Electricity Regulatory Index

for Africa 2022

AFRICAN DEVELOPMENT BANK GROUP

ERI
Electricity Regulatory Index for Africa

Disclaimer

The views expressed and maps in this publication are those of the authors and do not necessarily reflect the views and policies of the African Development Bank, its Board of Governors, its Board of Directors, or the governments that they represent.

The African Development Bank and its Board of Directors do not guarantee the accuracy of the data included in this publication and accept no responsibility for any consequence of its use. By making any designation of or reference to a particular territory or geographic area, or by using the term "country" in this document, the Bank does not intend to make any judgments as to the legal or other status of any territory or area.

African Development Bank Group
Avenue Joseph Anoma
01 B.P. 1387 Abidjan 01, Côte d'Ivoire
Phone: (+225) 27 20 26 10 20
Fax: (+225) 27 20 21 31 00
www.afdb.org

Electricity Regulatory Index for Africa

Table of Contents

List of Figures

List of Tables

Acronyms & Abbreviations

AAF	Automatic Adjustment Formula
ACC	Accountability
AfDB	African Development Bank
AfSEM	African Single Electricity Market
AGER	Autoridade Geral de Regulaçao (Sao Tome et Principe)
ANARE-CI	Autorité Nationale de Régulation du secteur de l'Electricité de Côte d'Ivoire
ARE	Autorité de Régulation du Secteur de l'Electricité (Benin)
ARE	Autorité de Régulation du Secteur de l'Electricité (DRC)
AREE	Autorité de Régulation des secteurs de l'Electricité et de l'Eau (Guinea)
AREEN	Autorité de Régulation des secteurs de l'Eau potable et de l'Energie
ARENE	Autoridade Reguladora de Energia (Mozambican)
ARME	Agencia Reguladora Multisectoral da Economia (Cabo Verde)
ARSE	Autorité de Régulation du Secteur de l'Energie (Burkina Faso)
ARSE	Autorité de Régulation du Secteur de l'Energie (Chad)
ARSEC	Agence autonome de Régulation du Secteur de l'Electricité en République Centrafricaine
ARSEE	Agence de Régulation du Secteur de l'Eau potable et de l'Energie Electrique (Gabon)
ARSEL	Agence de Régulation du Secteur de l'Electricité (Cameroun)
BERA	Botswana Energy Regulatory Authority
BPC	Botswana Power Corporation
CAIDI	Customer Average Interruption Duration Index
CAP	Institutional Capacity
CAR	Central African Republic
CEB	Central Electricity Board
CEET	Compagnie Energie Electrique du Togo

CEO	Chief Executive Officer
CIE	Compagnie Ivoirienne d'Electricité
COMESA	Common Market for Eastern and Southern Africa
CoSS	Cost-of-Service Study
CREE	Commission de Régulation de l'Electricité et de l'Eau (Mali)
CREG	Commission de régulation de l'Electricité et du Gaz (Algérie)
CRSE	Commission de Régulation du Secteur de l'Electricité (Sénégal)
CSO	Civil Society Organization
DBMS	Database Management System
DFIs	Development Finance Institutions
ECCAS	Economic Community of Central African States
ECB	Electricity Control Board (Namibia)
ECOWAS	Economic Community of West African States
EDC	Electricity Development Company
EDG	Electricité de Guinée
EDM	Energie du Mali
EDSA	Electricity Distribution and Supply Authority (Sierra Leone)
EE	Energy Efficiency
EEC	Eswatini Electricity Company
EEF	Energy Efficiency Development
EEHC	Egyptian Electricity Holding Company
EEP	Ethiopian Electric Power
EKEDC	Eko Electricity Distribution Company (Nigeria)
ELECTRA	ELECTRA Power Generator and Distributor (Cabo Verde)
EMAE	Empresa de Agua et Electricidade (Sao Tome & Principe)
ENDE EP	Empresa Nacional de Distribuçao de Electricidade (Angola)
ENERCA	Energie Centre Africaine
EP	Electricity Provider
EPRA	Energy and Petroleum Regulatory Authority (Kenya)
ERA	Electricity Regulatory Authority (Uganda)
ERB	Energy Regulation Board (Zambia)
ERI	Electricity Regulatory Index
ERIGS	ERI for Governance and Substance
ESCOM	Electricity Supply Corporation of Malawi Limited
ESERA	Eswatini Energy Regulatory Authority

ESI	Electricity Supply Industry
EUCL	Energy Utility Corporation Limited (Rwanda)
EUT	End User Tariff
EWURA	Energy and Water Utilities Regulatory Authority (Tanzania)
FEA	Facilitation of Electricity Access
FIN	Financial Independence
FPC	Financial Performance and Competitiveness
GERI	Global Electricity Regulatory Index
GHG	Green House Gas
HVAC	Heating, Ventilation and Air Conditioning
ICT	Information and Communication Technology
IND	Independence
IPP	Independent Power Producer
IRSEA	Instituto Regulador dos Serviços de Electricidade e de Ãgua (Angola)
IT	Information Technology
JIRAMA	Jiro Sy Rano Malagasy
KOAFEC	Korea-Africa Economic Cooperation
KPLC	Kenya Power & Lighting Company Limited
LCPDP	Rwanda Least Cost Power Development Plan
LEC	Lesotho Electricity Company
LEG	Legal Mandate
LERC	Liberia Electricity Regulation Commission
LEWA	Lesotho Electricity and Water Authority
LIC	Licensing Framework
MEPS	Minimum Energy Performance Standards
MERA	Malawi Energy Regulatory Authority
MIN	Mini-grid and off-grid systems
MW	Megawatt
NARUC	National Association of Regulatory Utility Commissioners
NAWEC	National Water and Electricity Company Ltd (Gambia)
NEEAP	National Energy Efficiency Action Plan
NERC	Nigerian Electricity Regulatory Commission
NGO	Non-Governmental Organization
NIGELEC	Société Nigérienne d'Electricité (Niger)
ORE	Office de Régulation de l'Electricité (Madagascar)
OPE	Open Access to Information

PAR	Participation
PEA	Petroleum and Energy Regulatory Authority (Ethiopia)
PEVP	Power, Energy, Climate Change and Green Growth
PHED	Port Harcourt Electricity Distribution Company (Nigeria)
PPA	Power Purchase Agreement
PPI	Presidential Power Initiative
PPP	Public Private Partnership
PRE	Predictability
PRLN	Peer Review and Learning Network
PUC	Public Utilities Corporation (Seychelles)
PURA	Public Utilities Regulatory Authority (Gambia)
PURC	Public Utilities Regulatory Commission (Ghana)
PV	Photovoltaic
QUA	Technical regulation: Quality of Service
QSD	Quality-of-Service Delivery
RE	Renewable Energy
REDs	Regional Electricity Distributors
REN	Renewable Energy Development
RERAC	Renewable Energy Resources Advisory Committee
RGI	Regulatory Governance Index
RISE	Regulatory Indicators for Sustainable Energy
ROI	Regulatory Outcome Index
ROL	Roles and Objectives
RR	Required Revenue
RSI	Regulatory Substance Index

RPSR	Rethinking Power Sector Reform (World Bank)
RURA	Rwanda Utilities Regulatory Authority
SADC	Southern African Development Community
SADEG	Société Algérienne de Distribution d'Electricité et du Gaz (SADEG)
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SBEE	Société Béninoise d'Energie Electrique
SEEG	Société d'Energie et d'Eau du Gabon (SEEG)
SENELEC	Société Nationale d'Electricité du Sénégal
SLEWRC	Sierra Leone Electricity and Water Regulatory Commission
SNEL	Société Nationale d'Electricité (DRC)
SONABEL	Société Nationale d'Electricité du Burkina
SPV	Special Purpose Vehicle
SSEG	Small Scale Embedded Generators
TAM	Tariff Application Model
TANESCO	Tanzania Electricity Supply Company
TAR	Economic Regulation: Tariff-Setting
TM	Tariff Methodology
TRA	Transparency
URA	Utility Regulatory Authority (Mauritius)
USAID	United States Agency for International Development
WAEP	West Africa Energy Plan
ZERA	Zimbabwe Energy Regulatory Authority
ZESCO	Zambia Electricity Supply Corporation

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 definition and codification of the regulator's functions and duties, including the regulated utility's obligations in primary or secondary legislation, license, or contract.
Economic Regulation	The aspect of the regulator's functions and duties which affect the financial and commercial viability of the utility company and long-term financial sustainability of the sector.
Electricity Regulatory Index	Refers to the final Electricity Regulatory Index that 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) to provide consumers with the data necessary for making more informed purchase decisions.
Independence of the Regulator	Institutional, financial and operational autonomy from political authorities and stakeholders.
Legal Mandate	Primary (or secondary) legislation under which the regulatory body was established.
Mini-Grid System	Off-grid small-scale distribution network that provides electricity (usually from 10 kW to 10 MW), to one or more communities, from small generators using fossil fuel, renewable energy technology or a combination of the two.
Minimum Energy Performance Standards	The set of procedures and rules detailing the energy performance of manufactured products, sometimes prohibiting the sale of products less energy efficient than the minimum standard.

[1]The list of definitions is understood within the context of the Electricity Regulatory Index and its assessment – it does not cover every possible interpretation of each term, as these rely on context.

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 key regulatory instruments and documents including primary legislation, licenses or contracts, consultation documents, regulators comments on consultation documents or tariff decisions are made available to the public, utilities and other stakeholders.
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	A contract between an off-taker or purchaser of electricity and a power producer. A power purchase agreement is tailored to the specific application relevant to the parties. It 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 making key regulatory decisions exist and are known to stakeholders, in addition to well-established public tariff review procedures.
Quality of Service Code	The document that establishes the requirements for regulated utilities to deliver an adequate level (within pre-defined thresholds) of quality and reliability in electricity service provided to customers.
Quality of Service Delivery (Commercial)	The non-technical aspect of power supply service that describes the relationship and interaction between power utilities and customers with respect to information on outages, meter readings and disputes, consumer account queries, response to consumer complaints, etc.
Quality of Service Delivery (Technical)	Refers to technical aspect of power quality issues, particularly ensuring continuity of supply, frequency control and voltage quality withing set standards and thresholds.

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 to compromise a regulator's decision-making independence.
Regulatory Governance	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	The impact of regulator's decisions, actions and activities on the regulated entity, as well as on the entire sector in general.
Regulatory Outcome Index	The index obtained by aggregating the main indicator scores for Regulatory Outcome.
Regulatory Substance	Refers to the attributes of regulation linked to the actual actions or decisions of regulators that affect the performance of the regulated industry; the practical operation of regulatory practices and processes that have direct impact on regulatory outcomes.
Regulatory Substance Index	The index obtained by aggregating the main indicator scores for Regulatory Substance.
Stand-Alone Individual System	Refers to generation systems that are not connected to the distribution network and which range from household-sized systems of 30–100-watt peak, capable of powering a few bulbs, a fan and possibly a small television, to institutional sizes (100–500-watt peak) for use in schools, health centers, etc.
Technical Regulation	The aspect of a regulator's duties and functions that affects the quality and reliability of electricity supply to consumers.
Transparency	Full disclosure to relevant stakeholders of key regulatory documents, consultation responses, and regulator's comments and decisions on issues raised during the consultation process.

Acknowledgements

The Electricity Regulatory Index (ERI) for Africa is a product of the Power, Energy, Climate Change and Green Growth (PEVP) Complex of the African Development Bank. The ERI was prepared under the overall leadership of the Director, Energy Financial Solution, Policy and Regulation Department, Wale Shonibare and his team. The senior management team of the PEVP complex provided strategic advice and guidance. The Energy Policy, Regulation and Statistics Division Manager, Callixte Kambanda, provided technical supervision and management of the ERI consultation process.

Chief Energy Sector Regulations Specialist, Rhoda Mshana led the core team of staff and consultants working on the ERI. Specifically, this team comprised regulatory experts Alfred Ahenkorah and Samuel Nyobe, who undertook the development of the Index and its interpretation, as well as Chief Energy Statistician, Nirina Letsara, who led the development of the statistical database for the index. Special recognition goes to the core ERI team including Senior Energy Economist Solomon Sarpong, Senior Energy Specialist Francine Mbock, Senior Energy Specialist Guillaine Neza, and Young Professional Georg Eder who provided essential technical inputs and data validation on the ERI. Sector specialists from the Energy Policy, Regulation and Statistics Division provided constructive feedback on the Index. Further insight was gained through consultations with technical partners including the University of Cape Town, who also prepared a country trend analysis included in this Report.

We would also like to express our appreciation to the Chief Economist Complex of the Bank, represented by the Macroeconomic Policy, Forecasting and Research Department, which provided critical feedback on the Index. They also provided practical and economic implications of its findings.

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 from the 43 countries in this year's edition of the Index.

We gratefully acknowledge the contributions of our editors and graphic designer, who worked to finalize the report. This is not an exhaustive list of acknowledgments, as many people contributed to the success of delivering this report. This includes the support staff at the African Development Bank.

Foreword

We are pleased to present the African Development Bank's fifth edition of the Electricity Regulatory Index for Africa (ERI). Since 2018, the goal of the ERI has remained the same: to highlight key areas of electricity regulation that need reform, to outline appropriate areas for intervention, and encourage action among stakeholders to address them.

The ERI continues to be a key source of information for sector stakeholders, as well as development partners, academia and investors. Indeed, this year, the Bank has strengthened its partnership and collaboration with key partners, including the World Bank and the University of Cape Town. The ERI has now gone global with the publication of the World Bank's Global Electricity Regulatory Index, based on the ERI and covering over 80 countries. The University of Cape Town has contributed to this year's report, providing an interesting country trend analysis on Nambia and Uganda.

This year's edition covers 43 of the 45 countries identified with independent regulatory authorities. The African Development Bank's goal is to ensure the coverage of all African countries with autonomous regulatory institutions, and where possible, to support the creation of autonomous regulators that will enable investment and to share knowledge & data on the electricity sector. We look forward to continuing this comprehensive approach.

This year's ERI shows that most countries have continued to strengthen their regulatory governance structures and have recorded improvements in technical regulation to enhance regulatory capacity. Countries have made strides to implement the recommendations, and many have enacted various reforms and developed codes and regulatory tools to strengthen the level of regulation in their countries.

Based on the results of this year's ERI, we have made recommendations to enhance stakeholder, financial and decision-making independence, and to improve economic regulation to ensure the sector's financial sustainability. We invite development partners and other sector stakeholders to collaborate with the African Development Bank for the joint implementation of the ERI's recommendations.

Wale Shonibare
Director, Energy Financial Solutions, Policy and Regulations

Executive Summary

This report is the fifth edition of the Electricity Regulatory Index (ERI). It measures the level of development of electricity sector regulatory frameworks in African countries and the capacity of regulatory authorities to effectively carry out their relevant functions and duties. The report covers 43 of the 45 countries with confirmed regulatory authorities. 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 2022 Key Findings

Uganda, which has occupied the top position since the inception of the ERI in 2018, maintained its prime standing in 2022 with an ERI score of 0.846. Other top performers included Egypt (0.785), Senegal (0.710), Ghana (0.709), and Kenya (0.695). The electricity regulatory frameworks in these 5 top countries are relatively well-developed and their utilities respond positively to regulatory instructions and guidelines, whilst their regulators are forward-looking and capable of exerting the necessary regulatory authority over the regulated entities. This has been reflected in the outcomes.

The fundamentals of supportive regulatory frameworks, which have been established in the surveyed countries, remain strong and are improving. Thirty countries have either amended their regulatory laws and instruments or have enacted new ones; as a result, they have addressed weaknesses that were identified through the ERI. Although higher than last year, the average ERI score remains low, at 0.496 compared to 0.456 in 2021.

Regulatory Governance Index (RGI)

The average RGI scores have remained high since 2018, although minor declines in sub-indicators have been observed in some countries. Although the average RGI declined from 0.736 in 2021 to 0.731 in 2022, some countries recorded improvements in RGI scores and movements in performance bands.

The RGI is a reflection of the spirit, letter and structure of the primary legislation that established the regulatory authorities. As products of the legislature, primary legislation has long-term effects and would require painstaking legislative processes to change or amend it. Furthermore, changes in primary legislation do not depend on the wishes of the regulator but involve the executive and legislature.

Mixed movements have been recorded in RGI scores as a result of both positive and negative actions taken by the regulator or national governments. Overall, 24 countries (up from 21 in 2021) scored above 0.500 in ERI, indicating an improvement in filling the gap between the level of development of the regulatory laws and effectiveness in the implementation and enforcement of the laws on the regulated utilities.

The results show that continuous improvement of RGI in some leading countries is more difficult, as it will involve time-consuming legislation change or amendment. Meanwhile, a few countries with initially poor RGI, have caught up with countries with initially high RGI. However, the disparity of RGI across countries persists. The poor performance of a few countries has collectively declined the average RGI from 0.736 in 2021 to 0.731 in 2022. The number of countries in the high and substantial level of regulatory development has increased from 36 to 37; while the number of countries in the low level of development has reduced from 4 to 2 countries; this reflects the regulatory changes undertaken. Eleven countries have either amended or passed new legislation related to RGI, and this has caused movements in country

positions with respect to RGI. Annex 1 highlights the RGI-related measures that have been taken up by countries since 2018, linked to ERI findings and recommendations.

Independence has remained the weakest sub-indicator under RGI, as governments and stakeholders continue to exert an influence on regulatory authorities and processes. A change in primary legislation remains the only viable solution in the countries affected.

Regulatory Substance Index (RSI)

Historically the overall average performance in RSI has been below the average RGI score, the RSI improved marginally from 0.575 in 2021 to 0.582 in 2022. Eighteen countries have effected regulatory changes since 2018, which have affected RSI (See Annex 1).Twenty-seven countries confirmed that they have conducted a Cost-of-Service Study (CoSS), compared to nine in 2021. The CoSS report has reputedly been implemented within the last 5 years in 17 out of 43 countries. The number of countries without Tariff Methodologies (TMs) reduced from 13 in 2021 to 9 in 2022, as more countries have either developed and published TMs or updated existing TMs. The average RSI score (0.582) is lower than the average RGI score of 0.731 and illustrates the persistent gaps that need to be addressed regarding the regulator's ability to implement their mandates. Institutional capacity, reflects the knowledge, skills and experience of regulatory staff required for managing the sector, is an important sub-indicator to assess the technical capacity of the regulatory authorities.

Improvements in RSI have been recorded over the past year, from an average of 0.575 in 2021 to 0.582 in 2022. This is because regulators have taken steps to exert their regulatory influence on the sector. Consequently, 72% of countries scored above 0.500 in RSI, indicating that regulators are gradually taking control and enforcing their regulatory laws to make the industry move in line with prudent regulatory practice.

Regulatory Outcome Index (ROI)

The ROI not only reflects the regulatory actions of the regulator but is also influenced by externalities such as government intervention and global movements in fuel prices and pandemics. Indicatively, 65% of countries scored below 0.500 on the Financial Performance and Competitiveness (FPC) sub-indicator. Poor financial health of the utility is a major driver of the ROI indicator, as it impedes the utility from delivering on its mandate and constrains the regulators from exercising their regulatory mandate.

Of the 30 countries that have either enacted or modified regulations between 2018 and 2022, 16 countries passed legislation that has had an impact on ROI. These regulations are mainly distribution-related and involve tariff regulations, quality-of-service regulations, regulations on time-bound utility performance indicators in relation to connection and disconnections, and regulations on mini-grid and stand-alone systems. Improvements that have been recorded in ROI in 2022 is attributed to actions taken by the regulators and utilities to improve the financial performance of the utilities by focussing on improvements in Tariff Methodologies and utility financial performance. Whilst the regulators have sought to improve tariff methodologies, utilities have taken steps to reduce technical and financial losses, with 40% of the countries reporting loss levels below20%.

ROI scores above 0.500 were recorded by only 15 (35%) of the surveyed countries in 2022, highlighting deep disparities between the level of development of regulatory frameworks and utility service outcomes. The low performance in ROI continues to affect the overall score of the ERI, despite an improvement in ROI, from an average score of 0.339 in 2021 to 0.396 in 2022.

Key Recommendations

Regulatory Governance: To improve on their regulatory governance framework, some participating countries need to:

- Amend regulations or enact new regulations to prevent commissioners or the CEO being appointed if they are from the utility company or vice-versa, in order to enforce required cooling-off periods to prevent professional nomadism between the regulatory authority and the utility.
- Reduce the level of financial influence from the government on regulators. This can be achieved by amending laws to remove them from government budgets and by assigning levies and fees with levels approved by parliament as the source of funds of the regulatory authority.
- Establish an independent governance structure for the regulatory authority in the sector rather than attaching them to energy ministries. This will help to ensure the authority's regulatory independence and mandate.

Regulatory Substance: To ensure effective execution of their mandate and oversight of the sector, regulators in some participating countries need to:

- Implement tariff reviews in accordance with the approved Tariff Methodologies and schedules.
- Develop and enforce grid codes, distribution codes and quality-of-service codes in more than 15 countries that presently do not have them.
- Develop and implement supply-side and demand-side energy efficiency policies, regulations and action plans for the 30% of countries that currently do not have them. The objective is to reduce technical and non-technical losses in the electricity sector.
- Develop and implement Minimum Energy Performance Standards (MEPS) and labels to prevent the dumping of inefficient appliances on countries and to improve demand-side energy efficiency.

Regulatory Outcome: To ensure that regulatory decisions and actions translate into desired outcomes in the sector, regulators in some participating countries need to:

- Develop and implement Regulatory Accounting Frameworks to guide utilities in tariff data collection and application.
- Conduct a Cost of Service Study (CoSS) regularly (at least once every 5 years) to aid in unbiased tariff determination[2].
- Include mechanisms that ensure that only reasonable costs (outside of costs covered in the tariff methodologies, such as new/unplanned investment costs) incurred by the utilities are included in the tariffs.
- Ensure that the utilities adhere to regulations by applying, for instance, financial sanctions on offenders when regulations are flouted

Impact of the Electricity Regulatory Index (ERI)

The African Development Bank (AfDB) fully recognizes the vital role that robust legal and regulatory frameworks play in attracting private sector investment and ensuring the financial sustainability of the power sector. For this reason, the African Development Bank is using the ERI to mainstream electricity sector regulation issues within the broader discourse relating to the performance of the energy sector across the continent. The overarching objective of the ERI is to deploy a standard methodology to diagnose the regulatory environment and assess the performance of regulators. As part of this exercise, the ERI seeks to highlight underlying gaps and bottlenecks and to galvanize support from all stakeholders to build a coordinated and concerted approach to address any impediments

[2] Regular CoSS are essential to match trends in the cost of supply with tariffs. However, due to the time and effort required to conduct such studies, 5-year intervals are considered optimal.

to progress. The ERI goes beyond being a knowledge product. It is a practical document providing recommendations that translate into tangible and measurable regulatory actions (see Tables 10 and 11 for Action Plans for Short-Term and Long-Term Interventions. in participating countries. Since the ERI's launch in 2018, the Bank has used it in pursuit of several major objectives, namely to:

- *Establish a credible, robust, and standard methodology* for assessing the regulatory environment and the performance of regulators globally.
- *Provide a guide and reference for DFIs and development partners* in the design of their regulatory interventions in ERI participating countries. Also to forge collaborations to build a coordinated approach to regulatory reforms and capacity enhancement support.
- *Design and spearhead solutions to address regulatory bottlenecks* in some countries and to curate demonstrated and workable solutions for replication by national and regional regulators and sector stakeholders.
- *Drive the harmonization of regulatory frameworks in different regions of Africa* to enhance power trade across borders and regions.

The ERI methodology goes global: the Global Electricity Regulatory Index (GERI) While the Electricity Regulatory Index (ERI) methodology has been undergoing continuous improvement, so too has an empirical approach for regulatory assessment. This has been developed through primary data obtained from bespoke questionnaires designed for the ERI. This is an objective and robust methodology that has gained recognition by sector experts and stakeholders globally. The African Development Bank has collaborated with the World Bank to expand the frontiers of ERI to global dimensions by applying key ERI methodology and principles to assess the regulatory environment of countries outside Africa. The AfDB's ERI and the World Bank's Rethinking Power Sector Reform (RPSR) Regulatory Index, which was created for the Rethinking Power Sector Reform in Developing Countries Report, have combined to form the Global Electricity Regulatory Index (GERI). This provides for global comparison and benchmarking of regulatory frameworks and so broadens the scope for regulatory dialogue. The maiden edition of the GERI, published in December 2022, covers 82 countries in total; 42 in Africa (40 from Sub Saharan Africa (SSA) removing Egypt and Algeria which are captured under Middle East and North Africa region, 8 from East Asia & the Pacific, 13 from Europe & Central Asia, 6 from Latin America & the Caribbean, 11 from Middle East & North Africa, and 4 from South Asia. The Bank continues to work with research institutions, including the University of Cape Town, to further improve the methodology and undertake reviews and analysis of participating country performances.

The ERI has become a reference document for regulatory assessment of African countries and a guiding resource for development partners' regulatory interventions across the continent. The Bank has established key collaborations with development partners (including USAID/ Power Africa), for the design and implementation of various regulatory initiatives anchored on ERI recommendations. The Bank in collaboration with USAID and the US National Association of Regulatory Utility Commissioners (NARUC), the AfDB held two regional workshops in 2018 on "Emerging Issues in Electricity Regulation" which brought together participants in West Africa and East Africa to discuss key regulatory issues emerging from the Bank's 2018 Electricity Regulatory Index and another one NARUC's guides on Mini-Grid Regulation and the Role of Women in Energy Regulation in 2021.

In 2021, the Bank in collaboration with NARUC, developed Regulatory Guidelines for Advancing Economic and Commercial Quality of Service Regulation in Africa's Power Sector. These Guidelines were built on the findings of the ERI and provide a framework for countries to address

regulatory gaps. Following the publication of the Guidelines, technical assistance projects are being implemented in two countries (Eswatini and Togo) to directly address gaps in their Economic and Commercial Quality-of-Service Regulations, highlighted in the ERI. Under the West Africa Energy Program (WAEP), the Bank collaborated with USAID and the Public Utilities Regulatory Commission (PURC) of Ghana to orient and build the capacity of Civil Society Organizations (CSOs) and media organizations on regulatory issues. As accountability actors, the orientation of these CSOs to ERI principles and diagnosis has equipped them to better engage with the sector and advance the regulatory discourse. Under the African Single Electricity Market (AfSEM) initiative of the Africa Union Commission, the ERI is a key source of data for monitoring and tracking regulatory indicators for the harmonization of regulatory frameworks across the continent.

The ERI has been successful in motivating action among participating countries to undertake key regulatory initiatives to improve their regulatory environments. Guided by the diagnosis and recommendations of the ERI, many participating countries have also taken steps to address some of the regulatory gaps highlighted in the ERI, either by themselves or with the support of their development partners. Year on year, the ERI highlights improvements by some countries who have taken steps to address specific gaps identified by the ERI.

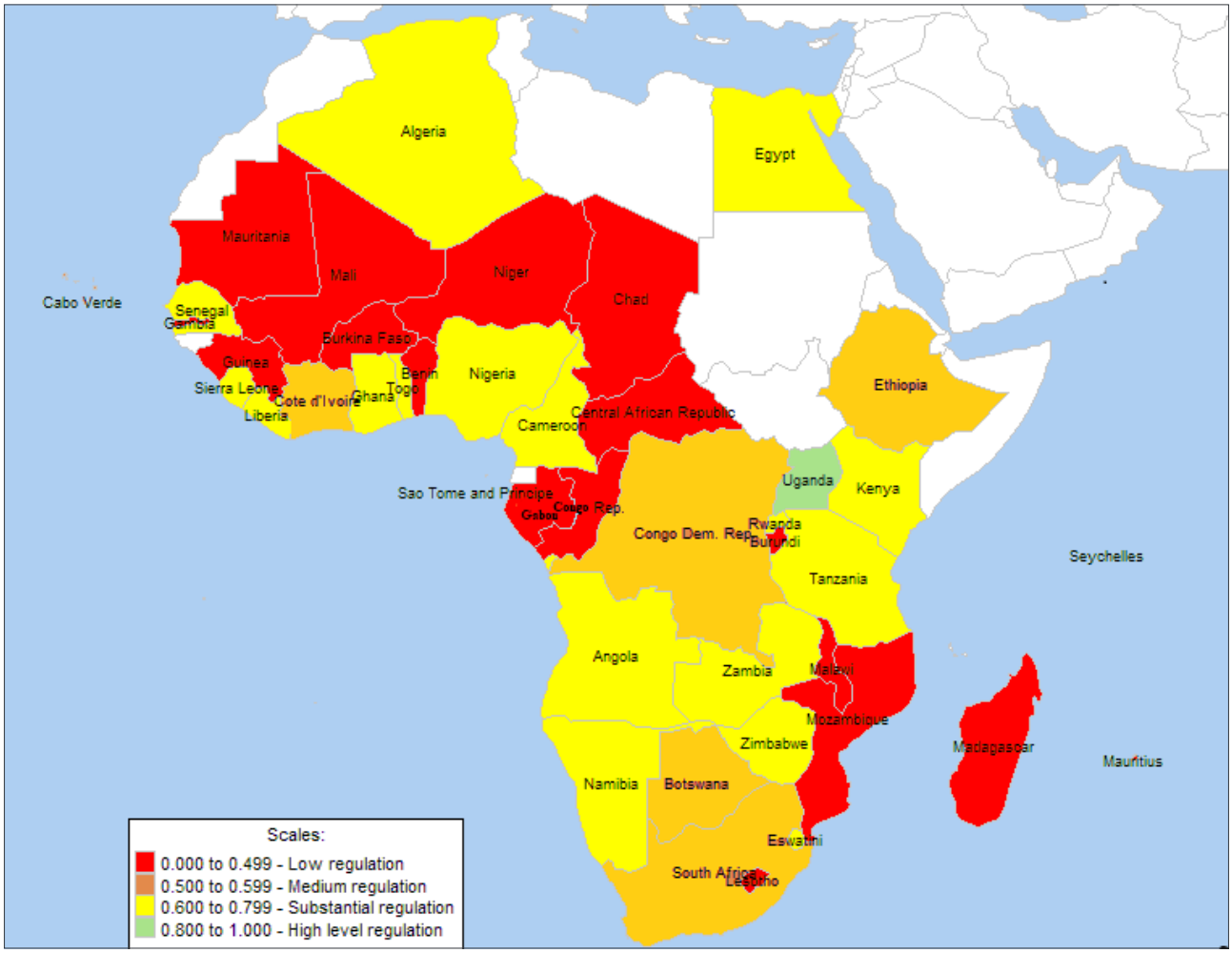
These country-level interventions have been enhanced by the Bank's efforts to pilot an initiative to digitalize their regulatory activities and processes as a one-stop bespoke solution to many regulatory bottlenecks. Such activities have been successfully piloted in Ghana and are being widely replicated across many countries in Africa. With funding from the KOAFEC Trust Fund, the Bank in 2021 successfully commissioned a functional Database Management System (DBMS) as the first phase to fully digitize regulatory activities and processes of the Public Utilities Regulatory Commission of Ghana (PURC). This solution has helped PURC to improve on various gaps identified by the ERI. The PURC DBMS has led to a noticeable increase in work efficiency, cross-functional collaboration among departments and staff of PURC, consumer relations, complaints resolution and tracking, transparency in regulatory activities, and stakeholder participation in regulatory process. The ability of consumers to register and lodge complaints, and to make enquiries using the mobile app, has resulted in a noticeable decrease in the time taken by PURC to address such complaints and to provide feedback through the ticketing and tracking system. In addition, the DBMS has enhanced the security and preservation of data. When PURC experienced a fire outbreak in 2022, the robustness of the DBMS ensured the restoration of operations within a reasonable timeframe and without loss of data.

The PURC digitization solution has become a blueprint that has spurred a digitalization drive among national and regional regulatory institutions. The Bank is currently supporting on-going digitalization initiatives in Uganda, Tanzania, and Nigeria. The Bank is mobilizing resources to implement phase 2 of the PURC DBMS; this will involve integrating the systems of the two regulators in Ghana with that of the utilities and consumers for real-time information and data exchanges.

The ERI highlights the key role of regulatory interventions in complementing hard infrastructure (such as regional grids) to facilitate electricity trade across borders. Guided by this ERI observation, the Bank is providing technical assistance to regional regulatory entities in SADC, COMESA, and ECOWAS to contextualize and harmonize regulatory principles and key performance indicators espoused by the ERI within the regions. The initiative involves a combination of studies, capacity building, and development of tools and frameworks aimed at establishing harmonized electricity regulatory frameworks in the regions, to enhance cross-border electricity trade and provide a smooth transition to continental electricity trade, as envisaged under the African Single Electricity Market (AfSEM)[3]. The initiatives will cover the harmonization of relevant codes (including grid connection codes) and tariffs, including wheeling charges that are critical to regional electricity trade.

[3] Africa Single Electricity Market (AfSEM) is a program under the Africa Union aimed at facilitating sustainable development of the African electricity sector through integrating continental electricity markets based on the 2019 African Continental Free Trade Area (AfCFTA) Agreement. AfSEM will be the largest single electricity market in the world, covering 55-member states and serving a population of over 1.3 billion.

Figure 1: Electricity Regulatory Index 2022



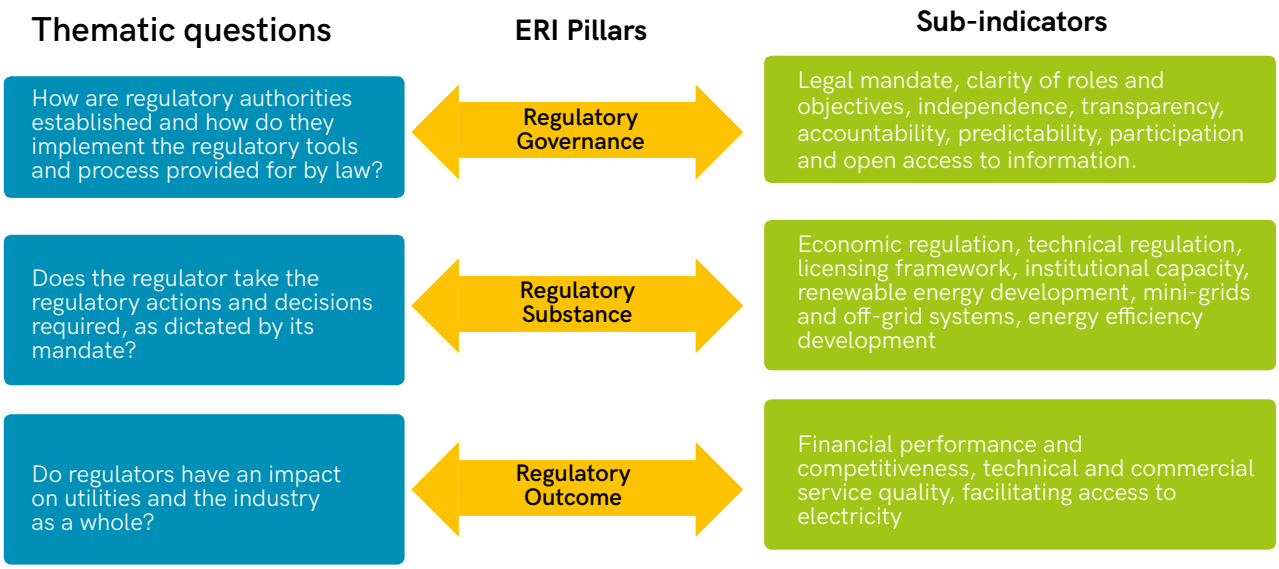
I. Methodology In Brief

1.1 Definitions

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

- **The Regulatory Governance Index (RGI)** assesses the institutional and legal design of the regulatory framework, within which the regulator's mandate is established. It is composed of eight indicators.
- **The Regulatory Substance Index (RSI)** evaluates how well electricity sector regulators are carrying out their mandate by developing 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 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. It is calculated from an aggregation of survey responses from the electricity distribution utilities and power consumers. The ROI for the utility comprises three sub-indicators. Figure 2 highlights the main thematic questions and considerations around which the RGI, RSI and ROI are constructed.

Figure 2: Main Indicators of the ERI



1.2. Construction of the ERI

The ERI scores were calculated based on responses to comprehensive surveys distributed to electricity sector regulatory institutions and utilities in 45 African countries that had confirmed regulatory authorities. Out of the 45 countries surveyed, 44 regulatory agencies provided responses. This included two from Ghana, which brings the number of countries providing valid responses to 43. In addition, 44 regulated utilities from 43 countries also responded. The resulting data and analysis are therefore based on a sample of 43 countries that provided the complete sets of data. The ERI 2022 is based on data that has been submitted from the completed surveys and validated for the period up to August 2022.

The indicators for Regulatory Governance and Regulatory Substance were used to construct the ERI for Governance and Substance (ERIGS) using the primary data obtained from questionnaires sent to the regulators. The RGI and the RSI together assess the effectiveness of a regulatory environment to support electricity sector reforms, promote efficiency, and to fulfil national objectives. The ERIGS provides important insights into national regulatory development, without recourse to the effects of the regulatory actions and decisions on the sector.

An 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 ERIGS and ROI were combined, as indicated in Figure 3 below, to determine the ERI.

Figure 3: Calculating the ERI

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

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

Where:

ERI_{GS} = Electricity Regulatory Index (Governance 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:

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 regarding the relevant indicator. A score of 0.000 signifies a 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, which also range from 0.000 to 1.000 with the same implications given above, are calculated. Table 1 illustrates the classification of scores for ERI.

Table 1: Classification of Scores

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 non-existent legal and institutional structures and capacity of the regulator.

1.3 Limitations

Interpreting the Results

The ERI results show the level of development of a country's regulatory environment. Hence, the results give an indication of the quality of the regulatory framework; they do not forecast on how much investment is likely to occur under any current national regulatory environment. The ERI for Africa is not an assessment of the level of development of the electricity sector of a country. Even though robust regulatory regimes catalyze sector development, these frameworks will not necessarily translate into sector developments without consistent enforcement and compliance by stakeholders, among other exogenous factors. While the existence of the requisite regulatory framework does not necessarily translate directly into strong sector development, neither does a highly developed and vibrant electricity sector in a country necessarily indicate the existence of a robust regulatory regime. The performance of the sector depends on numerous factors in addition to the regulatory regime.

Questionnaire Design/ Respondents

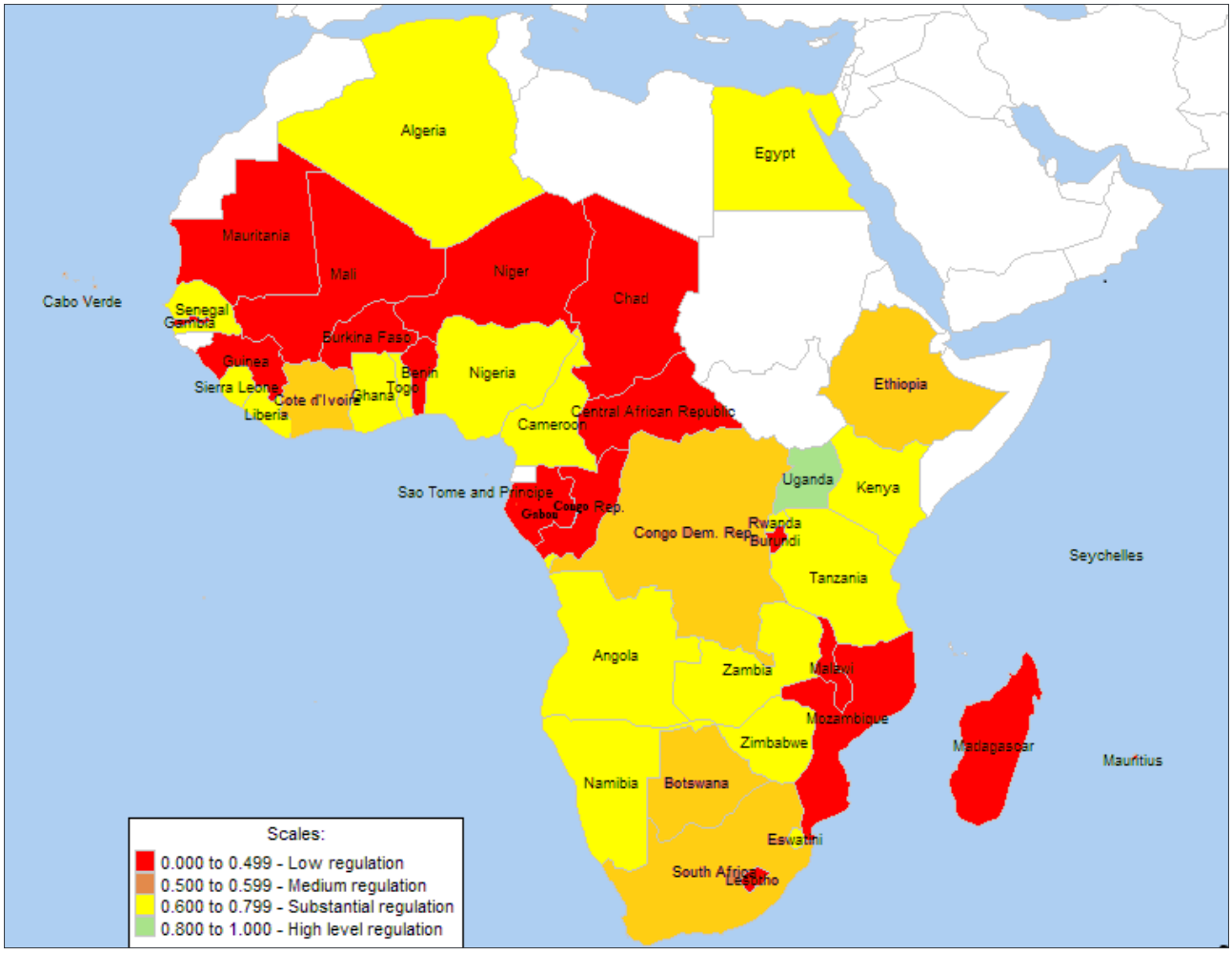
The ERI is based on analysis of primary data obtained from a completed set of detailed survey questionnaires sent to national regulatory authorities and public utilities. Each agency is required to identify a focal point to complete the questionnaire and to ensure that the submission is complete and accurate. Furthermore, the Bank undertakes a validation and verification process of all submissions to ensure, as much as possible, the accuracy of the information that is used in developing the ERI report.

Accounting for Impact

The ROI measures the effect of regulation on electricity companies. Based on the current formula for calculating the ERI, the ROI has a weight of almost 50% in the final result. It is comprised of 3 sub-indicators compared to 8 and 7 sub-indicators under RGI and RSI respectively. This makes the ERI index very sensitive, as any change in scoring in one of the sub-indicators will impact the ROI and ultimately the overall ERI. A small change in the value of one of its three indicators has a significant impact on the country's ERI score.

II. ERI 2022 Results

Figure 4: ERI 2022 Results



2.1 Overall Performance

This ERI 2022 report covers 43 of 45 African countries with established independent regulatory authorities (Sudan is the only country yet to be covered). In terms of overall performance, 18 countries scored between 0.600 and 1.000, reflecting high and substantial levels of development of the electricity regulatory frameworks in those countries. The scores of 6 countries fell between 0.500 and 0.600, whilst 19 countries scored below 0.500 in ERI 2022. This means that about 44% of African countries with a regulatory authority need to improve significantly on various aspects of electricity regulation.

Several reasons account for the relative movements of countries along the ERI ladder. These include: (a) the entry or re-entry of countries with varying degrees of development of their regulatory frameworks; (b) action or inaction of countries to amend or introduce new legislation to bring their regulatory frameworks in line with international standards; (c) actions taken by regulators in certain countries to implement their regulatory mandates, such as the development or revision of tariff methodologies; and (d) utility performance in conformity with the regulatory frameworks in place.

The results show that the elements of a supportive regulatory framework, where these

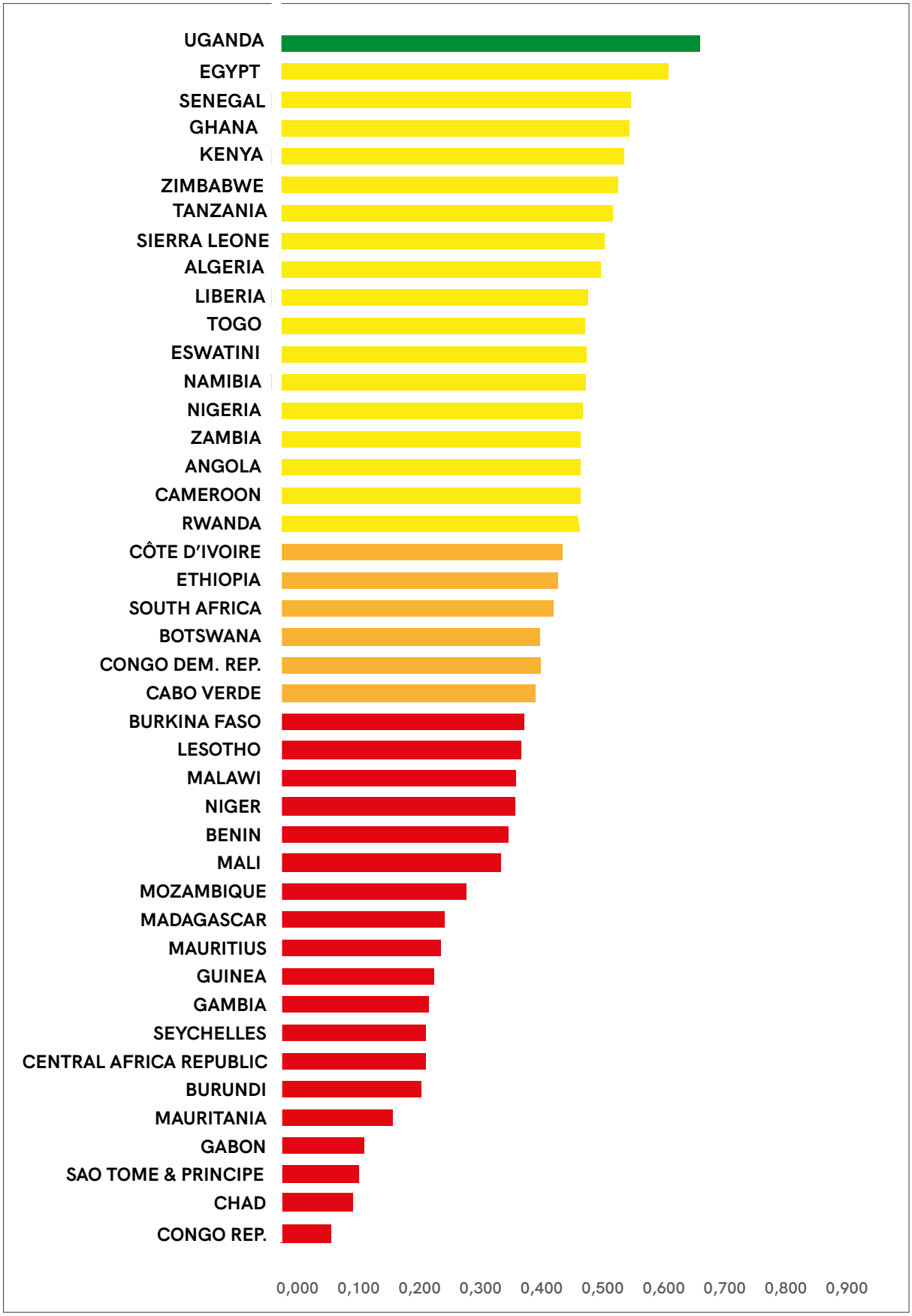
have been established in the countries, remain strong and are improving. A number of countries have improved their regulatory frameworks by amending their regulatory laws or enacting new ones to address weaknesses identified by the ERI since 2018. Although higher than the 2021 average of 0.456, the average ERI score remains low, at 0.496. The low scores in ERI is linked to the significant impact of the low ROI scores. The ERI is very sensitive to the ROI, which is based on responses from the distribution utilities and their assessment of the regulatory regime. The ROI improved from an average score of 0.339 in 2021 to 0.396 in 2022. The improvement is attributed to the fact that many countries have taken steps to improve the financial performance of their utilities. Twenty-seven countries confirmed that they have conducted a Cost-of-Service Study (CoSS), compared to nine in 2021. The CoSS report is reported to have been implemented within the last 5 years in 17 out of 43 countries. Utilities have also taken steps to reduce technical and financial losses, with 40% of the countries reporting loss levels of less than 20%.

The average RGI score however declined from 0.736 in 2021 to 0.731 in 2022, whilst RSI improved marginally from 0.575 to 0.582 over the same period. Mixed movements have been recorded in RGI scores as a result of both positive and negative actions taken by the regulator or national governments. Senegal, for example, improved from 0.675 to 0.714 as it announced the Electricity Law n°2021-31 of 9 July 2021, further liberalizing the sector and expanding the mandate of the regulator, CRSE, to cover the oil and gas sectors. Additionally, the regulator has established a Dispute Settlement Committee to deal with disputes between the regulator and utilities, between utilities, and between utilities and consumers. For its part, Sierra Leone amended the National Electricity Act to make provision for concessions and to allow eligible customers to directly negotiate and purchase electricity from producers.

Other countries have faced limitations resulting from changes in recruitment procedures and remuneration scales. In some countries, the executive is involved in the recruitment or appointment process of leadership at the regulatory authority, including direct appointments, transfers of staff, etc. Additionally, the basis of regulatory staff salaries in many countries is linked to the public service scales, which may be lower than the salary scales of public utilities.

The improvement in average RSI was partly due to an improvement in RSI-related parameters in countries such as Cabo Verde and Seychelles. Cabo Verde has formulated an integrated national electrification plan that sets out a least-cost electrification pathway including grid, mini-grid and off-grid systems and it clearly demarcates areas for each system. It has also adopted a Tariff Methodology, which includes a written formula for determining End User Tariffs (EUTs) and a schedule for major tariff reviews.

Figure 5: ERI 2022 Scores and Rankings



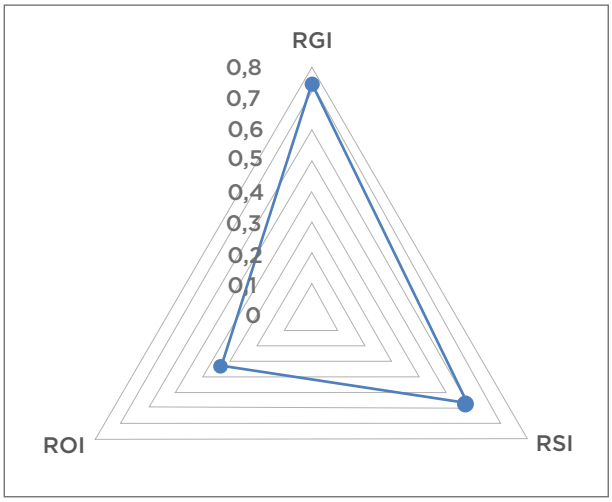
Seychelles has completed a renewable energy assessment and has introduced legislation (Distributed Generation Systems, IPPs, tariff regulations, etc.) to open power generation to the private sector. Minimum Energy Performance Standards (MEPS) have also been introduced for refrigerators, HVAC, lighting and industrial equipment.

Uganda, which has occupied the top position since the inception of the ERI in 2018, still emerged as the leader, with an ERI score of 0.846. Egypt (0.785), Senegal (0.710), Ghana (0.709), and Kenya (0.695) took the second, third, fourth and fifth positions, respectively (see Figure 5). The electricity regulatory frameworks in these 5 top countries are relatively well developed and their utilities respond positively to regulatory instructions and guidelines, whilst their regulators are forward-looking and capable of exerting the necessary regulatory authority where needed. This has been reflected in the outcomes.

2.2 Overall Performance of Countries across ERI Dimensions

The average scores across the three pillars of the RGI, RSI and ROI were 0.731, 0.582 and 0.396, respectively. Figure 6 shows the performance of the countries in the sample by the ERI pillars.

Figure 6: Components of the ERI 2022



Note: The graph shows the average value of each component of the ERI 2022 on a scale of 0-1.

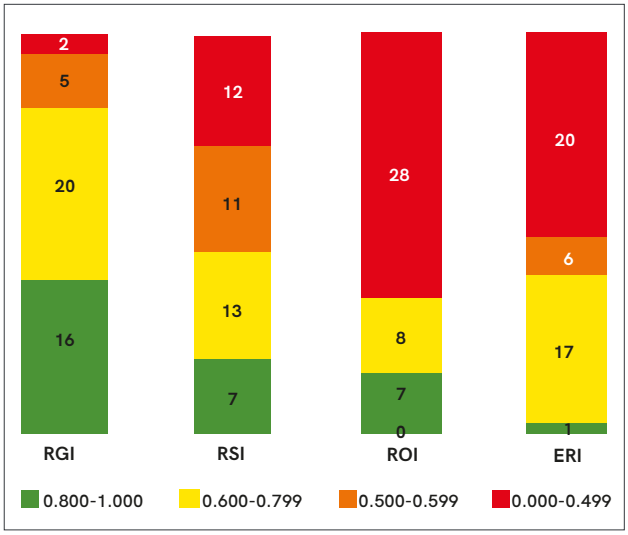
The distribution of country performance across the ERI pillars shows that most participating countries (95%) have well-developed regulatory frameworks, scoring RGI above 0.500. This should have had a positive influence on their regulatory outcome scores. ROI scores above 0.500 were however recorded by only 15 (35%) of the countries, which highlights deep disparities between the level of development of regulatory frameworks and utility outcomes. This may be indicative of a lack of capacity by the regulator to transform good regulatory governance into good regulatory outcomes. Such outcomes may be a result of reduced institutional capacity, as many countries highlighted challenges in terms of a limited number of staff with the necessary technical skills and years of experience. It may also be reflective of an inability to retain and properly remunerate qualified staff.

Only two countries (Burundi and Gabon) scored below 0.500 in RGI, compared to four in 2021. Some 72% of countries scored 0.500 and above in RSI, indicating that regulators are gradually taking control and enforcing their regulatory laws to align the industry to prudent regulatory practice.

Overall, the ERI 2022 results indicate that there have been improvements, albeit marginal, compared to 2021 and 2020. However, there is still scope for regulators to improve the implementation of regulators' actions and decisions (RSI) and to improve on their regulatory outcomes (ROI) in the sector. There is still a level of non-cooperation between utilities and regulators in many countries. This is demonstrated by the difference in responses to survey questions between the regulator and utilities, reflecting data inconsistencies and/or challenges in terms of the implementation of regulatory regimes. These discrepancies illustrate the work that needs to be done to strengthen the engagement, dialogue and working relationships between regulators and the utilities.

Twenty-four countries (up from 21 in 2021) scored above 0.500 in the ERI (see Figure 5), suggesting a reduced gap between the level of regulatory framework development and the effectiveness of the frameworks on the regulated utilities. It must be noted that the improvement in the RSI sub-components also shows that the regulators are taking all the necessary steps within their legal scope, to improve the regulatory environment. This has helped them to enhance the power of the regulator and influence the behaviour of the utilities to get them to conform with the regulations. There is still room for the regulators to ensure that the utilities adhere to regulations by applying, for instance, financial sanctions on offenders when regulations are flouted. This will require an enabling environment and human capacity to transform the good regulatory governance to good regulatory outcomes, through the identification, analysis and preferment of solutions to gaps and flaws in regulatory regime.

Figure 7: Country Performance by ERI Dimension: Number of Countries per Rating Threshold, 2022



2.3 Regulatory Governance Index (RGI)

The Regulatory Governance Index (RGI) comprises eight indicators – Legal Mandate; Clarity of Roles and Objectives; Independence; Accountability; Transparency; Participation; Predictability; and Open Access to Information. The RGI measures the institutional and legal frameworks within which regulators operate. External RGI refers to the institutional and legal design of the regulatory system, whilst Internal RGI shows the degree of control maintained by the regulator, and the extent to which it is capable of promoting good regulatory governance.

Figure 8: Regulatory Governance Index Map 2022

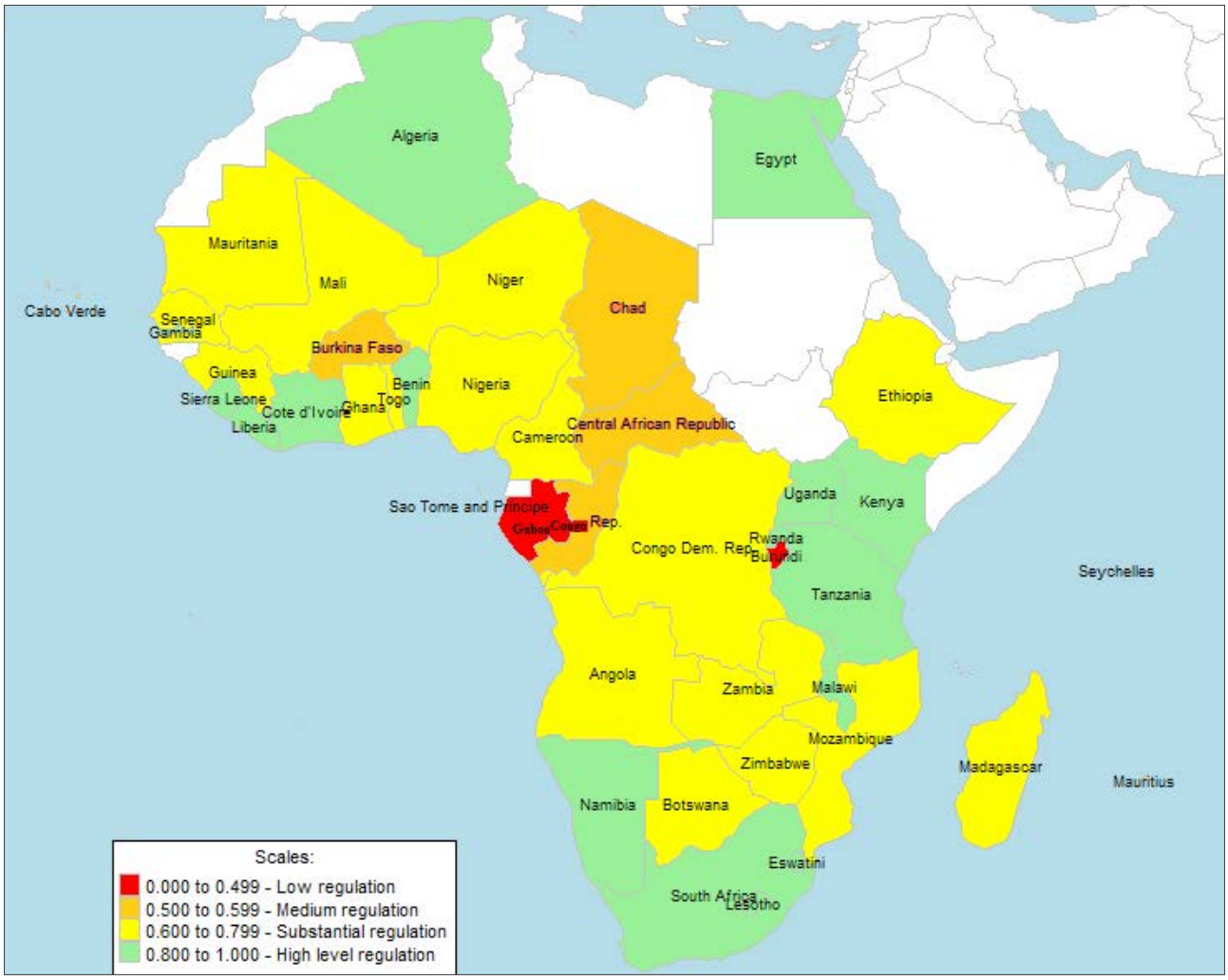
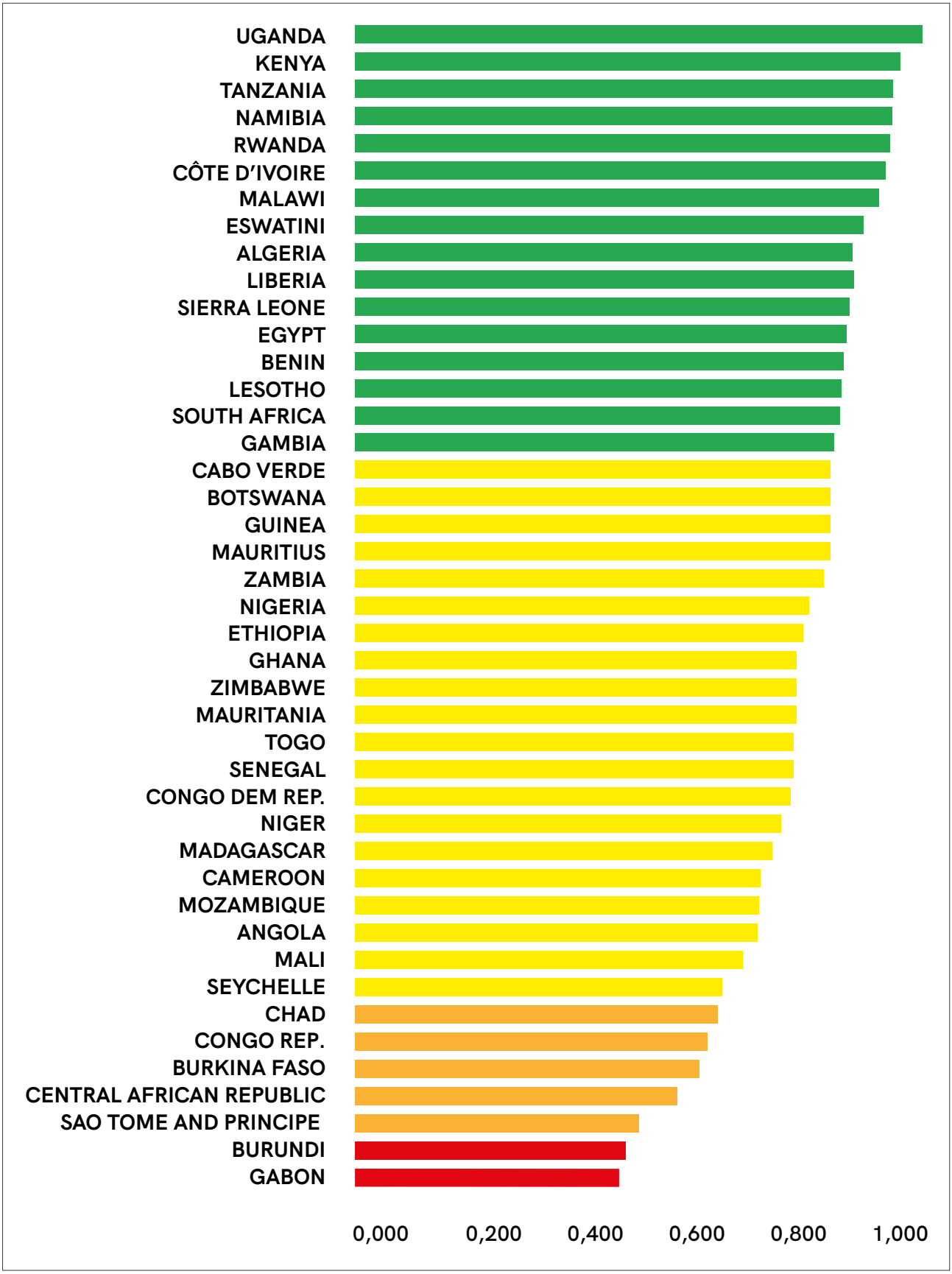


Figure 9: RGI 2022 Scores and Rankings by Country



Although the average RGI declined from 0.736 in 2021 to 0.731 in 2022, some countries recorded improvements in RGI scores and movements in performance bands. The number of countries in the high and substantial level of regulatory development remained at 36 but the number of countries in the low level of development has reduced from 4 to 2 countries, with the notable movement of São Tomé & Príncipe and Seychelles from a low to a medium level of regulatory development in RGI. Table 2 shows the new regulations, systems and codes that have been introduced by São Tomé & Príncipe and Seychelles and which have accounted for their movement from low to medium level of regulatory development in RGI.

Table 2: Game Changers: New Regulations, Systems and Codes

São Tomé & Principe	Seychelles
The regulator is not required to seek approval from the executive on regulatory decision	There are specific provisions in the law that requires the regulator to consult the public or stakeholders or to seek the views or approval from other entities on regulatory decisions.
Tariff Methodology, which was in preparation in 2021, has now been approved.	The regulator is the final decision maker on issuing and amending licenses.
The approach for involving stakeholders has been expanded from "ad-hoc meetings with stakeholders" to include "Submission of written comments".	The regulator's decisions on disputes are final and legally binding on disputing parties.
The stakeholders that the regulator consults in its decision-making process have been expanded from "Regulated Utility companies, Other industry players" to include "Consumers and, Government".	Government and regulatory authority boards decide on regulatory authority staff salaries. In 2021 it was the sector minister/government
The source of the financial budget is stated in the legislation	Regulatory decisions taken by the regulator are always supported by explanations/rationale and the rationale behind decisions are published.
	Consultation of stakeholders before regulatory decisions is a regulatory requirement and involves regulated utilities, other industry players, NGOs and government through public hearings, ad-hoc meetings with stakeholders, submission of written comments, workshops and surveys. In 2021, ad-hoc meetings with stakeholders comprised the only method stated.

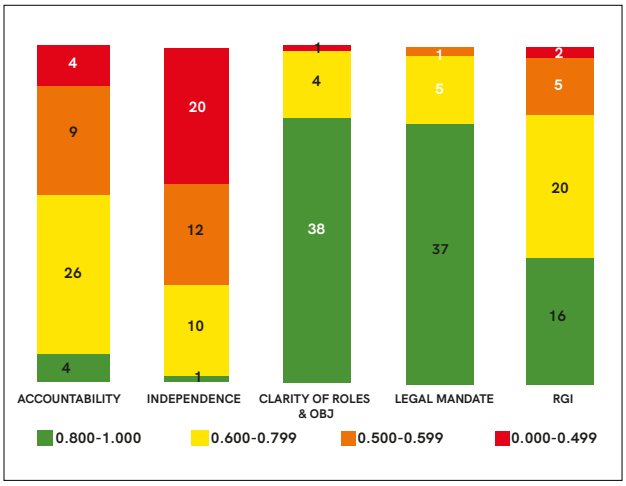
On average, there have been improvements in the average scores for Legal Mandate, Clarity of Roles and Objectives, Independence from Stakeholders, Predictability, and Participation. This has resulted from countries adopting new policies, regulations and processes that strengthen their regulatory environments. Annex 1 highlights the RGI-related measures that have been taken up by countries since 2018, linked to ERI findings and recommendations.

2.3.1 External Regulatory Governance

External Regulatory Governance can be defined as "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." The framework is classified as external because the components, provisions and links were determined 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 frameworks of the regulator. Figure 10 shows the results of External RGI indicators.

Figure 10: Country Performance across External RGI Indicators, 2022



2.3.2 Breakdown of External RGI Results

Legal Mandate is the prime indicator that establishes the reason or justification for the existence or establishment of the regulatory authority. It measures the legal or regulatory force behind the institution. Specifically, it assesses how the institution was established – by the legislature through parliament or other legislative body or by another governmental act (order or decree). Regulatory authorities were established by Acts of Parliament in 37 of the 43 countries, thereby meeting international best practice criteria.

Establishing a regulator by an act of the legislature alongside robust energy sector laws provides strong safeguards, ensures higher credibility, and boosts investor and consumer confidence.

It isolates the regulator from the influence of political decisions and mitigates the potential for new political leadership in a country to effect arbitrary changes to the regulatory framework that could lead to regulatory capture.

All the countries recorded high scores for Legal Mandate (average of 0.942), with only one country scoring 0.500 (see Figure 10). The regulatory authorities in Angola, Burundi, Democratic Republic of Congo and Egypt were established by decree, whilst those in Central African Republic and Mali were established by Ordinance. According to the responses received, there are no electricity sector laws in Ghana and Lesotho. The regulatory institutions in those two countries were established by specific multi-purpose acts, which give them the mandate, among other functions, to regulate the electricity sector. Technical and financial regulations are separated among two regulatory institutions in Ghana, which is a deviation from the norm in all the other countries and from international best practice. In Cabo Verde, the primary functions of the regulator are not clearly defined in the primary legislation that established the institution but are set out in a different legislation.

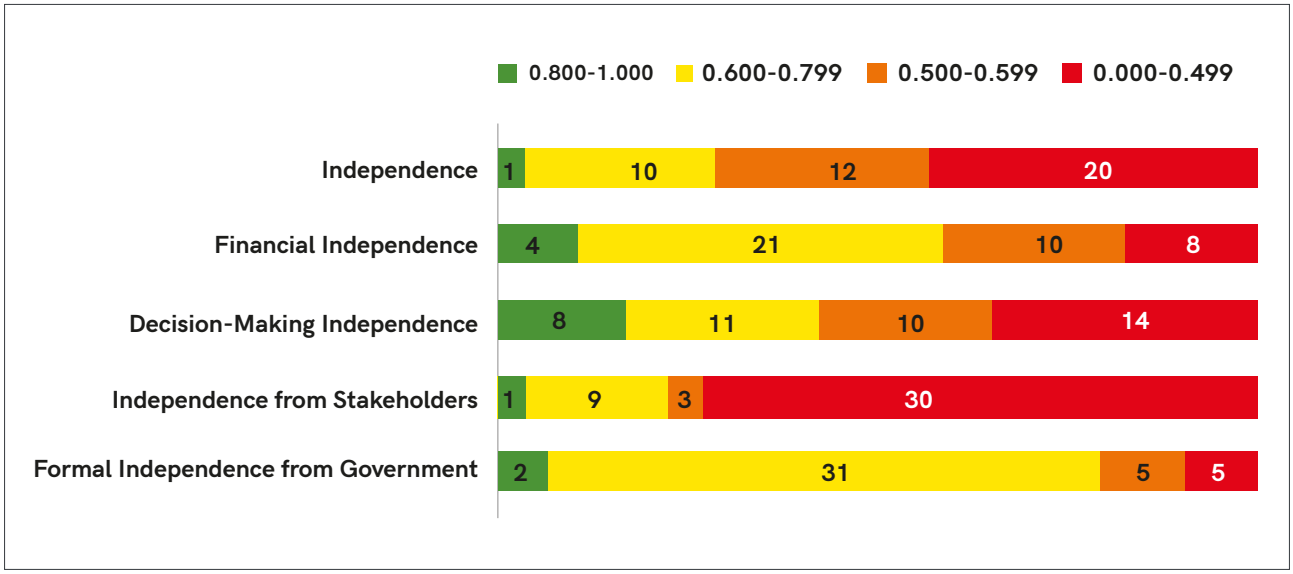
Clarity of Roles and Objectives is the highest scoring indicator in the RGI, with an average score of 0.963 (Figure 10). This indicator explores where the main regulatory functions of the regulators are defined. Four key decision-making functions relating to licensing, determination of tariffs, determination and control of the regulated functions, and conflict resolution are defined and embedded within this indicator. Clearly defined roles and functions of the regulator remove possible sources of overlap of responsibilities between the regulator, the sector ministry and any other agency. It also defines where the obligations of regulated entities are stated and the entity that has the authority to change them.

The results show that all but one of the countries (Cabo Verde) have their roles and powers defined in the primary legislation and meet international best practice criteria. In addition, most countries clearly define which decisions the regulators are permitted to take in the primary law. Two regulatory institutions regulate

the electricity sector in Ghana, splitting licensing and tariff functions between them; however, permitting one institution to be responsible for both functions is contrary to best practice As indicated by the respondents and as stated earlier, the regulator's functions are not spelt out in the primary legislation of Cabo Verde, but in a different legislation. Regulators in most countries in the sample provide inputs into policy formulation, the exceptions being Burkina Faso, Gabon, Liberia, São Tomé & Principe and Togo.

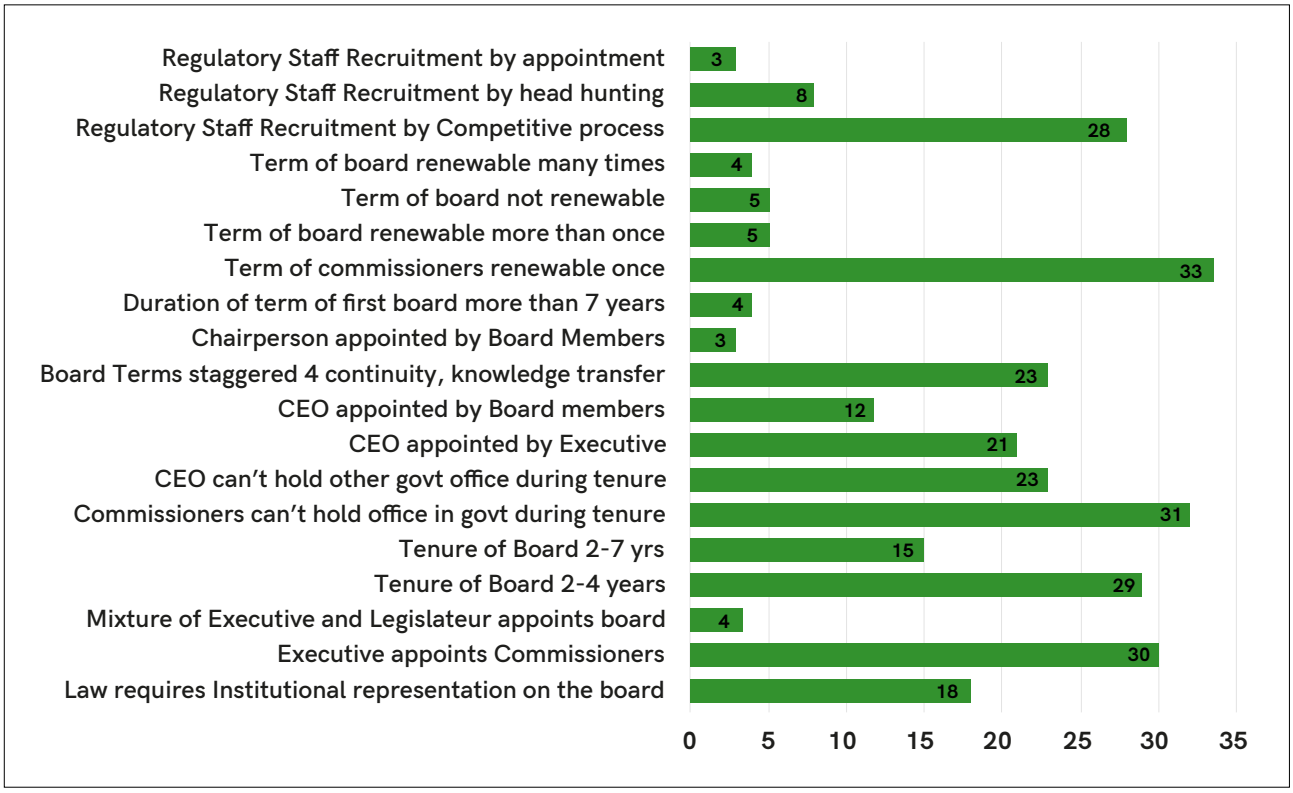
Independence assesses the degree of financial and decision-making autonomy of the regulator, free from the influence of governments and stakeholders. Independence is assessed across four sub-indicators – (a) independence from government and the legislature; (b) independence from stakeholders and market players; (c) decision-making independence; and (d) financial and budgetary independence. Together, these four sub-indicators determine the level of regulatory independence. Figure 11 shows the results of RGI across the Independence dimensions.

Figure 11: Country Performance across Independence Dimensions, 2022



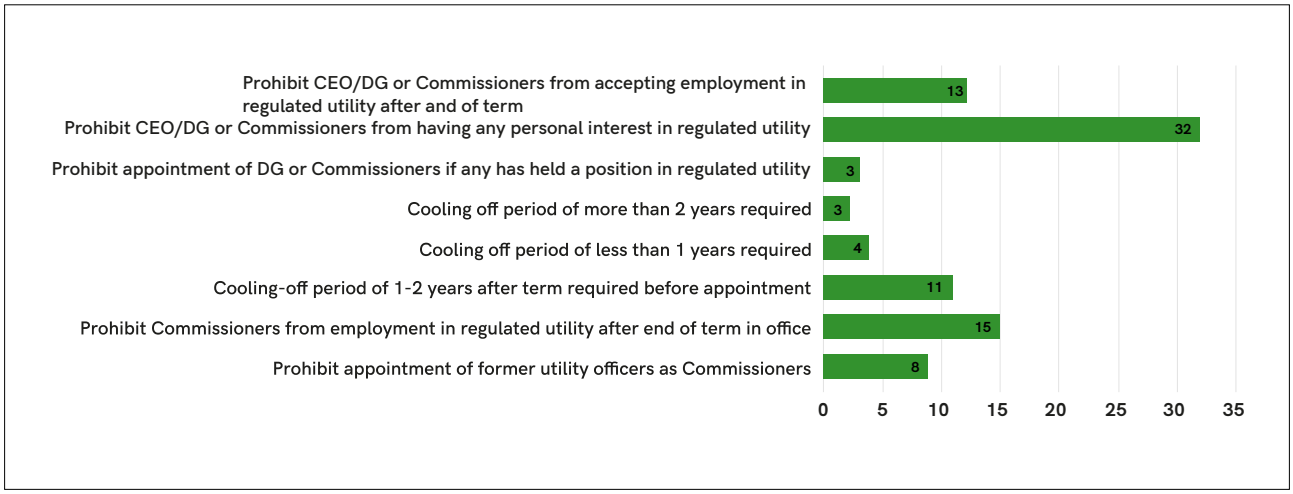
(a) Independence from Government: To avoid interference from the executive and legislature, it is required that the regulatory laws be so designed as to keep political authorities at an arm's length from the regulatory authority. However, this has been achieved in only a handful of countries and much more needs to be done to ensure regulators' independence from governments. Provisions that give some governments the opportunity to get involved in regulatory matters are found in various parent regulatory laws/acts and it will require redevelopment or amendment to remove such provisions. Areas of best practice include: (i) staggering the terms of the commissioners to allow for institutional memory and the transfer of regulatory knowledge to new commissioners, and (ii) staff recruitment by competitive processes. Figure 12 shows details of the elements that constitute independence from government.

Figure 12: Countries and Elements of Formal Independence from Government, 2022



(b) Independence from Stakeholders: Lack of full independence, especially from stakeholders, was identified as a continuing challenge for regulators. With an average score of 0.276, Independence from Stakeholders (up from 0.262 in 2021) is the weakest sub-indicator. Weak or limited procedures, coupled with inadequate staff capacities, make the leadership of regulatory institutions and the institutions themselves more susceptible to influence from stakeholders, especially major consumers and utilities. Regulatory authorities are also susceptible to short-term political pressures, which detracts from their ability to ensure the long-term sustainability of the relevant country's electricity sector. Keeping stakeholders from interfering in regulatory matters and decisions is a very important requirement of an independent regulator (see Figure 13).

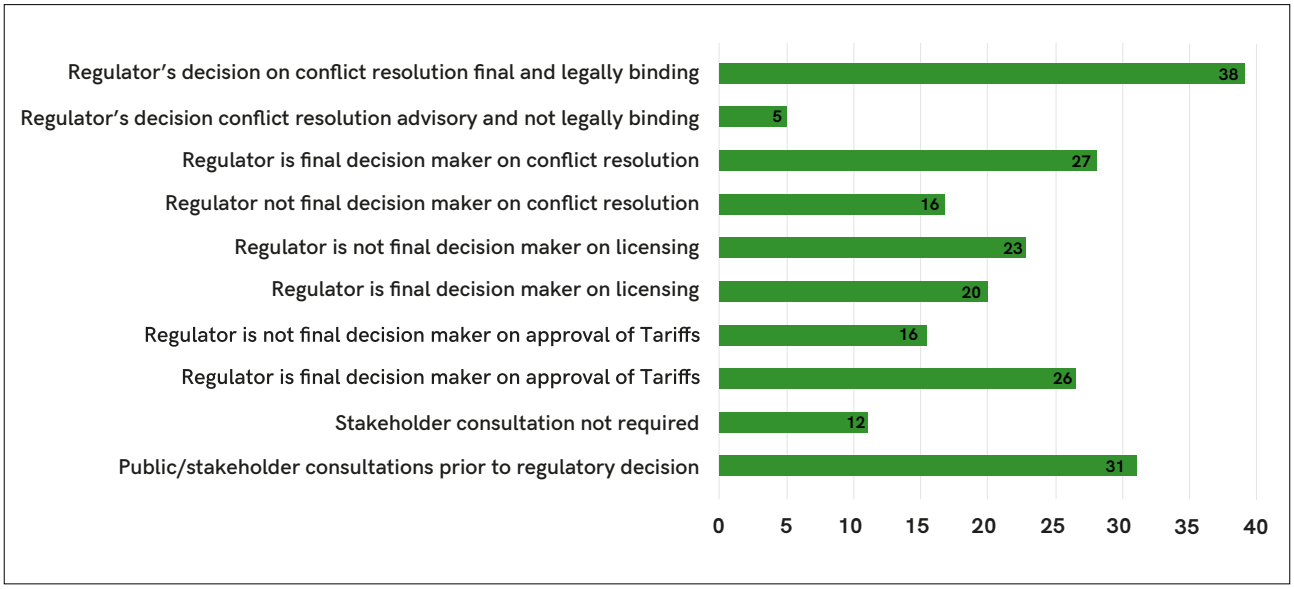
Figure 13: Countries and Elements of Independence from Stakeholders, 2022



(c) Decision-Making Independence: This sub-indicator assesses the level of independence and authority the regulator has in terms of its decision-making role, tariff approvals, licensing, and conflict resolution between regulated entities and customers. The regulator is the final decision-maker on tariffs and conflict resolution in 28 countries. Figure 14 provides a summary of responses received from the regulators on questions relating to the sub-indicator Decision-Making Independence. In some countries, challenges were recorded concerning the executive being able to overturn regulatory decisions, or the requirement that regulators need to consult or seek executive approval before regulatory decisions are taken.

Angola, Cabo Verde, Congo Republic, Madagascar and Mauritius indicated that the regulator either shared the decision-making authority or played a facilitative role in arriving at regulatory decisions. In those five countries, the regulator exclusively handles licensing, tariff determination and conflict resolution issues without interference. Wherever interferences exist, the regulator would not be fully capable of discharging its regulatory duties in an unbiased manner.

Figure 14: Number of Countries and the Regulator's Role in Decision-Making, 2022



(d) Financial Independence: A regulator requires a sustainable and independent source of funding to run the institution and implement its initiatives and activities. Best practice in terms of financial independence requires that:

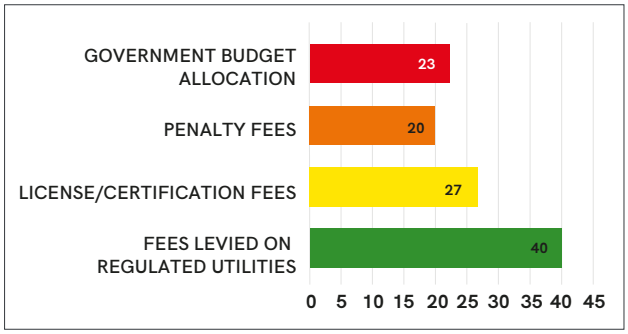
- The regulator is funded from sources independent of the government's annual budget allocations or sources that could be influenced by stakeholders. Licensing fees and fees levied on regulated utilities, the levels of which are approved by parliament, are the safest sources and in line with best practice. Excess funds at the end of the financial year may be paid to the government.
- The funds must be adequate to meet all operational expenditure of the regulator. Some regulators impose fines and penalty fees on defaulting regulated institutions but dependence on penalty fees is unsustainable because they dwindle as the utilities comply with the regulations and could compromise the objectivity of the regulator. They could also make the regulator more inclined to impose penalties, a practice which could plunge the electricity sector into legal disputes.
- Where the government is the sole or a major source of funding for the activities of the regulator, the independence of the regulator is compromised because the government could withhold funds if the decisions of the regulator do not favor the government.

- To avoid abuse of financial independence, the regulator must have good internal auditors and mechanisms to ensure that funds are applied only for approved purposes. Regular external audits must also be undertaken to ensure full financial accountability. Appropriate sanctions should be applied whenever there are infringements.

- The regulatory authority must allocate expenditure for its activities.

Regulators require qualified, well-trained professionals, who are always in high demand by institutions both within and outside of their countries of origin. Within a specific country, if the conditions of service of regulatory staff are lower than that of the utilities, the regulatory authority may not be able to recruit adequately qualified or experienced staff, and that could limit their ability to effectively regulate the utility. The regulatory staff might also be influenced into making decisions that favor the regulated utility. Best practice requires that conditions of service, including the salary levels of the regulator, must be better than that of the utility or, at the very least, equal to that of the utility. This is to enable the regulator to attract, train, and retain qualified regulatory staff at all times and avoid regulatory capture. Figure 15 shows the sources of revenue for the regulators in the participating countries.

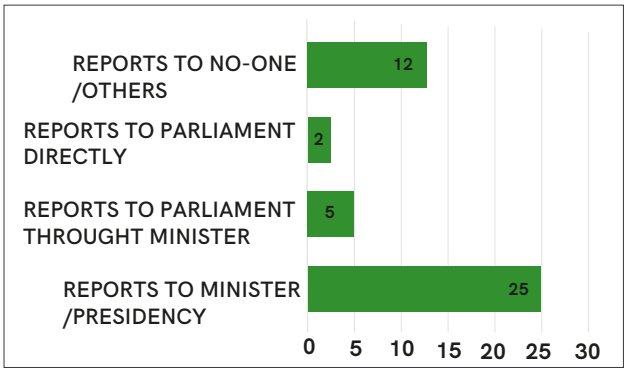
Figure 15: Sources of Funding for the Regulator



The source of the financial budget for the regulator is stated in legislation in all countries. Fees levied on regulated utilities form part of the funds for the regulator in 40 countries, while license or certification fees provide funding for the regulator in 27 countries. Penalty fees and government budget allocations are used in 23 and 20 countries respectively.

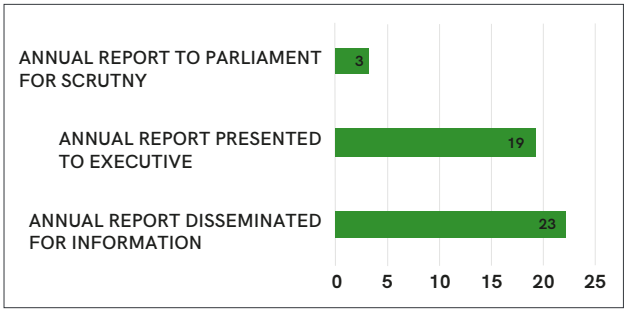
Accountability assesses the extent to which the regulator accounts for its actions to stakeholders. A mechanism must be in place through which stakeholders may contest the decisions of the regulator, considered to be ultra vires. Regulators are duty-bound to report regularly on their activities to stakeholders. Independent mechanisms should be in place to ensure that regulators behave in accordance with the legal mandate established for the exercise of their role. Countries including Eswatini, Kenya, Lesotho, Seychelles, Sierra Leone, Tanzania and Uganda reported that they have specialized courts that adjudicate regulatory matters.

Figure 16: Reporting Requirements of Regulators



The assessment shows that the regulators in all 43 countries prepare and present annual reports to stakeholders, through various channels and agencies. In addition, regulators in all the countries in the sample are obliged to prepare and submit annual reports to various stakeholders, except in Burundi and Gabon where this is not required.

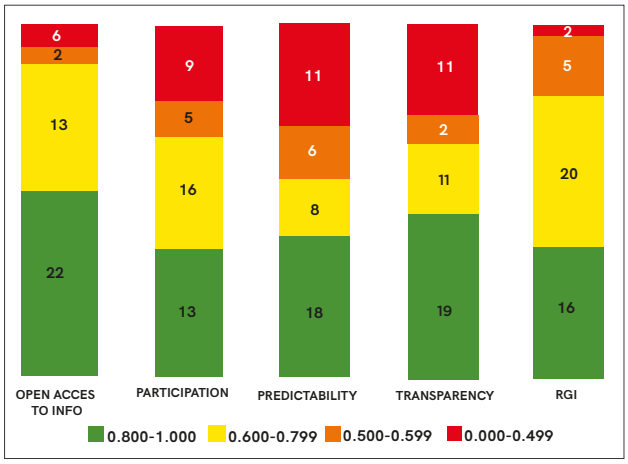
Figure 17: Reporting Channels of the Regulator's Annual Reports



2.3.3 Internal Regulatory Governance Indicators

Transparency, Participation, Predictability and Open Access to Information are the indicators that show the degree of control maintained by the regulator, and the extent to which it is promoting good regulatory governance. The indicators that constitute the internal RGI (Regulatory Governance Index) are well developed in more than half of the regulatory institutions surveyed, with a significant number well positioned in the green and yellow bands. Open Access to Information and Predictability, as indicators for internal Regulatory Governance, 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 and Predictability need to be further enhanced (see Figure 18).

Figure 18: Country Performance by Internal RGI Indicators



2.3.4. Breakdown of Internal RGI Results

The Transparency indicator assesses whether the decision-making process of the regulator and the outcomes are shared with, or accessible by, its stakeholders. The results of the survey show that most of the regulators in the survey sample are transparent in their decision-making process. Nineteen regulators scored in the green zone, eleven in the yellow zone, two in the orange zone and eleven in the red zone (see Figure 18).

- *Information on regulatory procedures* is available online in 37 countries. In six countries (Cameroon, Central African Republic, Chad, Congo Republic, São Tomé & Principe and Seychelles) information is made available to a person upon filing an application.
- *Information on regulatory decisions:* Thirty-five (35) regulators report that regulatory decisions are available to the public, however regulators from only 20 countries provided evidence of this. In 40 countries, regulatory decisions are supported by explanations while in 33 countries, the reasons or rationale behind decisions are published. Seventeen (17) countries provided evidence of recently published rationale/reasons behind regulatory decisions.
- *Publication of regulatory documents and decisions* is mandatory in 32 countries, but not in Burkina Faso, Burundi, CAR, Congo Republic, Eswatini, Ethiopia, Ghana (EC), Nigeria, Seychelles, Togo, Zambia and Zimbabwe. 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 to gain the necessary stakeholder confidence, legitimacy and acceptance.

The Predictability indicator assesses whether the regulator has a clear and predictable process to take regulatory decisions regarding reviews of electricity tariffs and the issuance of licenses, among other things (see Figure 19). Lack of predictability can hamper investor and consumer confidence in the electricity sector.

The number of countries without tariff methodologies reduced from thirteen in 2021 to eight in 2022 (Figure 19). In 2022, Burkina Faso, Burundi, Chad, Congo Republic, Gabon, Mali, Mauritania and Seychelles reported that they did not have tariff methodologies. The number of countries where the Tariff Methodology can be modified by ministerial decision or by unilateral decision of the regulator, reduced from 13 in 2021 to 12 in 2022, although one more country (Mauritania) has been added. .

Figure 19: Elements of Predictability of Regulatory Regimes, 2022

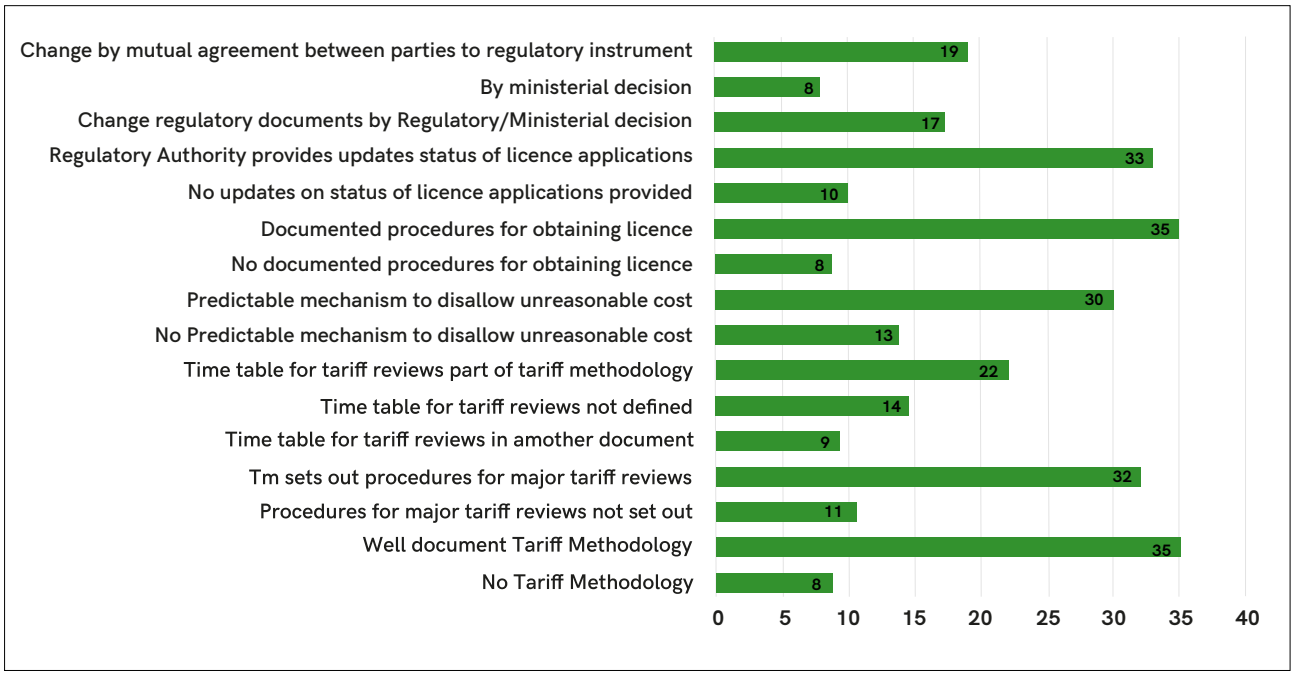
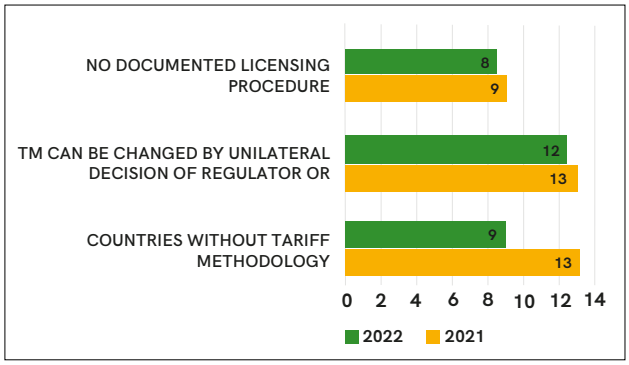


Figure 20: Changes in the Number of Countries without a Tariff Methodology/ Other Parameters of the Predictability Indicator, 2021-2022



The Participation indicator assesses how the regulator involves its stakeholders in its decision-making processes. Stakeholder consultation is required by law in 31 countries. Although not required by law, stakeholder consultations are conducted in 11 more countries: Burkina Faso, Burundi, Cameroon, CAR, Congo Republic, Democratic Republic of Congo, Gabon, Guinea, Mali, Mauritius and Togo. The methods used include public hearings, ad-hoc meetings, submission of written comments, and other methods of communication.

In all the countries except Gabon, comments received during stakeholder consultations are published; in 14 countries they are posted on the regulator's website. The regulator considers the stakeholders' inputs before taking a regulatory decision and provides feedback in all the countries, where stakeholder consultation is required.

The Open Access to Information indicator 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. Regulators in all the countries surveyed have public websites, where key regulatory documents such as those dealing with primary legislation, licenses, consultations, tariff guidelines and methodology are published. Thirty-seven (36) regulators also have IT officers to maintain the websites.

A recurring challenge faced by the regulatory institutions is the lack of sustainable resources to maintain and manage information, including knowledge, data and reporting. There is a need for more institutions to take advantage of digital tools to improve access to information.

[5] Mauritania did not participate in ERI 2021.

2.4 The Regulatory Substance Index (RSI)

The Regulatory Substance Index (RSI) is composed of seven indicators: (i) Economic Regulation; (ii) Technical Regulation; (iii) Licensing Frameworks; (iv) Institutional Capacity; (v) Renewable Energy Development; (vi) Mini-grid and Off-grid Systems; and (vii) Energy Efficiency Development. The RSI measures the level of implementation or enforcement of regulations by the regulator as handed down by the primary regulatory law.

The average RSI score for all the sample countries participating in ERI 2022 was 0.582, up from 0.575 in 2021, but this still falls within the orange band performance category. The top-performing country in 2022 was Uganda with a score of 0.975, followed by Tanzania (0.937), Rwanda (0.896), Kenya (0.880) and Ghana (0.870) (see Figure 22).

The average RSI score (0.582) is lower than the average RGI score of 0.731, illustrating the continued gaps to be addressed regarding the regulators' ability to implement their mandates. Institutional capacity, which is a reflection of the knowledge, skills and experience of regulatory staff managing the sector, is an important indicator to assess the technical capacity of the authorities. Staff attrition is a major threat to the capacities of regulatory institutions; it can reduce the performance of a regulator within a very short time span. Regulators should prioritize recruitment and training to build and maintain the capacity of their organizations.

Figure 21: Regulatory Substance Index (RSI) Map 2022

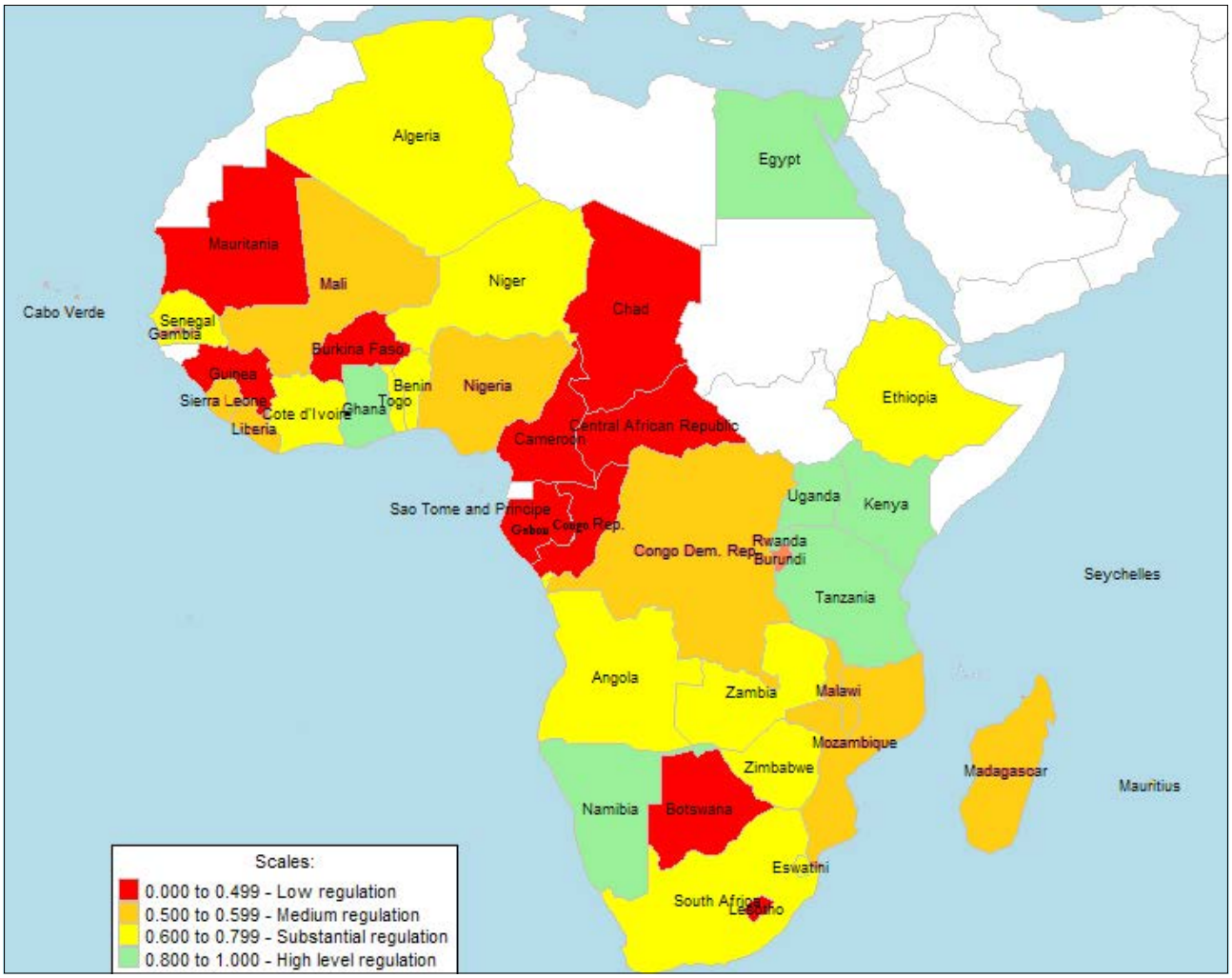
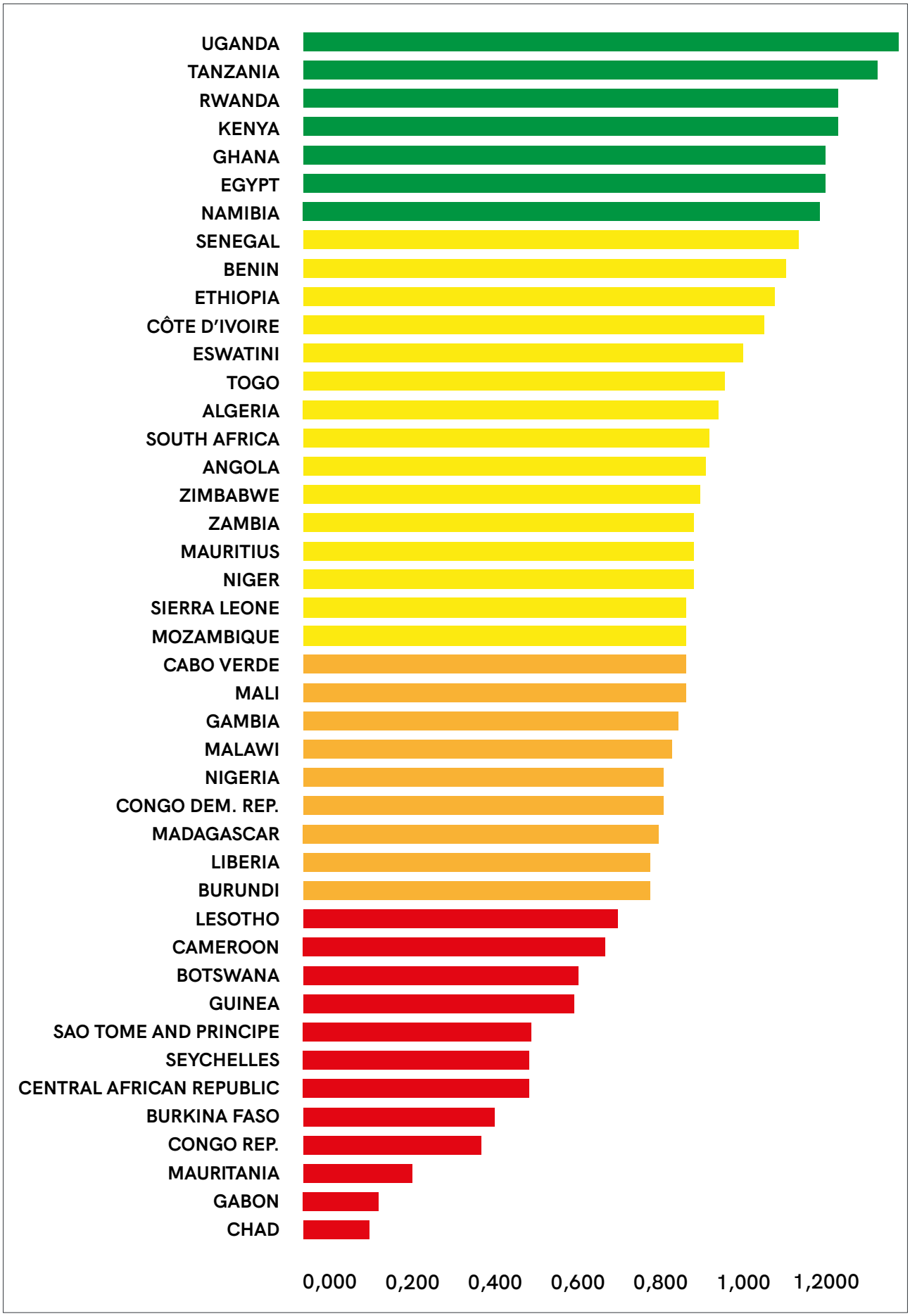


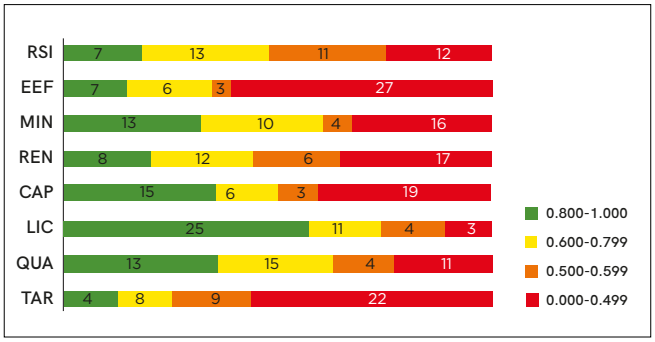
Figure 22: Regulatory Substance Index (RSI): Country Scores and Rankings



2.4.1 Breakdown of RSI Results

Figure 23 demonstrates the performance of countries by RSI indicators. The number of countries scoring below 0.500 indicates a significant need for improvement on the indicators of the RSI. Economic Regulation: Tariff Setting, Energy Efficiency Development and Institutional Capacity are the indicators with high numbers of countries scoring in the red band. This stems from limited staff expertise in economic, finance and tariff setting. Additionally, the implementation of tariff frameworks has been a challenge in many countries, due to both internal and external factors. Concerning Energy Efficiency, as this is an emerging technical area, this presents an opportunity for countries to integrate it into the regulatory frameworks of their electricity sector.

Figure 23: Number of Countries by RSI Indicators



Key: RSI =Regulatory Substance Index; EEF = Energy Efficiency Development; REN = Renewable Energy Development; TA= Tariff Setting; CAP = Institutional Capacity Development; LIC = Licensing Framework; QUA = Quality of Service Standards

Economic Regulation: Tariff-Setting. Economic regulation is the heartbeat of the electricity sector and one of the most important regulatory instruments to ensure industry sustainability. The Economic Regulation: Tariff-Setting indicator assesses whether the regulator has developed comprehensive tariff guidelines and methodology, to provide the appropriate schedules for major and minor tariff reviews or indexations. This not only gives advance notice to the regulated entities as to the information and reports that will be required of them periodically, but also gives consumers an idea of future tariff paths. The guidelines also give an indication to the utility of what kind of costs and expenditures are allowed through the tariffs at any time. If the guidelines are followed diligently, the utility could avoid revenue gaps that arise because of a refusal by the regulator to pass on unreasonable costs through the tariffs to consumers.

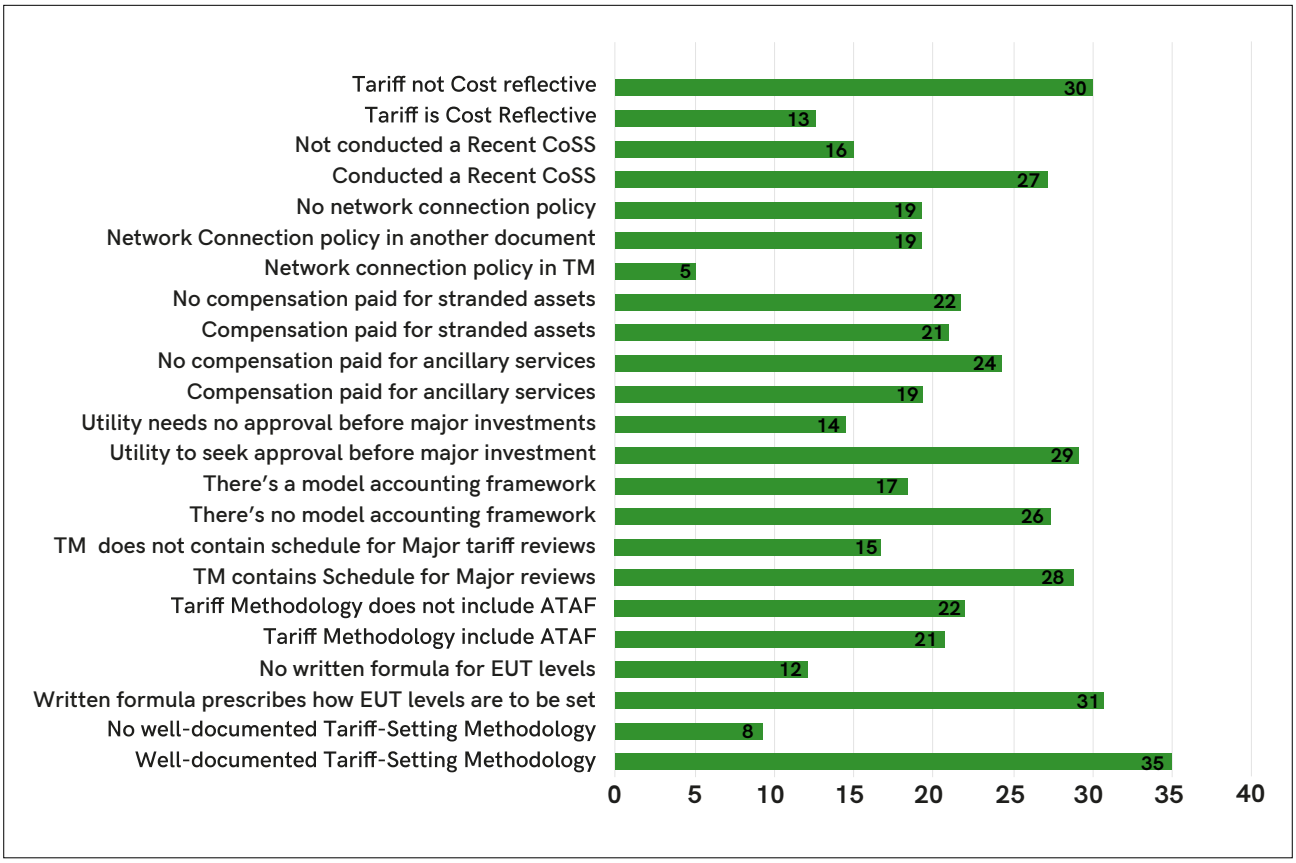
Well-developed economic regulation supports transparency and credibility of the tariff-setting regime and encourages investors to make long-term investments. In countries where the system is unbundled and an electricity market exists, consumers could also be motivated to sign long-term supply contracts with wholesale suppliers. Well-developed economic regulation also brings other benefits: (i) it incentivizes investors to make more commercially driven investments; (ii) it encourages competition in the electricity sector and (iii) it drives down electricity prices. A good economic regulatory regime will also include the development of tariff guidelines for grid-connected renewable energy systems and decentralized energy systems.

The ERI 2022 shows that the mean score obtained for Economic Regulation in 2022 was 0.482, which signals an improvement over the red-band average score of 0.452 recorded in ERI 2021. Best practice principles regarding economic regulations include but are not limited to:

- A well-documented Tariff Methodology with a schedule for major and minor tariff reviews, a formula for calculating end-user tariffs, and an automatic tariff-adjusting Formula,
- The development by the regulator of a model regulatory accounting framework for use by the utility in tariff application,
- Compensation for utilities for the provision of reserve capacity and other ancillary services,
- Compensation for assets that become stranded as a result of regulatory requirements,

- A requirement for the utility to seek approval from the regulator before making major investments,
- A network connection policy or regulation that allows connection of small or renewable plants to the network,
- Regular Cost of Service Studies (at least once every 5 years) to determine the true cost of operations of the utility and cost reflectivity of tariffs.

Figure 24: Number of Countries Showing Good Economic Regulation: Tariff Setting

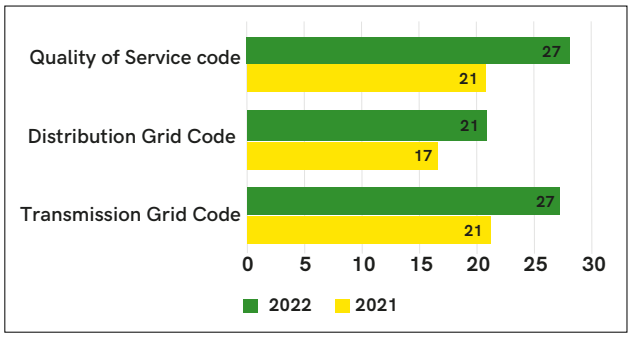


Overall, 21 countries scored 0.500 and above in economic regulation/tariff setting whilst 22 others came in the red zone. Four countries (Uganda, Egypt, Tanzania, Kenya) scored in the green zone. Eight countries (Rwanda, Liberia, Ghana, Namibia, Algeria, Cabo Verde, Mauritius and Cameroon) scored in the yellow zone.

The Technical Regulation indicator assesses whether and the extent to which 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 also provide details of penalties that are imposed 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 utilities that are connected to and use the national transmission system. The responses of the regulators with respect to the level of development of regulations on the use of the transmission grid shows that more countries developed regulations and codes between 2021 and 2022.

Figure 25: Number of Countries with Transmission Grid Code, Distribution Grid Code and Quality of Service Code, 2021-2022



The Distribution Code provides for the imposition of regulatory sanctions vis-à-vis poor performance in the System Average Interruption Frequency Index (SAIFI) and the System Average Interruption Duration Index (SAIDI). Operating licenses issued by the regulator require regulated entities to provide periodic reports on performance indicators to the regulator in all countries except Seychelles and Gabon.

The Licensing Framework indicator assesses whether the regulator has developed credible, workable and strict enough licensing procedures, requirements, and schedules to apply for and obtaining licenses, in order to operate in the sector. Electricity supply, transmission, distribution, and the sale and the provision of ancillary services to the electricity sector are regulated activities in all countries in the sample.

As decentralized energy solutions are expanding, it is important to develop procedures that will seamlessly enable the integration of mini-grids and stand-alone systems into the national electricity grid for power supply and exchange[5].

The ERI 2022 survey shows that all the countries in the sample (with the exception of Gabon, which has developed only simplified frameworks for off-grid systems) have licensing frameworks for both on-grid and off-grid systems. In 28 countries, the licensing framework was developed by the regulator, while in 14 others it was developed by other institutions. The licensing frameworks of 28 countries cover both off-grid and grid-connected systems, whilst 15 countries have only simplified systems 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 and the time involved in obtaining licenses or permits. It will also further reduce the cost of regulation for small off-grid operators. However, a complete waiver of the requirement for a license/permit must be avoided, as this could lead to a proliferation of sub-standard equipment, undermine accurate data collection, and jeopardize energy planning.

The results of the ERI 2022 survey revealed that licensing frameworks exist in all countries except Chad and Gabon. With an average score of 0.785, only three countries (Chad, Gabon and São Tomé & Príncipe) scored below 0.500. In 2021, Gambia and São Tomé & Príncipe reported that they did not have licensing frameworks but one year later Gambia had developed one and is now in the green band, having scored 0.800.

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 facilitate proper evaluation, planning, regulation and tariff-setting. Generally, the capacity of the regulatory institutions was reported to be above average. The average score in 2022 was 0.591, which is an improvement from 0.554 in 2021. The survey examined the availability of regulatory capacity in tariff-setting in the following areas: financial analysis; economic analysis; econometric analysis; financial modeling; tariff modeling; and legal issues in regulation. The results from the ERI 2022 survey are shown in Figure 26.

[5] Countries that have achieved universal access to electricity (Algeria, Egypt, Seychelles and Mauritius) may not require mini-grid electrification as a means of providing access to electricity.

Figure 26: Availability of Experts for Tariff-Setting: % of Respondents

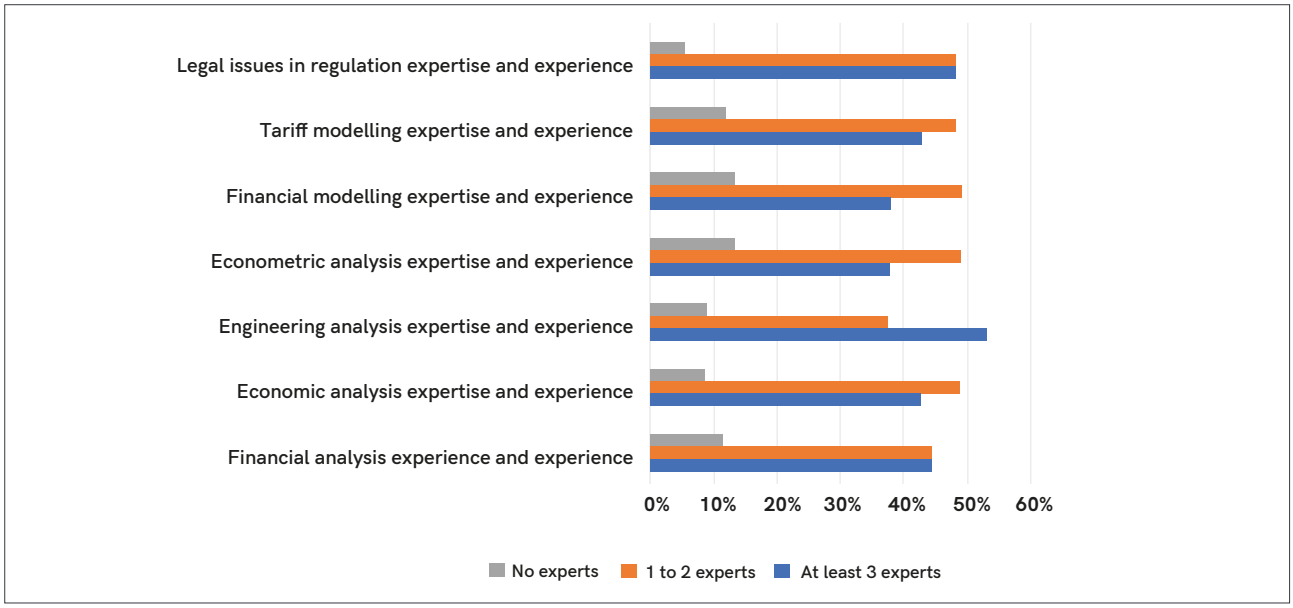
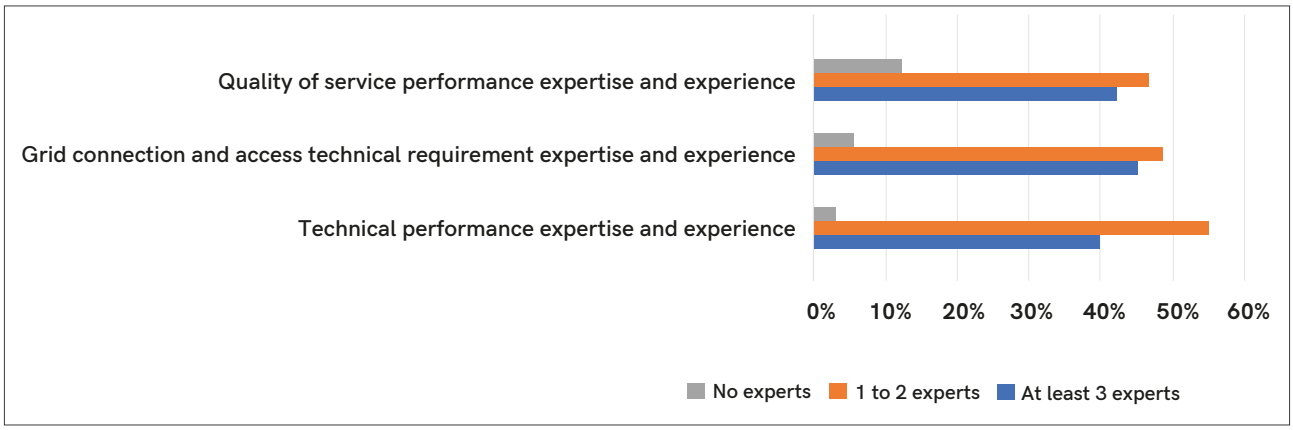


Figure 27: Availability of Experts for Technical Regulation: % of Respondents



The survey also examined the availability of regulatory capacity in key areas of Technical Regulation: namely technical performance, quality-of-service performance, and grid connection and access technical requirements (see Figure 27).

The Renewable Energy Development indicator assesses the extent to which a country has developed policy, legal and regulatory frameworks and mechanisms to support the growth of renewable energy (RE). Of the 43 countries surveyed, 36 reported that they had adopted RE policies and in 23 of these countries, the policy is backed by law. Twenty-seven countries had conducted RE Assessments, to inform the public on the commercial development of RE. Thirty- nine countries have specialized independent bodies that are responsible for the formulation, development and implementation of a Renewable Energy Strategy.

Thirty-seven countries have policies and strategies that encourage the private sector to participate in RE investments. Twenty-eight countries confirm the existence of Grid Codes that grant access for RE to the grid. Private sector participation arrangements or strategies are not available in Cameroon, Chad, Guinea, Lesotho, Mauritania, or São Tomé & Príncipe. Cameroon, Democratic Republic of Congo, Gabon, Gambia, Madagascar, Malawi and Mauritania have yet to appoint or establish such institutions. Fifteen countries have technology-specific Power-Purchase Agreement (PPA) models for different RE technologies (up from 5

in 2021) and 13 countries have different tariffs applicable for different technologies and sizes of RE installations.

There are specific provisions (in the Grid Code) that guarantee access to the grid for renewable energy in 29 countries. Moreover, electricity generated from RE and based on least cost is given priority dispatch in 26 countries. This provision is not available in 18 countries (Botswana, Burkina Faso, Burundi, Cameroon, Chad, Congo Republic, Côte d'Ivoire, Ethiopia, Gabon, Gambia, Guinea, Malawi, Mauritania, Mauritius, Rwanda, São Tomé & Príncipe, Seychelles and Zambia).

The Mini-grid and Off-grid Systems Development indicator assesses the level of development with regard to established policy, legal and regulatory frameworks, and mechanisms to support the growth of decentralized energy solutions in the country. The average score in 2022 was 0.566, down from 0.627 in 2021.

It must be stated, however, that countries that have achieved universal access levels to electricity may not need mini-grid electrification as a means of providing electricity service to their citizens. Countries that have achieved universal access have reported that they have specific programs aimed at ensuring access to electricity for isolated areas and vulnerable citizens.

There are National Electrification Plans that set out a least-cost electrification pathway, including grid, mini-grid, and off-grid systems; the plans clearly demarcate areas for each system. Twenty-four countries have integrated plans whilst six countries have only grid-connected systems as part of their electrification plans. Twenty-five countries have confirmed national programs for the development of mini-grids. Twenty-one countries have regulatory policies that clarify arrangements for the transfer of ownership and operations and for the maintenance of mini-grids when national grids envelope mini-grids, thus eliminating stranded asset situations.

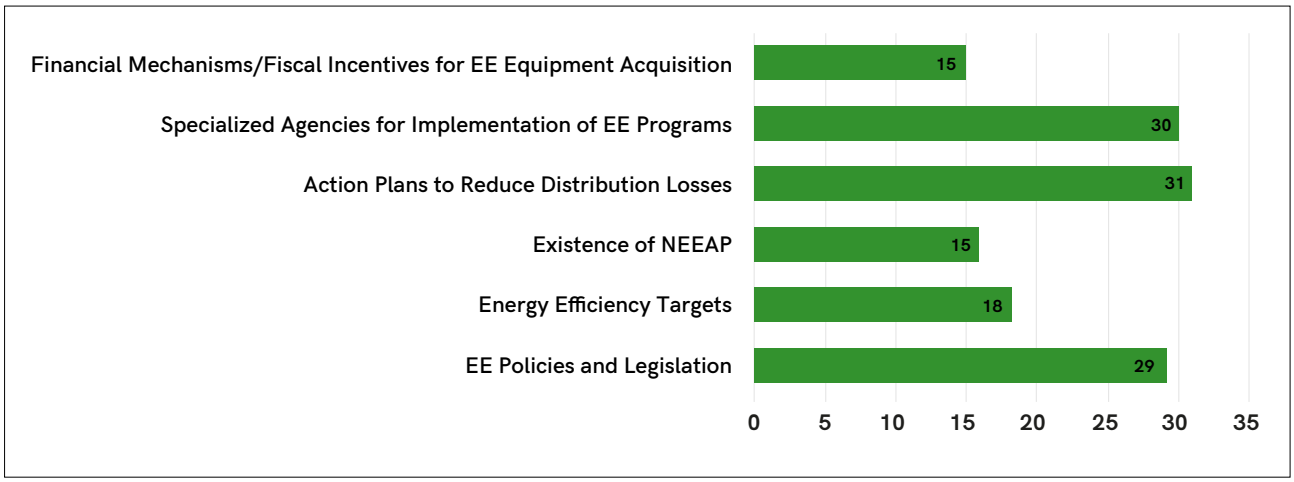
Twenty-five countries have confirmed regulatory policies that allow private mini-grids to sell mini-grid electricity to the grid. In 27 countries various incentives (including duty and other tax exemptions) are allowed for mini-grid development, while 20 countries offer capital subsidies, and 23 countries offer grants for mini-grid development. Technical/quality standards have been developed for mini-grids in 25 countries. Connection codes that specify technical standards for connecting mini-grids are available in 23 countries. Twenty-three countries have developed and operationalized mini-grid specific licensing/ registration regulations.

Mini-grids are reported to be part of Integrated National Electrification Plans in 24 countries, where both isolated and grid-connected mini-grid systems are covered. The National Electrification Plans cover only grid-connected systems in Botswana, Côte d'Ivoire, Namibia, São Tomé & Príncipe, Sierra Leone and South Africa. There are no National Electrification Plans in Algeria, Burkina Faso, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Gabon, Guinea Mauritania, Mauritius, Nigeria, Seychelles and Zambia.

There are national programs to support stand-alone systems in 24 countries. Incentives for the development of stand-alone systems include: duty exemption in 22 countries, capital subsidies in 14 countries, and grants in 14 countries. There are Quality Standards for stand-alone systems in 25 countries and Installer Certification is a requirement in 26 countries to ensure high standards. The lack of appropriate technical standards and a lack of regulatory frameworks for off-grid systems are salient reasons why most countries performed below average.

The Energy Efficiency (EE) Development indicator assesses the level of development with regard to established policy, legal and regulatory frameworks and mechanisms to support the growth of decentralized energy solutions in a country.

Figure 28: Number of Countries with Energy Efficiency (EE) Policies, Institutions, Programs and Action Plans, 2022



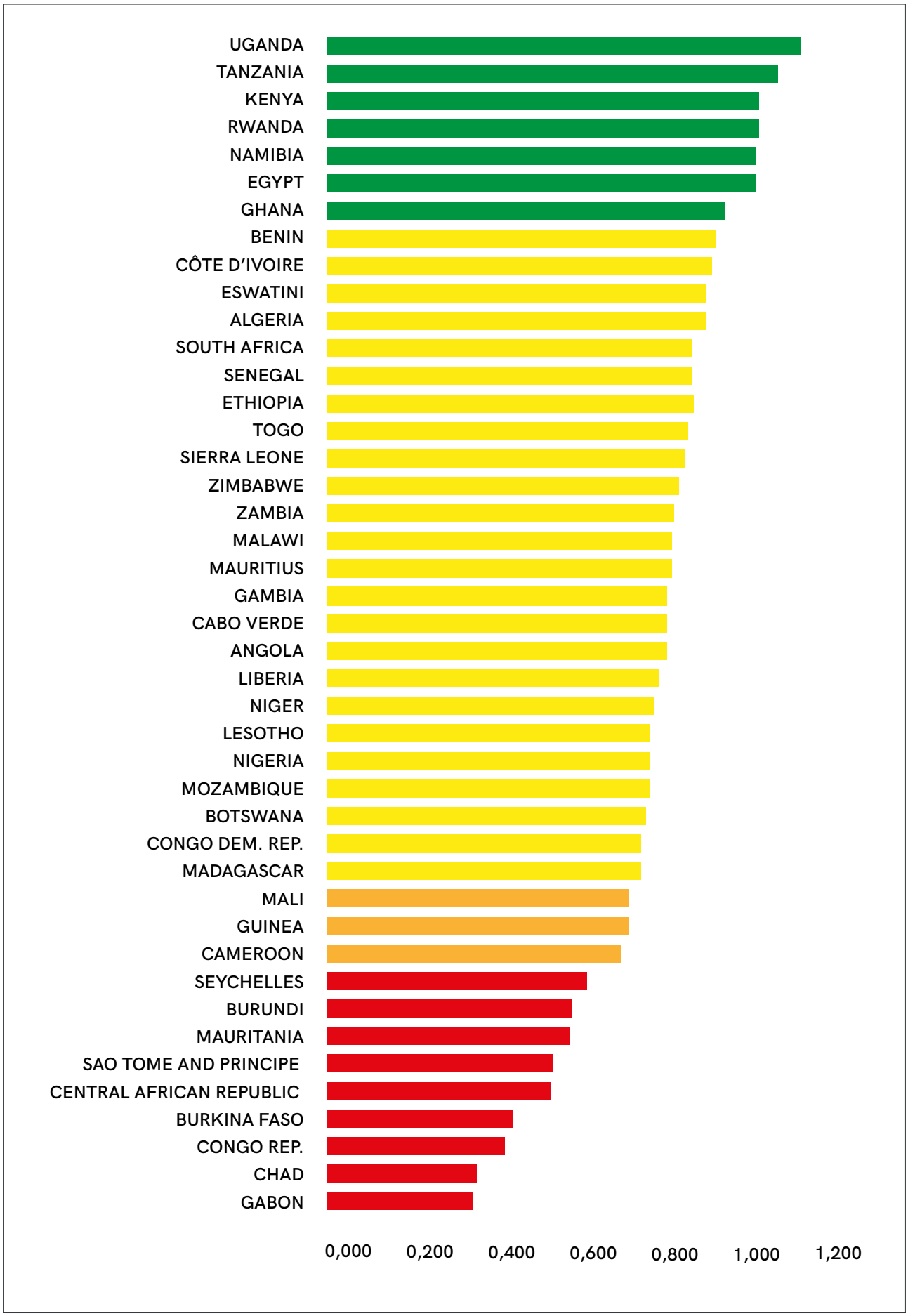
Key: EE = Energy Efficiency; NEEAP = National Energy Efficiency Action Plan.

Minimum Energy Performance Standards (MEPS) and labeling frameworks, which are very useful end-use tools for appliance energy efficiency, are operational in 25 countries. MEPS are yet to be developed and operationalized in 18 countries, namely Angola, Burkina Faso, Cabo Verde, Cameroon, CAR, Chad, Congo Republic, Gabon, Guinea, Lesotho, Madagascar, Mali, Mauritania, Mauritius, Niger, Nigeria, Sierra Leone and Zambia.

Eleven countries have requirements for periodic energy audits of heavy energy-consuming industries; this is to identify and correct all avenues of electricity waste. Seven countries (Algeria, Benin, Egypt, Ghana, Mauritius, Kenya and South Africa) have requirements for manufacturers and importers of electrical appliances to periodically report on the EE levels of their appliances. There are Building Codes in 18 countries and EE in buildings is required in 12 countries.

With the sole exception of Chad, all the countries in the survey sample report that they are signatories to the Paris Agreement. There is a Monitoring, Reporting and Verification Mechanism for greenhouse gases (GHGs) in 22 countries. The average score for EE is 0.444, up from 0.434 in 2021 but still in the red band.

Figure 29: Country Rankings according to the Regulatory Governance and Substance Index, 2022



2.5 Electricity Regulatory Governance and Substance Index (ERIGS)

The Electricity Regulatory Index for Governance and Substance (ERIGS) is calculated by averaging the aggregate scores on the Regulatory Governance Index (RGI) and the Regulatory Substance Index (RSI). Figure 29 shows 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 fulfil national objectives. The calculation of ERIGS also provides important insight into national regulatory development, without recourse to the effects of the regulatory actions and decisions on the sector.

2.6. The Regulatory Outcome Index (ROI)

The Regulatory Outcome Index (ROI) for utilities reflects how the regulator's actions and decisions impact the utility and consequently the sector (see Figures 30 and 31). It comprises three indicators: (i) Financial Performance and Competitiveness; (ii) Quality-of-Service Delivery (commercial and technical); and (iii) Facilitating Electricity Access.

Figure 30: The Regulatory Outcome Index (ROI) 2022

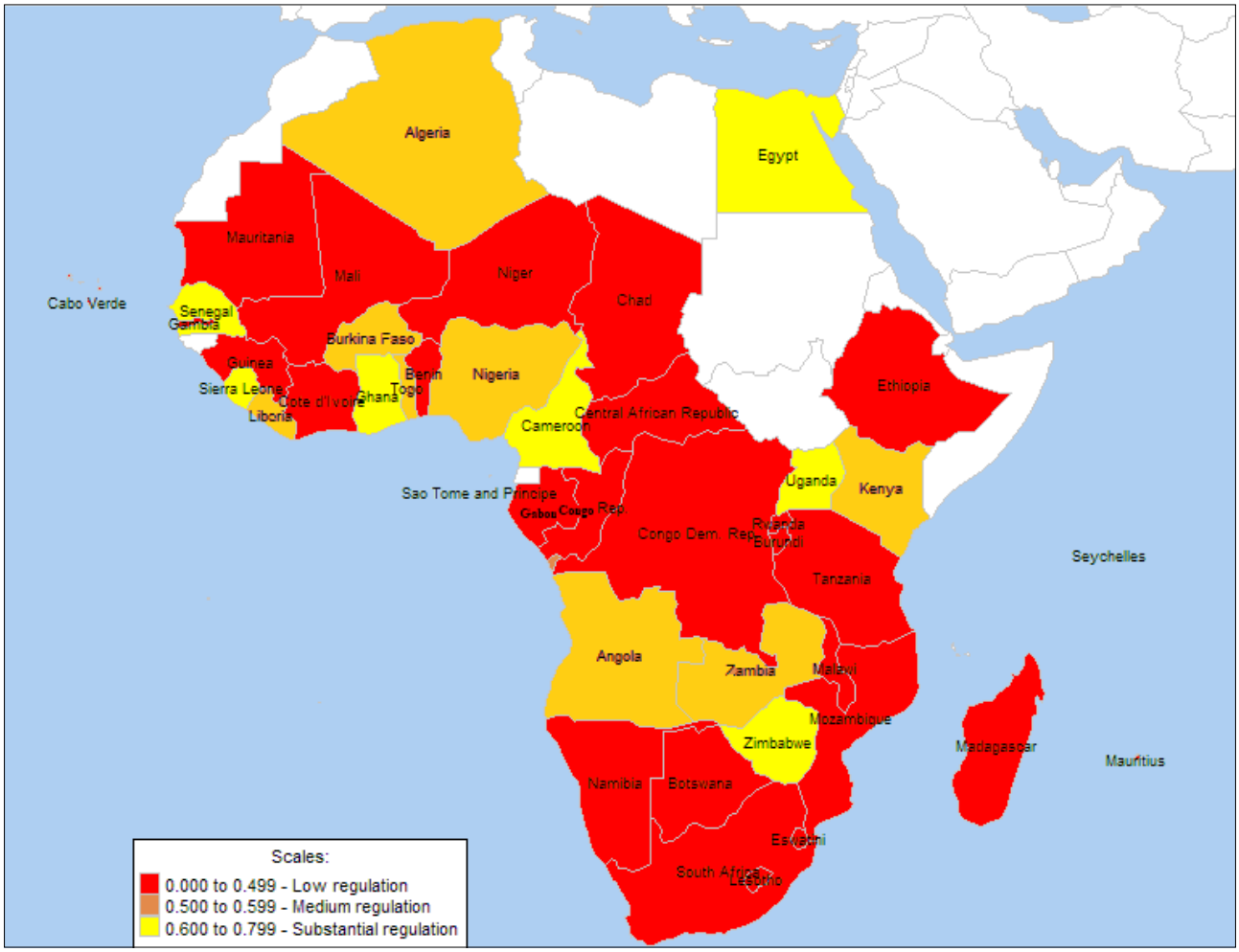
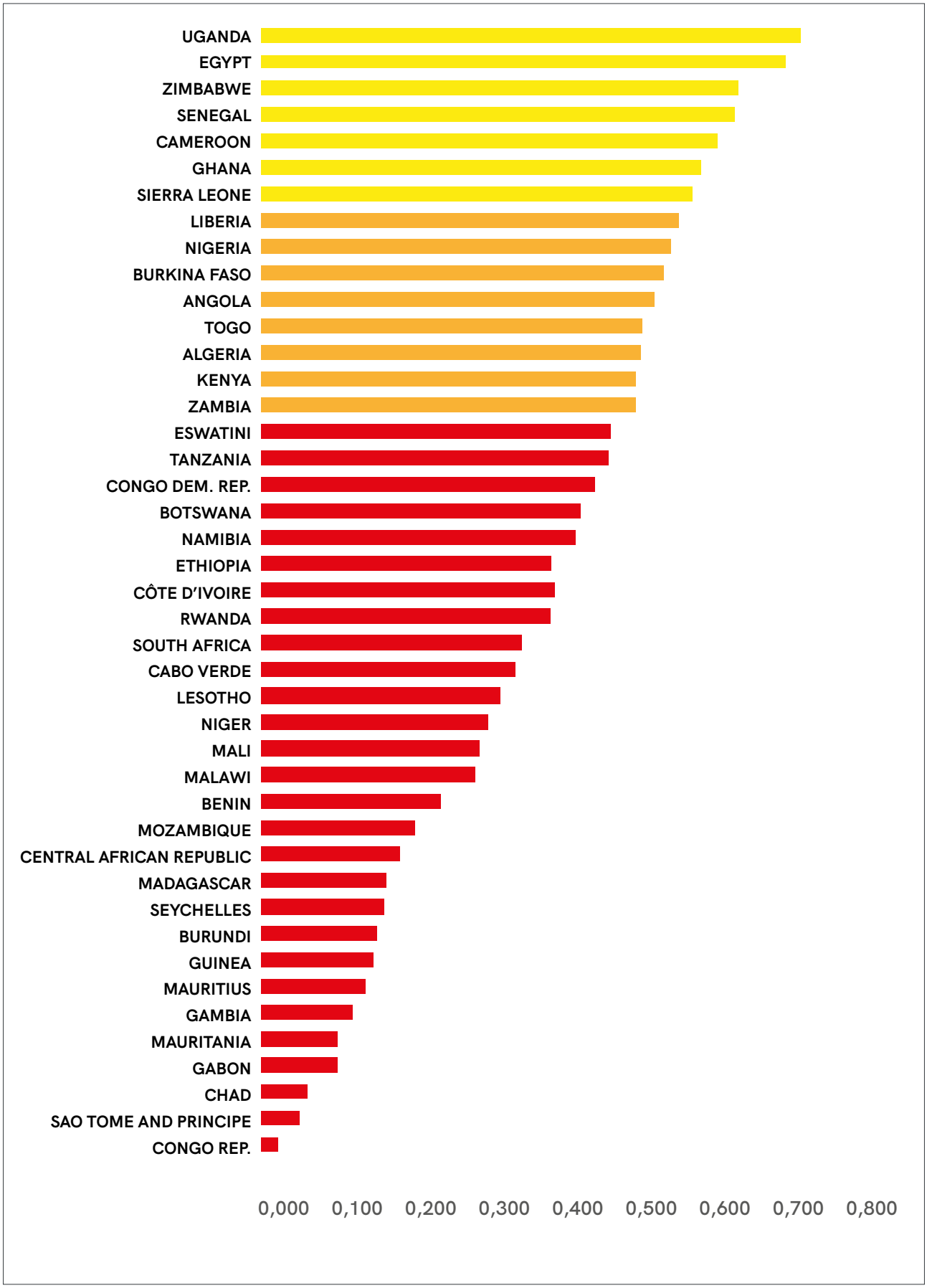


Figure 31: Country Rankings according to the Regulatory Outcome Index (ROI), 2022



With a score of 0.747, Uganda emerged as the top scorer in ROI. No country scored in the green zone. Six other countries, namely Egypt (0.745), Zimbabwe (0.678), Senegal (0.674), Cameroon (0.646), Ghana (0.625) and Sierra Leone (0.612) scored in the yellow zone whilst Liberia (0.595), Nigeria (0.584), Burkina Faso (0.575), Angola (0.553), Togo (0.542), Algeria (0.542), Kenya (0.537) and Zambia (0.533) scored in the orange zone. Twenty-eight countries, down from 33 in 2021, scored in the red zone. Average ROI improved from 0.339 in 2021 to 0.396 in 2022. Since 2018, 30 countries have either enacted or amended regulatory laws, regulations or codes to streamline the regulatory environment in accordance with ERI recommendations or international best practice. Annex 1 highlights certain actions taken by countries that have improved their performance on ROI.

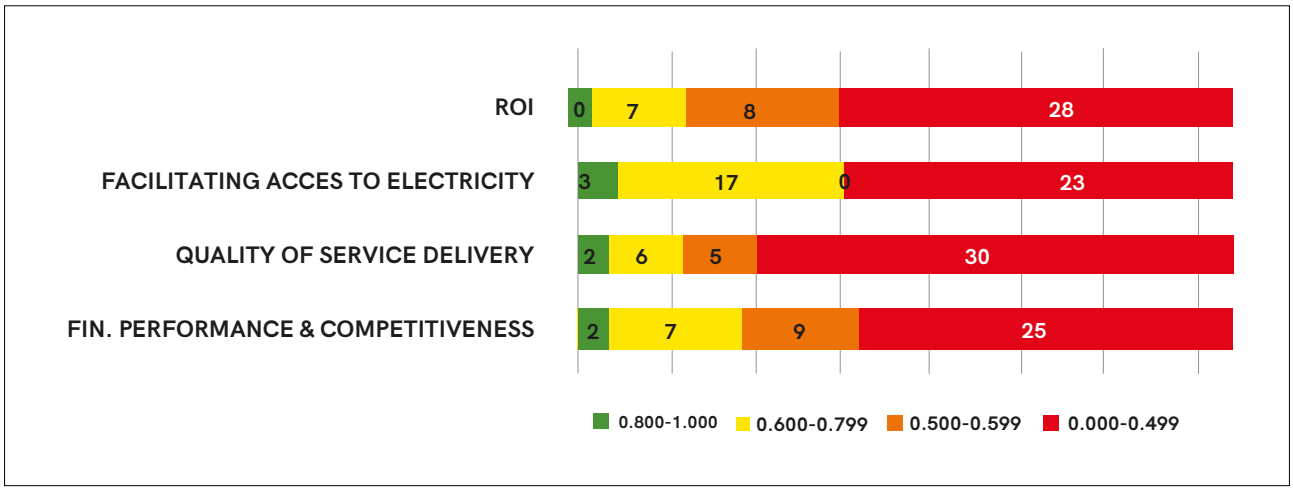
The regulatory measures that help to improve the ROI include:

- Conduct of a Cost-of-Service Study and implementation of the findings to ensure cost-reflective tariffs,
- Existence or development of appropriate Tariff Methodology and implementation of tariff schedules, including tariff indexation or application of the Automatic Adjustment Formula (AAF),
- Regulator and utility agreeing on a loss-reduction target and implementing measures to reduce losses,
- Regulator regulating Power Purchase Agreements (PPAs) and conditions therein,
- Regulator developing regulations and supporting the utility to reduce electricity theft,
- Regulatory requirement for the utility to record and report on SAIDI and SAIFI, the establishment of limits, and the application of financial incentives for achieving indices within the regulated range,
- Existence of customer service requirements with respect to the time needed for connection, reconnection etc., and
- Existence of regulatory requirements for the provision of access to electricity.

2.6.1 Breakdown of ROI Results for a Number of Countries

The ROI, from the utilities' perspective, was assessed across three indicators: (i) Financial Performance and Competitiveness; (ii) Quality-of-Service Delivery (commercial and technical); and (iii) Facilitating Access to Electricity (see Figure 32).

Figure 32: Number of Countries ranked by ROI Indicators, 2022



Financial Performance and Competitiveness (FPC) indicator. The Financial Performance and Competitiveness of the utility are affected by the cost of service and by operational inefficiencies (e.g. the level of technical and commercial losses and supply reliability). This is measured by the frequency and duration of outages and the responsiveness of the utility to customer calls and complaints. Poor service delivery by the distribution utility has the potential to reduce financial flows as dissatisfied consumers may be reluctant to pay for poor services. In extreme circumstances, clients may resort to court action to claim compensation for services denied or not provided and operational losses incurred.

Financial Performance and Competitiveness in ERI 2022 recovered slightly from the low average of 0.382 in ERI 2021 to an average of 0.431. Twenty-five countries scored less than 0.500 in FPC, indicating that addressing a utility's financial performance remains a challenge for many countries. Twenty-one of the 43 countries surveyed reported the existence of a Cost-of-Service Study (CoSS) conducted either by the regulator or by the utility and approved by the regulator. Utilities in 11 countries (Burundi, Chad, Democratic Republic of Congo, Guinea, Mali, Mauritania, Mozambique, Namibia, Rwanda, Seychelles and Sierra Leone) have conducted a CoSS for the utility's own use. Regulators and utilities in 12 countries (Botswana, CAR, Congo Republic, Côte d'Ivoire, Gabon, Gambia, Ghana, Madagascar, Mauritius, Nigeria, Togo and Zambia) have not conducted a CoSS in the last five years. Utilities in 27 countries confirmed the existence of their CoSS report, compared to nine in 2021. The CoSS is reported to have been implemented within the last 5 years in 16 out of 43 countries.

In terms of loss levels prevailing at the time of the survey, 16 countries reported losses below 20%, 17 reported loss levels between 20–30%, 6 reported loss levels of 30–40%, and 4 reported loss levels of over 40%.

Utilities from 19 countries stated that the regulator has established a schedule /timetable for tariff reviews. Sixteen countries reported that the regulatory authority always follows the schedule for tariff review. On the issue of electricity theft, 18 countries stated that there is a regulatory mechanism to deal with this problem.

The role of the regulator in supporting and monitoring the actions taken by the utility, including the setting of distribution loss reduction objectives, is of critical importance. It is imperative that the regulators establish justifiable regulations and cooperate with the utilities to implement measures that will improve financial performance and ensure cost recovery of their operations.

Quality-of-Service Delivery (Commercial and Technical) indicator. Technical Quality-of-Service refers to the technical aspect of power quality issues, particularly the continuity of supply, frequency control and voltage quality within set standards and thresholds.

The average score for this indicator is low at 0.322 but this is an improvement compared to the score of 0.280 recorded in 2021. Some improvements are listed below:

- The number of countries where there are regulatory ceilings on SAIDI and SAIFI set by the regulator increased from 13 in 2021 to 15 in 2022,
- The number of countries where SAIDI and SAIFI values are factored into an electricity tariff setting by the regulator increased from 5 in 2021 to 10 in 2022, and
- The number of countries where regulatory (financial) sanctions are imposed by law or regulatory instrument if the utility records SAIDI and SAIFI above the regulatory ceiling increased from 5 in 2021 to 8 in 2022.

Commercial Quality of Service refers to the non-technical aspect of a power supply service. It describes the relationship and interaction between power utilities and customers with respect to information on outages, meter readings and disputes, consumer account queries, response to consumer complaints, etc.

In 23 countries the regulator has developed QoS codes. In 16 countries, it is a regulatory requirement for the utility to undertake periodic technical audits of its facilities to establish the true state of affairs.

At least one area of customer service with respect to connections and service delivery is covered in the Quality-of-Service regulations/ codes in all countries except Angola, Botswana, Cabo Verde, Chad, Congo Republic, Mauritius and São Tomé & Príncipe. The technical quality of the 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), which is derived from SAIFI and SAIDI, should also form part of the Quality-of-Service performance reports submitted to the regulator.

Facilitation of Electricity Access (FEA) indicator. Energy, including electricity, is one of the most important factors of production, while access to electricity is crucial for poverty reduction and economic development. African governments are committed to increasing electricity access rates, particularly in rural and underserved areas. The average score for the FEA indicator in the ERI 2022 is the highest of the three ROI sub-indicators, at 0.434, up from 0.363 in 2021. This is mainly due to the number of countries providing evidence of the existence of regulatory mechanisms that are in place aimed at providing access to electricity.

At the operational level, it is important to expedite new electricity connections as part of a country's electrification efforts. In 2022, 24 countries (up from 20 in 2021) reported the existence of a regulatory ceiling for the number of days a utility is allowed in order to effect an electricity connection to customers after they have made payments. Confirmation on this was received from Botswana, Liberia, Madagascar, Mozambique and Zambia. By contrast, the findings from 11 countries (Burundi, Chad, Congo Republic, Gabon, Gambia, Mauritania, Mauritius, Niger, São Tomé & Príncipe, Seychelles and South Africa) revealed the absence of mechanisms to facilitate electricity access. This could, however, be due to the achievement of universal access rates in some of these countries.

Eighteen utilities (up from 17 in 2021) reported in 2022 that the regulator makes provision in the tariff for investments of NGOs, governments and customers to be recovered through the tariffs, in line with best practice. Regulatory reforms should, therefore, be designed to reduce barriers to investment and to attract both foreign and domestic private sectors. The aim being to provide electricity access to rural and isolated communities, including through mini-grids and stand-alone systems. Examples of incentives could be mechanisms to buy out investments in mini-grids, in the event that grids are extended to off-grid areas before affected mini-grid developers/investors have recouped their investments.

III. Trend Analysis of Ugandan and Namibian Regulatory Systems[6]

This section provides a trend analysis of the three ERI composite indices from 2018–2021. It explores the evolution and trajectory of regulation, as well as the underlying reasons for improvements or declines. The analysis is based on statistical data and questionnaires collected over the same period, as well as findings from the African Regulator's Peer Review and Learning Network (PRLN).

A new addition to this series of the 2022 ERI are highlights of the PRLN[7] findings from two of the participating countries, namely Uganda and Namibia. The findings reflect the de jure[8] and de facto[9] realities of a 2022 evaluation of Uganda's regulatory systems, based on an in-depth focus group discussion by participating CEOs over a one-week period. The peer review follows the approach defined by Brown et al. (2006)[10] for the evaluation of infrastructure regulatory systems.

3.1 Uganda's Electricity Regulatory Index (ERI) Trend Analysis

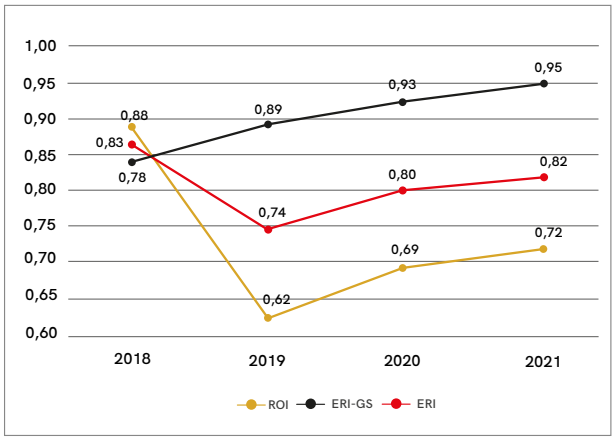
From 2018 to 2022, Uganda has ranked first in the country's ERI Survey. During this period the ERI registered a decline in 2019 followed by a recovery in 2020 and 2021, ending at the same level as 2018. Table 3 below shows Uganda's scores across ROI, ERIGS and ERI indices from 2018 to 2021.

Table 3: ROI, ERIGS, and ERI Indices in Uganda 2018–2021

	ROI	ERI-GS	ERI
2018	0.88	0.78	0.83
2019	0.62	0.89	0.74
2020	0.69	0.93	080
2021	0.72	0.95	0.82

The data shows that this aggregated temporal pattern is the result of differing behaviors in its two components: the Regulatory Outcome Index (ROI) and the Electricity Regulatory Index for Governance and Substance (ERIGS). Graphical analysis in Figure 33 shows the evolution of the ERI, ROI and ERIGS from 2018 to 2021.

Figure 33: Evolution of ERI Components in Uganda, 2018–2021



The ERI´s pattern over this period results from the combination of two very different evolutions of ROI and ERIGS. ROI shows a strong decline between 2018 and 2019 (from 0.88 to 0.62)

[6] Special report prepared by Dr. Peter Twesigye and Dr. Martin Rodriguez Pardina through the Power Futures Lab, Graduate School of Business, University of Cape Town.
[7] The PRLN is a dedicated capacity-building program by the Power Futures Lab at the University of Cape Town, which provides experiential learning for 6 African Regulator CEOs and aims to improve their leadership and managerial capability, leading to improved electricity infrastructure industry performance. The exercise benchmarks regulatory performance and progressively improves the credibility, transparency and robustness of regulatory decision-making. Current participating countries are Ghana, Kenya, Mozambique, Namibia and South Africa.
[8] Formal regulatory rules on paper.
[9] Informal practice of those regulatory rules.
[10] A.C. Brown, J. Stern, B. Tenenbaum with D. Gencer (2006), Handbook for Evaluating Infrastructure Regulatory Systems. Washington, D.C.:World Bank Publications.

followed by a gradual recovery in 2020 and 2021 but without reaching its previous level. The decline in ROI[11] was due to the inadequate revenue requirements allowed to the utility, emanating from sales growth revenue deductions and extensive CAPEX reconciliations out of the rate base. The ERIGS, on the other hand, follows a continuous upward trend from 0.78 in 2018 to 0.95 in 2021, largely because of the new regulations and tools that were developed as well as capacity building programs for regulatory staff. The combination of these two indices in the ERI resulted in a decline in 2019 (as the fall in ROI outweighs the increase in ERIGS), followed by a steady increase in 2020 and 2021. The drivers of improvements are further explained by the African Electricity Regulator Peer Review and Learning Network (PRLN) findings in the RGI, RSI and ROI sections below.

3.2 Uganda's Regulatory Governance Index (RGI) Trend Analysis

The Regulatory Governance Index (RGI or ERI-GS) is a composite index defined as the arithmetic mean of its eight indicators, namely: Accountability (ACC), Independence (IND), Legal Mandate (LEG), Open-access to Information (OPE), Participation (PAR), Predictability (PRE), Clarity of Roles and Objectives (ROL), and Transparency (TRA). The annual values for each of the indicators are shown in Table 4.

At the aggregated level, the RGI for Uganda shows a constant upward trend rising from 0.80 in 2018 to 0.95 in 2021. This was due to the development of over eight new regulations and instruments used to govern the operations of the electricity sector. This is commendable governance, considering that enacting new laws/regulations usually takes a long time.

Table 4: Uganda's Regulatory Governance Index (RGI) and its Indicators, 2018–2021

Indicator	Code Indicator	2018	2019	2020	2021
Accountability	ACC	0.67	1.00	0.78	0.93
Independence	IND	0.59	0.70	0.82	0.77
Legal Mandate	LEG	1.00	1.00	1.00	1.00
Open Access to Information	OPE	0.40	0.63	1.00	1.00
Participation	PAR	1.00	1.00	1.00	0.95
Predictability	PRE	0.83	0.87	0.80	0.95
Clarity of Roles & Objectives	ROL	0.89	1.00	1.00	1.00
Transparency	TRA	1.00	1.00	1.00	1.00
Regulatory Governance Index	**RGI**	**0.80**	**0.90**	**0.92**	**0.95**

Considering the whole period, all indicators show an increase or a constant value, with the single exception of Participation (PAR), which decreased slightly (from 1 to 0.95). Strong improvements were achieved in Open Access to Information (OPE) (from 0.40 to 1) and de jure Independence (IND) (from 0.59 to 0.77). By 2021 most indicators were showing high values, although there is still some room for improvement, mainly in ACC, IND, PAR and PRE. It is worth pointing out that, despite this general improvement, between 2020 and 2021 there was a slight decline in Regulatory Independence (IND). This is explained by the de facto findings of the peer review and learning network, which points to a potential risk of political influence to re-bundle the sector and exert pressure to conform to political ideals for expanding access. Regardless, Uganda has a sound legislative framework for regulation and its governance is robust. The leadership of Uganda's Electricity Regulatory Authority (ERA) is strong, with a performance-oriented organizational culture and capable staff, making ERA an employer of choice.

[11] ROI is assessed from feedback from regulated utilities, in this case Umeme Ltd.

3.3 Uganda's Regulatory Substance Index (RSI) Trend Analysis

The Regulatory Substance Index (RSI) is a composite index defined as the arithmetic mean of its indicators, namely: Licensing Framework (LIC), Mini-grid and Off-grid Systems (OFF), Technical Regulation: Quality of Service (QoS), Renewable Energy Development (REN), Economic Regulation: Tariff-Setting (TAR), Institutional Capacity (CAP), and Energy Efficiency Development (EED). The annual values in Uganda for each one of the indicators are shown in Table 5 below.

At the aggregated level, the Regulatory Substance Index for Uganda shows a constant upward trend rising from 0.77 (2018) to 0.94 (2021). A trend analysis of the RSI indicators shows improvements from 2018 to 2021 in Economic Regulation and Tariff setting (TAR), Mini-grid and Off-grid Regulations (OFF), and Technical Regulation for Quality of Service (QoS) (see Table 5). Uganda's strong RSI from the peer review exercise is largely due to it being the only country in Africa that publishes regular updates of the tariffs of all its generation units. This underscores its transparency, both for government and other stakeholders by providing an understanding of costs, which can then inform choices. By 2021 the three mentioned indicators (TAR, OFF and QoS) scored the full mark of 1.0, while improvement was also registered in Energy Efficiency Development (EED), which scored 0.93 in 2021. There was, however, a decline in institutional capacity (CAP) from 1.0 in 2020 to 0.76 in 2021, which the peer review exercise attributed to a delayed regulatory framework for stand-alone home systems and a grid code that requires updating to cater for new innovations like battery storage. Despite this slowdown, Uganda still achieved the highest score (above the average for Africa) in RSI of 0.575 in 2021 (AfDB ERI, 2021).

Table 5: Uganda's Regulatory Substance Index (RSI) and its Indicators, 2018–2021

Indicator	Code Indicator	2018	2019	2020	2021
Licensing Framework	LIC	1.00	0.90	1.00	1.00
Mini-grid and Off-grid Systems	OFF	0.50	0.80	1.00	1.00
Technical Regulation: Quality of Service	QoS	0.81	0.80	1.00	1.00
Renewable Energy Development	REN	1.00	0.60	0.83	0.89
Economic Regulation: Tariff-Setting	TAR	0.85	1.00	0.92	1.00
Institutional Capacity	CAP	-	-	1.00	0.76
Energy Efficiency Development	EED	-	-	0.86	0.93
Regulatory Substance Index	**RSI**	**0.77**	**0.87**	**0.94**	**0.94**

To analyze the extent to which the indicators are causing the annual variation of the RSI, we have computed the annual variation of the composite index and its indicators. The results show a strong improvement in Mini-grid and Off-grid Systems (OFF) and in Economic Regulation: Tariff Setting (TAR).

3.4 Uganda's Regulatory Outcome Index (ROI) Trend Analysis

The Regulatory Outcome Index (ROI) declined significantly in 2019, from a high-performance score of 0.88 in 2018. The peer review and learning network exercise established this to be due to revenue requirement reductions for licensed utilities and significant CAPEX reconciliations from the regulated asset base, which utilities claim would have been used to expand distribution lines for access. Access remains very low by regional standards and the regulator was encouraged to set aggressive targets in the concessions and to facilitate the mobilization of funds from the government, DFIs and grants. Subsequently, the Uganda ROI improved to 0.72 in 2021 but was still lower than in 2018, despite this being a top score on the continent (see Figure 34).

Figure 34: Uganda's Regulatory Outcome Index (ROI) Trend, 2018-2022

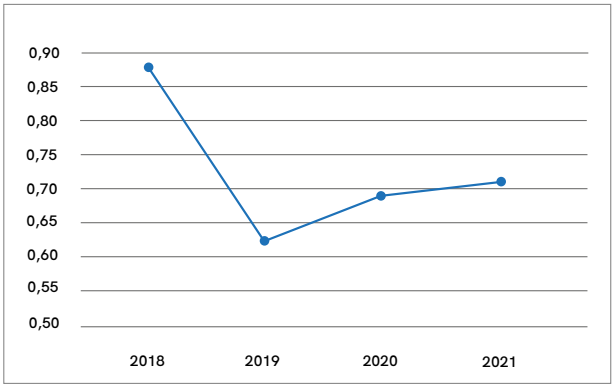
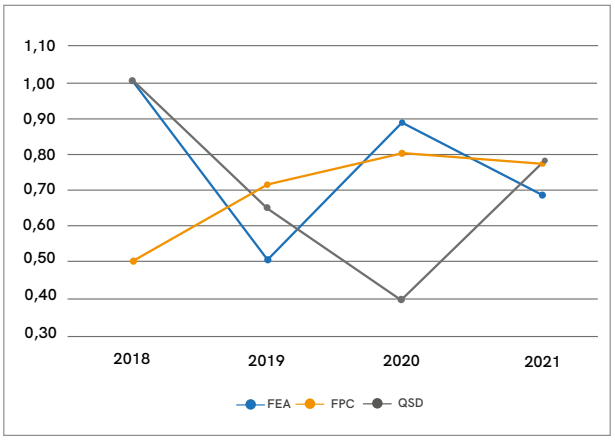


Figure 35: ROI Indicator Trends for Uganda, 2018-2021

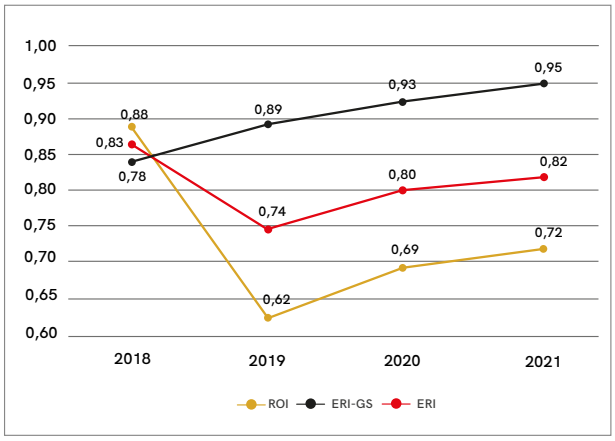


The analysis of ROI indicators (Figure 35) shows a general declining trend in Facilitating Electricity Access (FEA) and Quality of Service Delivery (QSD), while there is evidence of an observable stagnation of the Financial Performance and Competitiveness index (FPC) The three indicators show distinctive patterns. While the FPC grows consistently over the three periods; the FEA shows a saw-tooth pattern with declines in 2019 and 2021 and an increase in 2020, and the QSD has a V pattern of two consecutive falls followed by a partial recovery at the end of the period.

3.5 Namibia's ERI Trend Analysis

This section presents a trend analysis of Namibia's ERI for the 2018-2021 period, which shows a decline from 0.81 to 0.66 (see Table 6). Survey questionnaires and peer review findings reveal this to be due to a lack of decision-making independence in tariff and license approvals. There is no fully constituted Board of Directors, no term limits and no law that prohibits a regulatory board member or staff or former CEO from taking a position in a regulated entity. Given the composite nature of the ERI, in order to understand its evolution we need to look at its constituent indicators. Figure 36 shows that there is room for improvement of both indicators, particularly the ROI, to get closer to an overall score of 1.

Figure 36: Evolution of Namibia's ERI and its Indicators, 2018-2021



Namibia´s ERI trend follows the path of the Regulatory Outcome Index (ROI), in that it also shows a saw-tooth pattern with decreases in 2019 and 2021, with an increase in 2020. The ERI-GS on the other hand shows a continuously increasing trend throughout the period. Despite the upward trend in the ERI-GS index (comprising the average scores of indicators for RGI and RSI), the ROI is declining, leading to a decline in the overall Electricity Regulatory Index (ERI).

3.6 Namibia's Regulatory Governance Index (RGI) Trend Analysis

De jure governance improved from a score of 0.76 in 2018 to 0.90 in 2021 mainly because of the regulator's legal mandate to oversee the sector, transparency and the clarity of roles and objectives. Table 6 shows the annual values of RGI indicators over the 2018-2021 period.

Table 6: Namibia's RGI and its Indicators, 2018–2021

Indicator	Code Indicator	2018	2019	2020	2021
Accountability	ACC	0.35	0.75	0.33	0.70
Independence	IND	0.54	0.57	0.48	0.66
Legal Mandate	LEG	1.00	1.00	1.00	1.00
Open Access to Information	OPE	1.00	0.75	1.00	1.00
Participation	PAR	0.63	1.00	0.93	0.95
Predictability	PRE	0.92	0.87	0.80	0.91
Clarity of Roles & Objectives	ROL	1.00	1.00	1.00	1.00
Transparency	TRA	0.67	1.00	1.00	1.00
Regulatory Governance Index	**RGI**	**0.76**	**0.87**	**0.82**	**0.90**

All indicators show a positive increase for the aggregated period. There was a general growth or maintenance of the level in almost all indicators but there is still room for improvement, particularly in Accountability and Independence. These two indicators, according to the Peer Review and Learning Network (PRLN) findings, are directly and heavily influenced by the Ministry of Mines and Energy for necessary approvals. The regulator, however, is lauded as a training ground for skilled industry staff. Whereas the country is to be congratulated for being the first on the continent to implement the Modified Single Buyer (MSB) power-market model decisions, currently there is no enacted legislation for its operationalization. For this reason, caution should be taken not to expose the sector to legal and financial risks.

3.7 Namibia's Regulatory Substance Index (RSI) Trend Analysis

The de jure RSI trend analysis for Namibia is on a growth trajectory, having improved from a score of 0.79 in 2018 to 0.82 in 2021. Table 7 shows the trend for the RSI indicators over the 2018–2021 period.

Table 7: RSI Indicator Trends for Namibia, 2018–2021

Indicator	Code Indicator	2018	2019	2020	2021
Licensing Framework	LIC	1.00	0.50	0.67	0.80
Mini-grid and Off-grid Systems	OFF	0.13	0.67	0.83	0.96
Technical Regulation: Quality of Service	QOS	0.88	0.90	0.86	0.93
Renewable Energy Development	REN	1.00	0.60	0.83	0.89
Economic Regulation: Tariff-Setting	TAR	0.71	0.81	0.77	0.77
Institutional Capacity	CAP	-	-	1.00	0.76
Energy Efficiency Development	EED	-	-	0.51	0.61
Regulatory Substance Index	**RSI**	**0.79**	**0.72**	**0.78**	**0.82**

Despite systematic improvements in almost all indicators from 2019 to 2021, none of them scored the maximum points in 2021. The peer review identified the lack of final independence in licensing and tariff approvals and a lack of incentives for efficiencies/loss reduction which undermine economic regulation. Institutional capacity in monitoring transmission networks and regional electricity distributors (REDs) and in enforcing standards in the expansive country is low.

3.8 Namibia's Regulatory Outcome Index (ROI) Trend Analysis

The Regulatory Outcome Index exhibits a sharp and declining trend from a score of 0.87 in 2018 to 0.51 in 2021 (see Figure 37). The decline, as noted from the Peer Review and Learning Network (PRLN), is largely attributed to inadequate results in the Financial Performance and Competitiveness (FPC) sub-index, especially

because of insufficient revenue requirements for regional electricity distributors (REDs). It appears that most distributor tariffs are not fully cost-reflective; consequently REDs are skimping on CAPEX refurbishment and maintenance, ultimately running down assets. Second, there is inadequate prioritization of electricity access, and some REDs and local authorities are not incentivized to ramp up aggregated homestead connections despite the country being less populated. Access is low and requires more ambitious targets and investments. While there are capability challenges for smaller REDs and local authorities in running operational services in a viable fashion, the enforcement mechanisms for regulatory compliance and current methodologies do not incentivize efficiencies and technical improvements. Overall, the Quality-of-Service sub-indicator needs to be improved as well as the Access and Financial Sustainability of Distributors, as illustrated in Figure 38.

Figure 37: Namibia's ROI Trend, 2018-2021

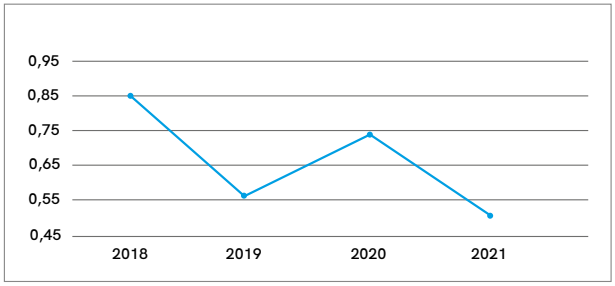
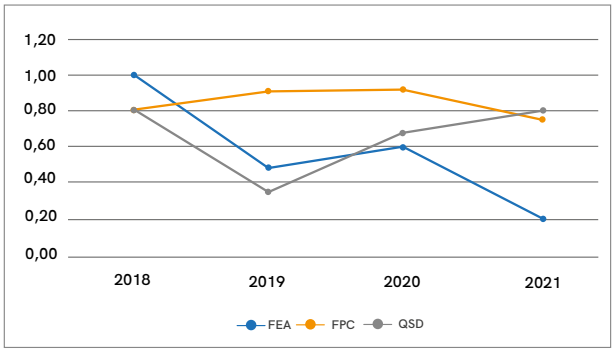


Figure 38: Namibia's ROE Sub-Indicator Trends, 2018-2021



3.9 Summary

Uganda. In conclusion from the above analysis, Uganda continues to perform well with strong and robust regulatory governance and substance frameworks. However, there is still room to improve its regulatory independence to avoid succumbing to political influence to achieve social objectives. In short, Uganda lacks prescribed rules to guarantee the financial sustainability of the sector. It also needs to improve its institutional capacity to prepare for regulating new innovations like battery storage and a more complex grid system operation, which will include variable renewable energy sources. Further effort is needed to facilitate funding programs for improved access and electrification, if Uganda is to emulate what sister countries in the region have achieved.

Namibia still has significant governance challenges to overcome, especially in regard to: (i) in insulating the regulator from line ministry political interference and approvals, (ii) institutionalizing and legalizing the powers of its Board of Directors, (iii) improving the transparency re the selection of the Board and filling existing vacancies at the Board and (iv) ensuring a legal framework for the Modified Single Buyer (MSB) is promulgated in a timely manner. There is also a need to review the monopoly power exercised by the incumbent NamPower, in order to allow faster interconnection of Independent Power Producers (IPPs). Further effort is needed to improve access with ambitious targets, as well as to provide technical and financial incentives for Regional Electricity Distributors (REDs) to guarantee their financial sustainability for the long term.

A key takeaway from this exercise is that the ERI is a good regulatory impact assessment tool for Africa. However, it needs to be continuously improved to reflect de facto scenarios of regulatory governance, substance and impact. Collaborations with institutions like the Power Futures Lab at the University of Cape Town, who facilitate the Peer Review and Learning Network (PRLN) should be strengthened to bring mutually beneficial revelations of the changing regulatory landscape and environment in Africa.

IV. Recommendations

4.1 Improving Regulatory Governance

Legal mandate and clarity of roles. In each country, an electricity law must establish the regulatory authority to empower and give more credibility to this institution in the electricity sector. Establishing a regulator by an act of the legislature along with robust energy sector laws provides strong safeguards, ensures higher credibility, and boosts investor and consumer confidence. The law must also clarify the roles and the objectives of the regulator to remove any ambiguity with regard to the mission of the other stakeholders.

Independence. The independence of the regulatory authority covers several aspects. The results of the survey have shown that the executive appoints regulatory authority commissioners and the CEO in 31 countries. In almost all the countries (35), it is possible for commissioners or the CEO to be appointed even if they have previously held a position at the utility company, and without any cooling-off period. Best practice recommends that the executive shall not be represented on the boards of the regulatory authority and that the executive must not appoint the commissioners. Commissioners must be recruited by a transparent and competitive process to avoid any influence from the executive. Moreover, a cooling-off period of at least two years should be observed by an applicant from leaving a regulated utility to becoming a member of the regulatory authority board.
Concerning licenses, most of the regulators are not the final decision-makers but advisors to the ministries. Some regulatory authorities continue to receive financial transfers from the government as major resources of their budget. In order to safeguard the financial independence of the regulator, the major sources of the regulatory authority's budget should come from the fees levied from utilities and from license fees.

Public or stakeholders' consultations need to be carried out prior to the regulator's decisions. Nineteen countries out of the 43 surveyed are still ranked below the average in terms of the independence of the regulator.

Accountability. In 32 countries of the 43 assessed, the regulators present the annual report to the executive (through the sector minister), but sometimes this report is not disseminated to the public. The regulator's annual report should be presented to the parliament and be disseminated to the public. The regulatory framework must enable stakeholders to contest or challenge regulatory authority decisions. Mechanisms should be in place to help ensure that regulators behave in accordance with the legal mandate with which they were established.

Transparency. . Scores in 11 countries out of the 43 assessed are still in the red band for the Transparency indicator. The publication of the regulatory documents and the access to the decision-making process are not mandatory in those 11 countries. Regulatory authorities must make the decision-making process accessible to the stakeholders (for example, by setting the tariff process); furthermore the regulatory documents have to be published. A great deal of effort has been expended by countries to improve their Transparency score, but this needs to be scaled up.

Predictability. In the case of the Predictability Indicator, the main elements sought are the Tariff Methodology and then the Licensing procedures. The Tariff Methodology must contain the sequence of the process which leads to the publication of the tariff to the end user. From 13 countries without a Tariff Methodology in 2021, this had reduced to 8 in 2022. Moreover 33 countries have documented procedures for obtaining or securing licenses. Table 8 shows the major elements of price changes.

Table 8: Major Elements for Price Changes in Tariffs

Periods: duration ranging from 3 to 5 years	1st Period	2nd Period	3rd Period	4th Period	5th Period
Nature of calculation elements	They are medium and long term: Macroeconomic indicators, formulas, deadlines	They are medium and long term: Macroeconomic indicators, formulas, deadlines	They are medium and long term: Macroeconomic indicators, formulas, deadlines	They are medium and long term: Macroeconomic indicators, formulas, deadlines	They are medium and long term: Macroeconomic indicators, formulas, deadlines
Origin of calculation elements	Laws, decrees, orders, contracts, and regulatory decisions	Laws, decrees, orders, contracts and regulatory decisions	Laws, decrees, orders, contracts and regulatory decisions	Laws, decrees, orders, contracts and regulatory decisions	Laws, decrees, orders, contracts and regulatory decisions
Information collection time; exchanges between parties; processing and publication	1 year max	Work done for one year before the end of the first period	Work done for one year before the end of the second period	Work done for one year before the end of the third period	Work done for one year before the end of the fourth period

Participation. The survey showed that 12 countries do not consult other players in the sector when making major decisions that involve the entire sector. Furthermore, even for those countries that agree to consult the stakeholders, 31 countries out of the 43 surveyed do not publish the results of the consultation. The players thus remain either unaware of the development of the sector's activities or detached from any idea of a constructive contribution from the regulatory framework. In terms of participation and access to information, the electricity sector law must require the regulator to consult stakeholders in the decision-making process. The regulatory authorities must aim at enhancing the consultation frameworks with the other players in the sector.

Open Access to Information. Each regulatory authority must have a functional and easily accessible website. Additionally, regulators should take advantage of the benefits of digitization to support their activities and improve the level of engagement with various stakeholders including utilities, consumers and investors.

4.2 Enhancing Regulatory Substance

Economic Regulation. It is important for the regulator to strengthen its capacities and implementation regarding the Tariff Methodology. As an indication, some elements that intervene in the minor adjustment of the tariffs are set out in Table 9.

Table 9: Recommended Best Practice on Minor Adjustment Tariffs

Reference	1 year	3 months	1 month
Elements used and indicators	-Contract formulas; -Inflation; -Nature of the source of generation	-Inflation; -Nature of the source of generation	-Inflation; -Nature of the source of generation
Timeframe	3 to 4 months before the end of a year	Automatic, upon the occurrence of a substantial change in an indicator	Automatic, upon the occurrence of a substantial change in an indicator
Source of information	-provided by the operator -the application of contractual formulas -regulatory decisions -acts of the executive -other elements from stakeholders	- Power utilities - Sudden and substantial changes in an indicator (Example: huge change in fuel price)	- Sudden and substantial changes in an indicator (Example: huge change in fuel price)

Of the 43 countries surveyed, more than half have not yet adopted best practices in economic regulation, which is still the subject of little control. It is recommended that regulators develop a tariff schedule that takes account of the different tariff adjustment periods, before communicating this to the electricity utilities. The timeframe of the tariff schedule should align to the types of information expected from the electricity utilities: their periodicity, the beginning of the meetings, and the dates of publication of the tariffs. The regulator must remain attentive to changes in the economic environment and be ready to make minor adjustments in the event of a sudden and substantial change in an economic indicator (e.g., the cost of fuel).

The financial information provided by the electricity utilities must be align with the regulatory accounting model drawn up by the regulatory authority. The network connection policy and the procedures for obtaining a connection must be drawn up and made available to the public for their information in case of need.

Beyond the multiple variations of tariff inputs which evolve over time, and which may lead the regulator to raise or lower the level of the tariff, the regulator must undertake to carry out a Cost-of-Service Study (CoSS) at least once every five years. This makes it possible to rearrange the rate base for a period of five years and to only make minor readjustments in the cases mentioned above.

Technical Regulation. The survey reveals that there are 14 countries that have not yet developed the Quality-of-Service (QoS) codes that deal with relations between electricity utilities and consumers. More than half of the countries surveyed (23) have not developed distribution codes, while 15 countries do not have transmission codes. Additionally, the regulator should develop and enforce QoS indicators such as the SAIDI and SAIFI to monitor the Quality-of-Service supply.

Licensing Frameworks. The survey reveals that 41 countries of the 43 surveyed have developed licensing frameworks. No activity should be undertaken in the electricity sector without a title that is a license, authorization or concession. In each country, the regulator must develop the model licenses to be submitted to any applicant that wishes to engage in an activity in the electricity sector. It is recommended that this model should also take into account the types of infrastructure, some of which may be connected to the network while others will remain isolated.

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 and the time required to obtain licenses or permits. It will also further reduce the cost of regulation for small off-grid operators. However, a complete waiver of the requirement for a license/permit must be avoided, as this could lead to a proliferation of sub-standard equipment and undermine accurate data collection, as well as jeopardizing energy planning.

Institutional Capacities. The survey reveals that, with an average score of 0.591, nineteen countries recorded scores of below 0.500. There is still a wide gap to be addressed in terms of enhancing the technical skills of regulatory staff to be able to fully execute their regulatory functions. Continuous learning programs should be encouraged to develop and refresh financial and technical skills. Regulators should also participate actively in regulatory associations to benefit from knowledge exchanges, peer review mechanisms, and dialogue on best practices.

Development of Renewable Energy (RE). The survey shows that 41% of the countries do not have a law covering the development of renewable energies. Furthermore, in 15% of the countries surveyed no assessment of the potential of RE has taken place. The regulator plays an important role in facilitating the development of this growing sector, through consultation and engagement with government to establish the necessary legislative frameworks. The regulator should develop regulatory tools and instruments including draft Power Purchase Agreements (PPAs), proposed tariff structures and other mechanisms to drive the sector's growth.

Development of Mini-Grids and Off-Grid Systems. The ERI 2022 survey shows that 36% of the countries surveyed do not have a national mini-grid development program and 32% have not developed a national electrification program. However, it is recommended that the regulator be proactive. The regulator can facilitate the development of a national program for the development of mini-grids and electrification through consultations with the ministry and utilities. Mini-grid and off-grid energy systems are an opportunity for many countries to increase electrification efforts.

The regulator needs to develop norms, standards and connection codes for mini-grids for efficient organization and to scale up these energy solutions. Twenty-two countries have regulatory policies that clarify arrangements for the transfer of ownership and operations, and for the maintenance of mini-grids when national grids envelope mini-grids, thus eliminating stranded asset situations. This mechanism should be adopted to form an integral part of all mini-grid development and regulatory mechanisms across the continent.

Energy Efficiency Development. The results of the survey show that 28% of the surveyed countries do not have plans to reduce technical losses in generation, transmission and distribution and end-use losses in the electricity sector to support national energy efficiency measures. Nonetheless, 74% of the countries report that they have already implemented policies for the development of energy efficiency as a tool for reducing supply-side and demand-side losses. Therefore, it is recommended regulatory laws are enacted to implement the adopted policies.

Mechanisms to promote the development of EE should therefore be developed and published. For those countries that have not yet developed such a policy, such a legal or regulatory mechanism should be put in place on the recommendation of the regulator. Eleven countries have requirements for periodic energy audits of heavy energy-consuming industries to identify and correct all avenues of electricity waste. Seven countries have requirements for manufacturers and importers of electrical appliances to periodically report on the energy efficiency levels of their appliances. It is recommended that regulators in all countries should adopt these regulatory mechanisms to ensure higher energy efficiency.

4.3 Improving Regulatory Outcomes

Financial Performance and Competitiveness. The survey shows that for 75% of electricity utilities, their tariffs fail to cover their prudent costs. Furthermore, 55% of countries do not set admissible thresholds for losses, or set them at high levels, which does not allow utilities to be profitable. It is recommended to regularly carry out studies on the cost of the service to set the right price for them. The tariffs must cover the reasonable costs incurred by the utilities. However, at the same time, mechanisms must be put in place to prevent unreasonable operator costs from being passed on via the tariff to the end user.

The regulator's efforts must continue in the fight against energy losses on the network. Electricity utilities must be encouraged to put internal mechanisms in place to combat such losses. Those who do not satisfy this approach must be sanctioned through the tariff. One of the factors in the tariff calculation must be the threshold level of technical losses and non-technical losses.

Quality-of-Service Delivery. The results of the survey revealed that 33% of the countries have not yet developed the Quality-of-Service code which should be the guide in relations between operators and consumers. It is recommended that all the regulatory authorities adopt a QoS code. In the specific case of the SAIDI and SAIFI indicators, the regulator must set their annual targets, monitor them, and sanction the electricity utilities if they exceed the limits of the set targets. However, the competitiveness of electricity utilities must not be viewed solely from a financial perspective; the quality of the service provided to users also needs to be taken into account.

Facilitating Access to Electricity. The African continent suffers from a low rate of access to electricity, registered at 56% in 2021. The survey reveals that 17 of the 43 countries do not have regulatory mechanisms in place aimed at improving access to electricity. Countries must implement all necessary policies to reduce this deficit, including the formulation of legislation and regulatory mechanisms aimed at increasing electrification. This approach should include the deployment of national programs that facilitate the scaling-up of renewable energies, mini-grids and off-grid energy solutions. Finally, at the operational level, regulators should develop and enforce performance metrics related to new electricity connections

NOTE: ***Comprehensive Action Plans for both Short-Term and Long-Term Interventions follow as Tables 10 and 11.***

Table 10: Action Plan: Snapshot of Recommended Short-term Interventions (1–2 Years)

	Develop regulatory mechanisms for compensation for firm generation capacity	Development of a Network Distribution Code	Development of a National Transmission Grid Code	Carry out a Quality-of-Service performance assessment	Carry out a Renewable Energy Assessment	National program to support the development of mini-grid systems	Energy Efficiency target at the national level	Importers or manufacturers to periodical report on the energy efficiency levels of their appliances	Development of a Building Code
Algeria		●			●				
Angola	●			●				●	●
Benin	●	●		●					
Botswana	●	●	●	●			●		
Burkina Faso		●	●	●	●	●	●	●	●
Burundi	●	●		●	●	●	●	●	●
Cabo Verde		●	●	●	●			●	
Cameroon	●	●			●	●	●	●	●
CAR	●	●	●		●		●	●	●
Chad	●	●	●	●	●	●	●	●	●
DRC		●	●	●		●	●		
Congo Rep.	●			●	●	●		●	●
Côte d'Ivoire	●	●	●					●	
Egypt									
Eswatini	●	●				●		●	●
Ethiopia								●	
Gabon	●	●	●	●	●	●		●	●
Gambia		●	●	●				●	●
Ghana (PURC)	●	●						●	
Guinea				●		●		●	●
Kenya				●					
Lesotho		●			●	●	●	●	●
Liberia	●	●	●	●	●		●	●	
Madagascar	●			●				●	●
Malawi	●	●			●			●	●
Mali	●	●	●	●		●		●	●
Mauritius		●		●		●			
Mauritania	●		●	●	●	●	●	●	
Mozambique									
Namibia	●	●	●	●		●		●	●
Niger	●	●						●	●
Nigeria	●	●			●			●	●
Rwanda			●					●	●
São Tomé & Prin.								●	
Senegal	●	●	●			●		●	●
Seychelles				●				●	
Sierra Leone	●			●		●	●	●	
South Africa	●			●	●			●	●
Tanzania	●								
Togo					●		●	●	●
Uganda		●	●					●	●
Zambia								●	●
Zimbabwe						●	●	●	●

Table 11: Action Plan – Snapshot of Recommended Short-Term Interventions (3–5 Years)

	Prohibition on appointing a former member of the electricity company as commissioner	Regulator to consult the public or stakeholders on regulatory decisions	Regulator as final decision making body in issuing or amending licenses	Regulator fees, levies and other revenue streams to be approved by parliament	Regulatory framework to encourage private sector to invest in Renewable Energy	National program to support development of standalone systems	Specialized Agencies for the formulation, development and implementation of Energy Efficiency (EE)	Financial or fiscal incentives to set for the development of EE	Specific clauses (target and year) or policy to facilitate access to electricity
Algeria	▼			▼		▼			
Angola			▼	▼				▼	
Benin	▼		▼	▼					
Botswana	▼			▼		▼		▼	
Burkina Faso	▼		▼	▼		▼		▼	
Burundi	▼	▼		▼		▼		▼	
Cabo Verde			▼	▼		▼			▼
Cameroon	▼	▼	▼	▼	▼	▼	▼		
Central Africa Republic	▼	▼	▼	▼		▼	▼	▼	▼
Chad		▼	▼	▼	▼	▼	▼	▼	▼
Dem. Rep. of Congo	▼	▼	▼	▼		▼		▼	
Republic of Congo	▼	▼	▼			▼			▼
Côte d'Ivoire	▼		▼	▼		▼			▼
Egypt	▼		▼	▼					
Eswatini	▼			▼		▼		▼	▼
Ethiopia	▼			▼			▼		▼
Gabon	▼	▼	▼	▼		▼	▼	▼	▼
Gambia	▼		▼						▼
Ghana (PURC)	▼		▼					▼	▼
Guinea	▼	▼	▼	▼	▼	▼		▼	
Kenya	▼						▼		▼
Lesotho	▼			▼	▼	▼		▼	▼
Liberia	▼					▼		▼	▼
Madagascar	▼		▼	▼			▼	▼	▼
Malawi	▼			▼			▼	▼	▼
Mali	▼	▼	▼	▼	▼		▼	▼	▼
Mauritius		▼		▼		▼		▼	
Mauritania			▼	▼	▼	▼	▼	▼	▼
Mozambique	▼		▼	▼			▼	▼	
Namibia			▼	▼				▼	
Niger	▼		▼	▼				▼	
Nigeria			▼				▼	▼	
Rwanda				▼					
São Tomé & Príncipe	▼		▼	▼	▼	▼		▼	▼
Senegal	▼		▼	▼					
Seychelles	▼			▼			▼		▼
Sierra Leone	▼			▼				▼	
South Africa	▼			▼					▼
Tanzania	▼			▼					
Togo	▼	▼	▼	▼				▼	
Uganda					▼				▼
Zambia	▼								
Zimbabwe	▼	▼			▼	▼			

Annex 1: Actions to Improve the Level of Regulation

Table 12: Actions Taken for Improved Governance

Country	RGI-related Actions
Benin	2020: Law 2020-05 of April 1, 2020 was passed to harmonize Benin's electricity code in with the ECOWAS grid code.
Botswana	2020: BERA Act (Amendment): Amended the membership of the Board from full time and part-time to all being part time.
	2019: Complaints Settlement Procedure Regulations: Provides a process and procedure for stakeholders to lodge their complaints with the regulator.
Kenya	2019: A new Act of Parliament – the Energy Act– was passed to align the energy sector laws with the Kenyan Constitution and deepen energy sector reforms.
Liberia	2020: Administrative Procedure Regulations: To ensure that the Regulatory Commission will operate in an open, transparent and impartial manner, including the use of a formal docketing system for the tracking of matters.;
Mauritius	2022: Proclamation of the Electricity Act 2005, enabling the URA to fully enact its mandate for economic and technical regulation activities.
	2021: URA ACT 2004 – • The URA Board composition was reviewed. The number of commissioners was increased from 3 to 6 to make the Board operation more efficient. • The mandate to grant and manage wayleaves was introduced to facilitate and speed the wayleave process.
	2020: Electricity ACT 2005: Bulk Supplier Licence replaced by Single Buyer Licence.
	2020: Amendment of the CEB Act 1963 to transfer regulatory powers to the URA and align the operations of the CEB to those of a licensee under the Electricity Act 2005.
Niger	2020: Law No. 2020-060 of November 25, 2020: Amends and completes Law. 2015-58. This incorporates a new chapter expanding ARSE's power of control and sanction.
Nigeria	2020: FGN Power Company: Incorporated in August 2020 – SPV for implementation of Presidential Power Initiative, PPI.
Rwanda	2018: Law N°52/2018 of 13/08/2018 Modifying Law N°21/2011 of 23/06/2011 Governing Electricity in Rwanda as Modified to Date. To address the regulatory gaps.
Senegal	2021: Electricity Law: Law 98 29 – Repealed and replaced.
	2022: Tariff methodology with timetable and validated network connection policy.
Tanzania	2022: The Electricity (Licensing and Registration Fees) Rules, 2022: New Rules brought in to govern licensing and registration activities.
Zambia	2021: Statutory Instrument No. 2 of 1998; Statutory Instrument No. 42 of 2021 to provide support to the Electricity Act and Energy Regulation Act of 2019.
	2019: The Energy Regulation Act, 1995 replaced by the Energy Regulation Act, 2019 which redefined the functions and re-constituted the composition of the Board.
	2019: The Electricity Act, 1995;The Electricity Act, 2019;Redefined the Act to address emerging issues to facilitate sustainable development and as well as to promote investment among others.

Table 13: Actions Taken for Strengthened Substance

Country	RSI-related Actions
Angola	2021: Presidential Decree n° 76/21 was passed to regulate activities related to the production, transmission, distribution and sale of electrical energy. It is a new regulatory instrument and its purpose is to attract more investors for electricity generation, distribution and sale.
	2021: Presidential Decree n° 45/21 – Regulation of Regulatory Information: New Instrument. This establishes the obligation to provide regulatory information, by the entities of the public electricity system to the regulator.
	2021: Presidential Decree n° 43/21 – Regulation of Independent Production of Electricity: New Instrument. Aims to provide an opportunity for the development of endogenous and renewable energies, in compliance with the goals of the National Strategy for New Renewable Energies.
Botswana	2020: Rooftop Solar Guidelines: New. The goal is to enable electricity consumers to generate electricity using solar for their own use and to sell the excess to the utility.
	2021: Rooftop Solar Rules: New instrument – aupplements the implementation of Rooftop Solar Guidelines.
Cabo Verde	2021: New Quality-of-Service Regulation.
	2021: New Network Access Regulations.
	2021: New Network and Production Dispatch Regulations.
	2021: Amended Tariff Regulations.
	2021: Regulation of Business Relations: New regulation to provide licensing procedures.
Cameroon	2020: Reorganization and operation of SONATREL. Modified regulations to improve competence in planning, development and construction of the public transmission network, as well as advisory support and partnerships.
Congo Republic	2021: New Decree No. 2021-672 approving the networks of the national electricity system. Establishes the obligations and duties of network operators, users of the transmission network and suppliers, in order to ensure the safety of the electricity system and the proper functioning of the market on the national territory.
	2020: New Order n°673 of January 22, 2020. Lays down the procedures for issuing and renewing the electricity import or export license, the procedures for issuing and renewing the electricity import or export license in the Republic of the Congo.
Eswatini	2022: Mini-grid and Micro-grid Framework: New instrument for regulation of mini-grid and off-grid systems licensing, tariffs, and operation.
	2021: Small-scale Embedded Generation Framework. New instrument for regulation of feed-in to the national grid by smaller-sized systems.
	2021: Ring-Fencing Guidelines: New Instrument. Regulation of utility ring-fencing of accounts according to regulated activities.
	2019: Energy Efficiency and Conservation Policy. New instrument to mitigate negative effects of climate change and encourage sustainable energy supply.
Gambia	2019: New Tariff Methodology 2019.
Kenya	2021: Directive: Designation of a System Operator; Improving transparency and efficiency in power dispatch. The System Operator will also play a key role in the implementation of the Kenyan power market.
	2021: Guidelines for Allowed Return on Equity. Provides guidance to prospective investors in electricity generation, transmission and distribution.
	2021: Guidelines for Indicative Feed-in Tariffs. Provides guidance to prospective investors in electricity generation, transmission and distribution.

Liberia	2020: Electricity Licensing Regulations: To provide a framework for the registration and licensing of persons engaged in or intending to engage in activities within the electricity supply industry involving the interconnected transmission and distribution system or grid under the law.
	2020: Micro Utility Licensing Regulations: To provide a framework for the registration and licensing of persons engaged in or intending to engage in the provision of micro utility services within the electricity supply industry under the law.
	2020: Electricity Licensing Handbook: To provide guidance to applicants in the registration and licensing process. The Handbook is a guide; which is not a substitute for the provisions of 2015 Electricity Law of Liberia (ELL) and the Regulations.;
	2021: Multi Year Tariff Methodology: To set out the regulatory framework and provide guidelines to service providers or operators on the processes to be followed for new electricity tariff applications, modification for existing tariff arrangements, and tariff adjustments.
	2021: Tariff Regulations: To provide the framework for approving tariffs by elaborating the principles, methodology and process for approving the tariff and other terms of supply of electricity with the electricity industry of Liberia.
	2021: Customer Service and Quality of Supply Regulations: To establish the framework for the delivery of safe, adequate, reliable, and non-discriminatory service by service providers and to specify the rules governing the technical parameters and commercial relations between the service provider and the customer.
Madagascar	2021: New Decree No. 2021-326 of March 24, 2021. Fixes the procedures relating to production, transmission and distribution concessions, production and distribution authorizations and electricity production declarations.
Mauritius	2022: New regulations on licensing and registration to enable the URA to license electricity operators.
	2022: New regulations on safety, quality and continuity to ensure continuity of electricity Services under the mandate of the URA.
	2022: New regulations on metering, billing and collection to replace the repealed regulations under the previous Electricity Act.
Mozambique	2021: New regulation for energy access.
	2021: New regulatory instrument for the promotion of private investments in renewables.
Namibia	2019: Market Rules: New Modified Single Buyer Market Model to increase competition in the market.
	2021: Distribution Infrastructure Standards: Amended Distribution Infrastructure Standards to enhance compliance with safety and reliability by harmonizing electrical infrastructure and maintenance practices.
	2022: Energy Storage Rules: New Energy Storage Regulatory Framework to regulate energy storage technologies to address security of supply.
	2021: Quality of Supply and Service Standards. Amended Quality of Supply and Service Standards to provide for new developments governing the quality of electricity supply and the quality of service provided by licensed electricity undertakings in Namibia.
	2021: New Off-grid Electrification Policy: Government's intent, direction and undertaking regarding the adoption of off-grid electricity access options as part of its national electrification efforts.
	2021: New Smart Grid Policy. Government's intent, direction and undertakings regarding the promotion and facilitation of Namibia's electricity grid.
	2021: RE Grid Code: New renewable energy code to specify minimum technical and design grid connection requirements for RE power plants connected or seeking connection to the Namibian electricity transmission and/or distribution networks.
	2019: Ministerial Guideline on Mini-grid Development: To streamline rural electrification.
	2019: Ministerial Guideline on Minimum Standards Requirements for solar home systems standards: To streamline rural electrification.

Rwanda	2019: Regulation No. 03/R/El-EWS/RURA/2019 Governing the Simplified Electricity Licensing Framework for Rural Electrification in Rwanda. To expedite electrification especially in rural areas by boosting the confidence of investors in the mini-grid sector.
	2019: Rwanda Least Cost Power Development Plan (LCPDP) 2019–2040. To expedite the electrification process.
	2018: Energy Sector Strategic Plan 2013/14–2017/18 & Energy Sector Strategic Plan 2018/19–2023/24: To set new targets and identify new approaches that will deliver improved performance.
São Tomé & Principe	2021: Tariff Regulations.
Senegal	2022 Transmission Grid Code approved.
	2022 Distribution Code approved.
Sierra Leone	2018: National Electricity Act amended to include eligible customers and make provision for concessions.
South Africa	2019 Integrated Resource Plan 2019.
	2020 New Generation Regulations –allowing municipalities to establish new generation capacity.
	2021: Tariff regulation – Schedule 2 – increasing the registration threshold.
Togo	2021: New Decree 2021-129/PR on the creation, attributions, organization and operation of the Fund for Universal Access to Electricity: This decree is issued to set up a mechanism to facilitate access to electricity for populations by means of reimbursable subsidies to operators responsible for the distribution of electricity.
	2022: The Electricity Act, 1999: The Electricity Act Amendment Bill 2022. Aims to open monopoly at the Transmission segment; provide for tougher penalties for power theft and vandalism of electricity infrastructure; increased funding for the regulator; and to provide for enhanced regulation of renewable energy and net metering.
	2022: New Inter-ministerial Order No. 001/PR/MDEM/MEF/CAB/2022 adopting the methodology for determining and periodically adjusting the required revenue (RR) of the national electricity distribution network operator in Togo. This Order sets the methodology for determining and periodically adjusting the required revenue (RR) of the national electricity distribution network operator in Togo.
	2020: The Electricity (Quality of Service Code) Regulations, 2003. To provide for tariff incentives for supply reliability and incentives for customer service.
Uganda	2022: Electricity Act: Electricity (Net metering) (Amendment Regulations, to increase the net metering threshold cap from 100kW to 5MW).

Table 14: Actions for Enhanced Outcomes

Country	ROI related Regulatory Reforms Undertaken
Angola	2020: Presidential Decree n° 178/20. Amends and republishes the Tariff Regulation. Its purpose is to introduce the required annual revenue methodology, defining the revenue levels for each company in the public electricity sector value chain and to ensure the sector's financial sustainability.
	2021: New Presidential Decree n° 42/21. Regulation of the Prepayment Modality of Electricity to make the commercialization more efficient in revenue collection for energy.
Botswana	2021: New Guidelines for the Review of Power Purchase Agreement to guide the Utility and the IPPs when they negotiate their PPAs.
Cabo Verde	2021: New Quality-of-Service regulation.
Cameroon	2022: Modified to improve capacity in the development of rural electrification.
	2022: Decree on the reorganization and operation of the Rural Electrification Agency.
	2020: Decree on the reorganization and operation of EDC. Modified implementation and development of infrastructure projects in the electricity sector.
	2020: New Decree on the creation, organization and operation of the Electricity Sector Development Fund, abbreviated as FDSE. The Fund is a non-Treasury Special Allocation Account dedicated to the development of the electricity sector.
Côte d'Ivoire	2020: ARR-n-103-MPEER-13-12-19 Pico Micro Mini-grids.
	Order: Electrical Network Connection Code_074-15.09. 2020: ARR-n-105-MPEER-13-12-19 Self-production.
Eswatini	2021: New Legislative Instrument: Connection Charge Guidelines. Regulation of Connection Charges.
Gambia	2019: New Tariff Methodology.
Ghana	2020: L.I. 1651 (Termination of Service) Regulation, 1990 L.I. (Consumer Service) Regulations.
	2020: Consolidation of L.I. 1651, L.I. 1665 and L.I. 1704A into one document
	2020: L.I. 1665 (Complaints Procedures) Regulations: L.I. (Consumer Service) Regulations,
	2020: L.I. 1704A: Regulations: L.I. (Consumer Service) Regulations,
	2020: Consolidation of L.I. 1651, L.I. 1665 and L.I. 1704A into one document
Liberia	2021: Multi Year Tariff Methodology. Sets out the regulatory framework and provides guidelines to service providers or operators on the processes to be followed for new electricity tariff applications, modification for existing tariff arrangements and tariff adjustments.
	2021: Tariff Regulations: To provide the framework for approving tariffs and other terms of supply of electricity with the electricity industry of Liberia.
	2021: Customer Service and Quality of Supply Regulations: To establish the framework for the delivery of safe, adequate, reliable, and non-discriminatory service by service providers and to specify the rules governing the technical parameters and commercial relations between the service provider and the customer.
Mozambique	2021: Regulation for Energy Access. New instrument for the promotion of private investments in renewables.

Namibia	2021: Quality of Supply and Service Standards. Amended Quality of Supply and Service Standards to provide for new developments of standards governing the quality of electricity supply and the quality of service provided by licensed electricity undertakings in Namibia.
Rwanda	2019: Ministerial Guidelines on mini-grid development. To streamline rural electrification.
	2019: Ministerial Guidelines on minimum standards requirements for solar home systems standards. To streamline rural electrification.
	2019: Regulation No. 03/R/El-EWS/RURA/2019 Governing the Simplified Electricity Licensing Framework for Rural Electrification in Rwanda: To expedite electrification especially in rural areas by boosting the confidence of investors in the mini-grid sector.
	2019: Rwanda Least-Cost Power Development Plan (LCPDP) 2019-2040. To expedite the electrification process.
São Tomé & Príncipe	2021: Tariff Regulation.
Senegal	2022: Network Code for relations between TSO/D and customers.
Togo	2022: New Inter-ministerial Order No. 001/PR/MDEM/MEF/CAB/2022 . This Order sets the methodology for determining and periodically adjusting the required revenue (RR) of the national electricity distribution network operator in Togo.
	2021: New Decree 2021-129/PR on the creation, attributions, organization and operation of the Fund for Universal Access to Electricity. To set up a mechanism to facilitate access to electricity for populations by means of reimbursable subsidies to operators responsible for the distribution of electricity.
	2018: New Law 2018-010 relating to the promotion of the production of electricity based on renewable energy sources in Togo.
Uganda	2022: The Electricity Act, 1999: The Electricity Act Amendment to open monopoly at the transmission segment; provide for tougher penalties for power theft and vandalism of electricity infrastructure; increased funding for the regulator; and to provide for enhanced regulation of renewable energy and net metering.
	2020: The Electricity (Quality of Service Code) Regulations, 2003: To provide for tariff incentives for supply reliability and incentives for customer service.

Annex 2: Detailed Results of the Regulatory Governance Index 2022

Table 15: Detailed Results of the Regulatory Governance Index 2022

Country	Legal Mandate	Clarity of Roles and Objectives	Independence	Accountability	Transparency	Predictability	Participation	Open-Access to Information	Regulatory Governance Index	Ranking
Uganda	1.000	1.000	0.718	0.932	1.000	0.955	0.950	1.000	0.944	1
Kenya	1.000	1.000	0.657	0.798	1.000	0.955	0.950	1.000	0.920	2
Tanzania	1.000	1.000	0.691	0.666	1.000	1.000	0.960	1.000	0.915	3
Namibia	1.000	1.000	0.624	0.698	1.000	0.909	0.950	1.000	0.898	4
Rwanda	1.000	1.000	0.809	0.566	1.000	0.955	0.750	1.000	0.885	5
Côte d'Ivoire	1.000	1.000	0.651	0.632	1.000	0.864	0.820	0.750	0.840	6
Malawi	1.000	1.000	0.682	0.698	1.000	0.909	0.710	0.675	0.834	7
Eswatini	1.000	1.000	0.544	0.798	0.800	0.955	0.950	0.625	0.834	8
Algeria	1.000	1.000	0.611	0.598	1.000	0.864	0.710	0.875	0.832	9
Liberia	1.000	0.750	0.599	0.900	0.600	1.000	0.750	1.000	0.825	10
Sierra Leone	1.000	1.000	0.527	0.932	0.600	0.909	0.750	0.800	0.815	11
Egypt	0.625	1.000	0.477	0.698	1.000	0.682	0.950	1.000	0.804	12
Benin	1.000	1.000	0.614	0.566	0.800	0.818	0.750	0.875	0.803	13
Lesotho	0.500	1.000	0.588	0.864	1.000	0.818	0.900	0.750	0.803	14
South Africa	1.000	1.000	0.447	0.764	1.000	0.773	0.700	0.725	0.801	15
Gambia	1.000	1.000	0.477	0.766	0.800	0.773	0.710	0.875	0.800	16
Cabo Verde	1.000	1.000	0.552	0.764	0.600	0.591	1.000	0.800	0.788	17
Botswana	1.000	1.000	0.596	0.698	0.800	0.455	0.950	0.750	0.781	18

Country	Legal Mandate	Clarity of Roles and Objectives	Independence	Accountability	Transparency	Predictability	Participation	Open-Access to Information	Regulatory Governance Index	Ranking
Guinea	1.000	1.000	0.584	0.698	0.800	0.636	0.660	0.725	0.763	19
Mauritius	1.000	1.000	0.486	0.698	0.600	0.864	0.390	1.000	0.755	20
Zambia	1.000	1.000	0.459	0.598	0.400	0.909	0.800	0.850	0.752	21
Nigeria	1.000	1.000	0.702	0.466	0.400	0.773	0.750	0.875	0.746	22
Ghana	0.750	0.975	0.551	0.749	0.700	0.568	0.650	0.963	0.738	23
Zimbabwe	1.000	1.000	0.465	0.766	0.400	0.909	0.550	0.775	0.733	24
Ethiopia	1.000	1.000	0.346	0.764	0.600	0.636	0.750	0.750	0.731	25
Mauritania	1.000	1.000	0.588	0.5	0.800	0.500	0.690	0.750	0.728	26
Togo	1.000	1.000	0.474	0.698	0.600	0.545	0.550	0.875	0.718	27
Senegal	1.000	0.750	0.568	0.666	0.600	0.500	0.750	0.875	0.714	28
DRC	0.625	1.000	0.445	0.566	0.800	0.818	0.500	0.950	0.713	29
Niger	1.000	1.000	0.633	0.632	0.600	0.227	0.660	0.875	0.703	30
Madagascar	1.000	1.000	0.473	0.5	0.600	0.455	0.910	0.675	0.702	31
Cameroon	1.000	1.000	0.397	0.698	0.300	0.864	0.370	0.750	0.672	32
Mozambique	1.000	1.000	0.455	0.466	0.200	0.727	0.580	0.950	0.672	33
Angola	0.625	1.000	0.403	0.698	0.600	0.636	0.670	0.725	0.670	34
Mali	0.875	1.000	0.532	0.632	0.800	0.500	0.370	0.425	0.642	36
Seychelles	1.000	1.000	0.395	0.666	0.300	0.273	0.800	0.550	0.623	37
Chad	1.000	1.000	0.475	0.698	0.500	0.182	0.530	0.000	0.548	38
Congo Rep.	1.000	1.000	0.266	0.698	0.300	0.409	0.370	0.275	0.540	39
Burkina Faso	1.000	0.750	0.557	0.632	0.400	0.182	0.420	0.375	0.540	40
CAR	0.875	1.000	0.455	0.598	0.500	0.409	0.450	0.000	0.536	41
São Tomé	1.000	0.750	0.489	0.566	0.300	0.136	0.460	0.550	0.531	42
Burundi	0.625	1.000	0.395	0.066	0.200	0.182	0.410	0.825	0.463	43
Gabon	1.000	0.450	0.438	0.200	0.400	0.136	0.130	0.325	0.385	44

Annex 3: Detailed Results of the Regulatory Substance Index 2022

Table 16: Detailed Results of the Regulatory Substance Index, 2022

Country	Economic Regulation: Tariff-Setting	Technical regulation: Quality-of-Service	Licensing Framework	Institutional Capacity	Renewable Energy development	Mini-grid and off-grid systems	Energy Efficiency development	Regulatory Substance Index	Ranking
Uganda	1.000	1.000	1.000	1.000	0.889	1.000	0.933	0.975	1
Tanzania	1.000	1.000	1.000	1.000	0.889	1.000	0.667	0.937	2
Rwanda	0.773	1.000	1.000	0.976	0.778	1.000	0.747	0.896	3
Kenya	0.955	0.714	1.000	1.000	0.889	0.738	0.867	0.880	4
Ghana	0.682	0.950	1.000	0.952	0.778	0.798	0.933	0.870	5
Egypt	1.000	0.857	0.500	0.897	0.889	0.810	1.000	0.850	6
Namibia	0.682	0.929	1.000	1.000	0.778	0.869	0.373	0.804	7
Senegal	0.545	0.857	0.900	0.667	0.778	1.000	0.733	0.783	8
Benin	0.545	0.786	1.000	0.357	0.889	1.000	0.733	0.759	9
Ethiopia	0.591	1.000	1.000	0.643	0.556	0.833	0.613	0.748	10
Côte d'Ivoire	0.455	0.843	0.920	0.500	0.556	0.821	0.933	0.718	11
Eswatini	0.591	0.771	1.000	0.857	0.778	0.571	0.413	0.712	12
Togo	0.500	0.786	0.700	0.976	0.778	0.833	0.400	0.710	13
Algeria	0.682	0.743	0.700	0.437	0.778	0.619	0.933	0.699	14
South Africa	0.091	0.929	0.760	0.952	0.889	0.393	0.867	0.697	15
Angola	0.455	0.686	0.700	0.857	0.889	0.548	0.533	0.667	16
Zimbabwe	0.591	0.757	0.700	0.849	0.889	0.476	0.320	0.655	17
Zambia	0.364	0.843	1.000	0.619	0.667	0.619	0.333	0.635	18

Country	Economic Regulation: Tariff-Setting	Technical regulation: Quality-of-Service	Licensing Framework	Institutional Capacity	Renewable Energy development	Mini-grid and off-grid systems	Energy Efficiency development	Regulatory Substance Index	Ranking
Mauritius	0.636	0.857	0.700	0.476	0.667	0.167	0.747	0.607	19
Niger	0.545	0.786	0.900	0.667	0.556	0.571	0.200	0.604	20
Sierra Leone	0.364	0.686	1.000	0.540	0.556	0.845	0.200	0.599	21
Mozambique	0.455	0.629	0.800	0.437	0.778	0.595	0.333	0.575	22
Cabo Verde	0.682	0.643	0.800	0.333	0.556	0.738	0.200	0.565	23
Mali	0.364	0.571	0.900	0.833	0.444	0.452	0.333	0.557	24
Gambia	0.364	0.143	0.800	0.833	0.444	0.905	0.400	0.556	25
Malawi	0.545	0.914	0.800	0.476	0.333	0.667	0.107	0.549	26
Nigeria	0.364	0.771	1.000	0.770	0.111	0.738	0.067	0.546	27
DRC	0.500	0.500	0.700	0.667	0.333	0.429	0.413	0.506	28
Madagascar	0.273	0.429	0.900	0.278	0.667	0.833	0.133	0.502	29
Liberia	0.727	0.143	1.000	0.310	0.222	0.667	0.440	0.501	30
Burundi	0.455	0.286	0.920	0.333	0.556	0.619	0.333	0.500	31
Lesotho	0.364	0.714	0.960	0.333	0.333	0.643	0.133	0.497	32
Cameroon	0.636	0.771	0.800	0.802	0.111	0.000	0.133	0.465	33
Botswana	0.364	0.371	0.580	0.571	0.444	0.298	0.520	0.450	34
Guinea	0.455	0.557	0.700	0.357	0.333	0.214	0.267	0.412	35
São Tomé & Prin.	0.273	0.629	0.420	0.190	0.333	0.179	0.480	0.358	37
Seychelles	0.273	0.071	0.660	0.024	0.667	0.238	0.520	0.350	38
Central African Republic	0.091	0.571	0.580	0.333	0.444	0.167	0.067	0.322	39
Burkina Faso	0.273	0.143	0.700	0.167	0.444	0.190	0.267	0.312	40
Congo Republic	0.136	0.286	0.540	0.429	0.222	0.190	0.200	0.286	41
Mauritania	0.000	0.071	0.700	0.381	0.000	0.000	0.200	0.193	42
Gabon	0.000	0.371	0.000	0.333	0.111	0.071	0.067	0.136	43
Chad	0.091	0.357	0.000	0.000	0.111	0.000	0.000	0.080	44

Annex 4: Detailed ERI 2022 Country Scores and Rankings

Table 17: Detailed ERI 2022 Country Scores and Rankings

Country	RGI	RSI	ERI-GS	ROI	ERI	Ranking
Uganda	0.944	0.975	0.959	0.747	0.846	1
Egypt	0.804	0.850	0.827	0.745	0.785	2
Senegal	0.714	0.783	0.748	0.674	0.710	3
Ghana	0.738	0.870	0.804	0.625	0.709	4
Kenya	0.920	0.880	0.900	0.537	0.695	5
Zimbabwe	0.733	0.655	0.694	0.678	0.686	6
Tanzania	0.915	0.937	0.926	0.493	0.675	7
Sierra Leone	0.815	0.599	0.707	0.612	0.658	8
Algeria	0.832	0.699	0.765	0.542	0.644	9
Liberia	0.825	0.501	0.663	0.595	0.628	10
Togo	0.718	0.710	0.714	0.542	0.622	11
Eswatini	0.834	0.712	0.773	0.499	0.621	12
Namibia	0.898	0.804	0.851	0.449	0.618	13
Nigeria	0.746	0.546	0.646	0.584	0.614	14
Zambia	0.752	0.635	0.693	0.533	0.608	15
Angola	0.670	0.667	0.668	0.553	0.608	16
Cameroon	0.672	0.465	0.569	0.646	0.606	17
Rwanda	0.885	0.896	0.891	0.411	0.605	18
Côte d'Ivoire	0.840	0.718	0.779	0.422	0.573	19
Ethiopia	0.731	0.748	0.739	0.426	0.561	20
South Africa	0.801	0.697	0.749	0.404	0.550	21
Botswana	0.781	0.450	0.615	0.452	0.527	22
DRC	0.713	0.506	0.610	0.455	0.527	23
Cabo Verde	0.788	0.565	0.676	0.393	0.515	24
Burkina Faso	0.540	0.312	0.426	0.575	0.495	25
Lesotho	0.803	0.497	0.650	0.369	0.490	26
Malawi	0.834	0.549	0.692	0.331	0.479	27
Niger	0.703	0.604	0.653	0.349	0.478	28
Benin	0.803	0.759	0.781	0.277	0.465	29
Mali	0.642	0.557	0.599	0.339	0.450	30
Mozambique	0.672	0.575	0.624	0.222	0.372	31
Madagascar	0.702	0.502	0.602	0.180	0.329	32
Mauritius	0.755	0.607	0.681	0.150	0.320	33
Guinea	0.763	0.412	0.587	0.159	0.306	34
Gambia	0.800	0.556	0.678	0.131	0.298	35
Seychelles	0.623	0.350	0.487	0.177	0.294	36
Central African Republic	0.536	0.322	0.429	0.198	0.292	37
Burundi	0.463	0.500	0.482	0.167	0.284	38
Mauritania	0.728	0.193	0.461	0.111	0.226	39
Gabon	0.385	0.136	0.261	0.108	0.168	40
São Tomé & Príncipe	0.531	0.358	0.445	0.058	0.160	41
Chad	0.548	0.080	0.314	0.069	0.147	42
Congo Republic	0.540	0.286	0.413	0.025	0.101	43

Annex 5: Best Practice Regulations

1. REGULATORY GOVERNANCE

Legal Mandate and Clarity of Roles and Objectives: In terms of mandates and clarity of roles, the executive must disengage from commercial public utility service regulation. An independent regulatory authority must be set up to control and monitor the sector. The missions and roles of the different actors such as the State, the regulatory authority, the electricity utilities and other operators in the sector, must be clearly defined in the law so that there is no ambiguity and overlapping of roles. The regulatory authority must report to parliament, which has national level representation, and spare it the effect of government supervision which often annihilates its action.

Independence:

a) *Independence from the government and stakeholders:* The best international practices underscore the need to have the boards or commissioners of the regulatory authority to be made up of experts in the field. Thus, the members of the Board of Directors should not be appointed by the executive. The Chairman of the Board of Directors, as well as the CEO of the regulatory authority, must not be appointed by the executive; this is to make them independent of any government pressure. Their mandate must be firm and must not go beyond 7 to 8 years; furthermore they must not have held any office in the government or any interest in the regulated utility. They must observe a cooling-off period of at least 2 years after the end of their term as commissioners before being employed by a regulated utility.

b) *In decision-making independence,* the regulator must be the final decision maker in tariffs and in granting licenses. In disputes, its decision must be binding on the disputing parties.

c) *Regarding financial independence,* license fees and fees levied from the regulated utilities must comprise the major source of the regulatory authority's budget. The level of fees should be approved by the parliament.

Accountability: To avoid any misunderstandings or conflicts, the electricity sector law should hold the regulator accountable for its activities, and its report should be presented to Parliament for scrutiny.

Transparency: The publication of regulatory documents and decisions must be mandatory/ compulsory under law, to enable them to be accessible to the public.

Predictability: International best practice dictates that the regulator is responsible for tariffs in the electricity sector. A well-documented comprehensive tariff methodology which sets the framework for calculating, adjusting and publishing tariffs, based on formulas set out in the tariff methodologies or contracts of the electricity utilities is a basic requirement. A concession operator, utility or consumers should be informed of the planned tariffs to be expected in a well-determined horizon.

Participation: Before making major decisions that may impact the sector, the regulator must consult all relevant stakeholders to gather their different opinions. This avoids misunderstandings and a one-sided vision in the sector.

Open Access to Information: The regulator authority has the obligation to facilitate access to information for stakeholders, by setting up information dissemination channels, namely: the website, the regulatory journal, press releases for dissemination in the media, etc.

2. REGULATORY SUBSTANCE

Economic Regulation: The regulatory authority must have a well-documented tariff methodology that leaves no room for imagination or improvization. To do this, best practice requires the regulatory authority to publicize the tariff calendar and publish it to all stakeholders in the sector, including major and minor tariff adjustment periods. The regulator must make available to the electricity utilities the formulas on the basis of which the tariff is determined and this must be published. Each regulator must develop a regulatory accounting model to better monitor the accounts of the electricity distribution utilities in order to be able to highlight the costs that must be reflected in the operating costs incurred by the operators. Within the framework of consumer protection in terms of tariffs, the regulatory authority must carry out periodic studies of the cost of the service, at intervals not exceeding five (5) years to be reassured of the quality of the tariffs applied to consumers.

Technical Regulation: The regulator must develop Quality-of-Service codes or regulations.. This often deals with the rights and obligations of electricity utilities and consumers in their commercial relations.

Regarding the monitoring of operators' activities, the regulator must develop and publish the performance indicators (SAIDI, SAIFI and others). These indicators form the basis against which the operators' quality of service must be monitored. The regulator should also develop network codes for electricity transmission and distribution, to provide key guidelines that will determine how connections to national or local networks can be made.

To ensure the sustainability of the regulated activity, the regulator is required to assess regularly the Quality of Service of the electricity utilities, as well as the performance of the structures and generation tools made available to the operators.

Development of Licensing Frameworks: The regulator must develop the licensing frameworks on the basis of which licenses are granted to potential operators. The regulators have the obligation to set up and publish the procedures that must be followed as well as an indication of the waiting period to obtain a license or authorization to operate in the electricity sector.

Institutional Capacities: To fully assume its missions, the regulator is required to have solid institutional capacities in all areas of regulation to be able to monitor and control the activities of electricity utilities in different fields, such as the economic and financial analysis, financial modelling, electrical engineering, civil and mechanical engineering and legal issues associated with utility regulation.

Renewable Energy Development: To boost the development of renewable energy, countries must adopt policies on the development of renewable energy (RE) and pass a law accordingly to regulate the development of this activity. Each country must make an assessment of the potential of renewable energies to allow potential investors to know the content, and the country to make strategic choices as to the priority to be given to the various types of RE in a geographical region.

An independent body should be set up for the implementation of the Renewable Energy Policy. Appropriate tariffs should be developed accordingly. Technical rules in terms of norms and standards must be put in place to facilitate connections and the injection of energy from renewable energy sources into the national grid.

Development of Mini-grids and Off-grid Systems: Africa remains under-electrified with an electrification rate of 56% (2021). One of the mechanisms for increasing this electrification rate is the development of mini-grids and off-grid systems. For this to succeed, countries have to adopt a law or legal instrument that guides the development of mini-grids and off-grid systems; also to set up a national program to support

such development. Special tariffs must be set up for mini-grids in order to incentivize this activity, whilst including provisions to enable seamless integration of mini-grids into the national when the national grid envelopes a mini-grid system.

Energy Efficiency Development: Countries must adopt and create a legislative environment to govern the development of supply-side and demand-side energy efficiency (EE) measures to reduce network losses and at the end-user level. The resulting law must set out the different stages and processes for reaching the evolutionary thresholds of EE each year. A national EE program must be defined and an independent body responsible for implementing this EE program should be created.

In terms of household electrical appliances and equipment, Minimum Energy Performance Standards (MEPS) and labels must be developed and enforced. Once the MEPS and the labeling regime are in place, sanctions must be imposed on entities that fail to respect the EE measures in their activities.

3. REGULATORY OUTCOMES

Financial Performance and Competitiveness: With regard to best practices, and for the electricity utility to be efficient and competitive, the regulator and utility must carry out or have to be carried out periodic cost-of-service studies to ensure that the service it provides to consumers is fairly remunerated. Technical and commercial losses must be controlled and not exceed a rate of 20%. The rate of collection of invoices addressed to customers must be more than 90% and the ratio between the rate of collection and the tariffs must be beyond 95% for the utility to be solvent. The electricity utility must be reassured at all times that it covers its normal costs and charges through the electricity tariff granted to it by the regulator, to avoid the risk of bankruptcy. One of the best practices is the continuous fight against electricity fraud or theft. The operator must take all measures to reduce this theft to its simplest expression.

Quality of Service Delivered to Consumers: Best practice in terms of the quality of service requires the regulator to develop a Quality of Service Code or regulation which provides the obligations of the regulated utility in respect of the consumers. The provisions of this code or document determine the responsibilities of the parties in the event of the occurrence of an incident or a breach in compliance with the obligations of the parties. Quality of service performance indicators such as SAIDI and SAIFI, which deal with interruptions in the supply of electricity should be considered. The regulator sets the admissible thresholds which must not be exceeded by the operators. Sanctions must be taken against electricity utilities that exceed the thresholds set by the regulatory authority. In addition, the operator must carry out technical audits of its assets and foresee consequent repairs or maintenance in order to improve service delivery to consumers.

4. FACILITATING ELECTRICITY ACCESS

Access to electricity remains a major concern in African countries. To achieve this, the best practices that are in use indicate that it must be done at several levels. First, national regulations or programs should be developed to increase access to electricity. Several avenues can be considered in this case including: (i) provision of tax and customs incentives for any imported equipment that are used for production of electricity based on renewable energies, (ii) adoption of less restrictive taxation on developers and (iii) roll out of incentive rates for utilities developing mini-grids and off-grid systems.

The regulator must take into consideration in the tariffs, the cost associated with providing access, set the number of days required for a customer to be supplied as soon as the related charges have been paid

Annex 6: List of Respondents

Table 18: Regulatory Authorities by Country

	Country	Name of the Commission/ Regulatory Authority	Website
1.	Algeria	Commission de régulation de l'Electricité et du Gaz (CREG)	www.creg.dz
2.	Angola	Instituto Regulador dos Serviços de Electricidade e de Ãgua (IRSEA)	www.irsea.ao
3.	Benin	Autorité de Régulation de l'Electricité du Benin (ARE)	www.are.bj
4.	Botswana	Botswana Electricity Regulatory Authority (BERA)	www.bera.co.bw
5.	Burkina Faso	Autorité de Régulation du Secteur de l'Energie (ARSE)	www.arse.bf
6.	Burundi	Autorité de Régulation des Secteurs de l'Eau potable et de l'Energie (AREEN)	www.areen.bi
7.	Cameroon	Agence de Régulation du Secteur de l'Electricité (ARSEL)	www.arsel-cm.org
8.	Cabo Verde	Agencia Reguladora Multisectoral da Economia (ARME)	www.arme.cv
9.	Central African Republic	Agence autonome de Régulation du Secteur de l'Electricité en République Centrafricaine (ARSEC)	N/A
10.	Chad	Autorité de Régulation du Secteur de l'Energie Electrique (ARSE)	N/A
11.	Democratic Republic of Congo	Autorité de Régulation du Secteur de Electricité (ARE)	www.are.gouv.cd
12.	Egypt	Egyptian Electric Utility and Consumer Protection Regulatory Agency (EGYPT ERA)	www.egyptera.org
13.	Eswatini	Eswatini Energy Regulatory Authority (ESERA)	www.sera.org.sz
14.	Ethiopia	Petroleum and Energy Regulatory Authority (PEA)	www.eea.gov.et
15.	Gabon	Agence de Régulation du Secteur de l'Eau potable et de l'Energie Electrique (ARSEE)	www.arsee-gabon.com
16.	Gambia	Public Utility Regulatory Authority (PURA)	www.pura.gm
17.	Ghana	Energy Commission of Ghana	www.energycom.gov.gh
18.	Ghana	Public Utilities Regulatory Authority (PURC)	www.purc.com.gh
19.	Guinea	Autorité de Régulation des secteurs de l'Electricité et de l'Eau (AREE)	www.aree-gn.com
20.	Côte d'Ivoire	Autorité Nationale de Régulation du Secteur de l'Electricité de Côte d'Ivoire (ANARE-CI)	www.anare.ci
21.	Kenya	Energy and Petroleum Regulatory Authority (EPRA)	www.epra.go.ke
22.	Lesotho	Lesotho Electric and Water Authority (LEWA)	www.lewa.org.ls
23.	Liberia	Liberia Electric Regulatory Commission (LERC)	www.lerc.gov.lr
24.	Madagascar	Office de Régulation de l'Electricité (ORE)	www.ore.mg
25.	Malawi	Malawi Electric Regulatory Authority (MERA)	www.mera.mw
26.	Mali	Commission de Régulation de l'Electricité et de l'Eau (CREE)	www.creemali.ml
27.	Mauritania	Autorité de Régulation Multisectorielle (ARE)	www.are.mr
28.	Mauritius	Utility Regulatory Authority (URA)	www.uramauritius.mu
29.	Mozambique	Autoridade Reguladora de Energia (ARENE)	www.arene.org.mz
30.	Namibia	Electricity Control Board (ECB)	www.ecb.na
31.	Niger	Autorité de Régulation du Secteur de l'Energie (ARSE)	www.arse.gouv.ne
32	Nigeria	Nigerian Electricity Regulatory Commission	https://nerc.gov.ng/
33.	Republic of Congo	Agence de Régulation du Secteur de l'Electricité (ARSEL)	N/A
34.	Rwanda	Rwanda Utilities Regulatory Authority (RURA)	www.rura.rw
35.	São Tomé & Príncipe	Autoridade Geral de Regulaçao (AGER)	www.ager-stp.org
36.	Senegal	Commission de Régulation du Secteur de l'Electricité (CRSE)	www.crse.sn
37.	Seychelles	Seychelles Energy Commission	www.sec.sc
38.	Sierra Leone	Sierra Leone Electricity and Water Regulatory Commission (SLEWRC)	www.ewrc.gov.sl
39.	South Africa	National Electricity Regulator of South Africa (NERSA)	www.nersa.org.za
40.	Tanzania	Energy and Water Utilities Regulatory Authority (EWURA)	www.ewura.go.tz
41.	Togo	Autorité de Régulation du Secteur de l'Electricité (ARSE)	www.arse.tg
42.	Uganda	Electricity Regulatory Authority (ERA)	www.era.go.ug
43.	Zambia	Energy Regulatory Board (ERB)	www.erb.org.zm
44.	Zimbabwe	Zimbabwe Energy Regulatory Authority (ZERA)	www.zera.co.zw

Table 19: Power Utility Companies by Country

	Country	Power Utility
1.	Algeria	Société Algérienne de Distribution d'Electricité et du Gaz (SADEG)
2.	Angola	Empresa Nacional de Distribuçao de Electricidade (ENDE-EP)
3.	Benin	Société d'Energie Electrique (SBEE)
4.	Botswana	Botswana Power Corporation (BPC)
5.	Burkina Faso	Société Nationale d'Electricité du Burkina (SONABEL)
6.	Burundi	REGIDESO
7.	Cabo Verde	ELECTRA Power Generator and Distributor
8.	Cameroon	ENEO
9.	Central African Republic	Energie Centrafricaine (ENERCA)
10.	Chad	Société Nationale d'Electricité (SNE)
11.	Democratic Republic of Congo	Société Nationale d'Electricité (SNEL)
12.	Congo Republic	Energie Electrique du Congo (E2C)
13.	Côte d'Ivoire	Compagnie Ivoirienne d'Electricité (CIE)
14.	Egypt	Egyptian Electricity Holding Company (EEHC)
15.	Eswatini	Eswatini Electricity Company (EEC)
16.	Ethiopia	Ethiopian Electric Power (EEP)
17.	Gabon	Société d'Energie et d'Eau du Gabon (SEEG)
18.	Gambia	National Water and Electricity Company Ltd (NAWEC)
19.	Ghana	Electricity Company of Ghana
20.	Guinea	Electricité de Guinée (EDG)
21.	Kenya	Kenya Power and Lighting Company Limited (KPLC)
22.	Lesotho	Lesotho Electricity Corporation (LEC)
23.	Liberia	Liberia Electricity Corporation (LEC)
24.	Madagascar	Madagascar Jiro Sy Rano Malagasy (JIRAMA)
25.	Malawi	Electricity Supply Corporation of Malawi Limited (ESCOM)
26.	Mali	Energie du Mali SA (EDM)
27.	Mauritania	Société Mauritanienne d'Electricité (SOMELEC)
28.	Mauritius	Central Electricity Board (CEB)
29.	Mozambique	Electricidade de Moçambique (EDM)
30.	Namibia	NamPower
31.	Niger	Société Nigérienne d'Electricité (NIGELEC)
32.	Nigeria	Port Harcourt Electricity Distribution Company (PHED)
33.	Nigeria	Eko Electricity Distribution Company (EKEDC)
34.	Rwanda	Energy Utility Corporation Limited (EUCL)
35.	São Tomé & Principe	Empresa de Agua et Electricidade (EMAE)
36.	Senegal	Société Nationale d'Electricité du Sénégal (SENELEC)
37.	Seychelles	Public Utilities Corporation (PUC)
38.	Sierra Leone	Electricity Distribution and Supply Authority (EDSA)
39.	South Africa	Eskom
40.	Tanzania	Tanzania Electricity Supply Company Limited (TANESCO)
41.	Togo	Compagnie Energie Electrique du Togo (CEET)
42.	Uganda	UMEME
43.	Zambia	Zambia Electricity Supply Corporation (ZESCO)
44.	Zimbabwe	Zimbabwe Electricity Transmission and Distribution Company

About this Publication

The 2022 edition of the Electricity Regulatory Index – produced and published by the African Development Bank – is the fifth 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. The ERI scores are calculated from responses to a bespoke questionnaire distributed to African electricity sector regulators, power utilities and other critical electricity sector stakeholders. This provides important insights into the strengths and weaknesses of electricity sector regulators and the overall regulatory frameworks in which they operate.

About the African Development Bank Group

The African Development Bank Group is a multilateral development bank whose shareholders include 54 African countries (its regional member countries) and 27 non-African member countries. The Bank Group is made up of 3 entities: the African Development Bank, the African Development Fund and the Nigeria Trust Fund. The Bank Group's primary objective is to contribute to the sustainable economic development and social progress of its regional member countries in Africa, individually and jointly. It does this by financing a broad range of development projects and programs through public sector loans, including policy-based loans, and through private sector loans and equity investments. The Bank Group also provides technical assistance for institutional support projects and programs, undertakes public and private capital investments, assists countries with developing policies and plans, and supplies emergency assistance.

Electricity Regulatory Index for Africa

African Development Bank
Energy Financial Solutions, Policy and Regulation Dept.
Power, Energy, Climate Change and Green Growth Complex
CCIA Building | Avenue Jean Paul II, Plateau
01 Box 01 1387 Abidjan, Côte d'Ivoire
www.afdb.org

AFRICAN DEVELOPMENT BANK GROUP

ERI
Electricity Regulatory Index for Africa