0.443	1.000
Nigeria	1.000	1.000	0.786	0.497	1.000
Senegal	1.000	1.000	0.756	0.277	1.000
Kenya	1.000	1.000	0.608	0.663	1.000
Namibia	1.000	1.000	0.478	0.330	1.000
Rwanda	1.000	1.000	0.749	0.497	1.000
Benin	1.000	1.000	0.556	0.277	0.667
Eswatini	1.000	1.000	0.612	0.663	0.667
Sierra Leone	1.000	1.000	0.550	0.553	1.000
Angola	0.830	1.000	0.443	0.497	1.000
Côte d'Ivoire	1.000	1.000	0.717	0.500	1.000
Niger	1.000	1.000	0.543	0.277	0.667
Mali	0.830	1.000	0.678	0.277	1.000
Ghana	0.500	0.933	0.446	0.665	0.500
Lesotho	0.500	1.000	0.686	0.663	0.777
Zimbabwe	1.000	1.000	0.447	0.497	0.333
Malawi	1.000	1.000	0.684	0.497	0.667
Burkina Faso	1.000	1.000	0.590	0.497	0.667
Mauritius	1.000	1.000	0.396	0.497	1.000
Zambia	1.000	1.000	0.415	0.497	0.333
Botswana	1.000	1.000	0.584	0.497	0.333
Madagascar	1.000	1.000	0.562	0.497	0.333
Ethiopia	0.830	1.000	0.349	0.610	0.333
Liberia	1.000	1.000	0.569	0.553	0.667
Mozambique	1.000	1.000	0.481	0.277	0.667
Guinea	1.000	1.000	0.724	0.277	0.667
Burundi	1.000	1.000	0.360	0.330	0.333
Togo	1.000	1.000	0.535	0.277	0.333
Chad	1.000	0.667	0.536	0.497	0.667
Gambia	1.000	1.000	0.467	0.277	0.333
Cameroon	1.000	1.000	0.374	0.277	0.000
Central African Republic	0.830	1.000	0.458	0.497	0.333
Gabon	0.830	0.667	0.451	0.500	0.333
Dem. Rep. Congo	0.830	1.000	0.423	0.497	0.000
Congo Rep.	1.000	0.667	0.211	0.497	0.333
Mean	0.944	0.970	0.551	0.464	0.637

Country	Predictability	Participation	Open Access to Info	RGI	Rank
Uganda	0.800	1.000	1.000	0.925	1
Tanzania	1.000	1.000	1.000	0.904	2
Nigeria	1.000	0.917	1.000	0.900	3
Senegal	1.000	0.892	1.000	0.866	4
Kenya	0.800	0.675	0.875	0.828	5
Namibia	0.800	0.925	1.000	0.817	6
Rwanda	0.400	0.792	1.000	0.805	7
Benin	0.800	0.925	1.000	0.778	8
Eswatini	0.800	0.792	0.625	0.770	9
Sierra Leone	0.600	0.625	0.675	0.750	10
Angola	0.800	0.725	0.700	0.749	11
Côte d'Ivoire	0.200	0.750	0.800	0.746	12
Niger	0.800	0.508	1.000	0.724	13
Mali	0.800	0.683	0.400	0.708	14
Ghana	0.900	0.742	0.938	0.703	15
Lesotho	0.400	0.717	0.875	0.702	16
Zimbabwe	0.600	0.933	0.775	0.698	17
Malawi	0.600	0.383	0.750	0.698	18
Burkina Faso	0.400	0.450	0.975	0.697	19
Mauritius	0.400	0.308	0.925	0.691	20
Zambia	0.800	0.675	0.800	0.690	21
Botswana	0.700	0.458	0.875	0.681	22
Madagascar	0.600	0.608	0.675	0.659	23
Ethiopia	0.800	0.583	0.750	0.657	24
Liberia	0.400	0.592	0.375	0.644	25
Mozambique	0.400	0.683	0.625	0.642	26
Guinea	0.400	0.308	0.475	0.606	27
Burundi	0.600	0.550	0.600	0.597	28
Togo	0.000	0.675	0.875	0.587	29
Chad	0.400	0.608	0.250	0.578	30
Gambia	0.200	0.550	0.750	0.572	31
Cameroon	0.500	0.317	1.000	0.558	32
Central African Republic	0.600	0.675	0.000	0.549	33
Gabon	0.600	0.108	0.575	0.508	34
Dem. Rep. Congo	0.200	0.258	0.000	0.401	35
Congo Rep.	0.000	0.275	0.000	0.373	36
Mean	0.586	0.630	0.720	0.688	

Regulatory Substance Index Results by Country

Country	Economic Reg. Tariff Setting	Tech. Reg. Quality of Service	Licensing Frmwk	Inst. Capacity
Uganda	0.923	1.000	1.000	1.000
Tanzania	0.923	0.914	1.000	1.000
Kenya	0.923	0.771	1.000	1.000
Rwanda	0.615	0.857	1.000	1.000
Senegal	0.692	0.686	0.667	1.000
Ghana	0.692	0.743	0.667	0.625
Nigeria	0.769	0.857	1.000	0.950
Namibia	0.769	0.857	0.667	1.000
Zimbabwe	0.462	0.771	0.467	1.000
Benin	0.846	0.786	1.000	0.550
Zambia	0.462	0.757	1.000	0.950
Togo	0.385	0.857	0.667	0.900
Angola	0.615	0.700	0.500	0.950
Ethiopia	0.615	0.357	0.833	0.500
Malawi	0.538	0.429	1.000	1.000
Niger	0.538	0.314	0.833	0.500
Eswatini	0.692	0.686	0.433	0.550
Madagascar	0.385	0.357	0.833	0.400
Gambia	0.462	0.150	0.667	1.000
Cameroon	0.538	0.700	0.667	0.700
Sierra Leone	0.462	0.329	0.800	0.500
Mali	0.692	0.614	0.633	0.500
Lesotho	0.615	0.643	0.500	0.500
Côte d'Ivoire	0.231	0.543	0.367	0.450
Mauritius	0.538	0.414	0.500	0.500
Mozambique	0.462	0.357	0.433	0.300
Dem. Rep. Congo	0.538	0.214	0.500	0.600
Central African Republic	0.154	0.257	0.667	0.600
Congo Rep.	0.154	0.143	0.333	0.700
Botswana	0.462	0.329	0.167	0.550
Guinea	0.462	0.114	0.000	0.500
Burkina Faso	0.308	0.329	0.000	0.500
Gabon	0.308	0.229	0.000	0.500
Liberia	0.462	0.071	0.000	0.900
Burundi	0.538	0.071	0.000	0.500
Chad	0.000	0.000	0.000	0.000
Mean	0.534	0.506	0.578	0.685

Country	RE Development	Mini-Grid Dev	Energy Eff. Dev.	RSI	Rank
Uganda	0.833	1.000	0.857	0.945	1
Tanzania	1.000	1.000	0.643	0.926	2
Kenya	1.000	0.833	0.686	0.888	3
Rwanda	0.667	1.000	0.800	0.848	4
Senegal	0.833	1.000	0.714	0.799	5
Ghana	1.000	1.000	0.829	0.794	6
Nigeria	0.833	0.833	0.286	0.790	7
Namibia	0.833	0.833	0.514	0.782	8
Zimbabwe	1.000	0.917	0.443	0.723	9
Benin	0.500	1.000	0.343	0.718	10
Zambia	0.833	0.667	0.143	0.687	11
Togo	0.667	0.750	0.571	0.685	12
Angola	0.833	0.833	0.286	0.674	13
Ethiopia	0.667	1.000	0.743	0.674	14
Malawi	0.667	0.667	0.143	0.635	15
Niger	0.667	1.000	0.214	0.581	16
Eswatini	1.000	0.167	0.214	0.535	17
Madagascar	0.833	0.667	0.214	0.527	18
Gambia	0.500	0.833	0.071	0.526	19
Cameroon	0.667	0.167	0.214	0.522	20
Sierra Leone	0.667	0.750	0.071	0.511	21
Mali	0.333	0.500	0.214	0.498	22
Lesotho	0.333	0.667	0.071	0.476	23
Côte d'Ivoire	0.667	0.417	0.500	0.453	24
Mauritius	0.667	0.000	0.486	0.444	25
Mozambique	0.500	0.500	0.329	0.412	26
Dem. Rep. Congo	0.333	0.167	0.143	0.357	27
Central African Republic	0.333	0.167	0.071	0.321	28
Congo Rep.	0.500	0.167	0.143	0.306	29
Botswana	0.333	0.083	0.214	0.305	30
Guinea	0.667	0.083	0.286	0.302	31
Burkina Faso	0.167	0.500	0.143	0.278	32
Gabon	0.500	0.167	0.071	0.253	33
Liberia	0.167	0.000	0.071	0.239	34
Burundi	0.000	0.167	0.071	0.193	35
Chad	0.167	0.000	0.071	0.034	36
Mean	0.616	0.569	0.330	0.545	

Regulatory Outcomes Index Results by Country

Country	Financial Performance and Competitiveness	Quality of Service Delivery (Comm & Tech)	Facilitating Electricity Access	ROI	Rank
Namibia	0.897	0.667	0.600	0.721	1
Uganda	0.794	0.388	0.875	0.686	2
Zambia	0.333	0.833	0.700	0.622	3
Niger	0.589	0.500	0.625	0.571	4
Tanzania	0.404	0.500	0.800	0.568	5
Zimbabwe	0.384	0.500	0.800	0.561	6
Ethiopia	0.589	0.167	0.800	0.519	7
Cameroon	0.595	0.333	0.600	0.509	8
Sierra Leone	0.461	0.333	0.700	0.498	9
Angola	0.356	0.500	0.625	0.494	10
Burundi	0.642	0.167	0.625	0.478	11
Kenya	0.486	0.167	0.750	0.468	12
Malawi	0.427	0.333	0.600	0.453	13
Togo	0.167	0.500	0.600	0.422	14
Lesotho	0.384	0.000	0.875	0.420	15
Nigeria	0.472	0.157	0.622	0.417	16
Côte d'Ivoire	0.138	0.222	0.875	0.412	17
Rwanda	0.471	0.000	0.750	0.407	18
Benin	0.588	0.000	0.625	0.404	19
Ghana	0.381	0.222	0.600	0.401	20
Guinea	0.179	0.000	1.000	0.393	21
Eswatini	0.512	0.167	0.500	0.393	22
Senegal	0.261	0.000	0.875	0.379	23
Dem. Rep. of Congo	0.333	0.167	0.625	0.375	24
Mali	0.385	0.333	0.250	0.323	25
Burkina Faso	0.190	0.167	0.500	0.286	26
Mozambique	0.205	0.000	0.625	0.277	27
Madagascar	0.179	0.000	0.600	0.260	28
Botswana	0.435	0.000	0.250	0.228	29
Gambia	0.190	0.000	0.400	0.197	30
Chad	0.153	0.000	0.400	0.184	31
Liberia	0.153	0.000	0.400	0.184	31
Rep. of Congo	0.000	0.000	0.500	0.167	33
Gabon	0.077	0.167	0.250	0.165	34
Central African Republic	0.077	0.000	0.400	0.159	35
Mauritius	0.205	0.000	0.200	0.135	36
Mean	0.364	0.208	0.606	0.393	

Annex 3: List of Respondents

Regulatory Authorities

#	Country	Name of Regulatory Commission/Authority
1	Algeria	Commission de regulation de l'Electricite et du Gaz (CREG)
2	Angola	Instituto Regulador dos ServiÃ§os de Electricidade e de Ãgua (IRSEA)
3	Benin	Aurotite de Regulation de l'Electricite du Benin
4	Botswana	Botswana Energy Regulatory Authority (BERA)
5	Burkina Faso	Autorite de Regulation du secteur de l'Energie
6	Burundi	Autorite de Regulation des secteurs de l'Eau potable et de l'Energie (AREEN)
7	Cape Verde	Agencia Reguladora Multissectorial da Economia (ARME)
8	Cameroon	Agence de Regulation du Secteur de l'Electricite (ARSEL)
9	Côte d'Ivoire	Autorite Nationale de Regulation du Secteur de l'Electricite de Cote d'Ivoire (ANARE-CI)
10	Egypt	Egyptian Electric Utility and Consumer Protection Agency's (Egyptera)
11	Eswatini	Eswatini Energy Regulatory Authority (ESERA)
12	Ethiopia	Ethiopian Energy Authority (EEA)
13	Gabon	L'Agence de Regulation du Secteur de l'Eau potable et de l'Energie Electrique (ARSEE)
14	Gambia	Public Utilities Regulatory Authority (PURA)
15	Ghana	The Energy Commission of Ghana
16	Ghana	Public Utilities Regulatory Commission (PURC)
17	Guinea	Autorite de Regulation des secteurs de l'Electricite et de l'Eau (AREE)
18	Kenya	Energy and Petroleum Regulatory Authority (EPRA)
19	Lesotho	Lesotho Electricity and Water AuthorityÂ (LEWA)
20	Liberia	Liberian Electricity Regulatory Commission (LERC)
21	Madagascar	Office de Regulation de l'Electricite (ORE)
22	Malawi	Malawi Energy Regulatory Authority (MERA)
23	Mali	Commission de Regulation de l'Electricite et de l'Eau (CREE)
24	Mauritania	Autorite de Regulation (ARE)
25	Mauritius	Utility Regulatory Authority (URA)
26	Morocco	Autorite Nationale de Regulation de l'Electricite (ANRE)
27	Mozambique	Autoridade Reguladora de Energia (ARENE)
28	Namibia	Electricity Control Board (ECB)
29	Niger	ARSE

30	Nigeria	Nigerian Electricity Regulatory Commission (NERC)
31	Central African Republic	Autonomous Agency for the Regulation of the Electricity Sector (ARSEC)
32	Democratic Republic of Congo	Autorite De Regulation Du Secteur De Electricite (ARE)
33	Republic of Congo	Agence de Regulation du Secteur de l'Electricite (ARSEL)
34	Rwanda	Rwanda Utilities Regulatory Authority (RURA)
35	Senegal	Commission de Regulation du Secteur de l'Electricite (CRSE)
36	Seychelles	Seychelles Energy Commision
37	Sierra Leone	Sierra Leone Electricity and Water Regulatory Commission (SLEWRC)
38	Tanzania	Energy and Water Utilities Regulatory Authority (EWURA)
39	Chad (Tchad)	Autorite de Regulation du Secteur de l'Energie Electrique (ARSE)
40	Togo	Autorite de Regulation du Secteur de l'Electricite (ARSE)
41	Uganda	Electricity Regulatory Authority (ERA)
42	Zambia	Energy Regulation Board (ERB)
43	Zimbabwe	Zimbabwe Energy Regulatory Authority (ZERA)

Power Utility Companies

#	Country	Name of Power Utility Company
1	Angola	Empresa Nacional de Distribuido de Electricidade (ENDE-EP)
2	Benin	Societe Beninoise d'Energie Electrique (SBEE)
3	Botswana	Botswana Power Corporation
4	Burkina Faso	La Societe Nationale d'Electricite du Burkina (SONABEL)
5	Burundi	REGIDESO
6	Cameroon	Eneo
7	Côte d'Ivoire	Compagnie Ivoirienne d'Electricite CIE
8	Eswatini	Eswatini Electricity Company
9	Ethiopia	Ethiopian Electric Utility(EEU)
10	Gabon	Societe d'Energie et d'Eau du Gabon (SEEG)
11	Gambia	National Water and Electricity Co. Ltd (NAWEC)
12	Ghana	Electricity Company of Ghana
13	Guinea	Electricite de Guinea
14	Kenya	Kenya Power & Lighting Company Limited (KPLC)
15	Lesotho	Lesotho Electricity Company
16	Liberia	Liberia Electricity Corporation (LEC)
17	Madagascar	JIRO SY RANO MALAGASY (JIRAMA)
18	Malawi	Electricity Supply Corporation of Malawi Limited (ESCOM)
19	Mali	EDM- Energie du Mali
20	Mauritius	Central Electricity Board

21	Morocco	ONEE (Office National de l'Electricite et de l'Eau Potable)
22	Mozambique	EDM - Electricidade de MoÃ§ambique
23	Namibia	NamPower
24	Niger	Societe Nigerienne d Electricite (NIGELEC)
25	Nigeria	Port Harcourt Electricity Distribution Company (PHEDC)
26	Nigeria	Ibadan Electricity Distribution Company
27	Nigeria	Abuja Electricity Distribution Company
28	Nigeria	Kano electricity distribution company
29	Nigeria	Benin electricity distribution company
30	Nigeria	Ikeja Electric
31	Republique Centrafricaine	Energie Centrafricaine (ENERCA)
32	Dem. Republic of Congo	Societe Nationale d'Electricite
33	Republic of Congo	Energie Electrique du Congo
34	Rwanda	Energy Utility Corporation Limited (EUCL)
35	Senegal	Societe Nationale d'Electricite du Senegal (Senelec)
36	Sierra Leone	Electricity Distribution and Supply Authority (EDSA)
37	South Africa	ESKOM
38	Tanzania	Tanzania Electric Supply Company Ltd (TANESCO)
39	Chad (Tchad)	Societe Nationale d'Electricite du Tchad (SNE)
40	Togo	Compagnie Energie Electrique du Togo (CEET)
41	Uganda	UMEME
42	Zambia	ZESCO
43	Zimbabwe	Zimbabwe Electricity Transmission & Distribution Company (Pvt) Ltd (ZETDC)

Representative Consumer Groups

#	Country	Name of Consumer Group
1	Benin	Chambre de Commerce et d'Industrie du Benin
2	Benin	Ligue pour la defense du Consommateur au Benin (LDCB)
3	Botswana	Business Botswana
4	Burkina Faso	La Chambre de Commerce et d'Industrie du Burkina Faso
5	Burundi	The Burundi Federal Chamber of Commerce and Industry
6	Cabo Verde	Associação para Defesa do Consumidor (ADECO)
7	Cameroon	Comite Consultatif des Consommateurs d'Electricite (CCCE)
8	Cameroon	Chambre de commerce, d'industries, des mines et de l'artisanat du Cameroun
9	Centrafrique	Chambre de Commerce, dIndustrie, des Mines et de lArtisanat
10	Côte d Ivoire	Chambre de Commerce et d'Industrie de Cote d'Ivoire
11	Gambia	Gambia Chamber of Commerce and Industry

12	Gambia	Consumer Protection Association of the Gambia (CPAG)
13	Ghana	Private Enterprise Federation (PEF)
14	Guinea	Chambre de Commerce, de l'Industrie et d'Artisanat de la Republique de Guinea
15	Kenya	Kenya Association Of Manufacturers
16	Lesotho	Lesotho Chamber of Commerce and Industry
17	Liberia	Liberia Chamber of Commerce
18	Madagascar	Federation des Chambres de Commerce et dIndustrie de Madagascar (FCCIM)
19	Malawi	Malawi Confederation of Chambers of Commerce and Industry (MCCCI)
20	Malawi	Consumer Association of Malawi (CAMA)
21	Mauritius	SME Mauritius
22	Mauritius	Mauritius Chamber of Commerce and Industry (MCCI)
23	Nigeria	Network for Electricity Consumers Advocacy of Nigeria (NECAN)
24	Nigeria	Nigerian Association of Chambers of Commerce, Industry, Mines and Agriculture (NACCIMA)
25	Democratic Republic of Congo	Federation des Enterprises du Congo
26	Republic of Congo	Union des Consommateurs de l'Eau et de l'Electricite
27	Rwanda	ADECOR
28	Senegal	Union nationale des chambres des Metiers du Senegal (UNCM)
29	Sierra Leone	Sierra Leone Chamber of Commerce, Industry and Agriculture
30	South Africa	Business Unity South Africa
31	Uganda	Uganda Chambre of Commerce and Industry (UNCCI)
32	Uganda	Uganda Consumers Protection Association (UCPA)
33	Zambia	Zambia Chamber of Commerce and Industry
34	Zimbabwe	Confederation of Zimbabwe Industries (CZI)

About this Publication

The 2020 edition of the Electricity Regulatory Index – produced and published by the African Development Bank – is the third 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 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, provides important insights on the strengths and weaknesses of electricity sector regulators and the overall regulatory frameworks in which they operate.

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