

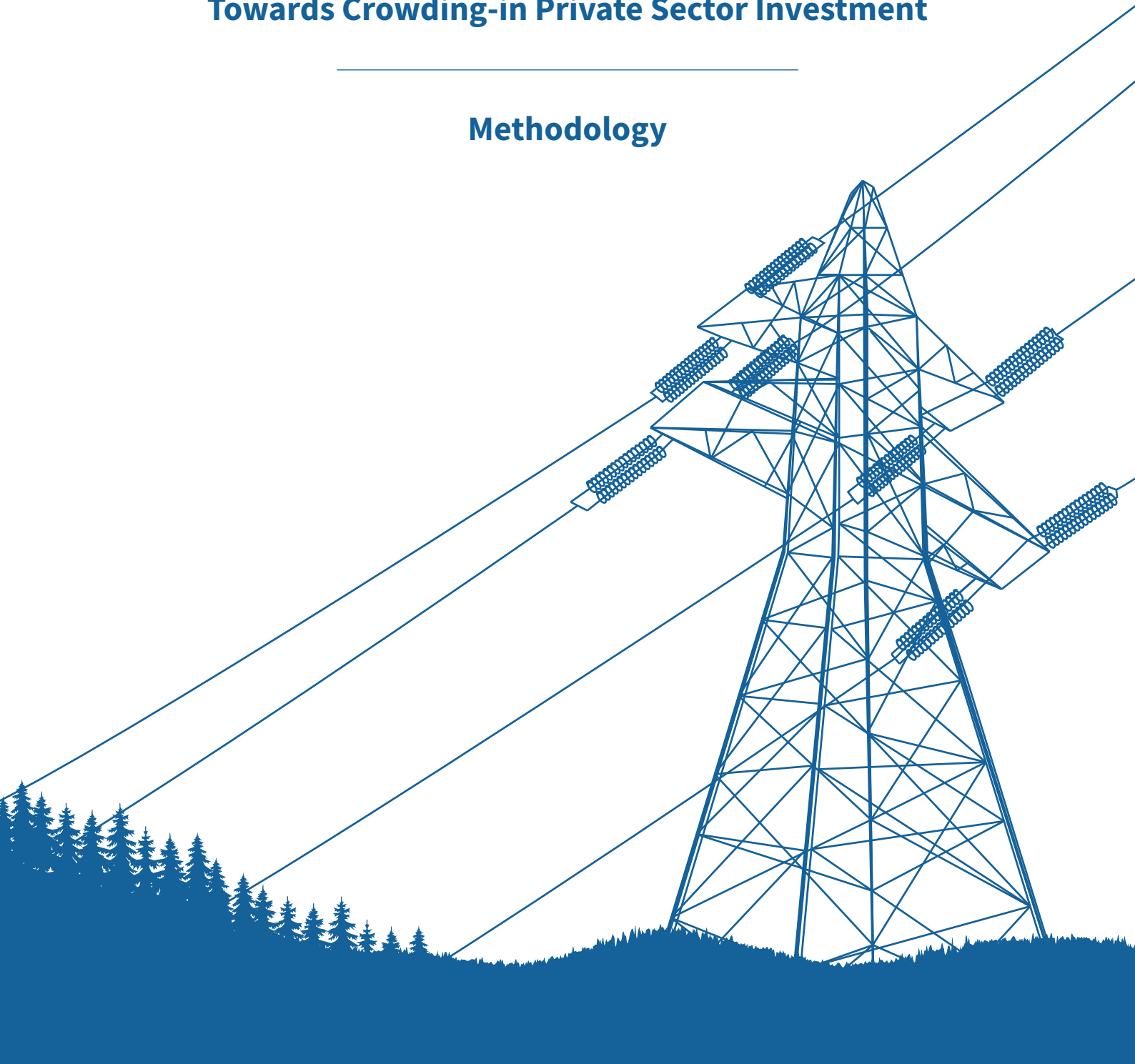


United Nations
Economic Commission for Africa



Regulatory Review of the Electricity Market in Africa Towards Crowding-in Private Sector Investment

Methodology





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The regulatory review methodology was developed in three phases. During the first phase (March-August 2019), energy and infrastructure policy and regulation experts from ECA and RES4Africa developed the initial concept and skeleton of the draft methodology. In September 2019, as part of a second phase, a consultative meeting was held with seasoned energy policy and regulation experts from Africa and beyond. The following experts and sector leaders participated in this consultative meeting on the draft methodology concept.

From continental and regional organizations and national energy sector institutions: Mr. Peter N. Kinuthia, Senior Energy Policy Advisor, African Union Commission; Mr. Solomon Sarpong, Senior Energy Economist, African Development Bank; Mr. James Manda, Technical Manager, African Forum for Utility Regulators; Mr. Hichem Jemai, Director of Administration and Finance, Association of Power Utilities of Africa; Mr. Elijah C. Sichone, Executive Secretary, Regional Electricity Regulators Association of Southern Africa; Mr. Yawovi Negbegble, Principal Power Regulatory Officer, ECOWAS Regional Electricity Regulatory Authority; Mr. Charles Omusana, Principal Economist for Investment and Private Sector Promotion, East African Community Secretariat; Mr. Yiheyis E. Gudeta, Acting Director for Energy Policy, Ministry of Water, Irrigation, and Energy of Ethiopia; Mr. Peter R. Twesigye, Manager of Regulatory Affairs, UMEME Ltd, Uganda; and Ms. Martha Cheruto, Engineer in-Charge, Kenya Power.

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Acronyms

AfDB	African Development Bank
B2C	Business to Customers
BOO	Build, Operate, and Own
BOOT	Build, Own, Operate, and Transfer
BOT	Build, Operate, and Transfer
CBA	Cost-Benefit Analysis
CfD	Contract for Difference
DFIs	Development Finance Institutions
DSAs	Distribution Service Agreements
DSO	Distribution System Operator
ECOWAS	Economic Community of West African States
EISS	Energy, Infrastructure, and Services Section, UNECA
EPC	Engineering, Procurement, and Construction
ESMAP	Energy Sector Management Assistance Program, the World Bank
FiP	Feed-in Premiums
FiT	Feed-in Tariff
GHG	Greenhouse Gases
GTD	Generation, Transmission, and Distribution
ICA	Infrastructure Consortium for Africa
IPPs	Independent Power Producers
IPTs	Independent Power Transmissions
KPIs	Key Performance Indicators
MASEN	Moroccan Agency for Sustainable Energy
PPAs	Power Purchase Agreements
PPP	Public-Private Partnership
PSP	Private Sector Participation
RAB	Regulatory Asset Base
RES	Renewable Energy Sources
RES-E	Renewable Energy and Efficiency
RES4Africa	Renewable Energy Solutions for Africa
ROAR	Regulatory Review of Openness, Attractiveness, and Readiness
ROW	Right-of-Way
RPO	Renewable Purchase Obligations
RPS	Renewable Portfolio Standard
SDG 7	Sustainable Development Goal #7
SPD	Small Power Distributor
SPP	Small Power Producer
TSAs	Transmission Service Agreements
TSO	Transmission System Operator
UNDP	United Nations Development Program
UNECA	United Nations Economic Commission for Africa
USD	United States Dollars
VAT	Value-Added Tax

1. Introduction

The Sustainable Development Goals provide a framework to pursue global development in key areas defined across 17 goals. SDG7 is one critical component and pillar aiming to ensure access to affordable, reliable, sustainable, and modern energy for all by 2030. Energy infrastructure and capacity development, especially in the context of Africa, plays an indispensable role in socio-economic development and overall transformation. As a result, national development strategies in most of Africa already reflect the need to expand electricity access rapidly, and devoted considerable public finance for energy infrastructure development, while instituting measures to reform energy sector governance and legislation.

Despite progress in the last decades, today, global SDG7 progress tracking reports indicate remaining challenges to rapidly and sustainably improving energy supply, particularly in Africa. The latest assessment (UN, 2021a) indicates that in the COVID-19 environment, the positive trend registered in the last years reversed and nearly 590 million people lack access to electricity in Africa, which is 2 percent higher than in 2020. Urgent action is required to accelerate the gains on SDG-7 remains, notably in Africa where nearly 90 percent of the population without access at the end of the decade is expected to concentrate, partly due to rapid population growth.

The UN High-Level Dialogue on Energy in 2021 is a major milestone for global consensus on accelerating efforts in the Decade of Action for SDGs. The Dialogue is supported by five thematic reports. The report on Finance and Investment (UN, 2021b) concluded that to fast-track progress on SDG 7 in member States, it is vital to “fix regulatory barriers to ensure market openness, attractiveness, and readiness for private-sector finance.” On its Africa assessment, the 2021 SDG7 tracking progress report points to electricity market regulation in Africa as among the key barriers limiting effective leveraging of investment from the private sector to speed up progress. Among the key structural challenges, it is therefore essential that electricity markets in Africa address prevailing regulatory barriers towards effective investment participation of the private sector.

Financing energy development requires innovative solutions. The cost of achieving the SDGs at large in the continent is estimated at USD 1.3 trillion per year; and Africa would particularly require USD 32 billion per year through 2030 on universal electricity access-related investments (AfDB, 2019). According to the Infrastructure Consortium for Africa (ICA), 37 percent of infrastructure investments in the continent were undertaken by African governments in 2018, with the private sector accounting for 11 percent (ICA, 2018). Given the major infrastructure investment gap and the limited investment role of the private sector so far, addressing the crowding-in of private sector investment in the electricity market is crucial. The improvement of the regulatory environment will play a major role in this effort. Indeed, the Regulatory Indicators for Sustainable Energy (ESMAP, 2020) concludes that more than half of the global population lacking access to electricity remained in countries with weak regulatory frameworks by 2019.

For member States seeking to address regulatory gaps that stifle effective private sector investment participation in the electricity market, key policy and regulatory questions remain to be addressed. These include:

- ⚡ In the context that the scope of electricity market regulation is potentially expansive, how would national regulatory agencies prioritize reform?
- ⚡ Within the emerging global consensus on the need to address electricity market regulatory barriers, how would national regulators pinpoint their respective regulatory gaps vis-à-vis private sector participation to address them?
- ⚡ How would national regulatory authorities assess the efficacy of their electricity market regulation vis-à-vis their openness, attractiveness, and readiness for private sector participation as recommended by the UN High-Level Dialogue on Energy?
- ⚡ How would countries determine what it means for electricity market policy and regulation to ensure openness, attractiveness, and readiness?
- ⚡ Would assessments of regulatory gaps for the generation segment of the market be appropriate for networks or the off-grid market? How would regulation address peculiarities within the broader regulatory framework related to the electricity market value chain?
- ⚡ How would member States know if they are making robust progress in addressing their regulatory gaps to enhance private sector investment participation? How could such progress be monitored and evaluated?
- ⚡ How would countries identify the most robust aspects of regulatory reform to maximize on encouraging growth in infrastructure investment and finance?
- ⚡ How could member States cross-compare their level of regulatory development vis-à-vis others and draw lessons for their regulatory advancement?
- ⚡ Are there continental and regional broader regulatory guidance on how such reforms could take shape, and result in effective crowding-in of investment?
- ⚡ Is there a way to determine the ideal regulatory package related to effective crowding-in of private-sector infrastructure investment?

These issues, and other related practical questions, often confront regulatory authorities as they assess the effectiveness of regulation on the performance of the electricity market. They also face these issues as they identify new sets of regulatory measures to help strengthen the functioning of an ever-developing complex electricity markets, potentially with a growing number of market players. Responding to these complex sets of regulatory issues require the development of a regulatory assessment method, or model, to help articulate the current strengths of the regulatory system and identify major gaps for improvement and reform.

With this intent, the UN Economic Commission for Africa and the RES4Africa Foundation joined their forces and initiated a program in 2019 on “*Regulatory enhancement to crowd-in private sector investment in Africa’s electricity markets.*” The program aimed to achieve four goals: (1) development of a regulatory review methodology related to private sector participation requirements ; (2) implementation of the methodology in 17 African countries, in all regions of

the continent, for deeper understanding of specific regulatory strengths and challenges and to communicate results with national regulatory authorities; (3) development of a software, based on the methodology, to capacitate member states with a tool to plan regulatory reforms, and monitor and evaluate regulatory improvements; and (4) development, in partnership with the African Union, of a guiding continental framework on regulation and private sector participation in Africa's electricity markets.

The purpose of this report is to elaborate on the methodology developed by UNECA and RES4Africa Foundation to perform the analysis of electricity sector policy and regulatory environment in member States. The report covers the rationale of the methodology, its scope, the methodology development approach, and a deep-dive in to the analytical framework developed for all segments of the value chain – electricity generation, transmission, distribution, and off-grid systems. It also elaborates on the quantitative model adopted to reach final evaluation of the effectiveness of the policy and regulatory framework vis-à-vis private sector's requirements.

2. Rationale of the Methodology

The methodology aims to investigate the effectiveness of electricity sector policy and regulatory frameworks in their ability to crowd-in private investments. The methodological approach takes on the perspective of fundamental policy and regulatory elements which characterize an enabling business environment to crowd-in private sector investment in energy infrastructure.

The methodology enables reaching three fundamental outputs for a better understanding of what is needed to improve policies, laws, and regulations for private sector crowding-in:

- ⚡ Comprehensive and detailed overview of the current effectiveness of policy and regulatory elements identified for each of the assessed countries;
- ⚡ Benchmarking of the performance of policy and regulatory frameworks in member States; and
- ⚡ Best practices to share experiences and lessons learned among countries.

The rationale for such a methodology is based on several considerations. First, addressing key aspects of electricity market regulation requires proper assessment, based on specific conditions within a member State, which is best supported by a well-developed methodology. Second, recommendations on regulatory reform tend to be generic, and broad in scope, often making it difficult for regulatory authorities to take concrete steps to address them. An objective assessment approach would help close these gaps. Third, regulatory authorities in national jurisdictions are best supported with a common assessment approach that would enable them to cross-compare with other jurisdictions and target lessons to learn in specific areas of regulatory interest. Fourth, the approach also enables benchmarking analysis based on observations from the regulation of electricity markets in 17 African countries in the initial phase. This approach enables member States to evaluate their level of regulatory development in specific areas of regulatory inquiry, providing useful feedback to pursue change. As international recommendations on regulation and the private sector, such as through the UN High-Level Dialogue on Energy thematic report on Investment and Finance, relate to the

openness, attractiveness, and readiness of regulation to private sector participation, a formal methodology will help articulate in detail what these Dimensions mean, and how national regulators could pursue such goals practically.

Finally, as national electricity market regulators pursue reforms in key areas of interest, to support the burgeoning electricity markets in member States, such methodology offers the benefit of an evaluation and monitoring approach in pacing regulatory development with investment interests of member States. It is, therefore, essential that an objective and effective regulatory assessment methodology be developed to provide clear and practical guidance in bridging the often-identified regulatory barriers towards up-scaling energy infrastructure investment in Africa.

We acknowledge that the adoption and implementation of policies, laws, and regulation entail a high level of complexity, and country-specific factors may impact their effectiveness. Furthermore, we recognize that the developed methodology can rank countries on the level of development of their regulatory environment. However, numerical ranking between countries is not pursued by this analysis, and more attention and emphasis is placed on quantitatively assessing existing regulatory strengths and gaps in member States with the sole goal of supporting regulatory improvements and, where necessary, reforms.

3. Scope of the Methodology

The methodology adopts electricity market system-wide scope. Even though it focuses on aspects of the electricity market regulation related to private sector investment participation, it does so by adopting a perspective covering the entire value-chain. Indeed, it is recognized that private investors may be interested to invest in the generation segment of the market or in transmission assets. It is also plausible that investors could be interested only in distribution assets. Potential investors could also focus on the off-grid electricity market as a matter of investment interest. In each of these cases, investors could be particularly interested with regulatory provisions pertaining to a specific segment of the electricity market, or value chain.

The approach taken is to widen the scope of the methodology such that market segment level regulatory review, such as the generation market, or entire value chain regulatory assessment, from generation to networks and off-grid markets, is possible. Such a segmented and entire system regulatory assessment offers flexibility on the application of the methodology. Therefore, the scope of the methodology is an entire electricity value chain regulatory assessment (generation, transmission, distribution, and off-grid markets) vis-à-vis provisions for private sector investment participation. Such broad scope is complemented by the ability to conduct regulatory assessments by market segment.

4. Methodology Development Approach

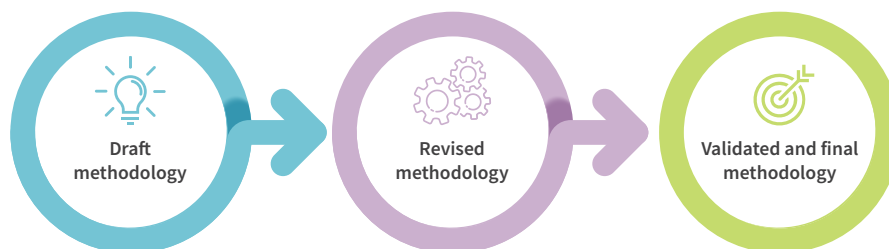
The regulatory review methodology was developed in three phases. During the first phase (March-August 2019), energy and infrastructure policy and regulation experts from the UN Economic Commission for Africa and the RES4Africa Foundation developed the initial concept

and skeleton of the draft methodology. Such methodology was thoroughly reviewed and improved towards a draft initial methodology framework. The draft methodological framework was then presented to a wide array of experts from Africa and beyond during the first review and consultation meeting. The consultative meeting, in September 2019, was aimed at reviewing thoroughly the draft methodological framework and taking expert inputs on its improvement. Representatives from the following continental organizations participated in this meeting: African Union Commission; African Development Bank; African Forum for Utility Regulators; and Association of Power Utilities of Africa. Experts from the following regional organizations also participated in the consultative meeting: ECOWAS Regional Electricity Regulatory Authority, Investment and Private Sector Promotion Unit of the East African Community Secretariat, and the Regional Electricity Regulators Association of Southern Africa. Furthermore, national experts have also took part in the meeting from: the Ministry of Water, Irrigation, and Energy – Ethiopia; UMEME Ltd – Uganda; and Kenya Power and Lighting Company. From think tanks, consultancies, and private sector operators, the following institutions participated in the consultation: Africa Energy Services Group – Rwanda; Deloitte Development Africa of Deloitte Consulting – South Africa; Green Africa Foundation – Kenya; and Africa GreenCo - Mauritius. International experts on energy policy and regulation also participated from: UNDP Global Environmental Finance Unit – USA, Pöyry Management Consulting (now AFRY Management Consulting) – Italy; Center for Energy and Environmental Policy Research of the Sloan School of Management at MIT - USA; and the International Institute of Social Studies of Maastricht School of Management – the Netherlands.

Based on expert inputs on the draft methodological framework, including expanding the scope and reach of the methodology, a revised and updated methodology was developed by UNECA and RES4Africa from September to December 2019. The third phase of the methodology development involved the validation of the finalized methodology by a group of African and international experts. The following institutions participated in the validation meeting – the African Union Commission, Energy Commission – Ghana, Ministry of Water, Irrigation, and Electricity – Ethiopia, Ministry of Energy and Mineral Development – Uganda, Ministry of Energy – Kenya, Ministry of Energy and Water – Angola, Ministry of Energy – Zambia, Moroccan Agency for Sustainable Energy (MASEN), Energy Utility Corporation Ltd – Rwanda, Kenya Power, and Lighting Company, Thormo Investment Ltd – Zambia, Africa Energy Services Group – Rwanda, and Energy Solutions Consulting – South Africa. Furthermore, experts from AFRY Management Consulting, who supported the development of the methodology, also participated in the validation meeting.




Based on inputs from the validation meeting, by February 2020 the initial final methodology was finalized. The details of the methodology were concluded by May 2020.

Figure 1: The methodology development approach



5. Methodological Framework

The methodology aims to focus on broader electricity market regulatory issues that fundamentally shape the scale and extent of private sector investment participation in energy infrastructure development. In the methodological framework, these fundamental regulatory issues at a higher scale are referred to as Dimensions. These Dimensions contain a cluster of policy and regulatory provisions relevant to private sector investment participation. The methodology defines three Dimensions, namely *openness*, *attractiveness*, and *readiness* of the policy and regulatory framework to crowd-in private sector participation.

 <p>Openness</p>	<p><i>Openness</i> – or power sector structure and governance. This Dimension covers, among others, energy policies, laws, and regulations meant to define the operating landscape, market-entry provisions, infrastructure development plans, sector governance approach market structures, and related considerations. These instruments combined provide an overall view of the degree of <i>openness</i> of electricity markets to private sector investors across the value chain.</p>
 <p>Attractiveness</p>	<p><i>Attractiveness</i> – or sector economics. This Dimension assesses policies, laws, and regulations that ensure the economic viability of electricity infrastructure investments, as well as fair competition among market operators. A review of these instruments provides an overall synthesis of the <i>attractiveness</i> of the electricity market to private sector investors.</p>
 <p>Readiness</p>	<p><i>Readiness</i> – or sector maturity. This Dimension investigates technical regulations and operational rules of the electricity system in relation to efficient integration and effective management of new infrastructure into the system. A review of these elements of the Dimension provides an overall picture of the <i>readiness</i> of the electricity market to investors along the value chain.</p>

Dimensions are largely elusive, and difficult to measure directly. It is, therefore, essential to observe them using relevant factors that define them. These defining factors of Dimensions are referred to as Topics. Each of the Dimensions is disaggregated into several Topics to enable better measurement and observation. Figure 3 provides a complete picture of the Topics covered under each Dimension.

While identification of relevant Topics helps refine the Dimensions better, Topics themselves are broad and require to be further disaggregated. For example, under the *openness* Dimension, the *power sector governance* Topic, which in itself is broad, requires to articulate the aspects of market governance that are most relevant to private sector investment participation. Consequently, Topics are further disaggregated by utilizing, namely, Indicators. Collectively, Indicators under each of the Topics provide enhanced ability to observe and measure Topics, and therefore Dimensions.

The identification of Indicators is helpful. However, to directly measure regulatory provisions around each Indicator, they must be directly observable and measurable. Therefore, each Indicator is further disaggregated into observable performance Indicators, called Key Performance Indicators (KPIs). The KPIs are single elements, or specific questions, that provide a detailed understanding of Indicators, which in turn inform Topics. The approach enables assessment of the regulatory environment related to fundamental attributes of the regulation: clarity; predictability; transparency; and accountability.

The methodology, cascading from the macro to the micro-level (as showed in Figure 2), enables proper assessment and understanding of the degree of *openness*, *attractiveness*, and *readiness* of electricity markets to private sector investors.

Combined, these *openness*, *attractiveness*, and *readiness* Dimensions, and granular disaggregated Topics constitute the methodological framework adopted to perform the regulatory analysis across the value chain of the the electricity supply industry.

Figure 2: Conceptual structure of the methodology

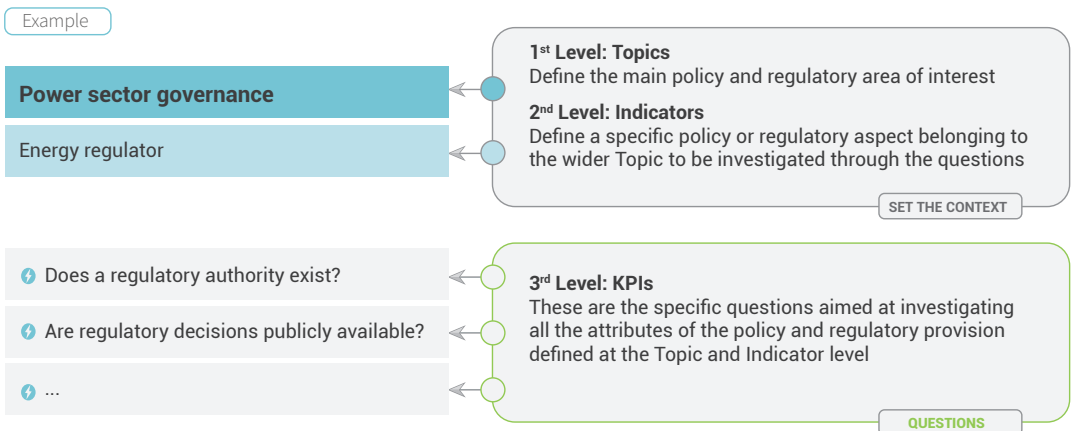
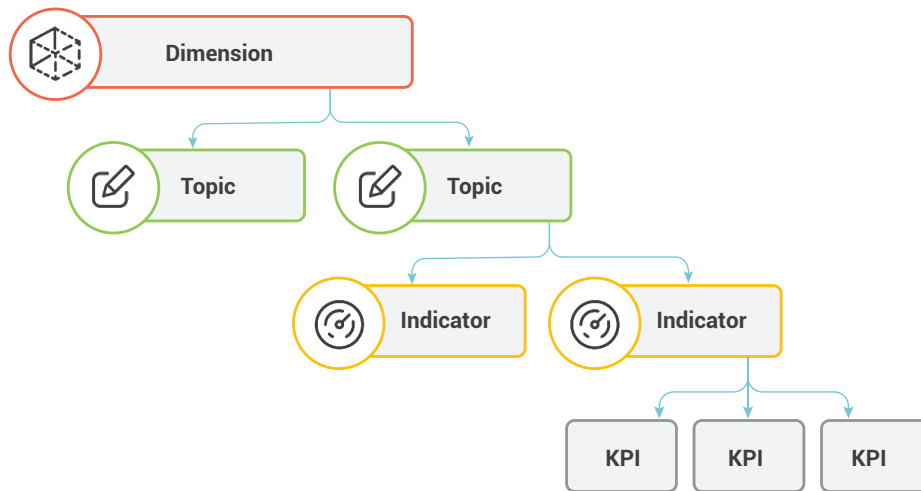


Figure 3: Overview of the Topics assessed within each Dimension

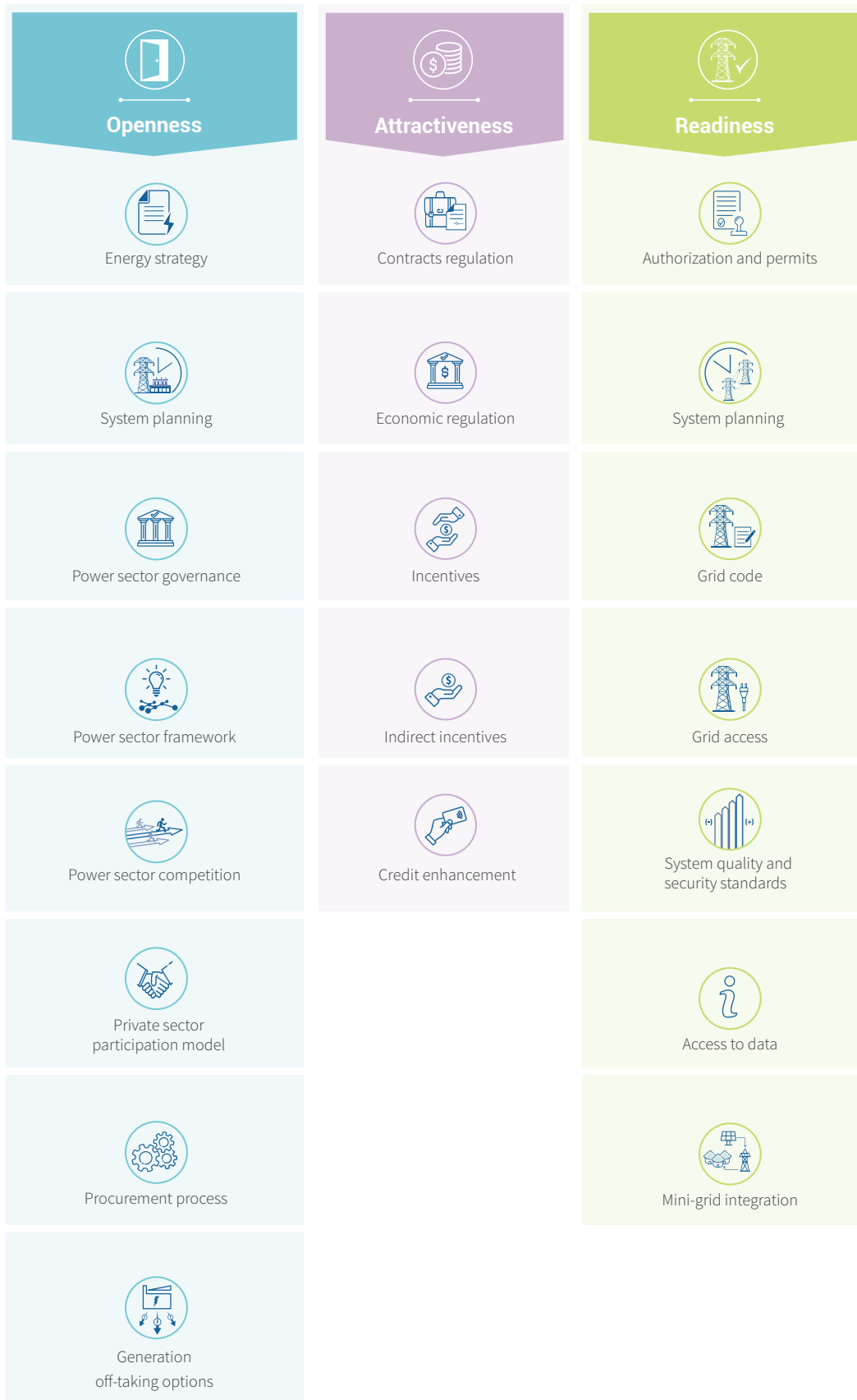





Table 1 provides a definition of the Topics identified and assessed for each of the Dimensions considered by the methodology. Topics, Indicators, and KPIs are further discussed in the next section.

Table 1: Overview of the Topics assessed within each Dimension

 Openness	Energy Strategy	The existence and characteristics of energy and climate policies
	System Planning	The existence and characteristics of plans for generation expansion, network development, and electrification.
	Power Sector Governance	The existence and characteristics of an Energy Act or Law, and an energy regulatory authority.
	Power Sector Framework	The openness of the power sector to competition (e.g. presence of IPPs).
	Power Sector Competition	The degree of unbundling of generation, transmission, and distribution services.
	Private Sector Participation Model	The number of available models for private parties to participate in the power sector.
	Procurement Process	The characteristics of PPP procurement policy, competitive tenders, and solicited/ unsolicited proposals.
	Off-taking Options (for Generation)	The existence of a spot market or single buyer as well as the regulatory characteristics of private PPAs and captive generation.
 Attractiveness	Contracts Regulation	The structure and characteristics of public PPAs, TSAs, DSAs, and standard retail contracts for off-grid operators.
	Economic Regulation	The structure and definition of the retail and network tariff.
	Incentives	The existence of instruments incentivizing private investors to operate in the power sector (e.g. FiT, capacity payments, green certificates, RES quotas)
	Indirect Incentives	The existence of policies or instruments indirectly incentivizing private investors to operate in the power sector (e.g., carbon pricing, result-based financing, tax relief)
	Credit Enhancement	The existence of lending agreements or guarantees that reduce risk or costs for private investors entering the power sector.

 Readiness	Authorizations and Permits	The existence and characteristics of permits needed for the construction of assets in the power sector (e.g. land and water rights, construction and environmental permits)
	System Planning	The existence and characteristics of the network development plan.
	Grid Code	The characteristics of the grid code (e.g. the existence of rules for system operation and connection).
	Grid Access	The existence of third-party access and the characteristics of grid connection and operation agreements.
	System Quality and Security Standards	The existence of quality and security standards for transmission network planning and operation.
	Access to Data	The public availability of data related to electricity sector performance.
	System Integration (for Off-Grid)	The existence and characteristics of regulation for grid arrival.

6. Country Data Collection Approach

The regulatory review framework requires gathering data at the country level related to generation, transmission, distribution, and off-grid segments of the market. If the specific interest is only on generation, then detailed data would be gathered related to that market segment. Similarly, data gathering could also focus on specific market segments of interest.

In the analytical framework, a number of the KPIs, Indicators, and Topics are applicable throughout the value chain, while others are unique to a specific market segment. Examples are provided in Table 2.

Table 2: Unique and overlapping data inputs

		Generation	Transmission	Distribution	Off-Grid
Topic	Contracts regulation	✓	✓	✓	✓
Indicator	Public PPA structure	✓			
KPI	- Is the public PPA standardized?	✓			
Indicator	Transmission Service Agreement (TSA)		✓		
KPI	- Is a standard TSA available?		✓		
Indicator	Distribution Service Agreement (DSA)			✓	

KPI	- Does it provide performance evaluation based on the network availability? (no if on the energy transmitted)			✓	
Indicator	Retail contracts				✓
KPI	- Are standard retailing contracts available for off-grid operators?				✓

The data entry is straightforward, recording only Yes or No answers, which correspond to a binary (1, 0) input. The presence of various policy and regulatory instruments are probed, using this binary data compilation approach. For each of the Yes answers, the survey design requests provision of specific sources such as a website where the information could be found, official documents, policy and regulatory documents, or any other source to support the answer. It also provides space for comments and explanations to further elaborate on the regulatory context related to the KPI answer.

The full scope of the survey to be administered at a country level to gather primary data is shown in the Annexes section. The instrument covers all Topics, under all Dimensions, and probes data entry for all KPIs in the ROAR model.

7. The Regulatory Review Methodology

The methodology enables an in-depth analysis of the policy and regulatory framework in force at the level of each of the segments of the electricity supply industry: generation; transmission; distribution; and off-grid systems. Adopting the logical approach described above, segment-specific analytical frameworks were developed to reflect peculiarities and specific characteristics of each of the segments covered, as well as potential differences in the relevance of particular policy and/or regulatory areas for each of the segments covered. The section below expands on the analytical frameworks developed, providing a general overview of the Topics, Indicators, and KPIs considered by each of the segment-specific analytical frameworks.

7.1 Generation market segment

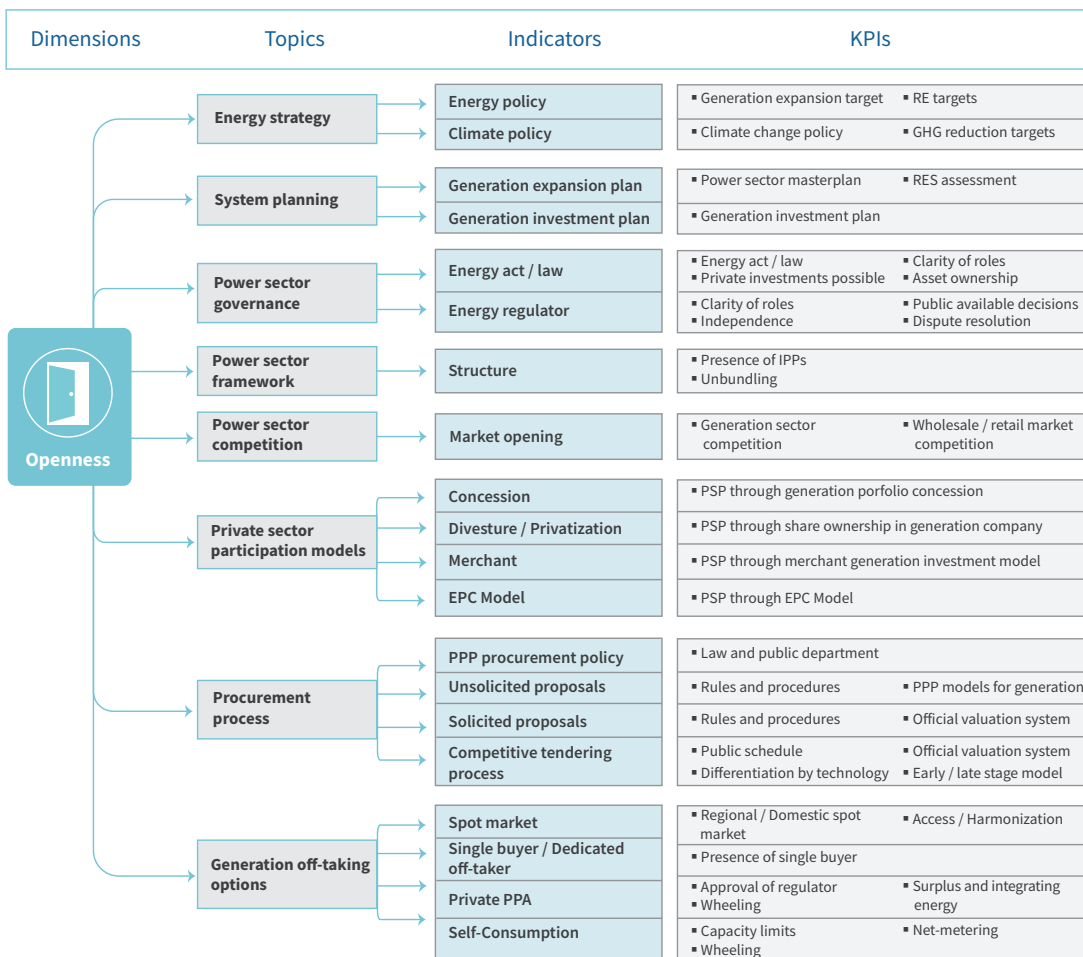
The *openness* of the generation market to private investors is evaluated by seven Topics. The *energy strategy* defines the policy spirit on the main targets and priorities for the evolution of the electricity sector, as articulated often through the national energy policy and climate change policy/strategy – the Indicators. The *system planning* Topic encompasses the national generation expansion plan and its associated investment plan; it is expected that such plans provide useful insight on future capacity and financial requirements, as well as plans related to private sector investment participation. The *openness* of the generation segment is also determined by the *power sector governance*. The energy act/law defines the legal basis for the regulation of the market, along with legal regimes for market operators and the operational scope for the private sector. Market governance is also determined by the nature of the market regulator, where the KPIs provide detailed investigation including its functional, financial, and

decision-making independence. The *power sector framework* is equally relevant in shaping the degree of *openness* of the generation market to investors, investigating the degree of market unbundling. The opening to wholesale and retail market competition is also assessed by *power sector competition* Topic. *Private sector participation models* define the permissible models to access the market defined by the electricity market regulation in force. This Topic is evaluated based on whether generation investors could participate through a concession model, divestiture/privatization approach, and/or through merchant generation investment. Investment participation could also be facilitated through the *procurement process*, based on Indicators such as applicability of PPPs, the possibility of submitting solicited and unsolicited project proposals, and the presence of competitive tendering processes.

The *openness* of the regulatory environment to private sector generation investment is further assessed through *generation off-taking options*, investigating the permissible ways for generators to sell their electricity output. The permissibility, or availability, of spot markets, a single-buyer or dedicated off-taker model, the possibility of generation for self-consumption, and the possibility of private PPAs are identified and explored.

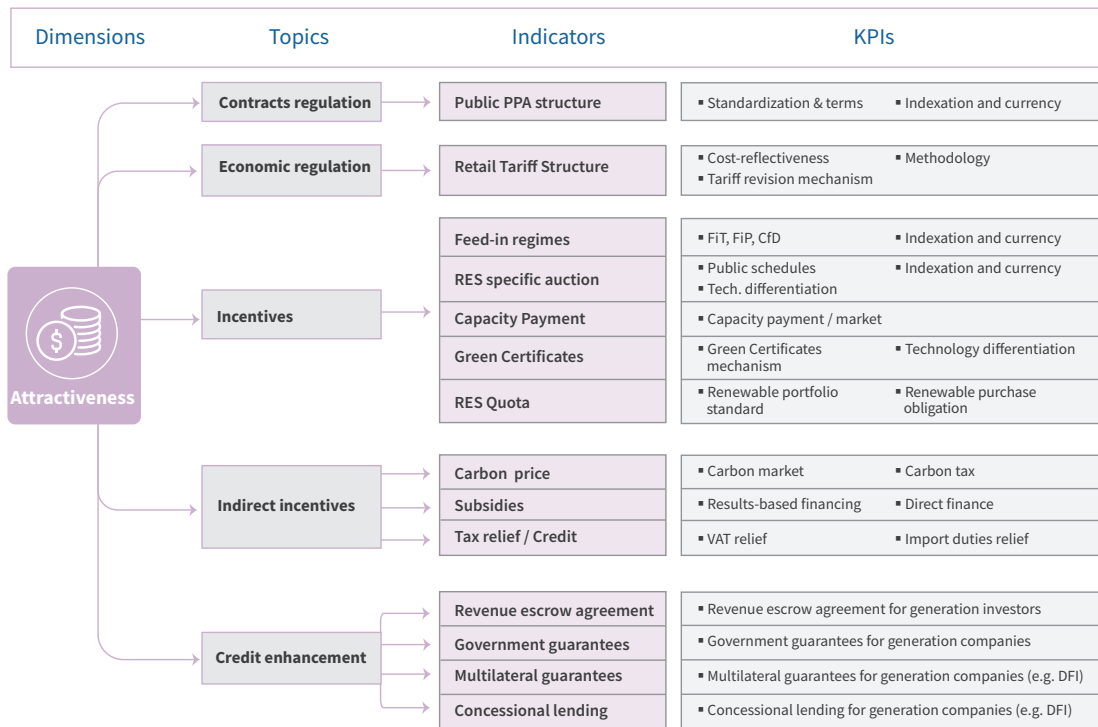
Combined, these series of Topics and Indicators provide sufficient input to assess the degree of *openness* of the regulatory environment to private investors in generation assets.

Figure 4: Regulatory review methodological framework (Generation - Openness)



The *attractiveness* of the generation segment to private investors is evaluated by the assessment of five Topics. Investors do prefer *contracts regulation* regimes that are simplified and standardized to mitigate transaction and administration costs; in this case, the public PPA structure is evaluated, mainly with a focus on its standardization and key provisions for bankability. A crucial aspect of *attractiveness* emanates from *economic regulation*, where electricity tariffs regulation is investigated in its transparency, predictability and its ability to ensure fair consideration of costs associated with each service and final cost-reflectiveness. Market *attractiveness* is further evaluated through the slew of direct and *indirect incentives* that could be extended to private investors, including FiTs, RES quota, auctions, green certificates, capacity payments, carbon price, subsidies, and tax reliefs. Finally, investors often closely examine *credit enhancement* provisions to decrease the cost of equity and debt and enhance their business case. These would include the permissibility of escrow agreements, government and multilateral guarantees, and concessional lending.

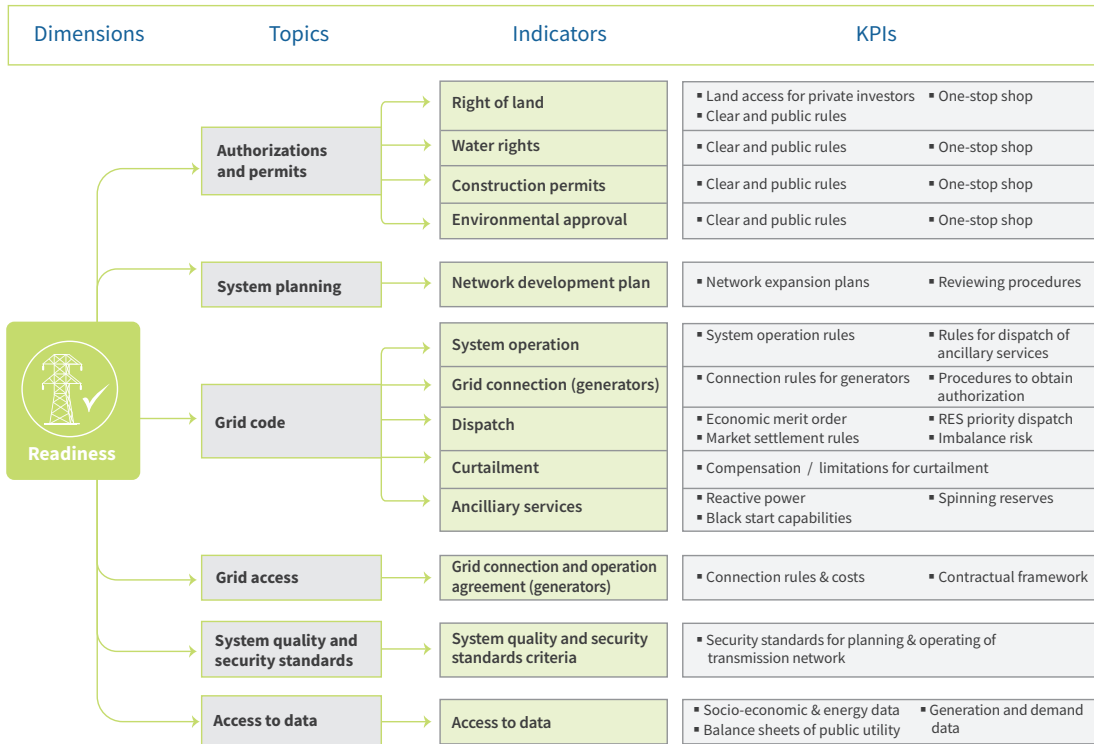
Figure 5: Regulatory review methodological framework (Generation - Attractiveness)



The *readiness* of the generation market is evaluated on six Topics. Clarity and ease of *authorization and permits* are essential. This would typically involve the right of land, water rights, construction permits, and environmental approval relevant for generation projects. *Readiness* is also evaluated related to *network system planning*, as knowledge and transparency about grid infrastructure development plans is essential to evaluate and assess location of future generation projects. A crucial aspect relates to the definition of the *grid code*, which defines the main rules for a safe and reliable development and operation of electricity system. This would encompass system operation, grid connection rules, dispatching, curtailment management, and provisions around ancillary services. Regulatory clarity in these areas

greatly defines how ready the market is to integrate and ensure the safe and reliable operation of new infrastructures. Similarly, *grid access*, covering aspects related to grid connection and operation agreements, and the availability of *system quality and security standards* further define market *readiness*. Finally, transparency and *access to data*, notably on key metrics of electricity sector performances and national socio-economic condition, is essential to investors. Combined, these Topics and Indicators would help evaluate the overall regulatory *readiness* of the market to crowd-in scaled private investment.

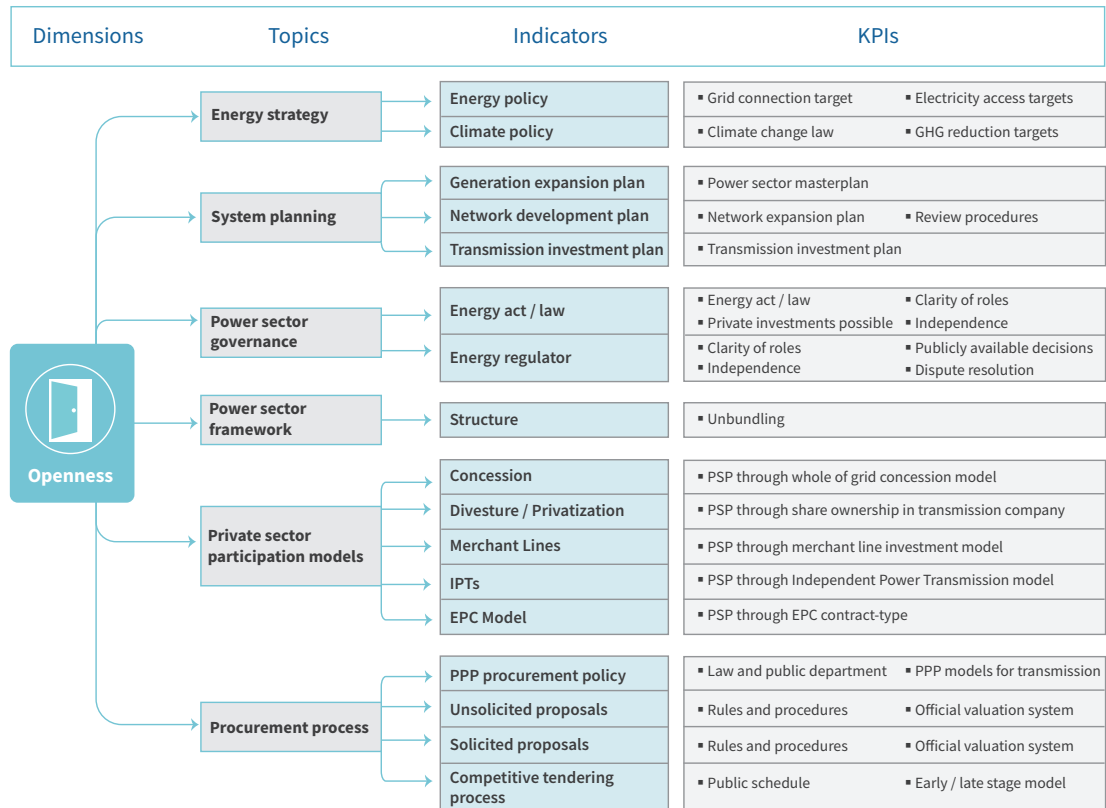
Figure 6: Regulatory review methodological framework (Generation - Readiness)



7.2 Transmission market segment

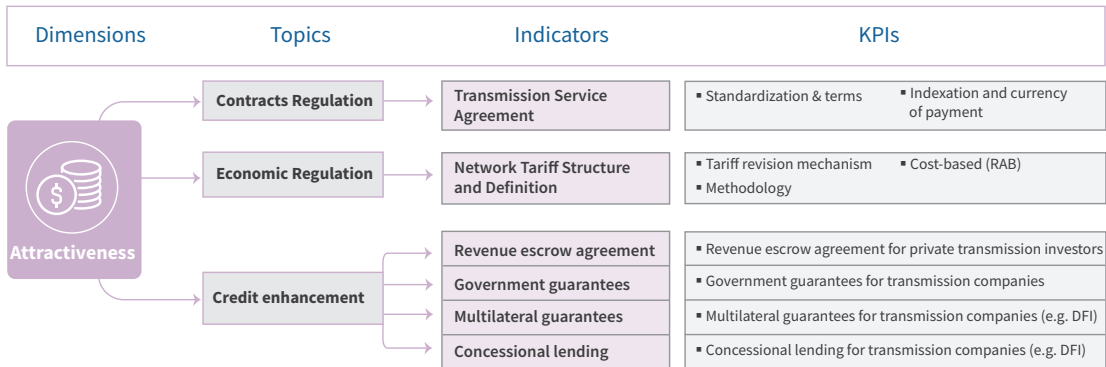
The *openness* Dimension for the transmission segment is assessed, similar to the generation segment, based on six Topics. The Topics related to the *energy strategy*, *power sector governance*, *power sector framework*, and the *procurement process* are similar in both the transmission and generation segments. Further emphasis is given to *system planning*. In the case of the transmission market segment, this Topic also encompasses considerations such as the presence of a network development plan and its associated transmission investment plan. Such plans offer clear information to transmission investors on the planned expansion of the network system and anticipated investment volumes. Segment-specific elements are also considered in *private sector participation models* in the case of transmission investors, where several models are considered such as: whole-of-grid concessions, divestiture/privatization, merchant transmission investments, the possibility of independent power transmissions (IPTs), and EPC-type of contracts. Regulatory review of these Topics collectively defines the degree of *openness* of the transmission segment of the market to private investors.

Figure 7: Regulatory review methodological framework (Transmission - Openness)



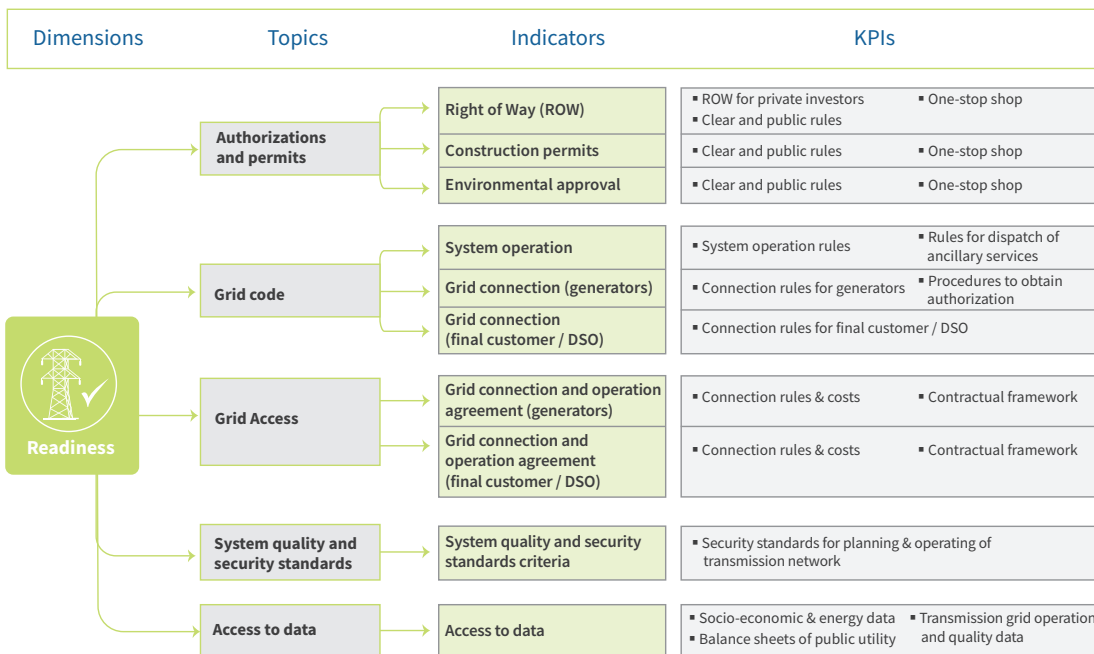
The *attractiveness* to private investors of policy and regulations relevant for the transmission segment is evaluated on three Topics. Related to *contracts regulation*, the focus is mainly on the existence of a transmission service agreement, considered as the main document defining rights and responsibilities of the network operator and regulating the relationship between the network operator and network users. *The economic regulation* assessment focuses on the network tariff definition approach/method, the network tariff structure, and its cost-reflectiveness. *Credit enhancement* is already discussed under the generation market segment and applies similarly.

Figure 8: Regulatory review methodological framework (Transmission - Attractiveness)



The *readiness* Dimension for the transmission segment is evaluated by the assessments of five Topics. Similar to the generation segment, *readiness* is evaluated based on performance related to the ease and clarity of *authorization and permits*, with a specific attention to right of way regulation, *system quality and security standards* in place, transparency and *access to data*. Related to the *grid code* topic, system operation aspects and grid connection regulation for both generators and bulk customers (distributors and other large demand points) are considered. Similarly, *grid access* in terms of connection and operation agreement are considered for both generators and bulk customers. The evaluation of these five regulatory Topics and their series of Indicators associated enables assessing the degree of *readiness* of the market to integrate new infrastructures.

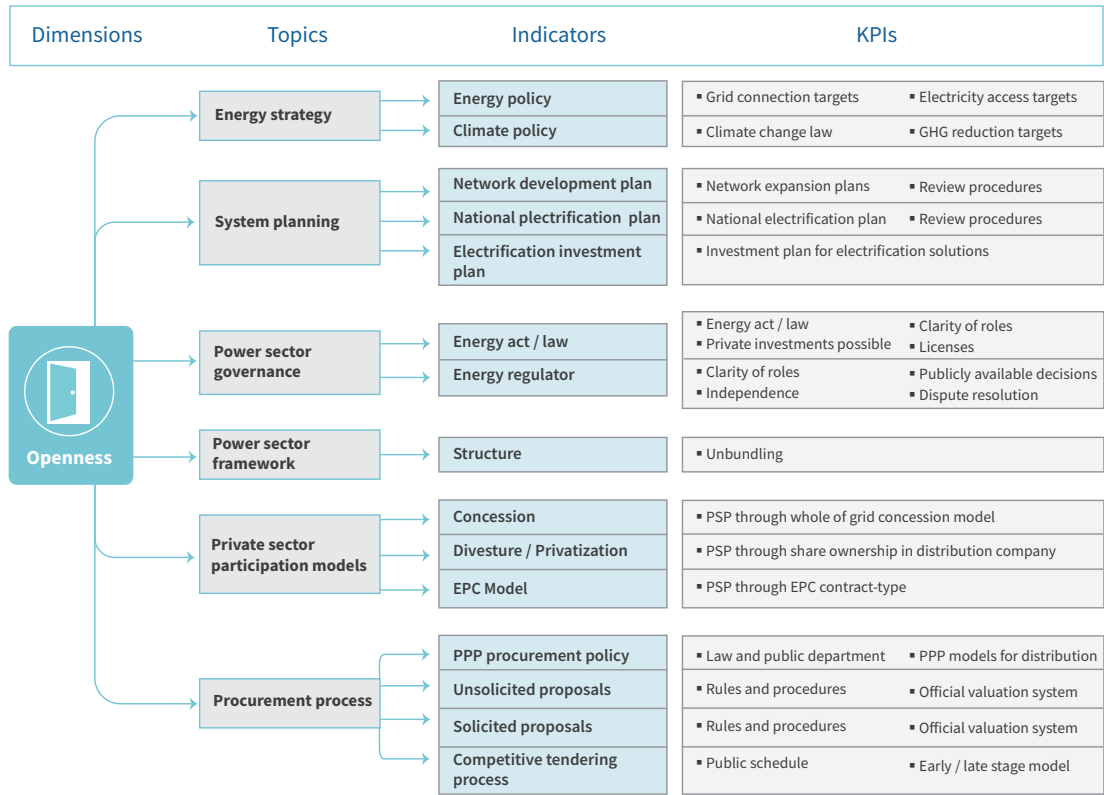
Figure 9: Regulatory review methodological framework (Transmission - Readiness)



7.3 Distribution market segment

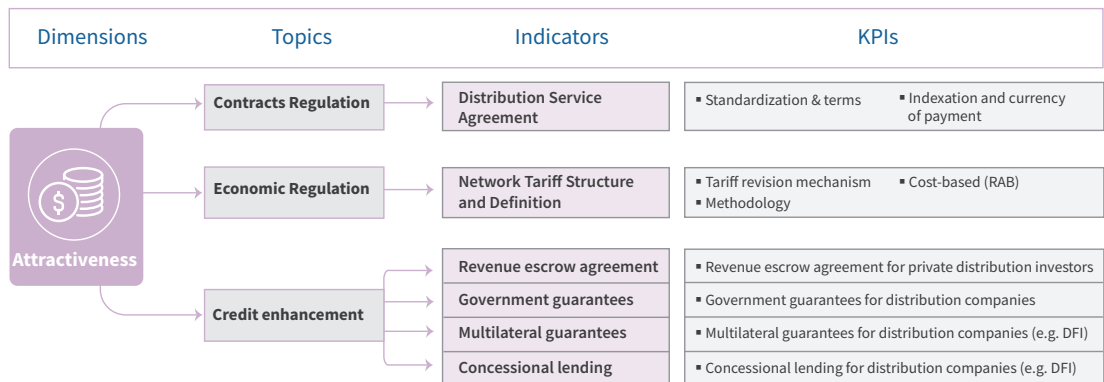
The *openness* related to the distribution segment is evaluated using similar Topics and Indicators utilized to evaluate the transmission one, as such details about these Topics have already been discussed under the generation and transmission segments' sections. However, few adjustments have been introduced to investigate peculiar aspects of the distribution segment. For instance, under the *system planning* Topic, further attention is paid to the presence of a national electrification plan and electrification investment plan and related regulatory provisions, as planning instruments for distribution infrastructures.

Figure 10: Regulatory review methodological framework (Distribution - Openness)



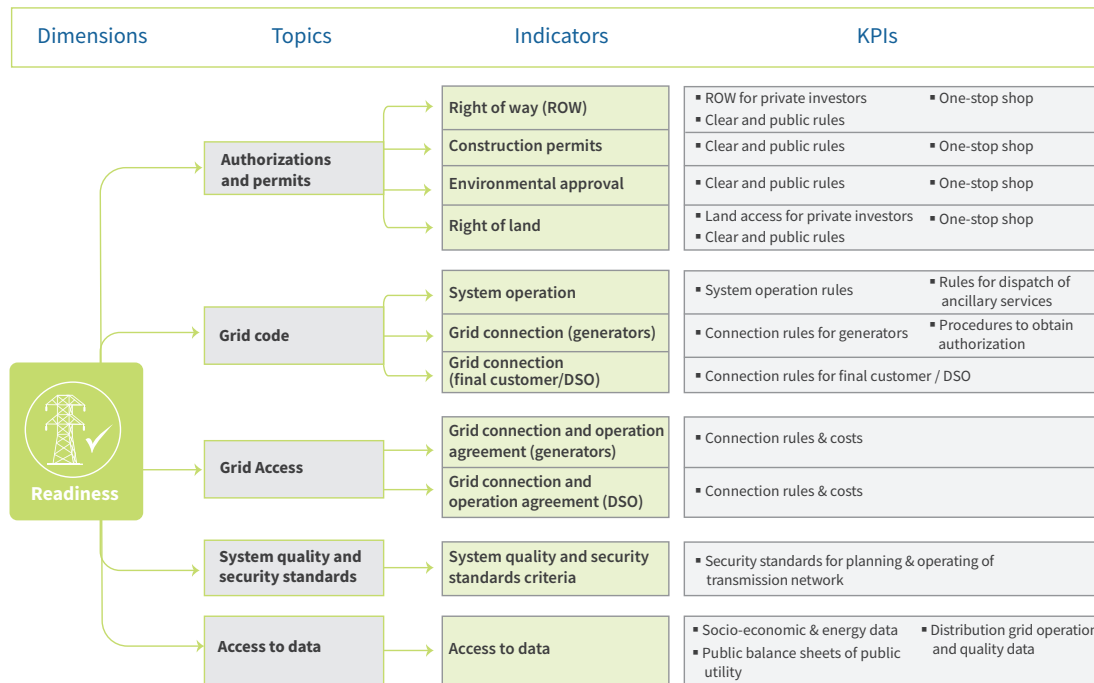
Similar to the transmission segment, the *attractiveness* of the distribution segment of the market is assessed through the analysis of policies and regulations covering *credit enhancement* for investors in distribution assets and *economic regulation* based on tariff definition for distribution service. Related to *contracts regulation*, the focus is on the presence and characteristics of a contractual framework, as a *distribution service agreement*, defining rights and obligations of distribution operators and regulating relationship between distributors and final users.

Figure 11: Regulatory review methodological framework (Distribution - Attractiveness)



The *readiness* of the distribution segment of the market is assessed based on five Topics, similarly to the transmission market segment. Adjustments are made at the Indicators and KPIs level to move the attention to dedicated technical and network regulation for the distribution segment, as in *grid code*, *grid access*, as well as *system quality and security standards* Topics. Combined, they would reflect on the degree of *readiness* of the distribution market to integrate and operate new infrastructure.

Figure 12: Regulatory review methodological framework (Distribution - Readiness)

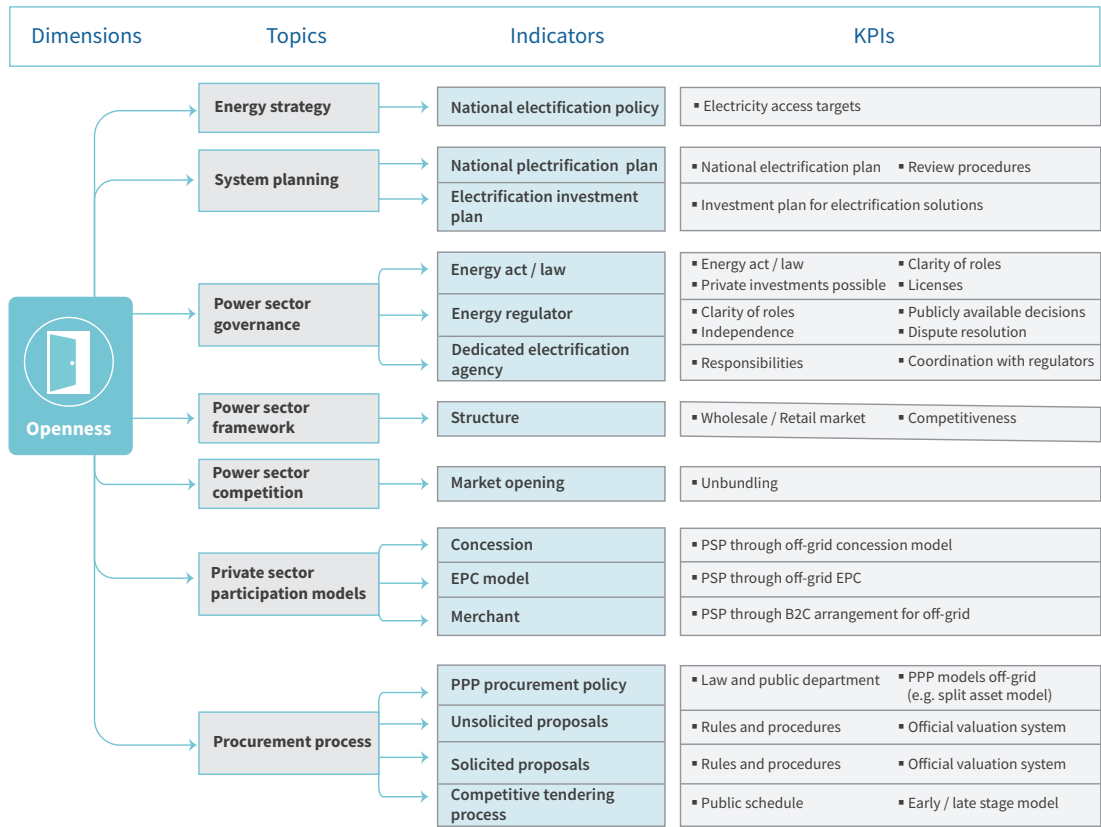


7.4 Off-grid market segment

The off-grid market is crucial in the African context. It is expected that major gains on electricity access will largely be enabled due to progress in the off-grid market. It is, therefore, necessary to determine how the current policies and regulations covering the off-grid segment facilitate or constraints effective private sector participation.

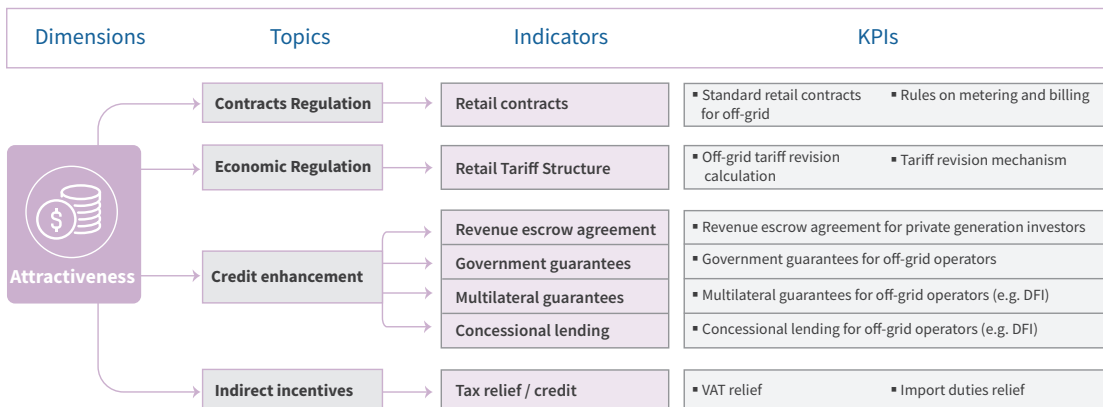
The *openness* of the regulatory framework to private sector players in the off-grid space is evaluated assessing six Topics. These are similar in structure to the other market segments: *energy strategy*, *system planning*, *power sector governance*, *power sector framework*, *private sector participation models*, and *procurement process* constitute relevant Topics for evaluating the *openness* of the off-grid market. However, small adjustments have been introduced at Indicators and KPIs levels to reflect distinctive aspects of the off-grid segment. For instance, a national electrification policy has been introduced has a relevant element of the broader energy strategy Topic for providing policy guidance on the off-grid segment development. *System planning* has also been reconfigured to consider, as a priority, a national electrification plan and related investment plan; as well, *power sector governance* analysis is completed by investigating the existence, role and attributions of a public electrification agency.

Figure 13: Regulatory review methodological framework (Off-grid - Openness)



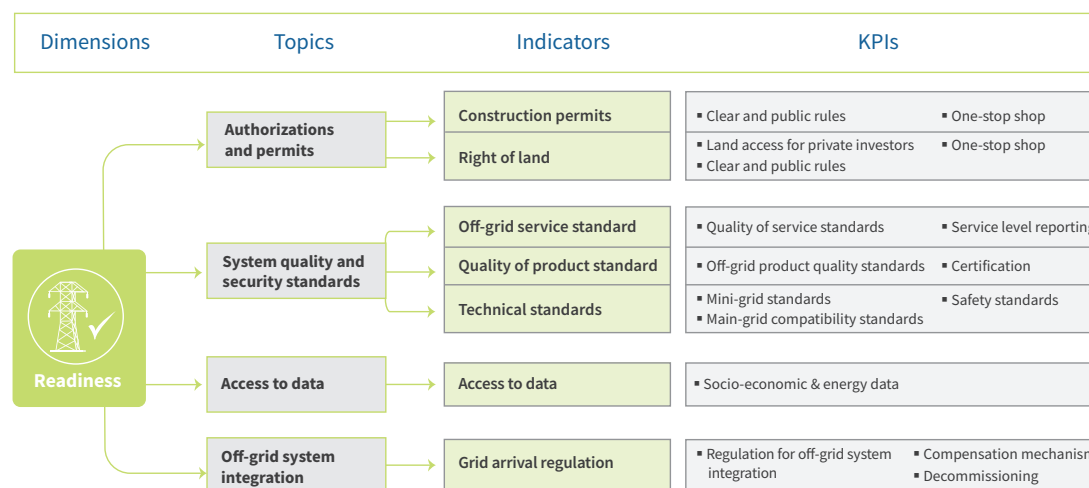
The *attractiveness* of the regulatory environment related to the off-grid segment is assessed on five Topics: *contract regulation*, *economic regulation*, *credit enhancement*, *indirect incentives*. Elements that are specific to the off-grid segment have been introduced at Indicators and KPIs levels, such as: the presence of rules or a blueprint for retail contract available for off-grid operators is the main element reviewed inside *contract regulation*; as well, defined regulation for off-grid system, notably mini-grids, is the main element investigated in *economic regulation* Topic. Combined, the Indicators in the four Topics, evaluated through the KPIs, provide a useful picture of the degree of *attractiveness* of the off-grid regulatory environment.

Figure 14: Regulatory review methodological framework (Off-grid - Attractiveness)



The *readiness* of the off-grid market is evaluated based on *authorization and permits* process efficiency, clarity of the *system quality and security standards*, and overall *access to data* to market players. However, an additional Topic on *off-grid system integration* is introduced to evaluate the unique case of the off-grid market. Regulatory uncertainty on main-grid arrival is crucial to private sector investment in this market segment. As such, issues of grid arrival regulation, including grid integration rules, compensation for stranded assets, and possible operational business models post grid-arrival are to be evaluated. Regulatory provisions that sufficiently clarify on all these issues demonstrate greater *readiness* to effectively crowd-in private sector participation.

Figure 15: Regulatory review methodological framework (Off-grid - Readiness)



8. Quantitative Evaluation Approach

The qualitative investigation of the policy and regulatory environment –through the framework of Topics, Indicators and KPIs– is completed by a quantitative evaluation methodology to score the effectiveness of policy and regulatory areas in their ability to crowd-in private investors.

To reach this outcome, UNECA and RES4Africa built a dedicated evaluation tool: the Regulatory Review of Openness, Attractiveness and Readiness tool, or ROAR tool. This tool is used to evaluate the policy and regulatory environment of the 17 countries covered by the joint UNECA and RES4Africa program and it will also be a ready-to-use output to capacitate member states with a tool to plan regulatory reforms, and monitor and evaluate regulatory improvements.

This section expands on the approach followed to develop the quantitative evaluation of regulatory effectiveness, with particular attention to the weighting system developed and the computational logic adopted to generate scores at Topic level.

It is important to note that since the interest of the program is not to compute a regulatory performance index and rank countries along their performances on the defined Dimensions, scores are given at the Topic level, defined as the best level to support countries to assess their

regulatory environment and pursue regulatory improvements and reforms. The evaluation approach adopted led to the possibility of undertaking a fully quantitative analysis of the policy and regulatory environment and open the possibility of benchmarking not only at the level of African countries covered by the program but cross-compare to potentially any country.

8.1 Weight determination and allocation

Assessment of the regulatory environment of electricity markets relative to their ability to crowd-in private sector participation is undertaken through the broader *openness, attractiveness, and readiness* Dimensions. These Dimensions are further elaborated through various regulatory and policy Topics and Indicators, which are observed through KPIs. In this cascading model, it is relevant to consider the relative importance elements such as Indicators within the same Topic or KPIs within the same Indicator.

At the Topic level, relative potency of Indicators to crowd-in private sector investments and influence the overall effectiveness of the Topic needs to be taken into account. At the KPIs level, specific qualities of the Indicator –as the ability to ensure transparency or accountability– may have a larger impact on the overall Indicator performance and this becomes necessary to address. Moreover, specific Indicators and KPIs may have relative potency related to different segments, being the generation, transmission or distribution. Therefore, once the full analysis framework structure has been determined, the relative weight, or potency, of each component was evaluated and determined.

Weight allocation could be a subjective process. Its objective determination should therefore be sought. In the case of this model development, considerable attention was given to this aspect. To objectively determine the relative importance of KPIs and Indicators a separate survey was administered. Senior experts who participated in the methodological framework development, as well as UNECA and RES4Africa experts, were probed. Through a survey instrument, the experts indicated their independent assessment on the relative importance of factors. Survey inputs were subsequently assembled, and the average of all the weights received from the surveyed experts is utilized as the final weight within the model.

Weight determination and allocation for Topics and Indicators

Topics contain a series of Indicators. The value of all the Indicators within a Topic must add to 100 percent. Experts provided input by allocating weights among different Indicators within a given Topic which must add up to 100 percent. The allocation of 100 percent among the different Indicators by experts is then utilized to determine the average relative importance of Indicators within a Topic, by taking the average of expert inputs. All Topics within a Dimension are accorded similar importance, therefore, carry the same weight. This exercise is undertaken for the generation, transmission, distribution, and off-grid models.

Weight determination and allocation for Key Performance Indicators (KPIs)

Each Indicator within the model is expressed by a set of KPIs. Within a given Indicator, KPIs do not carry the same degree of importance in their ability to determine the effectiveness of the related Indicator. It is, therefore, essential to determine the relative importance of KPIs. To do

so, surveyed experts submitted their weight assignment for all KPIs. In the case of KPIs, the allocation of values ranged from 1 (least relevant) to 4 (most relevant). The final value considered by the model for each KPI resulted from the mathematical average of all experts' inputs.

8.2 Computational logic of the scoring system

The scoring of the regulatory performance of countries vis-à-vis private sector participation in the electricity market across the value chain is performed within the methodological framework. Starting from the KPIs, results are aggregated quantitatively to the level of Indicators and Topics. The regulatory analysis can be quantitatively displayed at the level of Indicators for a thorough and detailed review, or at the Topic level for a broader overview of performance in specific Dimensions.

At the KPIs level, two parameters are inputs into the valuation process. The first is a binary, 0 or 1, entry for a series of regulatory and policy questions that need to be answered at the country level. This constitutes the raw data gathered from member States. In this case, all questions related to KPIs are designed so that the entry is either a 0, which implies the absence of a specific policy or regulation quality of interest within a given Indicator, or 1, which implies its presence. The second input is the weight to be attached to each KPI determining its relative value, between 1 to 4 (4 being most relevant), within a given Indicator. Therefore, the relative weight of the KPI in the context of a country is whether that particular KPI is in place (1 or 0) multiplied by the relative weight, as determined by the average of all weights for that KPI provided by experts using a separate survey.

Mathematically, let $y, KPI(s)_i$ be the score value of a given KPI, $w(KPI)_i$ be the weight associated with a given KPI, where $i=1, \dots, n$, and let A_i be the raw data value gathered from a country for KPIs, where $A_i \in \{0, 1\}$. Therefore,

$$KPI(s)_i = w(KPI)_i \times A_i$$

Indicators have several KPIs to articulate them. It is, therefore, necessary to determine the relative value of each Indicator based on underlying KPIs. To determine the score value of Indicators, it will be important to aggregate the relative value of all KPIs within a given Indicator. Mathematically, let $I(s)_i$ be the score value of Indicator i . Therefore,

$$I(s)_i = \left[\frac{\sum_{i=1}^n KPI(s)_i}{\sum_{i=1}^n w(KPI)_i} \right] \times 3$$

$$I(s)_i = \left[\frac{\sum_{i=1}^n [w(KPI)_i \times A_i]}{\sum_{i=1}^n w(KPI)_i} \right] \times 3$$

The Indicator score is multiplied by 3 to normalize all score values within a 0 to 3 range, 3 being the highest regulatory performance in a particular Indicator. This approach allows to evaluate the regulatory environment of a country related to private sector participation in a segment of the electricity market, or across the entire value chain, in a detailed manner at the level of Indicators.

At the Topic level, generating regulatory performance at a higher scale within a Dimension is possible. To do so, two sets of inputs are required. First, for each Indicator, following the approach discussed for Indicator score values, all Indicators are assigned such values. To aggregate this information, the relative weight of Indicators within a Topic is required. This is achieved based on expert inputs, and by averaging all the expert weights for a specific Indicator and computing the average relative weight of each Indicator within a Topic. Mathematically, let $T(s)_i$ be the regulatory performance score for Topic i within a Dimension, and $w(I)_i$ be the average weight allocated to Indicator i within Topic i . Therefore,

$$T(s)_i = \sum_{i=1}^n [I(s)_i \times w(I)_i]$$

$$T(s)_i = \sum_{i=1}^n \left[\left[\left[\sum_{i=1}^n [w(KPI)_i \times A_i] / \sum_{i=1}^n w(KPI)_i \right] \times 3 \right] \times w(I)_i \right]$$

Since the intent of the work is not to rank countries according to a regulatory performance index, further aggregation was not necessary. The approach so far enables regulatory performance analysis at the Topic level for each of the three Dimensions – *openness*, *attractiveness*, and *readiness* for the generation, transmission, distribution, and off-grid market segments.

9. Generating Regulatory Assessment Results

Application of the UNECA-RES4Africa regulatory review methodology, known as ROAR (Regulatory Review of the Openness, Attractiveness, and Readiness of electricity markets), yields results at multiple levels. As demonstrated in Figure 14 and Figure 15, two sets of outputs are possible. First, a country-specific overview of the effectiveness of the policy and regulatory environment to crowd-in private investment is presented at the Topic level. The illustration could be for any of the market segments, say generation or transmission segments, with a high-level birds’ overview across Topics for all the Dimensions, or deep-diving in scores for a single Dimension. Second, a cross-comparison of member States’ scores on a single Topic is also possible to benchmark results and learn from others’ experiences in a peer-to-peer approach. The illustration could be on a single Topic for any covered market segment, saying distribution or off-grid systems.

The ROAR model presents rich information to national regulatory authorities and energy sector line ministries to evaluate areas of regulatory strength in the current system, as well as pinpointing areas where current regulation has weaknesses, or gaps, for improvement and reform. The model also helps identify the best regulatory practices to review and adopt, as well as testing potential reform plans and doing scenarios about their potential impact in improving the *openness*, *attractiveness* and *readiness* of the policy and regulatory environment towards crowding-in private sector investors. The approach also enables countries to trace their regulatory development over time by measuring the different attributes of interest within a given time interval, say every year.

Figure 16: High-bird overview of Topics' scores across all Dimensions

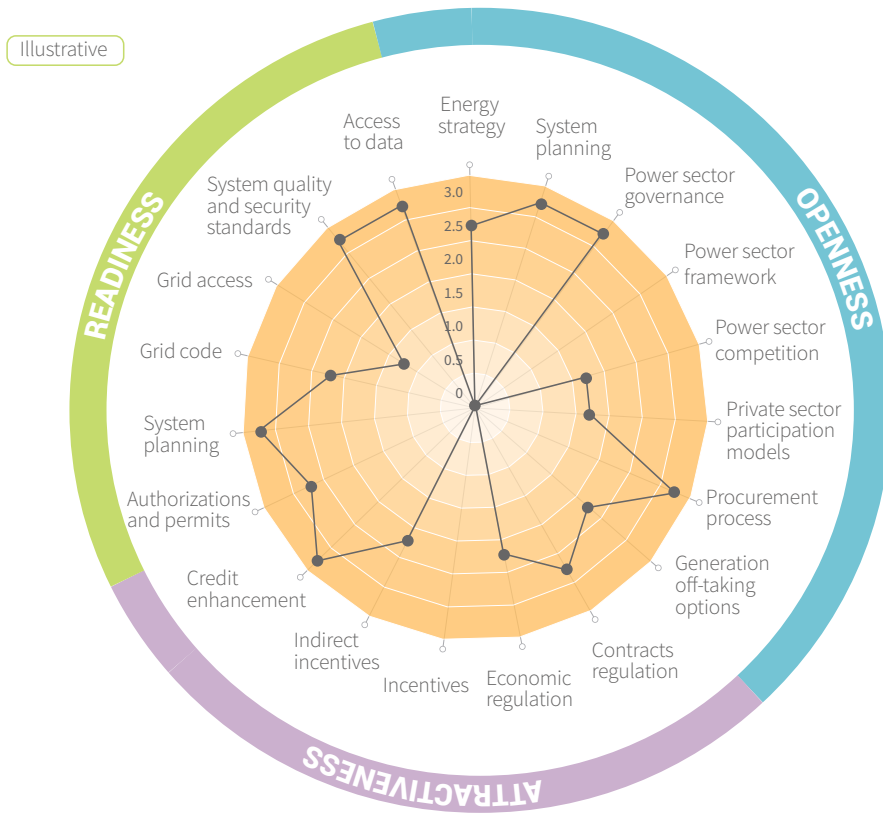
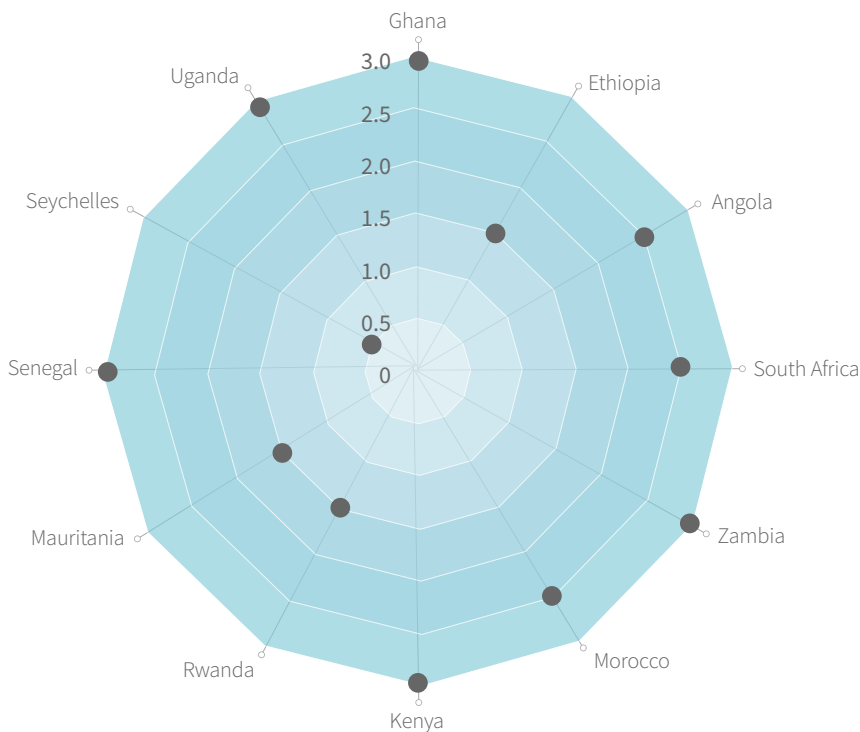


Figure 17: Cross-comparison of countries' score on single Topic



10. Application of the ROAR methodology in member States and next steps

The ROAR regulatory review methodology is developed to support member States in undertaking national reviews of their regulatory environment for the electricity market vis-à-vis enhancing the investment participation of the private sector. In the first phase, UNECA and RES4Africa, in partnership with national Ministries of energy and regulatory authorities, are undertaking regulatory reviews of the electricity market in Africa. From February 2020 until August 2021, regulatory reviews have been undertaken in 17 African countries in all regions. The process involved the gathering of extensive regulatory and policy data for the electricity sector, for the generation, transmission, distribution, and off-grid market segments, by senior national consultants. The data gathering was followed by a national data validation meeting, with experts from national energy and regulatory institutions, to verify and vet the assembled database before data-driven regulatory analysis could commence.

In Eastern Africa, national electricity market regulatory reviews following the ROAR model were completed in the D.R. Congo, Ethiopia, Kenya, Rwanda, and Uganda. In Southern Africa, similar work is completed in South Africa, Zambia, Angola, Mozambique and the Seychelles. In Central Africa, work is ongoing in Cameroon. In Western Africa, regulatory review is completed in Ghana, Mauritania, and Senegal, and is ongoing in Cote d'Ivoire. In Northern Africa, regulatory review is completed in Egypt and Morocco. National regulatory review reports for the 17 countries will be available through UNECA and RES4Africa websites.

It is expected that high-level dialogue on regulation and private sector participation with member States will lead to positive actions towards addressing key regulatory barriers to scale-up private sector investment.

The ROAR model is also being developed into a software to capacitate member States to implement the approach in their regulatory review and improvement efforts. The ROAR software could also be utilized as a monitoring and evaluation tool for enhancing the regulatory environment. The UNECA-RES4Africa ROAR software is expected to be available to member States by December 2021, accessible through UNECA and RES4Africa websites, and through direct request.

As member States pursue the achievement of SDG7 goals, meeting the regulatory gaps to close the investment gap remains crucial. The UNECA and RES4Africa ROAR model is expected to contribute towards addressing one of the most pressing challenges in the electricity market of Africa for private sector participation – a general improvement of the preparedness and effectiveness of the policy and regulatory environment. UNECA and RES4Africa remain committed to supporting member States in this regard.

References

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2. United Nations. 2021b. “Theme Report on Finance and Investment: Towards the Achievement of SDG 7 and Net-Zero Emissions.” Report of the High-Level Dialogue on Energy 2021. UN, New York, USA.

Annex: Data Gathering Template

Generation

OPENNESS
Energy Strategy
Energy Policy
- Does an energy policy exist?
- Is it publicly available?
- Does it include generation capacity expansion targets?
- Does a formal procedure for energy policy review exist?
- Does it include RES targets?
- Are targets in some forms legally binding?
- Does a formal procedure of targets monitoring exist?
Climate Policy
- Does a climate change policy exist?
- Does it include GHG reduction targets?
- Are targets in some forms legally binding?
- Does a formal procedure for climate policy review exist?
- Is it publicly available?
System Planning
Generation Expansion Plan
- Does a power sector master plan exist?
- Is it publicly available?
- Does a formal procedure for reviewing the generation expansion plan exist?
- Is it technology-specific?
- Does it include a RES assessment/potential mapping?
Generation Investment Plan
- Does an investment plan for the generation exist?
- Is it publicly available?

Power Sector Governance

Energy Act/Law

- Does an Energy Act/Law exist?
- Is it publicly available?
- Does it include clarity about institutional roles and responsibilities along the value chain?
- Are private parties allowed to invest in generation assets?
- Are generators required to obtain a license to operate?
- Is it possible for private parties to obtain generation licenses?
- Is the process for generation license application and issuing publicly available (competent authorities, documentation requirements, timeline)?

Energy Regulator

- Does a regulatory authority exist?
- Is there a clear definition of the responsibilities of the regulator?
- Are regulatory decisions publicly available?
- Is the regulatory authority sufficiently independent from political authorities and market players to make decisions? (Autonomous mode of appointment of commissioners and/or board members)
- Is the regulatory authority sufficiently independent from a financial perspective? (Regulatory funding established by law)
- Is the regulator able to enforce its decisions (are regulator decisions legally binding)?
- Does a mechanism for power sector operators dispute resolution exist?

Power Sector Framework

Structure

- Is transmission service unbundled from other services?
- Is distribution service unbundled from other services (retail)?
- Is transmission assets management separated from system operation service provider?

Power Sector Competition

Market Opening

- Is the generation sector open to competition (e.g., IPPs presence allowed)?
- Is the wholesale market open to competition?
- Is the retail market open to competition?

Private Sector Participation Models

Concession

- Is PSP in generation allowed through generation portfolio concession?

Divestiture/Privatization

- Is PSP in generation allowed through share ownership in the generation company?

Merchant Lines

- Is PSP in generation allowed through a merchant generation investment model?

EPC Model

- Is PSP in generation allowed through an EPC model?

Procurement Process

PPP (Public-Private Partnership) Procurement Policy

- Do laws governing PPPs exist?

- Does a public department for PPPs exist?

- Are there clear processes and institutional responsibilities for selecting PPPs?

- Are defined PPP models available for generation (e.g., BOO, BOOT, BTO)?

Unsolicited Proposals

- Are unsolicited proposals for power sector infrastructure investments possible?

- Are there rules and procedures for the treatment of unsolicited proposals?

- Is there an official valuation system for unsolicited proposals in place?

Solicited Proposals

- Are solicited proposals issued for power sector infrastructure investments?

- Is competitive tendering the unique procurement model used for solicited proposals?

- Are there rules and procedures for competitive tendering processing?

- Is there an official valuation system for competitive tendering processes?

Competitive Tendering Process

- Do competitive tenders for generation investments exist?

- Are government-owned companies excluded from tenders for generation investments?

- Does a public schedule of tenders for generation investment exist?

Generation Off-taking Options

Spot Market

- Does a regional or domestic spot market exist?

- Are the rules governing the spot market harmonized within the region?

- Are there rules and procedures for accessing the spot market?

- Are those publicly available?

Single Buyer/Dedicated Off-taker

- Does a single buyer/dedicated off-taker exist?

Private PPA

- Do private PPAs exist?

- Are private PPAs subject to regulatory approval?

- Are producers authorized to wheel the energy through the grid from a production site to a consumption site?

- Under a physical PPA, is the selling of energy surplus or procuring for integrating energy authorized?

Self-Consumption

- Does self-consumption exist?

- Is there an absence of limits on the capacity for self-production?

- Are producers authorized to wheel the energy through the grid from a production site to a consumption site?

- Are self-consumers allowed to withdraw energy from the grid?

- Are rules and regulations regarding net-metering in place?

ATTRACTIVENESS

Contracts Regulation

Public PPA Structure

- Is the public PPA standardized?

- Is the contract indexed to inflation?

- Is the contract expressed in EUR/USD or indexed to a foreign currency?

- Does it specify a response to changes outside the contract (how the rights and obligations of the parties will change in response to changes outside the contract)?

- Does it specify a dispute resolution process?

- Does it specify termination provisions (transfer obligations, clauses of early termination)?

Economic Regulation

Retail Tariff Structure

- Is a clear methodology for the retail tariff structure definition in place?

- Is it publicly available?

- Are tariffs split among GTD components?

- Is the tariff cost-reflective?

- Is there a periodical tariff revision mechanism in place?

Incentives

Feed-in Regimes

- Do FiT, FiP, CfD, incentives exist?

- Are these differentiated by technology?

- Are these capped in some terms (capacity or budget)?

- Is the tariff value defined considering the cost of technology?

- Are contracts indexed to inflation?

- Are contracts expressed in EUR/USD or indexed to a foreign currency?

RES Specific Auction

- Do RES-specific auctions exist?

- Does any public schedule of auction exist and is it publicly available?

- Are these differentiated by technology?

- Are contracts indexed to inflation?

- Are contracts expressed in EUR/USD or indexed to a foreign currency?

Capacity Payment

- Does a capacity payment exist?

- Does a capacity market exist?

Green Certificates

- Does a green certificates mechanism exist?
- Are they differentiated by technology?

RES Quota

- Does a Renewable Portfolio Standard (RPS) exist?
- Do Renewable Purchase Obligations (RPO) exist?

Indirect Incentives**Carbon Price**

- Does a carbon market exist?
- Does a carbon tax exist?

Subsidies

- Is results-based financing available?
- Does direct finance exist?
- Is there a financial authority overseeing those subsidies?

Tax Relief/Credit

- Does a VAT relief for generators exist?
- Does an import duty relief for generation assets (and off-grid components) exist?

Credit Enhancement**Revenue Escrow Agreement**

- Are escrow agreements for private generation investors available?

Government Guarantees

- Are government guarantees available for generation companies?

Multilateral Guarantees

- Are multilateral guarantees available for generation companies (e.g. DFI)?

Concessional Lending

- *Is concessional lending available for generation companies (e.g. DFI)?*
- *Is concessional lending policy not limited to government-owned companies?*
- *Is there a financial authority overseeing lending?*

READINESS

Authorizations and Permits

Right of Land

- *Do rules for land access exist?*
- *Is land acquisition by private investors possible?*
- *Are the rules at a national level? (No if these are at a local level)*
- *Is there a clear and publicly available procedure to get the authorization/license?*
- *Is there a one-stop-shop with other authorizations?*

Water Rights

- *Do rules for water access exist?*
- *Are the rules at a national level? (No if these are at a local level)*
- *Is there a clear and publicly available procedure to get the authorization/license?*
- *Is there a one-stop-shop with other authorizations?*

Construction Permits

- *Do rules for construction permits exist?*
- *Are the rules at a national level? (No if these are at a local level)*
- *Is there a clear and publicly available procedure to get the permit?*
- *Do clear rules for certificates of competences exist?*
- *Is there a one-stop-shop with other authorizations?*

Environmental Approval

- *Do rules for environmental approval exist?*
- *Are the rules at a national level? (No if these are at a local level)*
- *Is there a clear and publicly available procedure to get the authorization/license?*
- *Is there a one-stop-shop with other authorizations?*

System Planning

Network Development Plan

- Does a network development plan exist?
- Is it publicly available?
- Does a formal procedure for reviewing generation expansion plans exist?
- Is the development plan defined at a national level? (No if it is at a local level)
- Does the country carry out a regular assessment of network expansion needs?

Grid Code

System Operation

- Does the grid code define system operation rules?
- Are they defined at a national level? (No if defined at a local level)
- Are they publicly available?

Grid Connection (Generators)

- Do connection rules for generators exist?
- Are they defined at a national level? (No if it is at a local level)
- Is there a clear and defined procedure to get the authorization?
- Are they publicly available?

Dispatch

- Is dispatch run under an economic merit order?
- Do clear market settlement rules exist?

Curtailement

- Do conventional projects receive compensation for the curtailed energy?
- Do limitations on curtailment for conventional projects exist?
- Do RES projects receive compensation for the curtailed energy?
- Do limitations on curtailment for RES exist?

Ancillary Services

- Are rules and regulations regarding ancillary services in place?
- Are those publicly available?

Grid Access

Grid Connection and Operation Agreement (Generators)

- Do rules providing mandatory connection by the TSO exist (is third party access ensured)?
- Do rules provide priority access to RES projects?
- Does a contractual framework for connection to, and use of the transmission network exist?
- Do rules defining the allocation of connection costs exist?
- Are they defined at a national level? (No if it is at a local level)
- Are they publicly available?

System Quality and Security Standards

System Quality and Security Standards Criteria

- Do system quality and security standards criteria for planning and operating the transmission network exist?
- Are they publicly available?

Access to Data

Access to Data

- Is socio-economic data publicly available?
- Are the balance sheets of public utilities publicly available?
- Is electricity generation and demand data publicly available?

Transmission

OPENNESS

Energy Strategy

Energy Policy

- Does an energy policy exist?
- Is it publicly available?
- Does it include generation capacity expansion targets?
- Does a formal procedure for energy policy review exist?
- Does it include targets on new grid connected customers?
- Does it include targets on increase of electricity access?

- Are targets in some forms legally binding?

- Does a formal procedure of targets monitoring exist?

Climate Policy

- Does a climate change policy exist?

- Does it include GHG reduction targets?

- Are targets in some forms legally binding?

- Does a formal procedure for climate policy review exist?

- Is it publicly available?

System Planning

Generation Expansion Plan

- Does a power sector master plan exist?

- Is it publicly available?

- Does a formal procedure for reviewing the generation expansion plan exist?

- Is it technology-specific?

- Does it include a RES assessment/potential mapping?

Network Development Plan

- Does a network development plan exist?

- Is it publicly available?

- Does a formal procedure for reviewing network expansion plans exist?

- Is the development plan defined at a national level? (No if it is at a local level)

- Does a regulation/methodology to evaluate TSO investment exist (e.g., CBA analysis)?

Transmission Investment Plan

- Does a transmission investment plan exist?

- Is it publicly available?

Power Sector Governance

Energy Act/Law

- Does an Energy Act/Law exist?

- Is it publicly available?

- Does it include clarity about institutional roles and responsibilities along the value chain?
- Are private parties allowed to invest in transmission assets?
- Are transmission companies required to obtain a license to operate?
- Is it possible for private parties to obtain transmission licenses?
- Is the process for transmission license application and issuing public available (competent authorities, documentation requirements, timeline)?
- Are there rules to impose penalties or removal of transmission licenses in case of non-compliance?

Energy Regulator

- Does a regulatory authority exist?
- Is there a clear definition of the responsibilities of the regulator?
- Are regulatory decisions publicly available?
- Is the regulatory authority sufficiently independent from political authorities and market players to make decisions? (Autonomous mode of appointment of commissioners and/or board members)
- Is the regulatory authority sufficiently independent from a financial perspective? (Regulatory funding established by law)
- Is the regulator able to enforce its decisions (are regulator decisions legally binding)?
- Does a mechanism for power sector operators dispute resolution exist?

Power Sector Framework

Structure

- Is transmission service unbundled from other services?
- Is distribution service unbundled from other services (retail)?
- Is transmission assets management separated from system operation service provider?

Private Sector Participation Models

Concession

- Is PSP in transmission allowed through a whole grid concession model?

Divestiture/Privatization

- Is PSP in transmission allowed through share ownership in the transmission company?

Merchant Lines

- Is PSP in transmission allowed through a transmission merchant line investments model?

IPTs

- Is PSP in transmission allowed through an Independent Power Transmission concessions model possible?

EPC Model

- Is PSP in transmission allowed through an EPC model?

Procurement Process**PPP (Public-Private Partnership) Procurement Policy**

- Do laws governing PPPs exist?

- Does a public department for PPPs exist?

- Are there clear processes and institutional responsibilities for selecting PPPs?

- Are defined PPP models available for transmission (e.g., BOO, BOOT, BTO)?

Unsolicited Proposals

- Are unsolicited proposals for power sector infrastructure investments possible?

- Are there rules and procedures for the treatment of unsolicited proposals?

- Is there an official valuation system for unsolicited proposals in place?

Solicited Proposals

- Are solicited proposals issued for power sector infrastructure investments?

- Is competitive tendering the unique procurement model used for solicited proposals?

- Are there rules and procedures for competitive tendering processing?

- Is there an official valuation system for competitive tendering processes?

Competitive Tendering Process

- Do competitive tenders for transmission investments exist?

- Are government-owned companies excluded from tenders for transmission investments?

- Does a public schedule of tenders for transmission investment exist?

ATTRACTIVENESS

Contracts Regulation

Transmission Service Agreement (TSA)

- *Is a standard TSA available?*
- *Does it provide performance evaluations based on the network availability? (No if on the energy transmitted)*
- *Does it specify a response to changes outside the contract (how the rights and obligations of the parties will change in response to changes outside the contract)?*
- *Does it specify a dispute resolution process?*
- *Does it specify termination provisions (transfer obligations, and clauses of early termination)?*

Economic Regulation

Network Tariff Structure and Definition

- *Is a clear methodology for the network tariff structure definition in place?*
- *Is it publicly available?*
- *Is the tariff-regulation cost-based (RAB)?*
- *Is a periodical tariff revision mechanism in place?*
- *Is the network tariff regulated?*

Credit Enhancement

Revenue Escrow Agreement

- *Are escrow agreements for private transmission investors available?*

Government Guarantees

- *Are government guarantees available for transmission companies?*

Multilateral Guarantees

- *Are multilateral guarantees available for transmission companies (e.g., DFI)?*

Concessional Lending

- *Is concessional lending available for transmission companies (e.g., DFI)?*
- *Is concessional lending policy not limited to government-owned companies?*
- *Is there a financial authority overseeing lending?*

READINESS**Authorizations and Permits****Right of Way (ROW)**

- Do rules for ROW acquisition exist?
- Is ROW acquisition by private investors possible?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the authorization/license?
- Is there a one-stop-shop with other authorizations?

Construction Permits

- Do rules for construction permits exist?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the permit?
- Do clear rules for certificates of competencies exist?
- Is there a one-stop-shop with other authorizations?

Environmental Approval

- Do rules for environmental approval exist?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the authorization/license?
- Is there a one-stop-shop with other authorizations?

Grid Code**System Operation**

- Does the grid code define system operation rules?
- Are the rules defined at a national level? (No if defined at a local level)
- Are they publicly available?
- Do they define services related to the dispatch of ancillary services?

Grid Connection (Generators)

- Do connection rules for generators exist?
- Are the rules defined at a national level? (No if it is at a local level)
- Is there a clear and defined procedure to get the authorization?
- Are they publicly available?

Grid Connection (Final Customer/DSO)

- Do connection rules for final customers/DSO exist?
- Are the rules defined at a national level? (No if it is at a local level)
- Are they publicly available?

Grid Access

Grid Connection and Operation Agreement (Generators)

- Do rules providing mandatory connection by the TSO exist (is third party access ensured)?
- Do rules provide priority access to RES projects?
- Does a contractual framework for connection to, and use of, the transmission network exist?
- Do rules defining the allocation of connection costs exist?
- Are the rules defined at a national level? (No if it is at a local level)
- Are they publicly available?

Grid Connection and Operation Agreement (Final Customer/DSO)

- Do rules providing open access of customers/distributors to the grid exist?
- Does a contractual framework for connection to, and use of, the transmission network exist?
- Do rules defining allocation of connection costs exist?
- Are the rules defined at a national level? (No if it is at a local level)
- Are they publicly available?

System Quality and Security Standards

System Quality and Security Standards Criteria

- Do system quality and security standards criteria for planning and operating the transmission network exist?
- Are they publicly available?

Access to data

Access to Data

- Is socio-economic data publicly available?
- Are the balance sheets of public utilities publicly available?
- Is electricity generation and demand data publicly available?
- Is data regarding transmission grid operations and quality publicly available? (Dispatching and quality of the service)?

Distribution

OPENNESS

Energy Strategy

Energy Policy

- Does an energy policy exist?
- Is it publicly available?
- Does it include generation capacity expansion targets?
- Does a formal procedure for energy policy review exist?
- Does it include targets on new grid connected customers?
- Does it include targets on increase of electricity access?
- Are targets in some forms legally binding?
- Does a formal procedure of targets monitoring exist?

Climate Policy

- Does a climate change policy exist?
- Does it include GHG reduction targets?
- Are targets in some forms legally binding?
- Does a formal procedure for climate policy review exist?
- Is it publicly available?

System Planning

Network Development Plan

- Does a network development plan exist?
- Is it publicly available?
- Does a formal procedure for reviewing network expansion plans exist?
- Is the development plan defined at a national level? (No if it is at a local level)
- Does a regulation/methodology to evaluate DSO investment exist (e.g., CBA analysis)?

National Electrification Plan

- Does a national electrification plan exist?
- Does a formal procedure for reviewing the electrification plan exist?
- Is the electrification plan part of a comprehensive system development plan (including generation, transmission, distribution, and off-grid development)?
- Is it publicly available?

Electrification Investment Plan

- Does an investment plan for electrification solutions exist?
- Is it publicly available?

Power Sector Governance

Energy Act/Law

- Does an Energy Act/Law exist?
- Is it publicly available?
- Does it include clarity about institutional roles and responsibilities along the value chain?
- Are private parties allowed to invest in distribution assets?
- Are distribution companies required to obtain a license to operate?
- Is it possible for private parties to obtain distribution licenses?
- Is the process for distribution license application and issuing public available (competent authorities, documentation requirements, timeline)?
- Are there rules to impose penalties or removal of distribution licenses in case of non-compliance?

Energy Regulator

- Does a regulatory authority exist?
- Is there a clear definition of the responsibilities of the regulator?
- Are regulatory decisions publicly available?
- Is the regulatory authority sufficiently independent from political authorities and market players to make decisions? (Autonomous mode of appointment of commissioners and/or board members)
- Is the regulatory authority sufficiently independent from a financial perspective? (Regulatory funding established by law)
- Is the regulator able to enforce its decisions (are regulator decisions legally binding)?
- Does a mechanism for power sector operators dispute resolution exist?

Power Sector Framework

Structure

- Is transmission service unbundled from other services?
- Is distribution service unbundled from other services (retail)?
- Is transmission assets management separated from system operation service provider?

Private Sector Participation Models

Concession

- Is PSP in distribution allowed through a whole grid concession model?

Divestiture/Privatization

- Is PSP in distribution allowed through share ownership in the distribution company?

EPC Model

- Is PSP in distribution allowed through an EPC model?

Procurement Process

PPP (Public-Private Partnership) Procurement Policy

- Do laws governing PPPs exist?

- Does a public department for PPPs exist?

- Are there clear processes and institutional responsibilities for selecting PPPs?

- Are defined PPP models available for distribution (e.g., BOO, BOOT, BTO)?

Unsolicited Proposals

- Are unsolicited proposals for power sector infrastructure investments possible?

- Are there rules and procedures for the treatment of unsolicited proposals?

- Is there an official valuation system for unsolicited proposals in place?

Solicited Proposals

- Are solicited proposals issued for power sector infrastructure investments?

- Is competitive tendering the unique procurement model used for solicited proposals?

- Are there rules and procedures for competitive tendering processing?

- Is there an official valuation system for competitive tendering processes?

Competitive Tendering Process

- Do competitive tenders for distribution investments exist?

- Are government-owned companies excluded from tenders for distribution investments?

- Does a public schedule of tenders for distribution investment exist?

ATTRACTIVENESS

Contracts regulation

Distribution Service Agreement (DSA)

- *Is a standard DSA available?*
- *Does it provide performance evaluations based on the network availability? (No if on the energy transmitted)*
- *Does it specify a response to changes outside the contract (how the rights and obligations of the parties will change in response to changes outside the contract)?*
- *Does it specify a dispute resolution process?*
- *Does it specify termination provisions (transfer obligations, and clauses of early termination)?*

Economic Regulation

Network Tariff Structure and Definition

- *Is a clear methodology for the network tariff structure definition in place?*
- *Is it publicly available?*
- *Is the tariff-regulation cost-based (RAB)?*
- *Is a periodical tariff revision mechanism in place?*
- *Is the network tariff regulated?*

Credit Enhancement

Revenue Escrow Agreement

- *Are escrow agreements for private distribution investors available?*

Government Guarantees

- *Are government guarantees available for distribution companies?*

Multilateral Guarantees

- *Are multilateral guarantees available for distribution companies (e.g., DFI)?*

Concessional Lending

- *Is concessional lending available for distribution companies (e.g., DFI)?*
- *Is concessional lending policy not limited to government-owned companies?*
- *Is there a financial authority overseeing lending?*

READINESS**Authorizations and Permits****Right of Way (ROW)**

- Do rules for ROW acquisition exist?
- Is ROW acquisition by private investors possible?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the authorization/license?
- Is there a one-stop-shop with other authorizations?

Right of Land

- Do rules for land access exist?
- Is land acquisition by private investors possible?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the authorization/license?
- Is there a one-stop-shop with other authorizations?

Construction Permits

- Do rules for construction permits exist?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the permit?
- Do clear rules for certificates of competencies exist?
- Is there a one-stop-shop with other authorizations?

Environmental Approval

- Do rules for environmental approval exist?
- Are the rules at a national level? (No if these are at a local level)
- Is there a clear and publicly available procedure to get the authorization/license?
- Is there a one-stop-shop with other authorizations?

Access to Data**Access to Data**

- Is socio-economic data publicly available?
- Are the balance sheets of public utilities publicly available?

- Is electricity generation and demand data publicly available?

- Is data regarding distribution grid operations and quality publicly available? (Dispatching and quality of the service)?

Grid Code

System Operation

- Does the grid code define system operation rules for distribution?

- Are they defined at a national level? (No if defined at a local level)

- Are they publicly available?

- Do they define metering services?

Grid Connection (Generators)

- Do connection rules for generators exist?

- Are the rules defined at a national level? (No if it is at a local level)

- Is there a clear and defined procedure to get the authorization?

- Are they publicly available?

Grid Connection (Final Customer/DSO)

- Do connection rules for final customers/DSO exist?

- Are the rules defined at a national level? (No if it is at a local level)

- Are they publicly available?

Grid Access

Grid Connection and Operation Agreement (Generators)

- Do rules providing mandatory connection by the DSO exist (is third party access ensured)?

- Do rules provide priority access to RES projects?

- Do rules defining the allocation of connection costs exist?

- Are the rules defined at a national level? (No if it is at a local level)

- Are they publicly available?

Grid Connection and Operation Agreement (DSO)

- Do rules providing open access of customers to the grid exist?

- Does a contractual framework for connection to, and use of, the distribution network exist?

- Do rules defining the allocation of connection costs exist?

- Are the rules defined at a national level? (No if it is at a local level)

- Are they publicly available?

System Quality and Security Standards

System Quality and Security Standards Criteria

- Do system quality and security standards criteria for planning and operating the distribution network exist?

- Are they publicly available?

Off-Grid

OPENNESS

Energy Strategy

National Electrification Policy

- Does a national (rural) electrification policy exist?

- Is it publicly available?

- Does it include off-grid targets? (Total capacity, number of systems, connections, and people served)

- Do targets specify the technology to be used (grid extension/mini-grids/other off-grid systems)?

- Does a formal procedure for national electrification policy review exist?

- Are targets in some forms legally binding?

- Does a formal procedure of targets monitoring exist?

System Planning

National Electrification Plan

- Does a national electrification plan exist?

- Does a formal procedure for reviewing the electrification plan exist?

- Does it specifically consider off-grid targets?

- Is the electrification plan part of a comprehensive system development plan (including generation, transmission, distribution and off-grid development)?

- Is it publicly available?

- Is the electrification plan based on geospatial analysis technology?

Electrification Investment Plan

- Does an investment plan for electrification solutions exist?
- Is it publicly available?

Power Sector Framework

Structure

- Is transmission service unbundled from other services?
- Is distribution service unbundled from other services (retail)?
- Is transmission assets management separated from system operation service provider?

Power Sector Competition

Market Opening

- Is the generation sector open to competition (e.g., IPPs presence allowed)?
- Is the wholesale market open to competition?
- Is the retail market open to competition?

Private Sector Participation Models

EPC Model

- Is PSP in off-grid systems allowed through an EPC model? (i.e., tender from the public utility for construction of a new mini-grid than managed by the public utility)

Concession

- Is PSP in off-grid systems allowed through an off-grid electrification concession model?

Merchant Lines

- Is PSP in off-grid systems allowed through a merchant investment (B2C arrangements to build a mini-grid) model?

Power Sector Governance

Energy Act/Law

- Does an Energy Act/Law exist?
- Is it publicly available?
- Does it include clarity about institutional roles and responsibilities along the value chain?
- Are private parties allowed to invest in generation assets?

- Are off-grid companies required to obtain a license to operate?

- Is the process for mini-grids/solar home systems operation licensing application publicly available (competent authorities, documentation requirements, timeline)?

- Does it consider any capacity thresholds or simplified procedures?

- Does it provide temporary exclusivity above an area?

Energy Regulator

- Does a regulatory authority exist?

- Is there a clear definition of the responsibilities of the regulator?

- Are regulatory decisions publicly available?

- Is the regulatory authority sufficiently independent from political authorities and market players to make decisions? (Autonomous mode of appointment of commissioners and/or board members)

- Is the regulatory authority sufficiently independent from a financial perspective? (Regulatory funding established by law)

- Is the regulator able to enforce its decisions (are regulator decisions legally binding)?

- Does a mechanism for power sector operators dispute resolution exist?

Dedicated Electrification Agency

- Does a dedicated electrification agency exist?

- Is there a clear definition of its responsibilities?

- Is coordination between its powers and the one of the regulator(s) defined?

Procurement Process

PPP (Public-Private Partnership) Procurement Policy

- Do laws governing PPPs exist?

- Does a public department for PPPs exist?

- Are there clear processes and institutional responsibilities for selecting PPPs?

- Are defined PPP models available for off-grid (e.g., BOO, BOOT, BTO)?

- Is a PPP split assets investment approach for off-grids possible?

Unsolicited Proposals

- Are unsolicited proposals for power sector infrastructure investments possible?

- Are there rules and procedures for the treatment of unsolicited proposals?

- Is there an official valuation system for unsolicited proposals in place?

Solicited Proposals

- Are solicited proposals issued for power sector infrastructure investments?
- Is competitive tendering the unique procurement model used for solicited proposals?
- Are there rules and procedures for competitive tendering processing?
- Is there an official valuation system for competitive tendering processes?

Competitive Tendering Process

- Do competitive tenders for off-grid investments exist?
- Are government-owned companies excluded from tenders for off-grid investments?
- Does a public schedule of tenders for off-grid investments exist?

ATTRACTIVENESS

Contracts Regulation

Retail Contracts

- Are standard retailing contracts available for off-grid operators?
- Are rules about metering and billing defined?

Economic Regulation

Retail Tariff Structure

- Are off-grid tariffs deregulated (are off-grid operators free to establish their own tariffs)?
- Is there a standard tariff calculation tool for off-grid systems?
- Are off-grid tariffs regulated under a national uniform tariff approach?

Indirect Incentives

Tax Relief/Credit

- Does a VAT relief for generators exist?
- Does an import duty relief for generation assets (and off-grid components) exist?

Credit Enhancement

Revenue Escrow Agreement

- Are escrow agreements for private generation investors available?

Government Guarantees

- Are government guarantees available for off-grid operators?

Multilateral Guarantees

- Are multilateral guarantees available for off-grid operators (e.g., DFI)?

Concessional Lending

- Is concessional lending available for off-grid operators (e.g., DFI)?

- Is concessional lending policy not limited to government-owned companies?

- Is there a financial authority overseeing lending?

READINESS**Authorizations and Permits****Right of Land**

- Do rules for land access exist?

- Is land acquisition by private investors possible?

- Are the rules at a national level? (No if these are at a local level)

- Is there a clear and publicly available procedure to get the authorization/license?

- Is there a one-stop-shop with other authorizations?

Construction Permits

- Do rules for construction permits exist?

- Are the rules at a national level? (No if these are at a local level)

- Is there a clear and publicly available procedure to get the permit?

- Do clear rules for certificates of competencies exist?

- Is there a one-stop-shop with other authorizations?

Access to Data**Access to Data**

- Is socio-economic data publicly available?

Off-grid System Integration

Grid Arrival Regulation

- Does regulation for off-grid system integration exist?
- Does it allow the mini-grid to operate as a small power distributor (SPD)?
- Does it allow the mini-grid to operate as a small power producer (SPP)?
- Does it allow the mini-grid developer to sell its eligible assets to the utility?
- Does it allow the mini-grid to coexist with the main grid?
- Does it allow the mini-grid to decommission and remove its assets?
- Do guarantees or compensation mechanisms for stranded assets exist?

System Quality and Security Standards

Off-grid Service Standard

- Does regulation regarding the quality of service exist?
- Is it publicly available?
- Does it develop and enforce standards that are uniform for all mini-grids?
- Does it require mini-grids to adhere to the same standards as the main grid?

Quality of Product Standards

- Do national or international standards regarding off-grid products exist?
- Are national certifications regarding off-grid products required?
- Are there clear and public procedures to get certificates?
- Are they publicly available?

Technical Standards

- Are mini-grid-specific standards in place?
- Are optional main grid-compatible standards in place?
- Are mandatory main grid-compatible standards in place?



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