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Regulatory Review of the Electricity Market in Angola:

Towards Crowding-in Private Sector Investment

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This analysis is based on policies, laws and regulations adopted until April 2022. Therefore, the results will not consider and/or reflect the impact of policy and regulatory changes adopted thereafter.

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Executive Summary

This regulatory review provides analyses and observations on electricity sector policies, laws, and regulations of Angola towards crowding-in private sector investment in developing national electricity infrastructure. The report is part of the joint program of the United Nations Economic Commission for Africa and the RES4Africa Foundation on *Regulatory Review of Electricity Markets in Africa: Towards Crowding-in Private Sector Investment*.

Angola is the ninth-largest economy in Africa. It is also the fourth largest oil-producing country in the continent, with oil accounting for nearly 90 percent of exports and about one-third of GDP (World Bank, 2020). In the early 2010s, Angola experienced rapid economic growth. However, growth slowed down due to a drop in oil prices. In 2016, the economy entered a recession that persisted until 2020. While the pandemic has worsened the socioeconomic condition in Angola, pre-pandemic reforms have contributed to a recovery in 2021.

The power sector of Angola has experienced rapid growth in the last decade, with electricity generation and consumption more than doubling between 2010 and 2019. Since the early 2010s, Angola has made tremendous strides in rendering its power sector governance framework more transparent and robust. Such measures were intended to address the technical and financial challenges plaguing the sector and promote the development of renewable technologies. These efforts resulted in the unbundling of the former vertically integrated public utility and the restructuring of the sector, as well as policy and regulatory reforms to create a more conducive environment for private investment.

In particular, the Amendment of the General Electricity Law in 2014 and the adoption of a comprehensive Regulation on the Generation, Transmission, Distribution, and Commercialization of Electricity (Presidential Decree No. 76/21) have ensured a clear regulatory framework for all operators in the sector, offering a wide array of options for private participation across the value chain. These reforms, alongside comprehensive and robust technical regulations, have made Angola one of the most *open* and *ready* countries for private investment on the continent.

Notwithstanding these reforms and recent developments pointing to new commitments from independent power producers (IPPs), to date, Angola has seen little private participation in any segment of the electricity sector value chain, and structural challenges persist in the electricity market. Major barriers include insufficient grid infrastructure, high distribution losses, and a slower pace of development of solar and wind energy resources compared to the country's potential. Electrification currently stands at 47 percent, and while universal electricity access remains a priority, reaching this goal requires effective participation of private investment across the value chain.

The purpose of this regulatory review is to pinpoint the main policy and regulatory strengths and to identify remaining gaps in the policy and regulatory frameworks currently in force related to private sector participation in the entire electricity market. It further aims to offer concrete recommendations for regulatory improvement and reform toward attaining a competitive, resilient, and sustainable electricity market in Angola.

The regulatory review is undertaken following a comprehensive UNECA and RES4Africa regulatory review methodology, which was developed with the participation of African and international regulatory experts. The approach enables three broader assessments: the degree of *openness* of the electricity market to the private sector based on an evaluation of the power

sector structure and governance; the *attractiveness* of the market based on an assessment of sector economics, fair competition, and overall economic regulation; and the *readiness* of the market based on an assessment of technical regulations.

Main findings related to the Generation segment

The robust regulatory framework of Angola ensures a good degree of *openness* in its unbundled electricity generation market for private investors, offering clear procedures and a range of models for entering the market. Generators can choose from various off-taking options, benefiting from competition at both wholesale and retail levels. Greater *openness* could be achieved through the implementation of the competitive *procurement process* set out in the legislation and the strengthening of the independence of the regulatory authority, IRSEA. *Contracts* and *economic regulation* represent strong features of the current regulatory *attractiveness*, thanks to a standardized PPA and clear tariff setting and revision procedures. Angola offers limited *incentives* and *credit enhancement* options for investors, which would benefit from further policy and regulatory consideration. Despite the absence of a dedicated *grid code*, the country performs very well in market *readiness* due to a comprehensive set of regulatory instruments.

Main findings related to the Transmission segment

Transmission remains the domain of public entities in Angola, with private sector participation restricted to engineering, procurement, and construction (EPC) contracts. Nevertheless, transmission development is guided by comprehensive system planning tools and benefits from a clear regulatory and governance framework. Significant improvements in *openness* could be engendered by the liberalization of transmission activities. Transmission also offers a mixed picture of *attractiveness*. Despite the inability of private parties to obtain transmission concessions, the regulation details standardized concession agreement clauses, ensuring robust *contract regulation*. *Economic regulation* is particularly well-established due to the clear network tariff methodology and review procedures. However, the general lack of *credit enhancement* options represents a key area of improvement. Market *readiness* is strong, demonstrated by regulatory clarity regarding dispatching, non-discriminatory *grid access*, *system quality and security standards*, and *access to data*.

Main findings related to the Distribution segment

In contrast with the transmission market segment, the policy and regulatory environment is generally *open* to distribution market investors, with private parties being able to obtain distribution concessions offering exclusivity within a geographic area. However, despite legal provisions for the issuance of tenders for distribution concessions, none have taken place yet. Distribution market *attractiveness* mirrors that of the transmission market. *Contracts* and *economic regulation* are major strengths, while considerable room remains for improving *credit enhancement* opportunities for private investors. In addition to robust regulation for technical aspects such as system operation and quality and security standards, Angola provides a contractual framework for connection to and use of system agreements for both generators and final customers.

Main findings related to the Off-grid segment

The off-grid market segment demonstrates a good degree of *openness* to private sector participation. Strategic priorities and targets for mini-grid-based electrification are well-defined and accompanied by an investment plan. Private participation is possible through engineering, procurement, and construction (EPC) contracts, and merchant investments. The latter can take one of two forms: a mini-grid within the Sistema Eléctrico Público (SEP) governed by legislation, or a mini-grid in the parallel Sistema Eléctrico Não Vinculado (SENV) governed almost entirely by bilateral agreements between private parties. SEP mini-grids benefit from regulatory provisions for licensing requirements and procedures, to which SENV mini-grids are not required to adhere. As concession-type investments in the off-grid market are not possible, there is no need, or regulation, for their public procurement. The business environment for off-grid investors is fairly attractive. *Contracts regulation* stands out as a key strength due to legal provisions for retail contracts, as well as rules for metering and billing which apply to SEP and SENV mini-grids alike. *Economic regulation* is somewhat more complex, as SEP mini-grids must adhere to the national uniform tariff approach applied to the main grid, while SENV tariffs are deregulated. *Credit enhancement* and *indirect incentives* remain key areas of improvement in the off-grid market segment, with limited options currently available to private investors. Off-grid *readiness* for private investments is considerably weak, largely due to the absence of dedicated regulation for *off-grid system integration* and *quality and security standards*.

To enhance the *Openness* of the electricity market

- Ensure the timely review and update of energy sector policies, as defined by the law, to provide certainty about medium- and long-term strategic priorities and targets for the evolution of the national energy system;
- Establish a legal framework for the national climate policy based on the National Strategy for Climate Change and define an institutional framework to govern its periodical review and update;
- Comply with the legal provisions on electricity system planning stated in Presidential Decree No. 76/21 and adopt and publish a long-term power sector master plan with periodic (such as 5 years) updates;
- Formulate shorter-term generation expansion, network expansion, and electrification plans, aligned with the long-term master plan;
- Clarify the rules and licensing procedures applicable to renewable energy generators by adopting the Regulation on Linked Renewable Generation;
- Address the uncertainty regarding the governance of isolated systems operating within the SEP and SENV by clarifying which of the existing regulatory provisions apply to SENV isolated systems;
- Adopt dedicated regulation for isolated systems to clarify the operational regime for both SEP and SENV operators;
- Enhance the independence and powers of the regulator, IRSEA, notably by extending its mandate in economic regulation to improve private sector confidence in the impartial regulatory oversight of the market;
- Assess the feasibility of introducing Public-Private Partnership (PPP) models for transmission asset investments, and evaluate the costs and benefits linked to the introduction of an Independent Power Transmission (IPT) business model for new investments in transmission asset expansion;

- Provide clarity to potentially interested stakeholders and improve market predictability through procurement plans by publishing medium-term schedules for tenders and implementing competitive procurement schemes for awarding generation concessions (in line with national capacity expansion targets). Furthermore, issue tenders for distribution concessions for designated areas to encourage private sector participation in distribution infrastructure development;
- Pursue plans to connect to the Southern African Power Pool to provide generation market investors in Angola access to a regional spot market to expand off-taking options.

To enhance the *Attractiveness* of the electricity market

- Encourage further efforts to remove direct and indirect subsidies to electricity sector tariffs to ensure the financial sustainability of power sector utilities and attract additional private investment;
- Evaluate the impact of the current uniform tariff policy on the financial sustainability of SEP mini-grids and assess the necessity for incentives to ensure the financial sustainability of mini-grid assets;
- Introduce a standard tool for calculating mini-grid tariffs based on the principle of cost-reflectiveness;
- Specify provisions for a renewables tender program as foreseen by Presidential Decree No. 76/21 and strive for its timely implementation;
- Assess the feasibility of introducing a feed-in-tariff for renewable energy systems under 10 MW as foreseen by the National Energy Security Policy and Strategy, and evaluate the costs and benefits of incentive mechanisms such as green certificates and renewable energy sources (RES) quotas;
- Introduce targeted sector-specific incentives such as tax and duties exemptions for renewable technologies and off-grid asset components;
- Establish mechanisms and instruments to de-risk investments in electricity infrastructure development, covering generation, networks, and off-grid assets;
- Assess the feasibility of creating a risk mitigation facility dedicated to de-risking investments in energy infrastructure.

To enhance *Readiness* of the electricity market

- Streamline investment processes by establishing a one-stop-shop (or a single window) for the issuance of all permits for energy projects;
- Adopt clear rules on commercial options for mini-grid business continuity, or exit options, in the event of main grid arrival.

As Angola takes further bold steps toward its energy sector regulatory reform, the United Nations Economic Commission for Africa and the RES4Africa Foundation remain committed to partnering with the Republic of Angola in addressing any of the identified regulatory and policy gaps. They also commit to supporting regulatory capacity development, as well as any area of reform interest of Angola towards greater *openness*, *attractiveness*, and *readiness* of the electricity market.

Introduction





Luanda City at Night, Angola
Photo credit: Fabian Plock / EyeEm via Getty Images

1. Introduction

Recognition that energy plays a key role in facilitating socio-economic development, and that its insufficient provision impedes it, has brought energy to the forefront of national, regional, and global agenda. National sector development strategies in most of Africa reflect the need to expand energy access rapidly, facilitated through the implementation of Sustainable Development Goals (SDGs), particularly SDG7. African states have pursued the energy access agenda, devoted public finance for energy infrastructure and capacity expansion, and instituted measures to strengthen the energy sector.

Global SDG7 tracking reports warn that progress made so far is not on track to achieving universal access by 2030 and that nearly 90 percent of the population without access at the end of the decade will be residing in Africa.

Sustainable Development Goal 7 aims to ensure access to affordable, reliable, sustainable and modern energy for all.

Despite appreciable progress as a result of these measures, structural challenges remain within the electricity markets of Africa. Over 500 million people on the continent today lack access to electricity. The global SDG7 tracking reports warn that progress made so far is not on track to achieving universal access by 2030 and that nearly 90 percent of the population without access at the end of the decade will be residing in Africa, partly due to rapid population growth (IEA et al., 2020).

Financing energy development remains a key challenge. The cost of achieving the SDGs at large in the continent is estimated at USD 1.3 trillion per year. Africa would require USD 32 billion per year through 2030 on universal electricity access-related investments (AfDB, 2019). According to the Infrastructure Consortium for Africa, 37 percent of infrastructure investments in the continent were undertaken by African governments in 2018, with the private sector accounting for 3 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.

Towards the goal of crowding in the private sector, feasibility (bankability) of projects, country risks, profitability (viability), and the legal/regulatory environment are often identified as key barriers. Indeed, the regulatory framework is crucial for attracting private investments. The Regulatory Indicators for Sustainable Energy (ESMAP, 2020) indicate that more than half of the global population lacking access to electricity remained in countries with weak regulatory frameworks by 2019. These regulatory challenges remain to be addressed.

Since the early 2010s, Angola has made tremendous strides in rendering its power sector governance framework more transparent and robust, and overcome the technical and financial challenges plaguing the sector and promote the development of renewable technologies. These efforts resulted in the unbundling of the former vertically integrated utility and the restructuring of the sector, as well as policy and regulatory reforms to create a more conducive environment for private investment. In particular, the Amendment of the General Electricity Law in 2014 and the adoption of a comprehensive Regulation on Generation, Transmission, Distribution, and Commercialization of Electricity (Presidential Decree No. 76/21) have ensured a clear regulatory framework for all operators in the sector, offering a wide array of options for private participation across the value chain. These reforms, alongside comprehensive and robust technical regulations, have made Angola one of the most *open* and *ready* countries for private investment on the continent.

However, the country has a limited track record of private participation in the electricity sector and continues to face structural challenges that prevent private entities from successfully participating in electricity infrastructure development at a much larger scale. Major barriers

include insufficient grid infrastructure, high distribution losses, and a slower pace of development of solar and wind energy resources compared to the country's potential. While universal electricity access remains a priority, reaching this goal requires effective participation of private investment in the electricity market value chain.

This regulatory review examines these and additional issues in-depth concerning the crowding-in of private sector investment in the electricity market of Angola, from generation to networks and off-grid market segments. This analysis is based on policies, laws and regulations adopted until July 2022. Therefore, the results will not consider and/or reflect the impact of policy and regulatory changes adopted thereafter. The goal is, through regulatory improvement, to promote the achievement of SDG7 goals and the development of a resilient, competitive, diversified, and vibrant electricity market that will sustainably attract private capital to supplement public investment. This is particularly crucial in a post-COVID-19 environment where public resources are even more constrained due to priorities in public health and social protection, as well as economic recovery.



Country Overview



The Capanda Dam in Angola.
Photo credit: Igor Morozov/ https://creativecommons.org/licenses/by-sa/3.0/deed.en

2. Country overview

Angola is located on the western coast of southern Africa. It is bordered by the Atlantic Ocean to the west, Namibia to the south, the Democratic Republic of the Congo to the north, and Zambia to the east. The exclave province of Cabinda is separated from the rest of Angola by a strip of the Democratic Republic of the Congo. From the 1970s, the country experienced rapid population growth, with an annual growth rate of over 3 percent (UNDESA, 2019). At the end of 2019, the population was 32 million strong, having grown by over one million in one year. An estimated 66 percent of the population lives in urban areas (UNDESA, 2018).

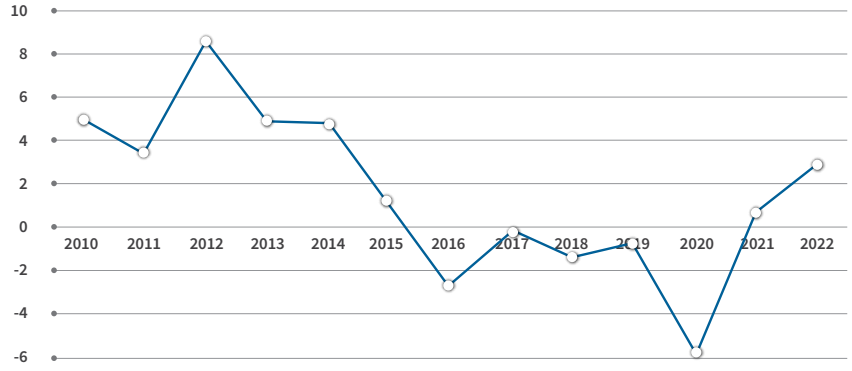


Map of Angola credit: Peter Hermes Furian
Map of Africa credit: Geo Atlas Graphi Ogre

2.1 Macroeconomic overview

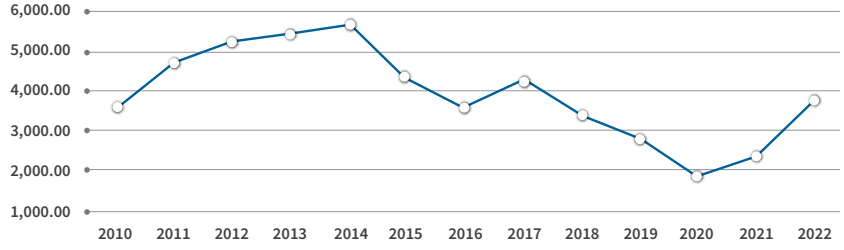
The economy of Angola is heavily reliant on oil production, which accounts for 90 percent of its exports and about one-third of its GDP (World Bank, 2020). In the early 2010s, Angola experienced rapid economic growth; however, growth slowed down due to a drop in oil prices. In 2016, the economy entered a recession that persisted until 2021. Similarly, GDP per capita exhibited rapid growth in the early 2010s, but plummeted from a high of over USD 5,600 in 2014 to merely a third of that in 2020. The recession ended with a slight GDP growth of 0.8% in 2021 due to the removal of COVID-19 restrictions, macroeconomic reforms, and diversification efforts boosting non-oil growth (World Bank, 2022).

Figure 1: GDP growth, (%, 2010-2022)



Source: IMF (2022)

Figure 2: GDP per capita, (USD, 2010-2022)

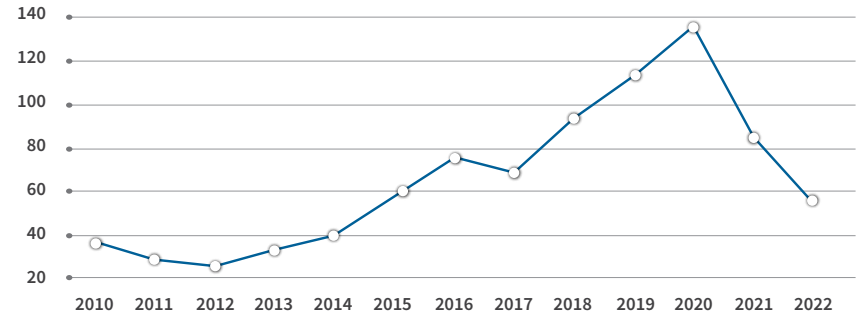


Source: IMF (2022)

Debt-to-GDP

During the economic recession debt-to-GDP ratio more than doubled, from 57 percent in 2015 to an estimated 127 percent in 2020 (IMF, 2021). The government has taken major steps to improve macroeconomic stability, including the introduction of a value-added tax, a fiscal responsibility law, and a liberalization of the exchange rate regime.

Figure 3: Debt to-GDP ratio (2010-2022)



Source: IMF (2022)

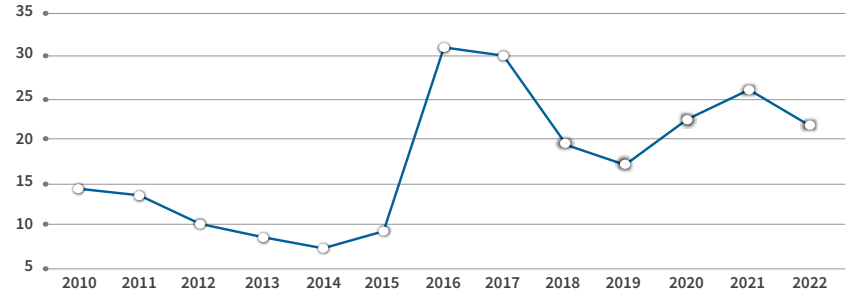
Inflation and exchange rate stability

The economic recession put pressure on the exchange rate and inflation. To address this challenge, the government reduced public spending and increased exchange rate flexibility. One primary factor that contributed to the stabilization of inflation after 2017 is reserve money targeting (AfDB, 2020). During the COVID-19 pandemic, inflation increased beyond the government target of 25 percent. However, it has since slowed and is expected to continue declining in the short to medium-term.

During the last few years, exchange rate instability in Angola has generated a high level of uncertainty, with a serious impact on business activities. In early 2019, the Banco Nacional de Angola introduced the auction mechanism and, most importantly, a 2 percent limitation on exchange rate fluctuation in each auction. With this measure, there was greater predictability concerning exchange rate variations, although the deadlines for payment processes abroad were still subject to high uncertainty.

Following these measures, currency depreciation slowed down. In 2021, the Angolan kwanza (AOA) appreciated against the U.S. dollar.

Figure 4: Inflation rate (%, 2010-2022)



Source: IMF (2022)

Business climate

Angola ranks 177th among 190 economies within the World Bank's 2020 Ease of Doing Business Index, with enforcing contracts and getting credit representing key areas of improvement. Performance in terms of getting electricity is somewhat stronger, with the country ranking slightly higher at 156.

Equal treatment for investors is ensured by the Private Investment Law, which grants foreign investors the same rights and benefits as national investors. Foreign investors can also benefit from the repatriation of profits and dividends, as well as tax and customs reductions.

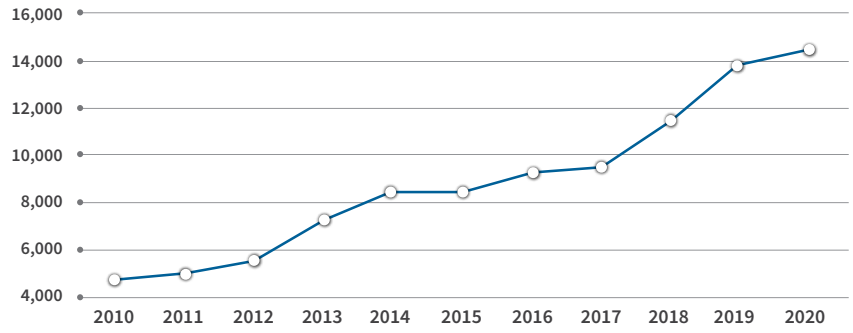
2.2 Electricity sector overview

Electricity production and consumption in Angola have experienced a marked growth in the last decade, more than doubling between 2010 and 2020. Installed capacity stands at 5,900 MW, with 63 percent coming from hydro and the majority of the remaining contributed from thermal sources. To date, renewable energy plays a marginal role in the electricity mix. The expansion of access to electricity has not kept a rapid pace, having reached 47 percent in 2020, up from just under 39 percent in 2010. In 2021, distribution losses stood at 34 percent posing a serious challenge to access expansion.

Electricity consumption

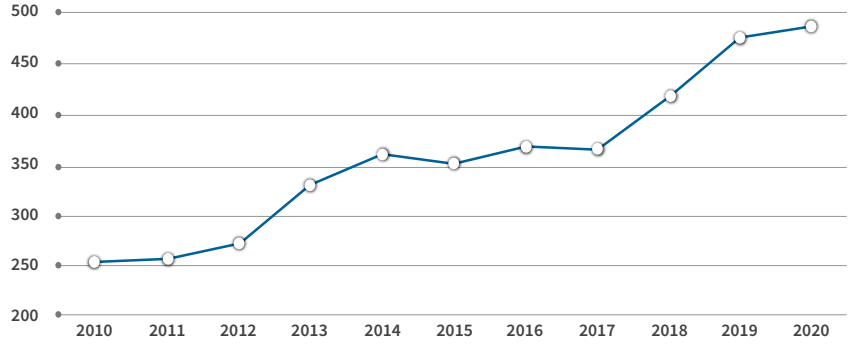
Angola has experienced rapid growth in demand for electricity. Power demand more than doubled between 2010 and 2019 from about 5 TWh to just under 14 TWh. Per capita consumption has followed a similar trend, increasing from around 200 kWh in 2010 to over 430 kWh in 2019.

Figure 5: Electricity consumption, total (GWh, 2010-2020)



Source: IEA (n. d., accessed 2022)

Figure 6: Electricity consumption, per capita (kWh, 2010-2020)



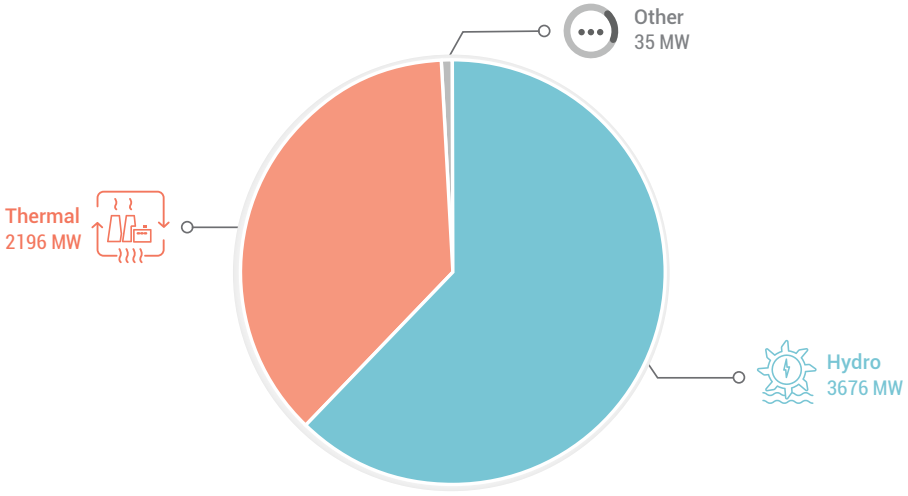
Source: IEA, World Bank (n. d., accessed 2022)

Electricity production and consumption in Angola have experienced a marked growth in the last decade, more than doubling between 2010 and 2020. Installed capacity stands at 5,900 MW, with 63 percent coming from hydro and the majority of the remaining contributed from thermal sources.

On-grid installed capacity and electricity production

Over the span of the last decade, there has been a rapid growth of on-grid installed electricity capacity, which quadrupled in this period. Between 2010 and 2021, the on-grid installed capacity increased from 1,375 MW to around 5,900 MW (PRODEL, 2022). Approximately 63 percent of the total installed capacity is generated from hydropower, while the remaining is generated mainly from thermal sources. To date, renewable energy sources play a marginal role as a share of national electricity capacity.

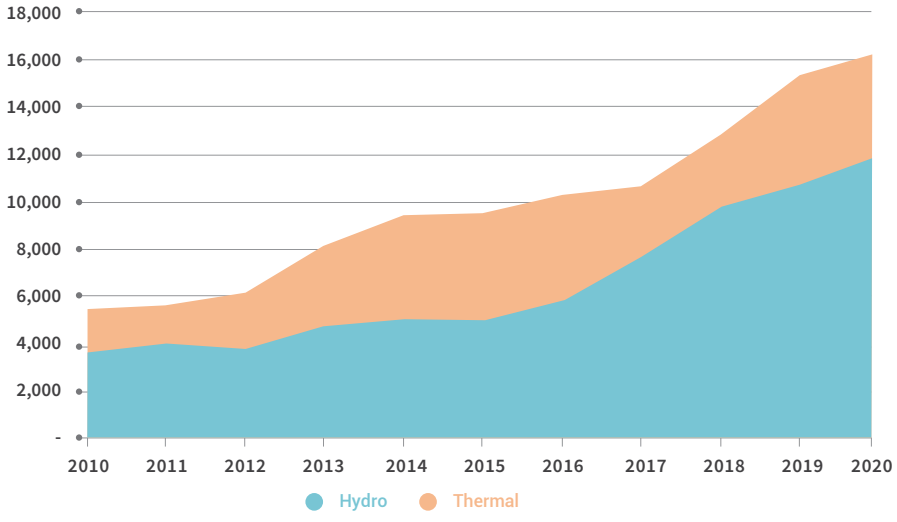
Figure 7: Installed generation capacity (MW, 2021)



Source: PRODEL (2022)

Electricity production more than doubled from 5,449 GWh in 2010 to 16,382 GWh in 2020. Hydro has always played the most prominent role, representing over two-thirds of power generation in 2020.

Figure 8: Electricity production (GWh, 2010-2020)



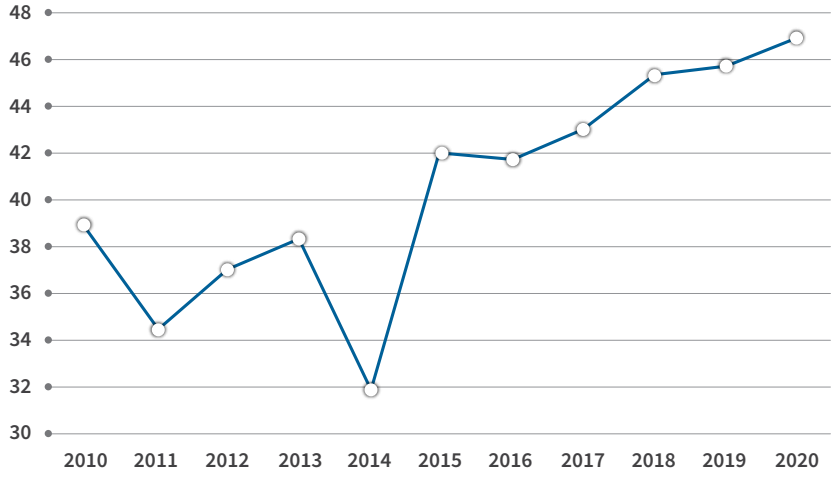
Source: IEA (n. d., accessed 2022)

Access to electricity

Between 2010 and 2020, the electrification rate increased from 33.4 percent to about 47 percent (World Bank, n. d.). The vast majority of Angolans with access to electricity are living in urban areas, while access in rural areas is considerably lower (only 7.3 percent of the rural population in 2018). The government's goal is to achieve an electrification rate of between 50 to 60 percent by 2025 (National Energy Security Policy and Strategy, 2011).

In 2021, over 1.7 million customers were connected to the grid (ENDE, 2022). In 2020, Angola received a loan from the African Development Bank to finance the Energy Sector Efficiency and Expansion Program (ESEEP). The ESEEP aims to strengthen and extend the transmission and distribution system, connecting an estimated 400,000 new customers (AfDB, 2020). Furthermore, the current Energy and Water Sector Action Plan sets out a target of 2.6 million total customers by 2022.

Figure 9: Electrification rate (%, 2010-2020)



Source: World Bank (n. d.), accessed 2022

Electricity service quality and reliability

In 2021, transmission losses represented 4 percent, while distribution losses amounted to nearly 34 percent, of which 12 percent were technical losses while the remaining 22 percent were commercial losses (ALER and ASAER, 2022). The high commercial losses can be partly explained by billing challenges due to the reduced penetration of the prepaid billing system.

The National Development Plan (NDP) 2018-2022 emphasizes the importance of eliminating the flat-rate payment regime through the installation of meters to reduce commercial losses and achieve overall distribution losses under 25 percent by 2022. Similarly, the NDP foresaw improvements to the grid which would have reduced average interruption time on the very high voltage system from 1,330 minutes in 2017 to less than 900 minutes by 2022.

Off-grid electricity market

In 2021, 5 percent of the population was electrified through off-grid solutions (ALER and ASAER, 2022). Angola Energia 2025, the government's Long-Term Vision for the Electricity Sector,

foresees additional electrification through isolated and individual systems leading up to 2025. In total, 31 municipalities, representing 1 percent of the population, are to be electrified with mini-hydro, and where this is not possible, by diesel generators and solar power. Furthermore, the National Strategy for New Renewable Energies foresees the establishment of 500 solar villages by 2025.

The Angolan Minister of Energy and Water, João Baptista Borges, announced in 2019 that a plan is underway to increase access to electricity in rural areas through the deployment of more off-grid systems. Around 30,000 solar off-grid systems, producing up to 600 MW were expected to be deployed by 2022, through the help of the National Rural Electrification Agency and in collaboration with private investors (Afrik21, 2019). A few months later, the Minister announced that 300 MW worth of solar park installations were already underway in Benguela, Luena (Moxico), Saurimo (Lunda-Sul), Dundo and Lucapa (Lunda-Norte), and Bailundo (Huambo).

2.3 Electricity sector governance and market structure

Overview of electricity sector reforms

Before 2014, the electricity market was built around a vertically integrated monopoly, the Empresa Nacional de Electricidade (ENE), operating in all the activities of the electricity value chain and charged with distribution and retail in 16 of the 18 provinces of Angola. The Empresa de Distribuição de Energia Eléctrica (EDEL) was dedicated to distribution in the remaining two provinces, Luanda and Bengo. Finally, the Gabinete de Aproveitamento do Médio Kwanza (GAMEK) was responsible for the construction and operation of the generation assets of the Capanda hydroelectric plant, and the development of hydro resources in the Kwanza River basin.

Under this market model, power supply suffered from inadequate generation capacity, high costs of supply, high technical and commercial losses, low levels of electrification, and extensive subsidization. Tariffs covered only 20 percent of total system costs and the remaining 80 percent were covered by the State budget. Coupled with other challenges, these factors resulted in structural financial deficits of the public utilities operating in the market.

In the early 2010s, the government decided to reform the sector to improve the coverage, reliability, and affordability of the electricity supply. The new National Energy Security Policy and Strategy (NESPS), adopted through Presidential Decree No. 256/11 introduced a medium-term reform program, known as the Electricity Sector Transformation Program (PTSE). The PTSE aimed to: i) restructure sector governance and reform the market model; ii) guarantee the efficiency of the tariff model; iii) reduce subsidization in the sector; iv) guarantee the quality and operational efficiency of public companies; and v) guarantee return on investments.

The approval of Presidential Decree No. 305/14 marked the adoption of an unbundled market model. The decree restructured the vertically integrated ENE, as well as the GAMEK and EDEL, into three new public utilities, one for each segment of the value chain, namely: PRODEL (generation), RNT (transmission), and ENDE (distribution).

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The amendment of the General Electricity Law in 2015 formalized the adoption of the new market model, clarified the responsibilities and functions of institutions in the electricity

sector, and strengthened the powers of the regulator. This amendment also separated distribution and commercialization services, previously bundled together, and facilitated private sector participation in both, as well as in generation. However, the reform maintained the transmission market segment as a public monopoly.

Another key focus area of the PTSE was tariff model reform to strengthen the economic viability of the restructured public utilities and ensure return on investments for market operators. This objective is being pursued through regulatory and tariff changes, most recently by Executive Decree No. 122/2019, which increased tariffs and phased out a set of subsidies. The 2020 revision of the Tariff Regulation (Presidential Decree No. 178/20) approved a new tariff methodology based on allowed revenue for operators in the market.

Institutions governing the electricity sector

The electricity market of Angola is governed by the following institutions.

Table 1: Institutions governing the electricity sector

Ministry of Energy and Water (MINEA)	As per Presidential Decree No. 223/20, the Ministry of Energy and Water is responsible for policy development, coordination, and oversight of the sector. MINEA proposes and promotes the implementation of national electrification policies, as well as the institutional model for carrying out the activities of production, transmission, distribution, and commercialization of electricity. Finally, the Ministry is responsible for licensing electrical facilities under Presidential Decree No. 41/04 (but not granting concessions or licenses for generation, transmission, distribution, or commercialization activities) and overseeing service delivery in the energy sector.
Regulatory Institute for Electricity and Water Services (IRSEA)	Presidential Decree No. 59/16 dissolved the IRSE and established IRSEA, transferring all responsibilities of the former regulatory authority onto the latter. These responsibilities include: • Overseeing the regulation of the sector; • Regulating the activities and quality of service of entities involved in the generation, transmission, distribution, and commercialization of electricity in the Sistema Eléctrico Público (SEP); • Regulating the electricity tariff and verifying compliance with established standards; and • Preparing and implementing energy policies and strategies.

Market players

The major market entities in the electricity market are the public utilities: the Empresa Pública de Produção de Electricidade for generation; the Rede Nacional de Transporte for transmission; and the Empresa Nacional de Distribuição de Electricidade for distribution.

Table 2: Market players

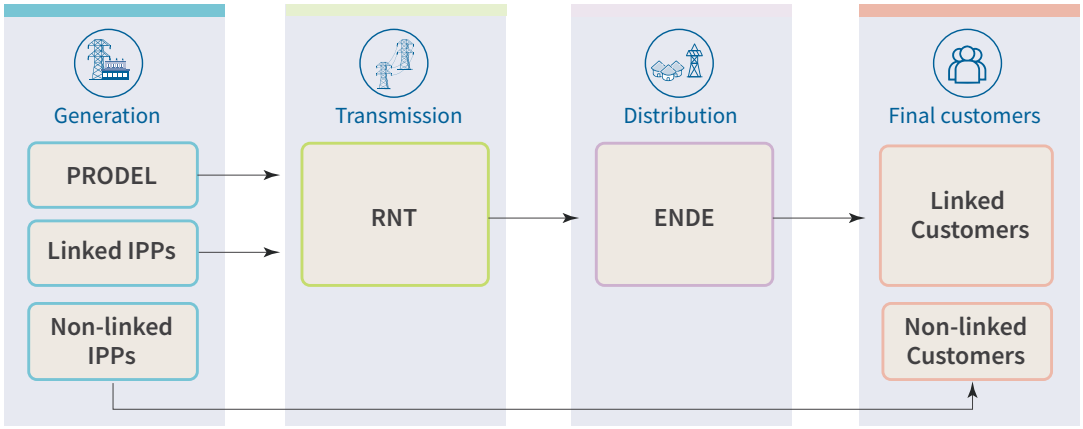
Empresa Pública de Produção de Electricidade (PRODEL)	PRODEL manages state-owned generation assets in the Sistema Eléctrico Público, which represent the vast majority of Angola's generation fleet.
Independent power producers (IPPs)	IPPs hold an insignificant share of electricity generation capacity in Angola (ALER and ASAER, 2022).
Rede Nacional de Transporte de Electricidade (RNT)	The RNT is a public utility dedicated to system management, market operation, and network management. Its main responsibilities are the dispatch and transmission of electrical energy through the national transmission network. RNT acts as the market operator at the wholesale level for the single-buyer Sistema Eléctrico Público.
Empresa Nacional de Distribuição de Electricidade (ENDE)	State-owned utility ENDE is currently the sole distributor in Angola, responsible for the distribution and commercialization of electricity within the Sistema Eléctrico Público.

Electricity market model

The implementation of the Electricity Sector Transformation Program (PTSE) resulted in the unbundling of the Angolan electricity market. It also led to the restructuring of public companies, with the separation of existing energy companies along the segments of the electricity value chain (PRODEL – generation; RNT – transmission; and ENDE – distribution). The market model was restructured into two sub-systems: the regulated, single-buyer model Sistema Eléctrico Público with RNT as the single buyer; and the liberalized Sistema Eléctrico Não Vinculado (SENV), where private generators and non-linked consumers can freely establish bilateral contracts.

The resulting structure of the Angolan electricity market is shown in the figure below. The generation market segment is dominated by the public company PRODEL, accompanied by a fairly small contribution from independent power producers (IPPs) (ALER and ASAER, 2022). The transmission segment is closed to private participation and is currently exclusively managed by RNT. ENDE remains the sole distribution utility, despite the possibility of private participation in this market segment.

Figure 10: Structure of the electricity supply industry



2.4 Policies and regulations governing the electricity supply industry

The electricity market of Angola is governed by numerous plans, strategies, policies, and laws summarized in the next section (see Annex A for further information).

Table 3: Energy sector strategies, policies, and plans

Angola 2025 Long-Term Strategy (2008)	Approved in 2008, Angola 2025 is the government's longest-term development strategy which contains strategic objectives for the energy sector. Specific objectives include the incentivization of the use of renewable energy and the stimulation of private sector participation in the electricity market.
National Development Plan 2018-2022	The National Development Plan (NDP) 2018-2022 follows the NDP 2013-2017 and serves as a medium-term planning instrument for the implementation of the strategic long-term priorities defined in the Angola 2025 Strategy. Regarding the power sector, the NDP 2018-2022 sets medium-term goals for rural electrification, the optimization of the generation fleet, and the reinforcement of the national grid.
National Energy Security Policy and Strategy (2011)	The National Energy Security Policy and Strategy (NESPS), approved by Presidential Decree No. 256/11, provides strategic direction for the energy sector leading up to 2025. It recommends the unbundling of the power sector and the creation of specialized utilities to strengthen regulatory functions and capacitate operators. By 2025, the NESPS envisions, among others: • The expansion of generation capacity to 9 GW and the development of non-hydro renewable resources; • The attainment of a 50-60 percent electrification rate; • A greater role for the private sector through the establishment of Public-Private Partnerships (PPPs) and the introduction of a feed-in-tariff for projects up to 10 MW.
Atlas and National Strategy for New Renewable Energies (2015)	Contributing to the implementation of the NESPS, the National Strategy for New Renewable Energies (NSNRE) establishes targets for renewable technology deployment up to 2025. The Strategy foresees the installation of an additional 800 MW of renewable energy (500 MW of biomass and 100 MW each of solar, wind, and small hydro), with an important role for off-grid systems. The Atlas accompanying the Strategy presents the findings of the renewable resource potential mapping by technology and lists potential project areas identified by the government.

Angola Energia 2025 – Power Sector Long-Term Vision (2016)	The government's Angola Energia 2025 defines long-term objectives for the energy sector. It provides guidelines for the development of five-year action plans of MINEA and sets out the objectives related to the expansion of generation, transmission, and distribution networks, and private sector participation. Among these targets is an electrification rate of 60 percent by 2025, at least 7.5 percent of total electricity generation coming from renewable sources (excluding large hydro) by 2025, with an installed capacity of 500 MW by 2022 and 800 MW by 2025. The strategy also foresees a connection to the Southern Africa Power Pool (SAPP) through Namibia.
Energy and Water Sector Action Plan 2018-2022	The second Energy and Water Sector Action Plan of MINEA establishes priorities and projects. It guides towards achieving the ambitious energy sector targets of the government for the 2018-2022 period. The Action Plan targets three key pillars of action: • The expansion of access to electricity to meet the goal of 50 percent electrification by 2022; • The optimization and sustainable management of the electricity sector with specific targets for generation, transmission, distribution, and commercialization; and • The encouragement of private sector participation in the electricity sector with a particular focus on the growth of IPP installed capacity (2 GW by 2022).
National Strategy for Climate Change 2018-2030	In 2017, the Ministry of Environment published its National Strategy for Climate Change 2018-2030 (NSCC). The NSCC provides guidelines for the integration of climate change into national policies and identifies strategic mitigation and adaptation measures to ensure Angola complies with its commitments under the Paris Agreement. A revised Strategy for the period 2020-2035 aligned with the Nationally Determined Contributions of Angola under the UNFCCC was adopted in 2021 (Government of Angola, 2021); however, it has not been made public.

2.4.1 Key laws and regulations for the electricity supply industry

Foundational legislation

The basis of electricity sector regulation in Angola is the General Electricity Law (Law No. 27/15) first adopted in 1996 and amended in 2015. The law defines the general principles for the governance of the generation, transmission, distribution, and commercialization of electricity services. The Regulation on Production, Transmission, Distribution, and Commercialisation of Electricity (Presidential Decree No. 76/21) implements the General Electricity Law by establishing a legal regime based on the general principles set out by the law and defining the bases for concessions for power sector activities.

The General Electricity Law and Presidential Decree No. 76/21 distinguish between activities within and outside the Public Electricity System (Sistema Eléctrico Público – SEP). Activities within the system constitute the subsystem of the National Electricity System which aims to satisfy the needs of most electricity users according to the principle of tariff uniformity and under a public utility regime. Electricity supply activities within the SEP are subject to concessions that are required for generation, transmission, and distribution activities on the main grid. They also require licenses to be obtained for distribution services in isolated systems and for the commercialization of electricity. Operators within the SEP are referred to as 'linked' (vinculado). On the contrary, activities outside the SEP, within the so-called Non-Linked Electricity System (Sistema Eléctrico Não Vinculado – SENV), such as self-generation and certain off-grid systems, are governed by freely established contracts between producers and customers.

Electricity supply activities within the SEP are subject to concessions that are required for generation, transmission, and distribution activities on the main grid. They also require licenses to be obtained for distribution services in isolated systems and for the commercialization of electricity.

Specific licensing requirements for all electrical facilities are contained in the Regulation on Licensing of Electricity Generation, Transmission, and Distribution Facilities (Decree No. 41/04). The Regulation states that in addition to obtaining concessions and licenses, as required, any entity developing new electricity facilities must obtain an establishment license authorizing the construction of the facility and, subsequently, an exploration license, authorizing the operation of the facility.

Presidential Decree No. 59/16 dissolved the former regulatory authority IRSE and transferred all its rights and obligations to the newly established Instituto Regulador dos Serviços de Electricidade e de Água (IRSEA). These include regulating the generation, transmission, distribution, and commercialization of electricity in the Public Electricity System. It also regulates the commercial relations between the entities undertaking these activities, arbitrates disputes, protects the interests of consumers, encourages competition to improve efficiency and prevents anti-competitive behavior, and ensures the presence of conditions that allow entities operating in the market to attain the financial equilibrium necessary to fulfill the responsibilities defined in their concession agreements or licenses. However, the powers of IRSEA are limited to proposing regulation and tariff structures to be approved by the government and overseeing their implementation once approved.

Grid Codes and technical regulations

Angola does not provide a comprehensive Grid Code, rather it governs the technical aspects of connection to and management of the grid through individual pieces of regulation dedicated to different technical aspects.[1] These regulations are the following:

- Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11), which establishes non-discriminatory third-party access to the grid and defines the technical and commercial conditions for access to networks and interconnections;
- Dispatch Regulation (Presidential Decree No. 3/11), which sets out the principles of system operation and dispatch; and
- Quality of Service Regulation (Presidential Decree No. 310/10), which establishes the technical and commercial requirements that the quality of service in the Sistema Eléctrico Público must meet.

[1] An attempt was made in 2008 with the draft of an Electricity Transmission Regulation, but it was never approved.

Tariff regulation

Uniform national electricity tariffs within the Sistema Eléctrico Público are set in line with the principles and methodology defined in the Tariff Regulation (Presidential Decree No. 178/20). The amendment of the regulation in 2020 introduced a new tariff regime based on a required revenue methodology. Network tariffs are also subject to the Regulation on Access to Networks and Interconnections, which lists the types of tariffs to be paid to system operators by system users.

The tariff structure is established by the competent body of the government, under the proposal of IRSEA. The actual value of the tariffs is calculated from the formulas established in the Tariff Regulation and applied to users connected to the grid by RNT and distribution companies. The Minister of Energy and Water has expressed the intention of the government to empower IRSEA to set prices directly;[2] however, this has yet to be implemented. Outside the SEP, tariffs are deregulated and defined in individual agreements between non-linked suppliers and consumers.

2.4.2 Other regulations for private sector participation

Private sector participation models

The Law on Public-Private Partnerships (Law No. 11/19) and its implementing regulation (Presidential Decree No. 316/19) define the procedure for the approval of PPPs. It also defines the rules concerning the monitoring of PPP projects, as well as the powers and duties of the PPP implementation body, identified as the Office for Public-Private Partnership within the Ministry of Economy and Planning. The implementation of power projects under PPP models remains in the development phase and as of yet, there are no projects in implementation based on this business model (ALER and ASAER, 2022).

Procurement processes

As per the General Electricity Law, except granting to public utilities, the awarding of concessions must be preceded by a competitive tender, a requirement that can be waived in case of awarding to public utilities. The issuing and awarding of public tenders are governed by the Public Contracts Law (Law No. 9/16).

As per the General Electricity Law, the awarding of concessions must be preceded by a competitive tender, a requirement that can be waived in case of awarding to public utilities. The issuing and awarding of public tenders are governed by the Public Contracts Law (Law No. 9/16). The law details the rules and procedures for tender definition, organization, management, and awarding. The law provides that whenever a tender is launched, an evaluation committee with several entities must be set up. As of yet, no tenders have taken place for electricity sector concessions.

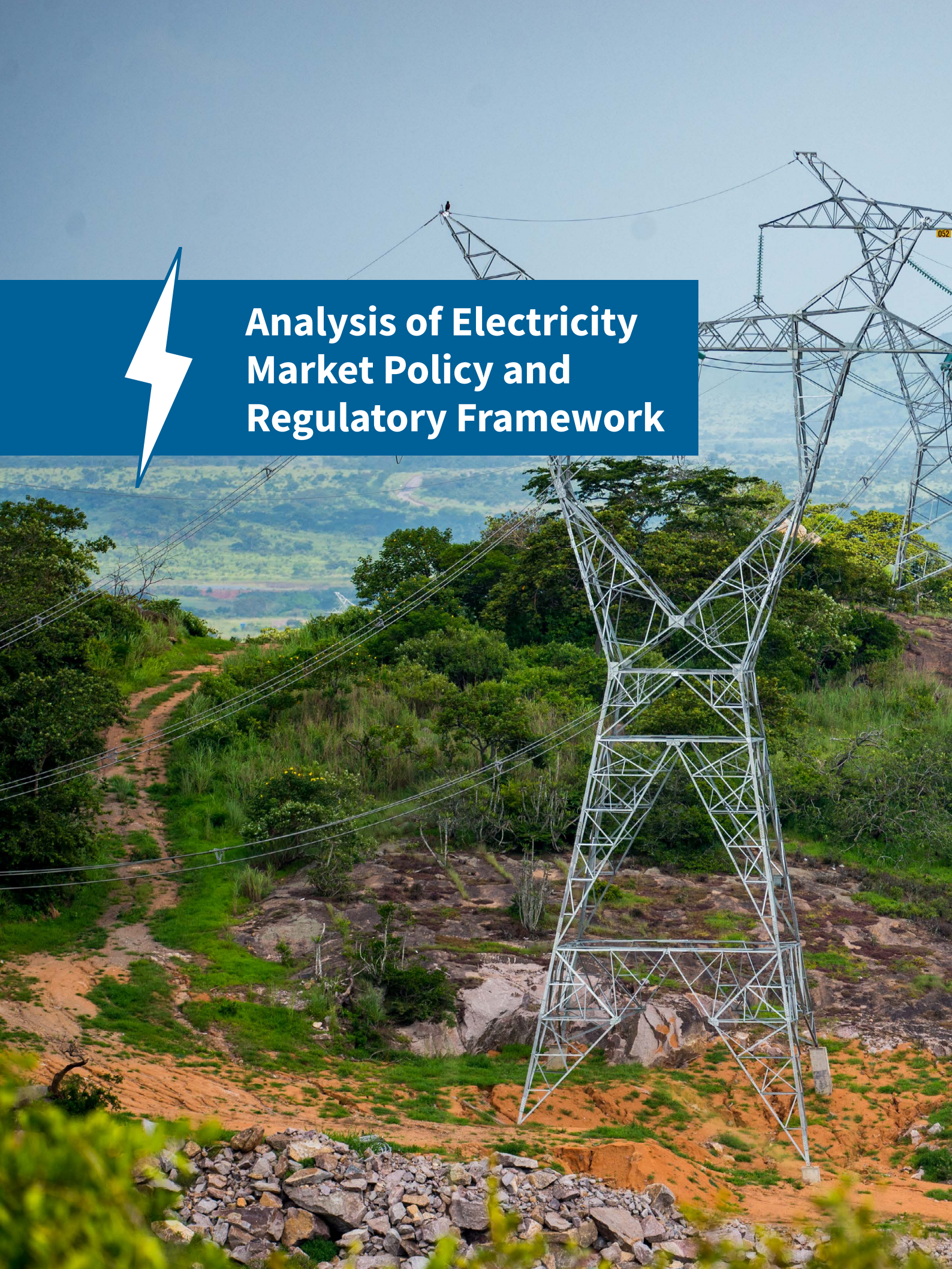
Incentives

The legal regime applicable to foreign investment in Angola is provided in the Private Investment Law (Law No. 10/18, subsequently amended by Law No. 10/21). The Law establishes the general principles of private investment in the country and provides a framework for evaluating the

[2] Speaking at the Energia Renovável em Angola 2022 conference in July 2022, the Minister of Energy stated that the regulatory authority will be transformed into an independent body and will see its powers reinforced, particularly with regards to tariff setting.

benefits offered to private investors. Electricity generation and distribution are identified as priority sectors for the attribution of such benefits, and as such benefit from the tax exemptions provided in the Tax Benefits Code (Law No. 8/22). Furthermore, renewable energy investments are subject to tax benefits such as a 35 percent reduction in the final Industrial Tax settlement rate and a 60 percent reduction in the Capital Investment Tax.

Analysis of Electricity Market Policy and Regulatory Framework





High voltage electricity pylon in Luanda, Angola
Photo credit: Antonio Rodrigues Peyneau via Shutterstock

3 Analysis of Electricity Market Policy and Regulatory Framework

UNECA and RES4Africa Foundation have developed a custom methodology to assess countries' policy, legislative, and regulatory frameworks in their ability to encourage the participation of private sector investors. The approach encompasses the entire electricity supply industry value chain, covering the generation, transmission, distribution, and off-grid segments of the market.

3.1 UNECA and RES4Africa methodological approach

The methodology identifies three areas, referred to as Dimensions, under which policy, legislative, and regulatory elements are clustered. These Dimensions are as follows.



Openness

Openness – or power sector structure and governance. This Dimension covers policies, laws, and regulations meant to define energy policy and strategy priorities, market-entry, infrastructure planning, sector governance, market structures, and related considerations. These instruments combined provide an overall view of the *openness* of the electricity market to investors.



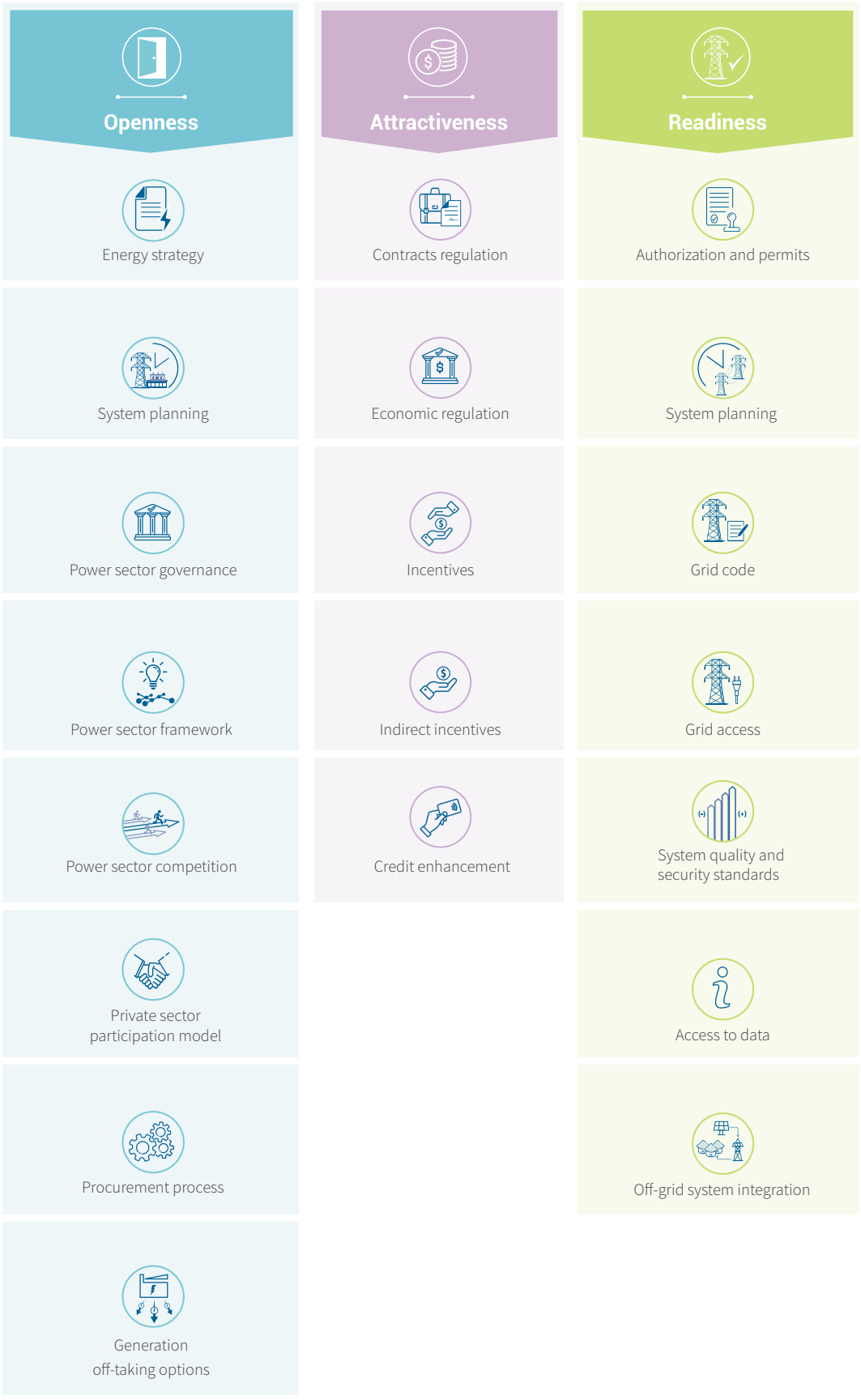
Attractiveness

Attractiveness – 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 *attractiveness* of the electricity market to private sector investors.

Readiness

Readiness – or sector maturity. This Dimension investigates technical regulations designed to ensure the implementation into, and efficient integration and management of electricity infrastructure within the energy system. A review of these elements of the Dimension provides an overall picture of the *readiness* of the electricity market to investors along the value chain.

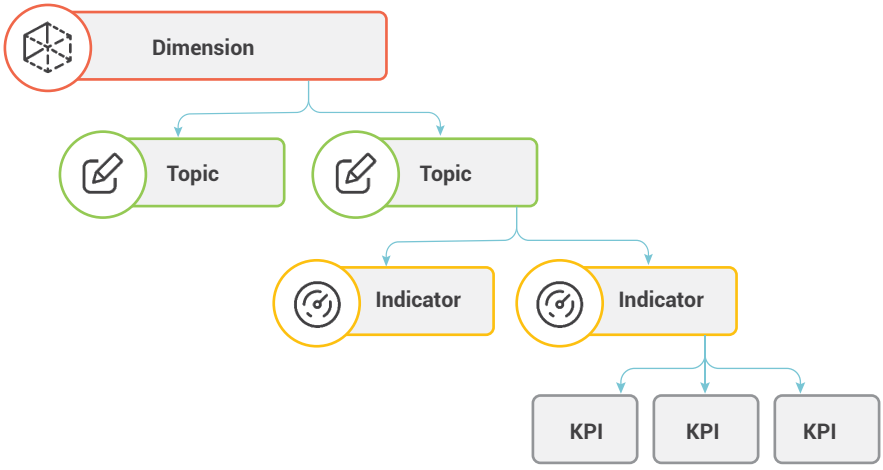
Figure 11: Overview of the Topics assessed within each Dimension



Each of these Dimensions is then disaggregated into three further levels, namely Topics, Indicators, and KPIs (key performance indicators).

- **Topics (1st Level)** define the main areas of policy and regulatory assessment (such as energy strategy, system planning, and grid code) specific to each of the dimensions. Topics are composed of Indicators. See Annex B for an overview of the Topics assessed.
- **Indicators (2nd Level)** cover single policy or regulatory elements (such as energy policy, Electricity Act, public PPAs, retail tariff structure, and grid connection). Each Indicator is composed of a series of KPIs.
- **KPIs (3rd Level)** are single elements, or specific questions, that provide a detailed understanding of Indicators, which in turn inform Topics.

Figure 12: Methodological building blocks



The methodology, cascading from the broader to the micro-level, enables proper assessment and understanding of the degree of *Openness, Attractiveness, and Readiness* of electricity markets to private sector investors. This approach led to the formulation of a set of questionnaires – one for each segment of the electricity market, that is generation, transmission, distribution, and off-grid. Based on YES/NO questions, the approach enables the assessment of the policy, legal, and regulatory environment related to its fundamental attributes: clarity, predictability, transparency, and accountability.

The quantitative result from this methodological exercise is estimated by summing the positive (YES) answers to the detailed questions (KPIs). To reflect on the relative relevance of a particular KPI under a given Indicator, and to assess the impact that a particular Indicator has on its Topic, Indicators, and KPIs are subjected to relative weights on a scale system. The weights were reviewed and validated by a panel of African and international experts, and reflect the average input of the experts.

To compute the necessary quantitative results based on data input from countries, UNECA and RES4Africa developed the *ROAR* (Regulatory review of the *openness*, *attractiveness*, and *readiness*) tool. The ROAR tool computes results by country based on country data inputs and a defined weighting methodology.

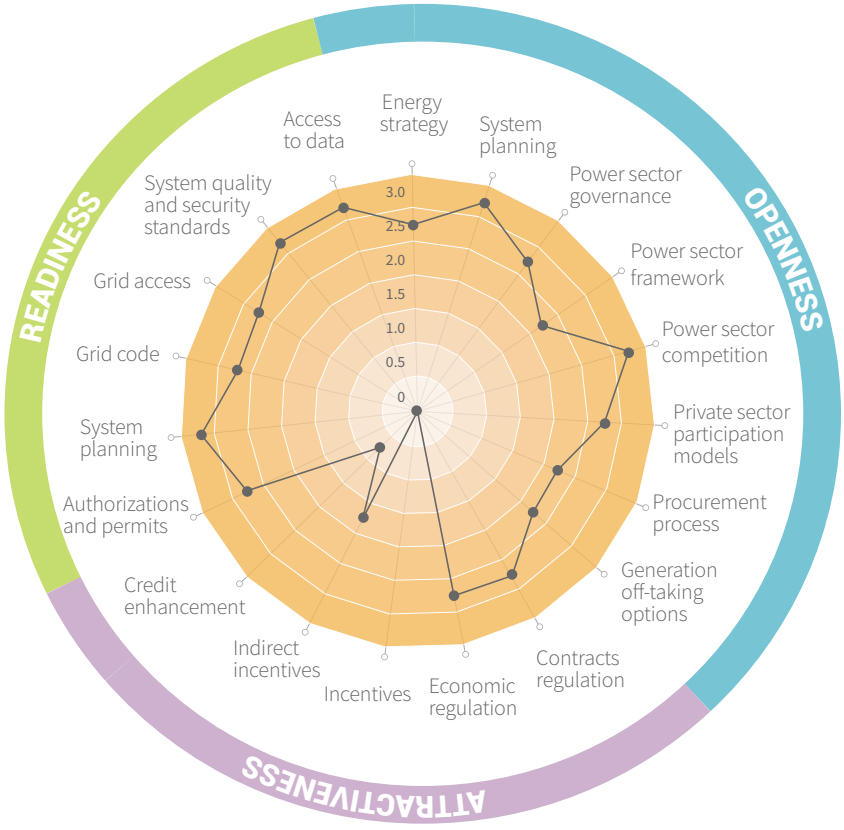
The quantitative results, therefore, are presented at the Topics level and use a scoring system based on a 0 to 3 point scale, where 0 is the lowest score – indicating a lack of regulatory preparedness on the assessed Topic related to private sector investment participation – and 3 is the highest – indicating a full regulatory preparedness on the assessed Topic.

3.2 Main findings

The section below presents the assessments of the regulatory environment related to the electricity sector policy and regulatory framework in relation to the crowding-in of private investors to the electricity market value chain.

3.2.1 Generation segment

Figure 13: Overview of the generation segment

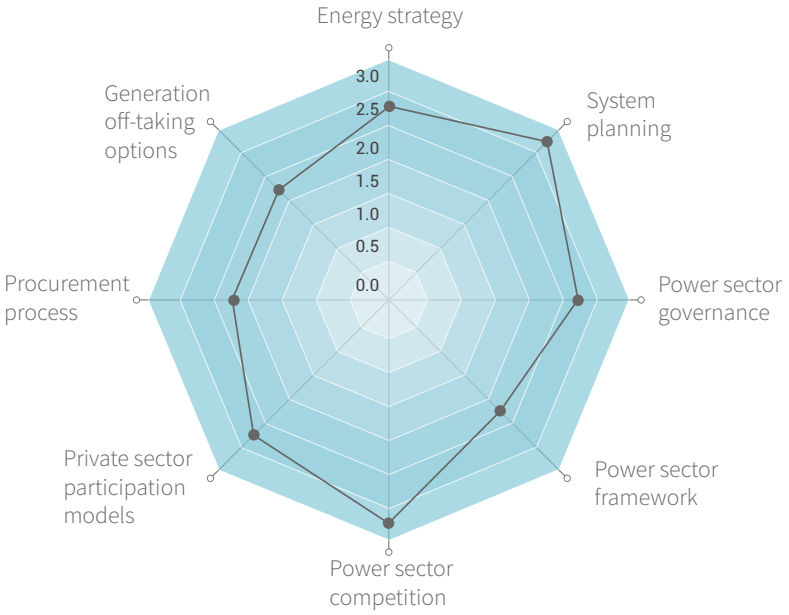


In the generation market segment, the regulatory performance is moderate to strong in most of the assessed regulatory areas under *openness* and *readiness*. However, regulatory gaps prevail related to market *attractiveness*. The results confirm the ability of national electricity sector authorities to implement reforms aligned with the main purposes of the PTSE program and to progress on the restructuring of the electricity sector governance and operational regime for market operators. This is confirmed by a strong regulatory foundation related to market *openness* and *readiness*, including high regulatory performance in areas such as *system planning* and *power sector competition* in the *openness* dimension and *system quality and security standards* in the *readiness* dimension.

However, Angola still faces challenges in key policy and regulatory areas such as *incentives* and *credit enhancement* defining market *attractiveness*. The *procurement process* and *generation off-taking options* also remain areas of improvement affecting market *openness*.

A deep dive into the Openness dimension

Figure 14: A deep dive into the Openness dimension for generation



Angola demonstrates considerable *openness* to private sector investments in the generation market segment, supported by robust *system planning* and *competition* at both wholesale and retail levels. Areas of improvement include the *procurement process,* which would benefit from the launching of tenders, and *generation off-taking options*, which could be expanded by integration into a regional spot market.

Energy strategy

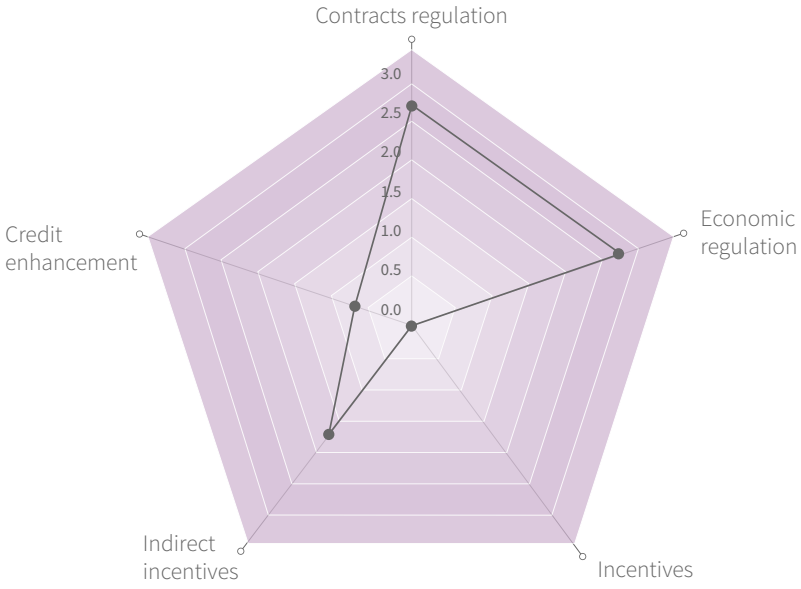
The Policy and Strategy for National Energy Security (PSNES), approved by Presidential Decree No. 256/11, defines the strategic direction for the energy sector up to 2025. It is complemented by targets laid out in the long-term power sector vision, Angola Energia 2025, as well as other action plans, sector plans, and implementation guidelines. The PSNES is also complemented by medium- and long-term development plans (the National Development Plan 2018-2022 and Angola 2025). Integration between the various planning instruments, as well as their periodic review and update, is ensured by the Basic Law of the General Regime of the National Planning System (Law No. 1/11) and its implementing regulation (Presidential Decree No. 316/20). The National Strategy for Climate Change, first published in 2018, provides climate-related energy sector guidance. However, it does not yet benefit from a clear regulatory framework related to climate change, nor from a periodic review mechanism, despite having been reviewed in 2021.

 System planning	Angola demonstrates a robust *system planning* due to the Energy and Water Sector Action Plan 2018-2022, which served as a power sector master plan. The Action Plan details scenarios for the expansion of the generation mix, maps the renewable energy potential, identifies priority projects and provides an associated investment plan. Furthermore, the recently approved Presidential Decree No. 76/21 mandates the system operator to develop an integrated power sector master plan, to be reviewed every five years.
 Power sector governance	The electricity market demonstrates a good degree of *power sector governance* due to the existence of the General Electricity Law (Law No. 14-A/96, amended by Law No. 27/15). The law clearly defines the governance of the electricity market, allows private sector participation in the generation, distribution, and off-grid markets, and defines the legal regimes for the exercise of market activities. These aspects are further regulated by the Regulation for the Production, Transmission, Distribution, and Supply of Electricity (Presidential Decree No. 76/21), which also specifies rules and procedures for obtaining concessions and licenses. From an institutional perspective, power sector governance is ensured by the existence of the Instituto Regulador dos Serviços de Electricidade e de Água (IRSEA), established by Presidential Decree No. 59/16. A key area of improvement in *power sector governance* is the independence of the IRSEA, which is subject to government oversight and lacks the ability to approve tariffs or sector regulations at large.
 Power sector framework	Presidential Decree No. 305/14 unbundled the former vertically integrated public utility ENE, replacing it with three specialized public utilities: PRODEL – generation; RNT – transmission; and ENDE – distribution. Transmission asset management and system operation are not yet separated. Both are undertaken by the public transmission concessionaire RNT, which also acts as the single buyer at the wholesale level.
 Power sector competition	With the amendment of the General Electricity Law, Angola opened the generation, distribution, and commercialization of electricity to private sector participation, improving regulatory performance related to *power sector competition*. Despite the regulation opening both the wholesale and retail markets to competition, few private entities have entered the market to date.
 Private sector participation model	Angola also performs very well in terms of *private sector participation models* as a direct result of the opening of the generation segment to private companies. The main model for private sector participation in the electricity generation service is through the concession regime defined by the General Electricity Law. The law also foresees the possibility of building new power plants as merchant initiatives from the private sector. Private participation in the form of share ownership in PRODEL is not permitted.
 Procurement process	The *procurement process* benefits from a clear regulatory framework, based on the Law on Public-Private Partnerships (Law No. 11/19) and the Public Contracts Law (Law No. 9/16). These laws define the procedure for the approval of PPPs, establish the procedures and requirements for public tenders and their awarding, and nominate the competent authorities for the organization of tenders and oversight of PPP contracts. While the General Electricity Law defines tenders as the unique procurement method for generation capacity (this requirement is waived in case of direct procurement from a public company), as of yet, no such tenders have taken place and a schedule for future tenders is not defined.

Generation off-taking options	Private generators have the option to sell electricity to the transmission concessionaire RNT (the dedicated off-taker) to distribution utilities, as well as directly to final customers. Self-generation is also permitted. Excess electricity can be sold to the grid (referred to as independent production), subject to a PPA with RNT, as per the Regulation on Independent Generation (Presidential Decree No. 43/21). The *generation off-taking options* could further be improved by enabling access to a regional spot market.

A deep dive into the attractiveness dimension

Figure 15: A deep dive into the Attractiveness dimension for generation



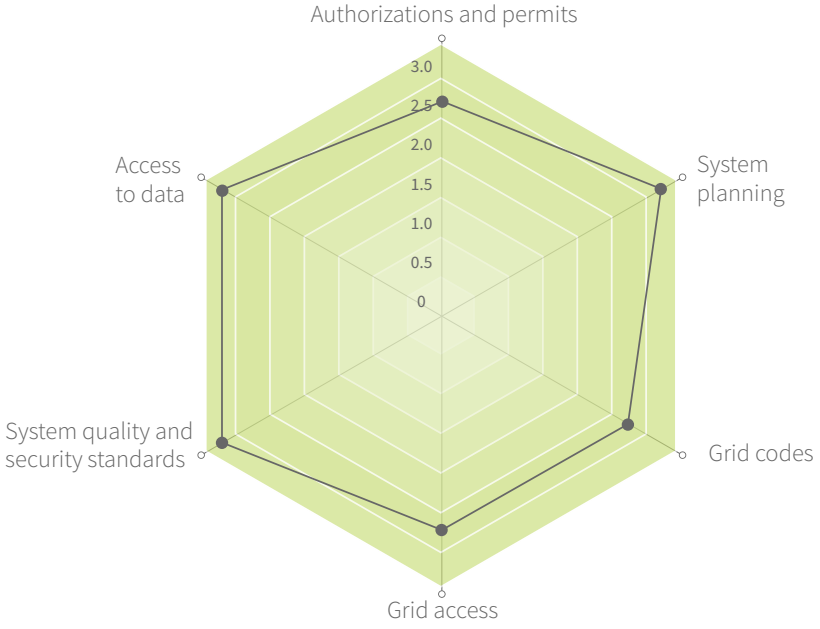
Angola achieved a high degree of regulatory performance related to *contracts regulation* and *economic regulation*. However, the overall regulatory *attractiveness* is weakened by the inadequacy of direct and indirect *incentives* and *credit enhancement* mechanisms. These inadequacies limit the bankability and financial sustainability of private investments in the power sector and represent key areas of regulatory improvement.

Contracts regulation	Angola performs well in terms of *contracts regulation* due to the existence of a blueprint for PPAs with RNT. The PPA is only made available to interested parties by the single buyer at the beginning of negotiations. The PPA template is indexed to inflation, includes provisions in case of force majeure, and specifies dispute resolution mechanisms.
Economic regulation	Regulatory performance related to *economic regulation* is enhanced is due to clarity emanating from the Tariff Regulation (Presidential Decree No. 4/11) which establishes the criteria and method for tariff calculation and the rules for review and update of electricity tariffs. The current maximum allowed tariffs were approved in 2019 by Executive Decree No. 122/19.

Incentives	The Angolan regulatory framework does not consider direct incentives such as feed-in regimes, technology-specific auctions, green certificates, or RES quotas to support the development of electricity generation technologies.
Indirect incentives	Angola extends *indirect incentives* to private investors in the form of specific tax reductions enshrined in the Private Investment Law (Law No. 10/18), although these do not include VAT exemption. Such tax exemptions are accessible to all private investors in possession of a Certificate of Private Investor. Other indirect incentives such as a carbon tax or direct subsidies are not currently available in the market.
Credit enhancement	Angola offers few *credit enhancement* options. Mechanisms such as government and multilateral guarantees and concessional lending are not currently available in the market.

A deep dive into the Readiness dimension

Figure 16: A deep dive into the Readiness dimension for generation



Angola performs very well in regulatory *readiness*, particularly related to *system planning*, *system quality and security standards*, and *access to data*. A national *grid code* is not in place; however, its functions are suitably fulfilled by a comprehensive set of regulatory instruments detailing rules for system operation, grid connection, and ancillary services.

 Authorizations and permits	Regulatory performance related to *authorization and permits* is well established. This is due to the existence of clear legislation and regulations related to the issuance of relevant authorizations for land rights, water rights, construction permits, and environmental permits. Permits must be obtained from various competent bodies as there is currently no one-stop-shop facility. Land ownership by private parties is restricted; however, the Land Law (Law No. 9/04) and the General Regulation for Land Concession (Decree No. 58/07) provide for the issuance of licenses and concessions to develop land as part of project implementation.
 System planning	Regulatory *readiness* is further demonstrated by the well-established *system planning*. The comprehensive network development plan contained in the Energy and Water Sector Action Plan 2018-2022 provided a planning scope. Furthermore, Presidential Decree No. 76/21 requires that the transmission concessionaire and system operator, RNT, prepare a transmission system expansion plan, to be reviewed every three years, as well as the integrated master plan, to be reviewed every five years.
 Grid code	Angola lacks a comprehensive *grid code*; however, its functions are covered by individual regulations dedicated to dispatch, access to networks and interconnections, and system quality and security standards. General system operation rules and rules for the provision and remuneration of ancillary services are set out in the Dispatch Regulation (Presidential Decree No. 3/11). Compensation rules for curtailed energy are included in PPAs.
 Grid access	*Grid access* is ensured due to provisions of the Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11), which ensure non-discriminatory third-party access to the grid. The regulation also defines the technical and commercial conditions for access to networks and interconnections. These include: (i) the conditions under which access is granted or restricted; (ii) the remuneration to which SEP entities are entitled for providing access to their networks; (iii) the technical requirements to ensure the stability of the electric system; and (iv) the conditions for using the interconnections to import or export electricity. Renewables do not receive priority access to the grid.
 System quality and standards	The *system quality and security standards* are determined in the Service Quality Regulation (Presidential Decree No. 310/10), which specifies the technical and commercial quality of service that entities of the Sistema Eléctrico Público must ensure.
 Access to data	Market transparency is well-served by the open *access to data* as a result of the availability of national socio-economic statistics through the Ministry of Finance and the Ministry of Economy and Planning. The balance sheets of public utilities and data on electricity demand and service quality are also available.

3.2.2 Transmission segment

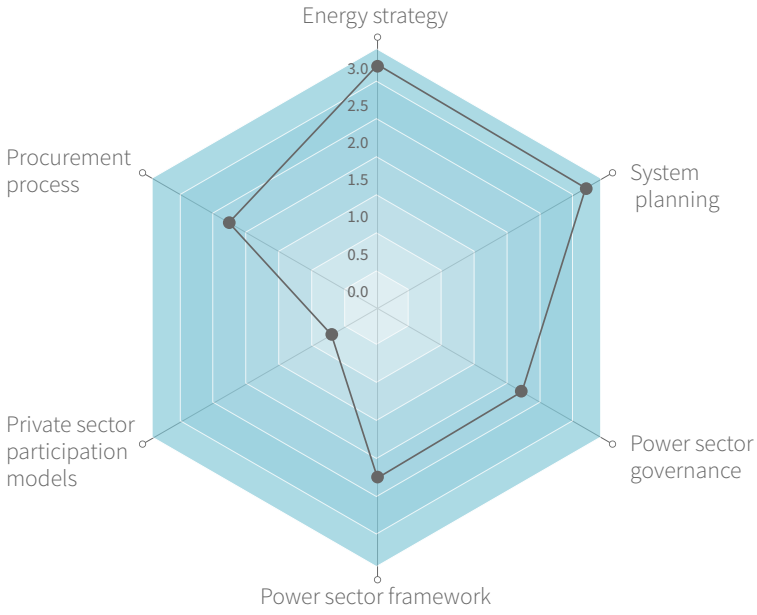
Figure 17: Overview of the transmission segment



Overall, the analysis of the policy and regulatory framework for the transmission market segment demonstrates a moderate ability of the market to attract private investors. The *openness* of the transmission market segment to private investments is greatly limited by the absence of *private sector participation models* other than engineering, procurement, and construction contracts. Additionally, investments are not able to benefit from *credit enhancement* options. Nevertheless, despite the absence of an integrated *grid code*, the market segment demonstrates *readiness* due to the comprehensive set of technical regulations in place.

A deep dive into the Openness dimension

Figure 18: A deep dive into the Openness dimension for transmission



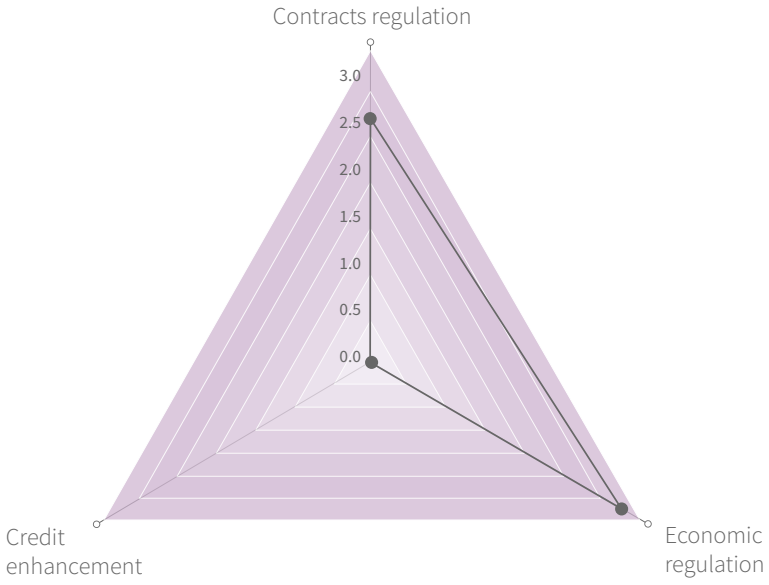
Notwithstanding the strong regulatory performance of Angola in key indicators related to strategic guidance and planning, the *openness* of the transmission market segment is more limited than for the rest of the value chain. This is predominantly due to the requirement that the transmission system concessionaire be a public utility, currently RNT, and the consequent absence of *private sector participation models* other than EPC contracts.

Energy strategy	In addition to what was discussed above (see *Generation – openness*), the National Development Plan 2018-2022 contains targets related to the electrification rate and the number of customers connected to the grid. These aspects provide clarity related to grid infrastructure development.
System planning	As in the generation market segment, Angola performs outstandingly in *system planning* for the transmission market segment due to the existence of the Energy and Water Sector Action Plan 2018-2022, which integrates the generation and network expansion plans. The Action Plan is also accompanied by an investment plan. The approval and review process for the integrated master plan (to be updated every five years) as well as for the transmission system expansion plan (to be updated every three years) is defined in Presidential Decree No. 76/21.
Power sector governance	Regulatory performance in *power sector governance* is somewhat weaker than in the generation market segment. This is attributed to the fact that the General Electricity Law specifies that the transmission concessionaire must be a public entity. As such, private parties cannot obtain such a concession and are therefore not allowed to operate transmission assets.

Private sector participation model	*Private sector participation models* in the transmission market segment are restricted due to the prevailing public monopoly. The only admissible mode of private sector participation in the transmission market segment is through EPC contracts.
Procurement process	The *procurement process* benefits from a clear regulatory framework (see *Generation – openness*). However, PPP investment and financing models do not apply to the transmission market segment where the possibility for private participation is severely limited.

A deep dive into the Attractiveness dimension

Figure 19: A deep dive into the Attractiveness dimension for transmission



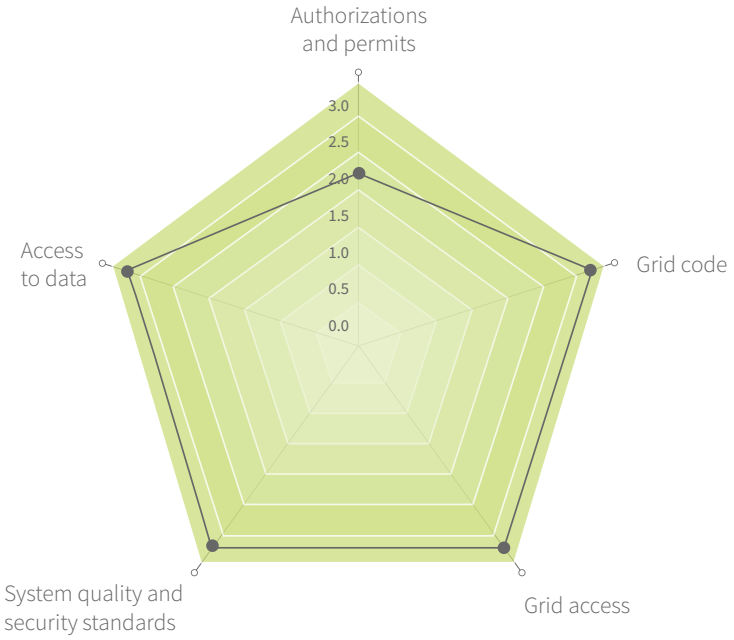
Overall, the review of the policy and regulatory framework for the transmission market segment finds a moderate ability of the market to attract private investors. Despite robust *contracts* and *economic regulation*, transmission investors in Angola may be deterred by the absence of *credit enhancement* mechanisms.

Contracts regulation	Standardized transmission concession agreement clauses, listed in the annexes of Presidential Decree No. 76/21, provide a sound *contracts regulation* regime. These clauses provide for the rights and responsibilities of the concessionaire, modification or termination of the concession, dispute resolution procedures, and force majeure.

Economic regulation	A good foundation for *economic regulation* is put in place due to the Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11) and Tariff Regulation (Presidential Decree No. 4/11). These regulatory provisions establish the criteria and method for network tariff calculation and the rules for their review and update.
Credit enhancement	*Credit enhancement* is a major challenge as a result of the absence of government and multilateral guarantees, as well as other mechanisms for supporting private investments in transmission. This is also largely related to the limitation placed on the ability of the private sector to participate in transmission infrastructure development.

A deep dive into the Readiness dimension

Figure 20: A deep dive into the Readiness dimension for transmission



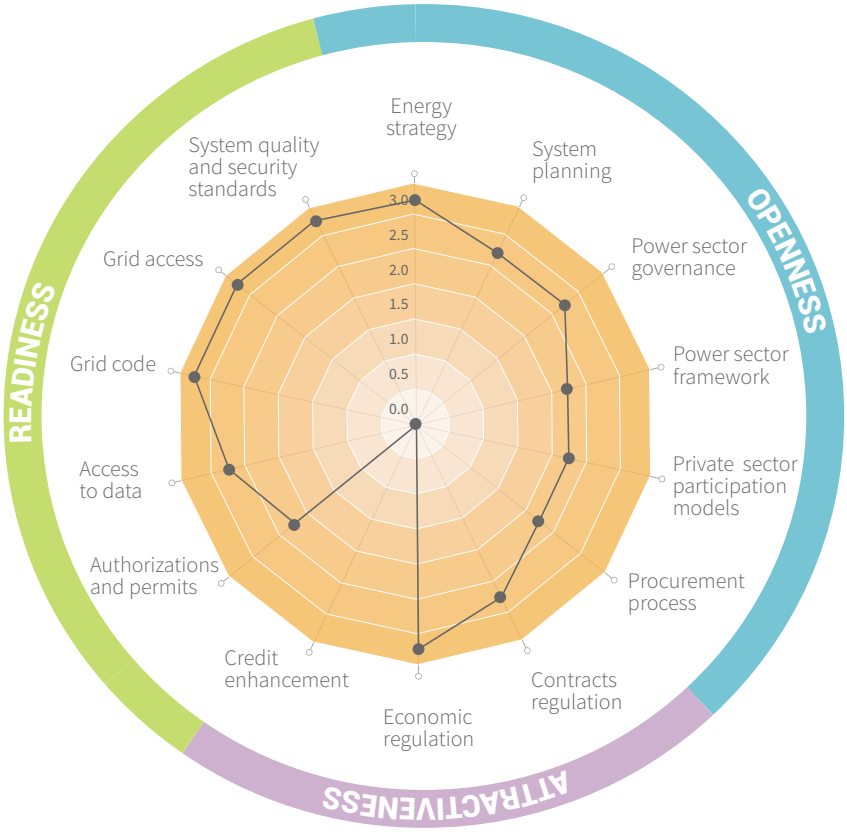
Despite the absence of a singular *grid code*, Angola performs well in terms of regulatory *readiness* as a result of articulating a comprehensive set of technical regulations.

Authorizations and permits	*Authorizations and permits* are governed by clear legislation and regulations about the requirements for construction permits and environmental authorizations. The rules governing the acquisition of Rights of Way are spread across the Water Law (Law No. 6/02), Land Law (Law No. 9/04), and Expropriation Law (Law No. 1/21). A clear procedure to obtain the authorizations is lacking. There is no one-stop-shop, and all authorizations and permits must be obtained from different competent authorities.

Grid code	Angola lacks a comprehensive *grid code;* however, its functions are well covered by individual regulations dedicated to electricity dispatch, access to networks (covering connection rules for generators, distributors, and final customers), and system quality and security standards.
Grid access	Through its Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11), Angola ensures non-discriminatory third-party access to the grid. Additionally, the Regulation sets out a clear contractual framework for connection and use of system agreements for both generators and distributors/ final customers.
System quality and standards	The Service Quality Regulation (Presidential Decree No. 310/10) specifies the technical and commercial quality of service all entities of the Sistema Eléctrico Público (SEP) must ensure.

3.2.3 Distribution segment

Figure 21: Overview of the distribution segment

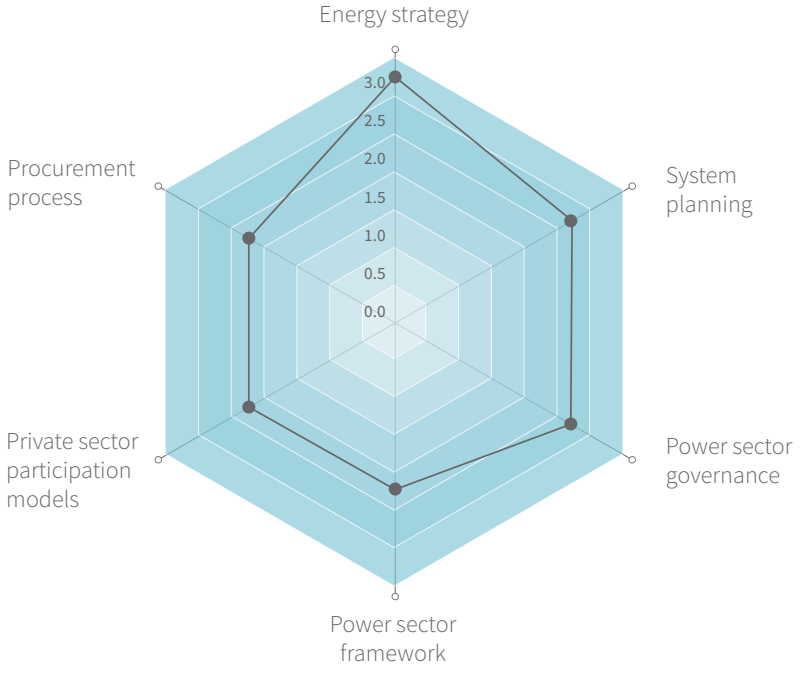


The regulatory review of the distribution market segment demonstrates that policy and regulatory frameworks are moderately suited to attracting private investors. Regulatory performance related to *readiness* is outstanding – notwithstanding the absence of a *grid*

code (for more details, please see *Generation – readiness*). There is also a moderate degree of regulatory *openness*. *Attractiveness*, although otherwise well supported by prevailing regulation, could be further improved by addressing gaps in *credit enhancement* mechanisms.

A deep dive into the Openness dimension

Figure 22: A deep dive into the Openness dimension for distribution



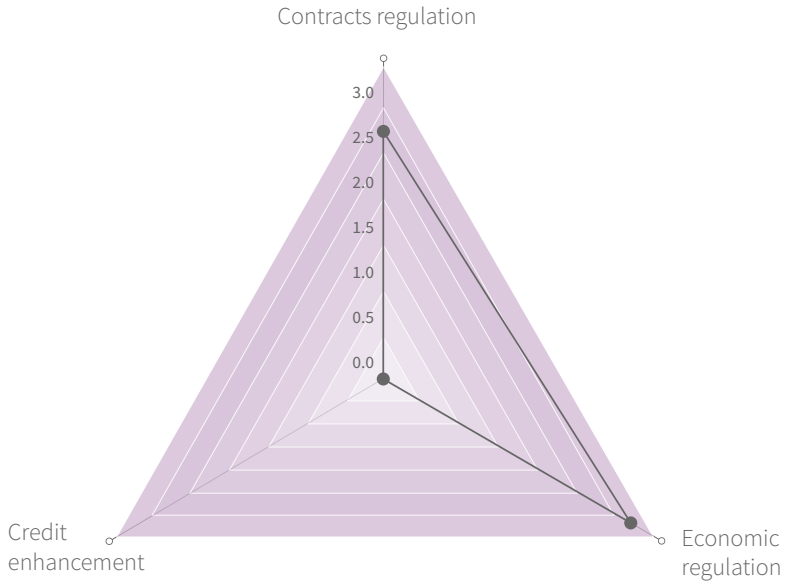
Distribution market *openness* is supported by strategic guidance and sound planning and governance. Notable shortcomings relate to the *procurement process*, especially the absence of tenders for distribution concessions since the liberalization of the market segment in 2015 and the lack of a public schedule for future tenders.

System planning	The distribution market segment is guided by an established *system planning* reflected in the integrated network development and electrification plan as well as an associated investment plan (all contained within the Energy and Water Sector Action Plan 2018-2022). As per Presidential Decree No. 76/21, distributors must review the network expansion plan every three years. The electrification plan, however, lacks a formal review procedure.
Power sector governance	As per the General Electricity Law, private parties are permitted to invest in and operate distribution assets. The procedure to obtain distribution concessions is clearly described in Presidential Decree No. 76/21. For details regarding the regulatory authority, see *Generation – openness*.

Private sector participation model	Private sector participation in the distribution market segment is enabled through the concessions business model as well as via EPC contracts. Share ownership in the public distribution utility ENDE is not currently permitted.
Procurement process	The *procurement process* benefits from a clear regulatory framework (see *Generation – openness*) with defined PPP models for distribution investments. The General Electricity Law establishes competitive tenders as the preferred procurement method. However, this requirement is waived in the case of awarding to a public entity. As of yet, no distribution tenders have taken place in Angola. A tender schedule has also not been announced, despite the liberalization of the market segment having taken place in 2015.

A deep dive into the Attractiveness dimension

Figure 23: A deep dive into the Attractiveness dimension for distribution

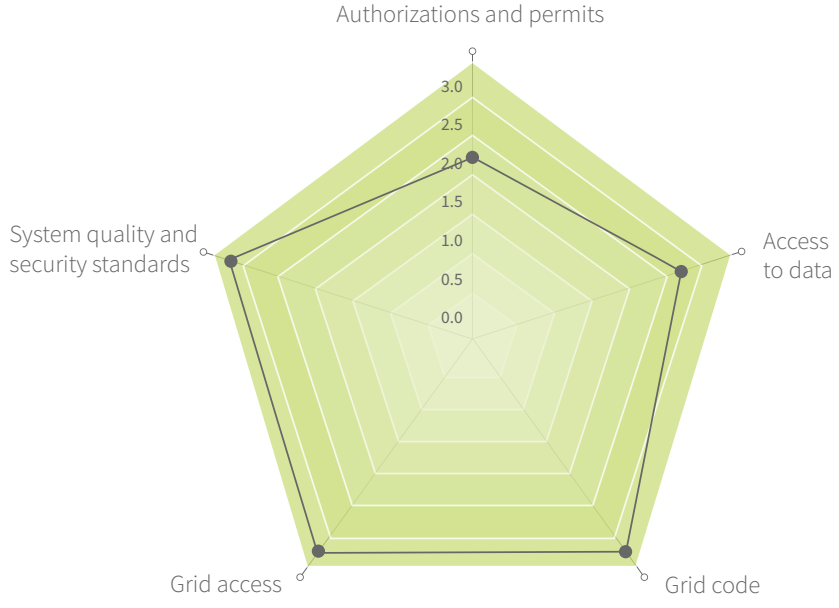


The review presents a mixed picture related to the *attractiveness* of the regulatory framework for private sector investments in distribution infrastructure development. Regulatory performance in *contracts* and *economic regulation* is well established, benefitting from standardized contract clauses and a clear methodology for network tariff calculation, respectively. On the contrary, *credit enhancement* mechanisms remain an important area of improvement.

Contracts regulation	The standardized distribution concession agreement clauses, listed in the annexes of Presidential Decree No. 76/21 provide a conducive contracts administration regime. Furthermore, the Electricity Supply Regulation (Decree No. 27/01), which contains provisions for retail contracts and rules for metering and billing, further strengthen the system of *contracts regulation*.
Economic regulation	The distribution market segment benefits from strong *economic regulation* as a result of instituting Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11) and Tariff Regulation (Presidential Decree No. 4/11). These regulatory provisions establish the criteria and method for network tariff calculation and the rules for review and update of tariffs.
Credit enhancement	Similar to other market segments, Angola offers very limited *credit enhancement* instruments to distribution investors. This area requires further regulatory and policy consideration and assessment.

A deep dive into the Readiness dimension

Figure 24: A deep dive into the Readiness dimension for distribution

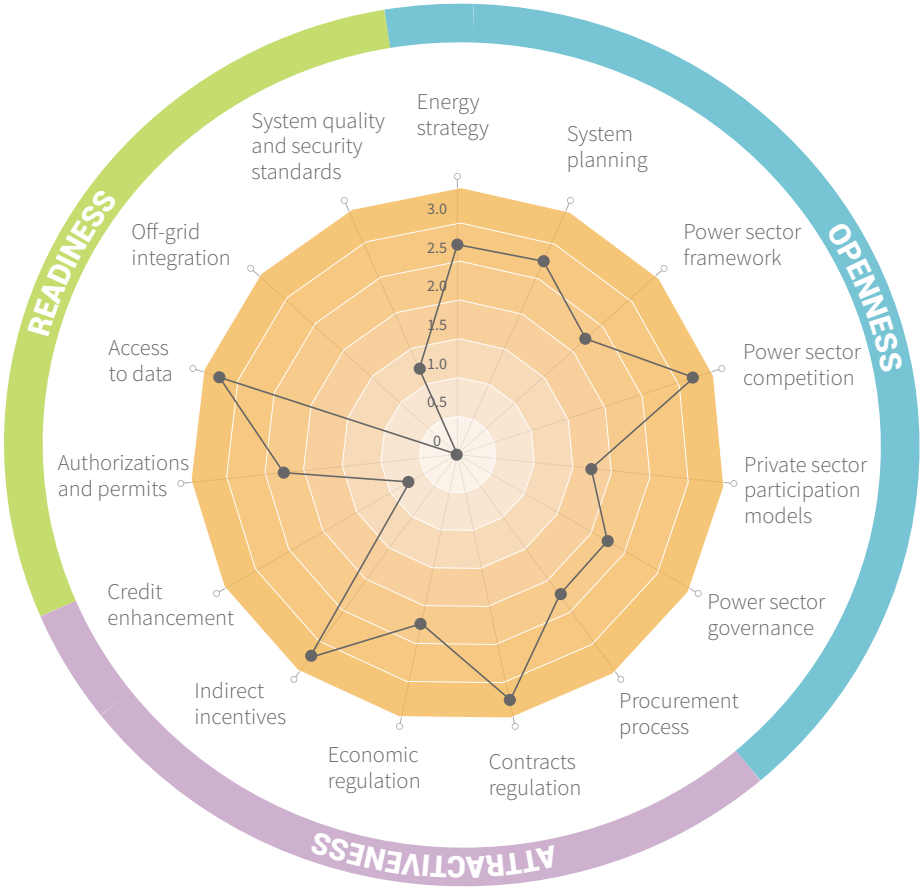


Regulation related to market *readiness* is well provided for in the electricity distribution market of Angola, even in the absence of an integrated *grid code* (for more details, please see *Generation – readiness*). The primary gaps that affect market *readiness* stem from the lack of a clear procedure to obtain rights-of-way and the absence of a one-stop-shop for *authorizations and permits*.

Access to data	Angola offers wide *access to data* on socio-economic indicators and utility balance sheets. However, publicly available distribution service quality data is lacking. Complementing the market with such data would further enhance market transparency.
Grid Access	Non-discriminatory distribution *grid access* is ensured through the Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11), which also sets out a contractual framework for connection and use of system agreements for both generators and final customers.

3.2.4 Off-grid segment

Figure 25: Overview of the off-grid segment

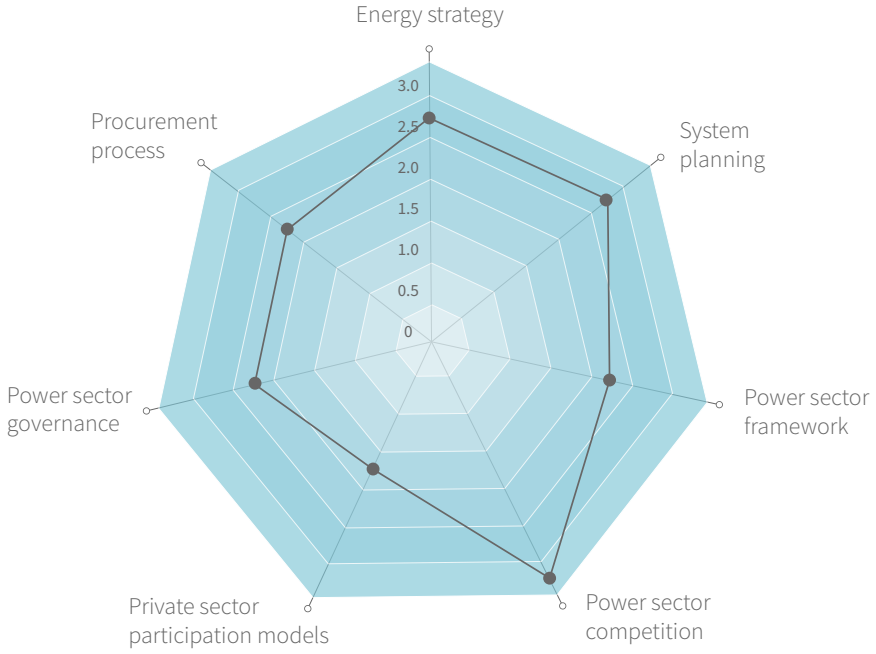


In the off-grid market segment, Angola presents a peculiar case, allowing for two types of isolated systems. The linked mini-grids, which are a part of the Sistema Eléctrico Público, are governed by the regulatory framework. The non-linked mini-grids in the parallel Sistema Eléctrico Não Vinculado are governed almost entirely by bilateral agreements among private parties. The results of the regulatory review reflect the framework applicable to the regulated SEP mini-grids, while SENV mini-grid operators and customers are often not bound by this regulation and can negotiate their conditions freely.

Regarding SEP mini-grids, Angola shows a moderate level of policy and regulatory preparedness to accommodate private investments in the off-grid market. While performance is high in key areas such as *power sector competition, contracts regulation,* and *indirect incentives*, areas of improvement remain. This is particularly the case related to *attractiveness* and *readiness* which are held back by the lack of *credit enhancement* mechanisms and dedicated regulation for *off-grid system integration* and *system quality and security standards* for off-grid assets.

A deep dive into the Openness dimension

Figure 26: A deep dive into the Openness dimension for off-grid



Angola performs moderately well in the *openness* dimension as a result of *energy strategy*, *system planning,* and *power sector competition* provisions. *Private sector participation models* do not include a concession-type model, therefore, a public procurement process for mini-grids is lacking. Furthermore, related to *power sector governance*, a dedicated electrification agency or related institution is not established to guide market development.

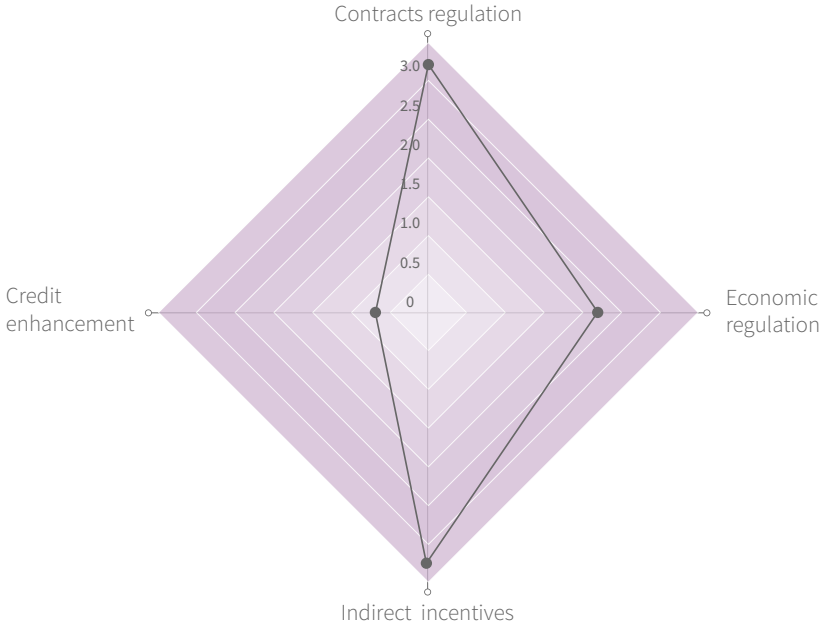
Energy strategy

The electrification strategy is a part of Angola Energia 2025, which sets an electricity access target of about 60 percent by 2025. The strategy defines the electrification methods (grid extension, mini-grids, and individual off-grid products), identifies priority projects, and targets municipal capitals to be electrified by 2025. Furthermore, the National Development Plan 2018-2022 includes a program on the Expansion of Access to Electricity in Urban Areas, Municipalities, and Rural Areas. The cross-integration and periodic review of energy sector policies covering electrification are guided by Law No. 1/11 and Presidential Decree No. 316/20.

System planning	The off-grid market is well supported by *system planning*. Angola Energia 2025 includes long- and medium-term electricity infrastructure development plans, complemented by a detailed project list and investment plan. These plans are contained in the Energy and Water Sector Action Plan 2018-2022.
Power sector governance	The General Electricity Law opens to private sector participation in the off-grid market segment. Presidential Decree 76/21, which implements the General Electricity Law, foresees the existence of both linked and non-linked isolated (off-grid) systems. Linked isolated systems are regulated and their operators are required to obtain a distribution license for isolated systems. Non-linked isolated systems are governed by bilateral contracts and are not subject to licensing or registration. Regulation dedicated to isolated systems is lacking. This ambiguity has implications for the willingness of the private sector to enter the off-grid market (AfDB and SEFA, 2020).
Private sector participation model	Private sector participation is possible in the form of EPC contracts and merchant investments. Merchant mini-grids can be a part of the SEP, subject to obtaining a license for distribution in isolated systems. Alternatively, they can operate in the parallel SENV system, where a license is not required.
Procurement process	In general, the power sector benefits from a clear procurement framework based on the Law on Public-Private Partnerships (Law No. 11/19) and the Public Contracts Law (Law No. 9/16) (see *Generation – openness*). However, private sector participation in the off-grid market segment is not possible through concessions. It is possible only through merchant investments. Therefore, there is no public procurement of mini-grids.

A deep dive into the attractiveness dimension

Figure 27: A deep dive into the attractiveness dimension for off-grid

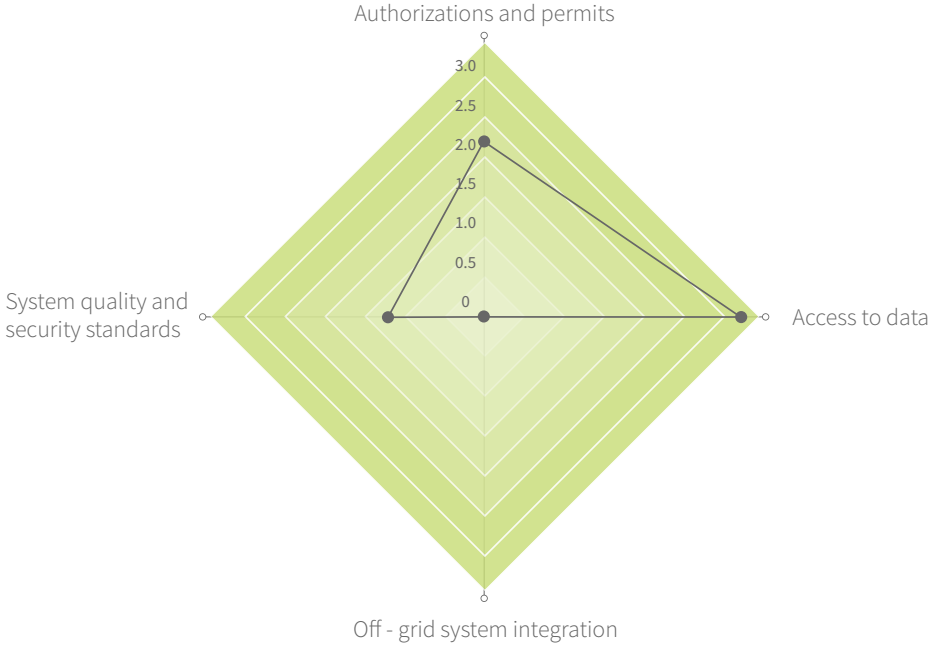


The off-grid market is supported by outstanding *contracts regulation*. However, there are gaps in *economic regulation* due to the absence of a dedicated off-grid tariff-setting methodology. *Credit enhancement* remains a key area of improvement in the off-grid market segment as well, with limited options available to private investors.

Contracts regulation	The Electricity Supply Regulation (Decree No. 27/01) applies to both SEP and SENV mini-grid operators. It contains provisions for retail contracts at all voltage levels and defines rules for metering and billing. These regulatory provisions establish a sound *contracts regulation* regime.
Economic regulation	*Economic regulation* is guided by Tariff Regulation (Presidential Decree No. 4/11). It establishes the criteria and method for tariff calculation and the rules for review and update of electricity tariffs. Retail tariffs are uniform for regulated operators across the country. However, they do not apply to SENV mini-grids. The current maximum allowed tariffs were approved in 2019 by Executive Decree No. 122/19.
Indirect incentives	Angola extends *indirect incentives* to all private investors, including in the off-grid market segment, in the form of tax reductions ensured by the Private Investment Law (Law No. 10/18). However, they do not include a VAT exemption. Such tax exemptions are accessible to all private investors in possession of a Certificate of Private Investor. Other indirect incentives such as carbon tax or direct subsidies are not currently available, resulting in a moderate regulatory performance related to the provision of *indirect incentives*.

A deep dive into the Readiness dimension

Figure 28: A deep dive into the Readiness dimension for off-grid



The *readiness* of the off-grid market for private investments is considerably affected by the absence of dedicated regulation for *off-grid system integration* and off-grid *quality and security standards*.

 Authorizations and permits	The off-grid market demonstrates moderate regulatory performance in terms of *authorizations and permits*. Construction permits benefit from clear regulations. Land ownership by private parties is restricted; however, the Land Law (Law No. 9/04) and the General Regulation for Land Concession (Decree No. 58/07) provide for the issuance of licenses and concessions to develop the land. The lack of a one-stop-shop for *authorizations and permits* administration requires investors to seek such services from different competent authorities, potentially leading to delays and increased transaction costs.
 Off-grid system integration	Dedicated legislation for mini-grid integration in the event of main grid arrival is lacking. The lack of such dedicated regulation introduces a high degree of uncertainty and risk to potential investors regarding their business continuity and exit options, including the ability to avoid stranded assets and the possibility of compensation in such cases.
 System quality and standards	The Service Quality Regulation (Presidential Decree No. 310/10) specifies the technical and commercial quality of service all entities of the Sistema Eléctrico Público (SEP) must ensure. These include regulated mini-grids, effectively requiring them to meet main grid standards. Quality standards for off-grid products such as solar home systems are not available.



Conclusions and Recommendations



Hydroelectric power plant in Angola.
Photo credit: Antonio Rodrigues Peyneau via Shutterstock

4. Conclusions and Recommendations

The last decade was a period of marked change and rapid development in the power sector of Angola. Not only did electricity generation and consumption more than double, the country also implemented a series of crucial reforms that rendered the power sector governance framework more transparent and robust. The government is attempting to tackle the technical and financial challenges plaguing the sector. It is also increasingly promoting the development of renewable technologies. These efforts resulted in the unbundling of the former vertically integrated utility and the restructuring of the sector, as well as in policy and regulatory reforms that created a more conducive environment for private investment.

In particular, the Amendment of the General Electricity Law in 2014 and the adoption of a comprehensive Regulation on the Generation, Transmission, Distribution, and Commercialization of Electricity (Presidential Decree No. 76/21) have ensured a clear regulatory framework for all operators in the sector, offering a wide array of options for private participation across the value chain. These reforms, accompanied by comprehensive and robust technical regulations, ensure a high degree of market *openness* and *readiness* for private sector investments.

The Amendment of the General Electricity Law in 2014 and the adoption of a comprehensive Regulation on the Generation, Transmission, Distribution, and Commercialization of Electricity (Presidential Decree No. 76/21) have ensured a clear regulatory framework for all operators in the sector, offering a wide array of options for private participation across the value chain.

Notwithstanding these reforms and recent developments pointing to new commitments from IPPs, to date, Angola has seen negligible private sector participation in any segment of the electricity market, and certain structural challenges persist. Major barriers in the policy and regulatory environment relate to factors such as the lack of incentive mechanisms and credit enhancement instruments available to interested private investors. These mechanisms are often instrumental, especially in newly liberalized markets, to enhance the viability of business models related to electricity infrastructure development, the deployment of new technologies, and the reinforcement of overall market attractiveness to private investors. The electricity market is also constrained by insufficient grid infrastructure, high distribution losses, and more limited focus on the development of renewable energy projects which have driven private sector interest in the electricity generation markets of Africa in the last years. The electrification rate currently stands at 47 percent. Given the universal electricity access priority of Angola, increasing private sector investments in the electricity market value chain remains crucial.

The policy and regulatory review performed in this report confirm the overall good performance of Angola in many areas of policy and regulation relevant to effective private sector participation. This outcome attests to the efforts made by the government during the past decade in terms of policy, strategy, and governance reforms. The review further identifies regulatory and policy areas that still require attention from national electricity sector decision-makers and the market regulator.

4.1 Takeaways from the regulatory review

Related to the *Openness* of the electricity market

- Current legislation ensures a good degree of *openness* in the electricity generation market for private investors. Unbundling of the generation, transmission, and distribution services was implemented in 2014 as a part of the large-scale Electricity Sector Transformation Program. The subsequent Amendment of the General Electricity Law in 2015 liberalized

all market segments except transmission and opened the market to competition at both wholesale and retail levels. The comprehensive implementation of the Amendment through Presidential Decree No. 76/21 has cemented the regulatory framework of the liberalized electricity market, strengthened sector governance, and specified procedures for accessing the market. These reforms have created potentially vast opportunities for private generators to enter the market through concessions or merchant models and sell electricity to the TSO, public and/or private distributors, and final customers. Nevertheless, *openness* could be further improved by the implementation of the competitive *procurement process* set out in the legislation, the strengthening of the independence of the regulatory authority IRSEA, and the provision of access to the SAPP's regional spot market.

- As per the Amended General Electricity Law, the unbundled transmission market segment remains the domain of public entities, with private sector participation restricted to engineering, procurement, and construction contracts. Nevertheless, the transmission infrastructure operation and development are guided by comprehensive and integrated system planning tools and processes and benefit from a clear regulatory and governance framework. Significant improvements in *openness* could be engendered by the liberalization of transmission activities and the separation of transmission asset management from system operation.

- In contrast to the transmission market segment, the policy and regulatory environment are generally open to distribution market investors. The unbundling of the former utility ENE and the Amendment of the General Electricity Law in 2015 facilitate private involvement in this market segment. The measures also enable private parties to obtain distribution concessions offering exclusivity within a specified geographic area. Law No. 10/19 on Public-Private Partnerships defines the procedure for the approval and establishment of PPPs, overseen by the Office for Public-Private Partnership within the Ministry of Economy and Planning. The law defines PPP models available to distribution investors. The otherwise well-defined *procurement process* would benefit from effective implementation, particularly related to the issuance of tenders for distribution concessions, none of which have taken place yet.

- The off-grid market segment similarly demonstrates a good degree of *openness* to private sector participation. Strategic priorities and targets for mini-grid-based electrification are well defined in the Energy and Water Sector Action Plan 2018-2022. The plan also serves as an investment blueprint for off-grid infrastructure development. Private sector participation is enabled through engineering, procurement, and construction contracts, and through merchant investments. The latter can take one of two forms: a mini-grid within the Sistema Eléctrico Público governed by legislation, or a mini-grid in the parallel Sistema Eléctrico Não Vinculado governed almost entirely by bilateral agreements between private parties. SEP mini-grids benefit from regulatory provisions for licensing requirements and procedures, to which SENV mini-grids are not required to adhere. As concession-type investments in the off-grid market are currently not permissible, there are no provisions for their public procurement.

Related to the *Attractiveness* of the electricity market

- The regulatory framework in the generation market segment demonstrates a moderate level of *attractiveness* for private investment. *Contracts* and *economic regulation* represent strong features of market *attractiveness* anchored in standardized PPAs and clear tariff setting and revision procedures, respectively. On the other hand, *incentives*, both direct and indirect, and *credit enhancement* options are inadequate. These gaps limit the bankability and financial sustainability of private investments in the power sector and represent key areas of policy and regulatory improvement in the electricity market of Angola.

- Transmission regulation also offers a mixed picture of *attractiveness*. Despite the inability of private parties to obtain transmission concessions, the annexes of Presidential Decree No. 76/21 list standardized concession agreement clauses, providing for the rights and responsibilities of the concessionaire, modification or termination of the concession, dispute resolution procedures, and force majeure, among others. Furthermore, a high degree of regulatory performance is observed related to *economic regulation* due to the clear network tariff methodology and review procedure set out in the Regulation on Access to Networks and Interconnections (Presidential Decree No. 19/11) and Tariff Regulation (Presidential Decree No. 4/11). However, government and multilateral guarantees and concessional lending to support private investments in transmission infrastructure development are not available, leaving *credit enhancement* as a crucial area of regulatory improvement.

- Distribution market *attractiveness* mirrors that of the transmission market. *Contracts* and *economic regulation* are major strengths, while considerable room remains for improving *credit enhancement* opportunities for private investors. Unlike the transmission market segment, private parties are permitted to access distribution concessions and can rely on the standardized concession clauses in Presidential Decree No. 76/21.

- Angola provides a fairly attractive business environment for private investors in the off-grid market. *Contracts regulation* stands out as a key strength due to the provisions for retail contracts contained in the Electricity Supply Regulation (Decree No. 27/01). The decree defines rules for metering and billing and applies to SEP and SENV mini-grid operators alike. *Economic regulation* is somewhat more complex, as SEP mini-grids must adhere to the national uniform tariff approach applied to the main grid while SENV tariffs are deregulated. The development of a standard calculation tool for SEP mini-grids could allow operators to establish tariffs reflecting the higher costs of off-grid supply relative to main-grid supply. *Credit enhancement* and *indirect incentives* remain key areas of improvement in the off-grid segment as well, with limited options available to private investors.

Related to the *Readiness* of the electricity market

- Angola presents a peculiar case in terms of *readiness*, as it performs exceptionally well even in the absence of a unified *grid code*. The functions of the *grid code* are instead covered by a comprehensive set of regulatory instruments (Presidential Decrees No. 3/11, No. 3/19, No. 310/10) detailing rules for system operation, *grid access*, and ancillary services, as well as *system quality and security standards*. Up-to-date *system planning* is ensured by the integrated Energy and Water Sector Action Plan 2018-2022 and by the regulatory requirement for the transmission concessionaire to prepare a three-years transmission

expansion plan as well as a five-year integrated master plan. Clear legislation exists for *authorizations and permits* for generation projects (land and water rights, construction permits, and environmental authorizations); however, a one-stop shop to facilitate such services is not in place. Land ownership by private parties is restricted but the legislation provides for the issuance of licenses and concessions to develop the land. Additionally, there is wide-ranging *access to data* on electricity demand and service quality, as well as socioeconomic statistics enhancing market transparency.

- Transmission market *readiness* is similarly well-established related to regulatory provisions in the realms of *grid code*, *grid access*, *system quality and security standards* and *access to data*. Non-discriminatory third-party access to the grid is guaranteed by the Regulation on Access to Networks and Interconnections (Presidential Decree No. 3/19). *Authorizations and permits* are the only areas where transmission market segment *readiness* is only moderately advanced. This is a consequence of the lack of clarity regarding the procedure to acquire rights-of-way, with provisions dispersed across several laws (Laws No. 6/02, No. 9/04, and No. 1/21). Additionally, in the absence of a one-stop-shop, authorizations and permits must be obtained from individual competent authorities.

- The distribution market segment broadly mirrors transmission, demonstrating a high degree of regulatory *readiness*. The comprehensive set of Presidential Decrees (No. 3/11, No. 3/19, No. 310/10 on Dispatch, Access to Networks and Interconnections, and Quality of Service, respectively) provide regulatory clarity in the areas of *grid code, grid access,* and *system quality and security standards.* Besides ensuring third-party access to the distribution grid, Presidential Decree No. 19/11 sets out a contractual framework for connection as well as the use of system agreements for both generators and final customers. The lack of an integrated desk to access *authorizations and permits* results in a higher administrative burden and transaction costs for potential investors. Distribution service quality data is not publicly available.

- The regulatory *readiness* for private investments in the off-grid market segment demonstrates major gaps, largely due to the absence of dedicated regulation for off-grid systems regarding *integration* in the event of main grid arrival and *quality and security standards*. The lack of provisions for *off-grid system integration* leaves investors with a high degree of uncertainty and risk regarding their business continuity and exit options, limiting private investment. In the absence of dedicated standards, isolated systems in the SEP are required to meet more stringent main grid *quality and security standards*. Quality standards for off-grid products such as solar home systems are currently non-existent.

The regulatory review acknowledges the efforts put in place by national institutions to strengthen the electricity market policy and regulatory framework in Angola. It further identifies areas for regulatory action and reforms to enhance the *openness*, *attractiveness,* and *readiness* of the national electricity market to effectively crowd in private investors.

Recommendations on how to address the regulatory challenges highlighted by the assessment are provided to the relevant energy and regulatory institutions. If implemented, the regulatory measures would constitute positive steps toward strengthening the role of the private sector in supporting the development of the electricity market in Angola towards the goal of providing reliable, competitive, and sustainable energy for all.

4.2 Recommendations

To enhance the *Openness* of the electricity market



Energy Strategy

The electricity market benefits from a range of policy and planning instruments whose cross-integration and periodic review are guided by Law No. 1/11 and Presidential Decree No. 316/20. Policies and plans refer to the period leading up to 2025, with few provisions for the period thereafter (the long term). The National Strategy for Climate Change, first published in 2018, is not yet accompanied by a clear regulatory framework and a formal review mechanism. Therefore:

- Establish the regulatory and institutional framework to offer legislative backing and a formal review procedure for the National Strategy for Climate Change;
- Review and publish updated short- and long-term energy sector policies and plans to provide clarity about the strategic direction of the sector post-2025.



System planning

Presidential Decree No. 76/21 mandates the system operator to develop, publish, and periodically review an integrated power sector master plan. However, *system planning*, including generation expansion and electrification, is currently detailed in the Energy and Water Sector Action Plan 2018-2022. The Action Plan covers a relatively short period that has come to an end. Therefore:

- Publish a long-term power sector master plan and ensure its update every 5 years, as required by Presidential Decree No. 76/21;
- Formulate shorter-term generation expansion, network expansion, and electrification plans, aligned with the long-term master plan.



Power sector governance

The legal regime for power sector activities is provided in the General Electricity Law (Law No. 27/15) and its implementing regulation, Presidential Decree No. 76/21. These distinguish between two parallel sub-systems, the regulated Sistema Eléctrico Público (SEP) and the Sistema Eléctrico Não Vinculada (SENV) governed by bilateral agreements. With regards to generators in the SEP, the regulation defines a general regime and a special regime for renewables. The latter shall be subject to a dedicated Regulation on Linked Renewable Generation which is yet to be adopted.

- To clarify the rules and procedures applicable to renewable generation, adopt and publish the Regulation on Linked Renewable Generation.

In the off-grid market, Presidential Decree No. 76/21 distinguishes between SEP and SENV isolated systems and offers regulatory provisions for the former. However, it leaves uncertainty regarding the governance of the latter, with implications for tariff setting and service quality standards for these systems.

Therefore:

- Clarify which of the existing regulatory provisions apply to SENV isolated systems;
- Adopt dedicated regulation for isolated systems to clarify the operational regime for both SEP and SENV operators.

The regulator, IRSEA, is empowered to fulfill its duties and exercise its powers as defined in its Organic Statute (Presidential Decree No. 59/16). However, the regulatory authority is subject to government oversight and can only propose tariffs and regulations, which must then be approved by the Executive. To improve market confidence:

- Enhance the independence and powers of IRSEA to provide impartial oversight of the sector.



Power sector competition

The electricity market is open to competition at both wholesale (in the SENV) and retail levels. Retailers must obtain a commercialization license as set out in Presidential Decree No. 76/21. However, the issuance of such licenses has been put on hold, pending a review of the Access and Commercial Relations Regulations. Therefore:

- Pursue the timely review of these regulations to enable the implementation of retail competition.



Private sector participation model

While private participation is encouraged in all other segments of the electricity market value chain, the transmission segment remains the domain of public utilities. Private sector participation is limited to EPC contracts. To attract additional investment in transmission infrastructure development:

- Evaluate the feasibility of introducing PPP models for transmission asset development and operation, such as the Independent Power Transmission model.



Procurement process

The *procurement process* is governed by a clear regulatory framework based on the Law on Public-Private Partnerships (Law No. 11/19) and the Public Contracts Law (Law No. 9/16). A mandate for power sector procurement through competitive tendering is defined in the General Electricity Law. However, this legal framework would benefit from effective implementation. As of yet, tenders for electricity infrastructure development have not been issued. In this regard:

- Implement tenders for awarding generation concessions in line with national capacity expansion targets;
- Issue tenders for distribution concessions for designated areas to encourage private sector participation in this market segment;
- Provide clarity and improve predictability about the procurement plans to potentially interested stakeholders by publishing medium-term tender schedules.



Generation off-taking options

IPPs in the generation market are offered three primary off-taking options: public PPAs with single-buyer RNT within the SEP; or bilateral agreements with final consumers or self-generation, both outside the SEP. To further expand the array of off-taking options:

- Pursue plans to connect to the Southern African Power Pool to provide private generators in Angola access to a regional spot market.



To enhance the Attractiveness of the electricity market



Economic regulation

The Tariff Regulation and Regulation on Access to Networks and Interconnections determines clear methodologies for both network and retail tariff definition and provide for their periodic review. Tariff structures are proposed by IRSEA, and are subsequently approved by the government. The approval of Executive Decree No. 122/19 which approved new tariffs for final consumers no longer includes a price subsidy, representing an important milestone towards cost-reflective tariffs. Nevertheless, electricity tariffs in Angola continue to stand out as among the lowest in the continent. Therefore:

- To ensure the financial sustainability of power sector utilities and attract additional private investment, further efforts to render tariffs cost-reflective are highly encouraged.

SEP isolated systems must adhere to the national uniform tariffs set by the government. The higher costs associated with off-grid electricity supply impact the viable operation of SEP mini-grids. The definition of guidelines for mini-grid tariff setting may facilitate the development of this market. In this regard:

- Evaluate the impact of the current uniform tariff policy on the financial sustainability of SEP mini-grids;
- Assess and quantify the need for incentives to ensure the financial sustainability of mini-grid assets;
- Introduce a standard tool for calculating mini-grid tariffs based on the principle of cost-reflectivity.



Incentives

Electricity infrastructure investments, notably in clean energies, do not currently benefit from direct incentives, despite policy and regulatory provisions regarding their introduction. To encourage renewable energy deployment in line with government targets:

- Introduce relevant incentives to encourage renewable energy development with the adoption of the Regulation on Linked Renewable Generation;
- Specify provisions for a renewables tender program as foreseen by Presidential Decree No. 76/21 and strive for its timely implementation;

- Assess the feasibility of feed-in tariffs for renewable systems under 10 MW as foreseen by the National Energy Security Policy and Strategy;
- Assess the applicability of mechanisms such as green certificates and RES quotas;
- Monitor incentives disbursement and ensure the periodic review of targets and incentives.



Indirect incentives

Indirect incentives strengthen the business case for private investment in electricity infrastructure. The Private Investment Law (Law No. 10/18) offers tax incentives for private investors in all sectors. Energy sector investments could be further supported by:

- Introducing targeted sector-specific incentives such as tax and duties exemptions for renewable technologies and off-grid asset components;
- Evaluating the economics of introducing other indirect incentives such as performance-based financing and carbon pricing mechanisms.



Credit enhancement

Credit enhancement mechanisms play a fundamental role in de-risking electricity infrastructure projects and enhancing their bankability. At present, such mechanisms are virtually non-existent in the electricity market of Angola. To support the de-risking of private investments in the energy sector:

- Establish a national mechanism to de-risk investments in electricity infrastructure, covering generation, networks, and off-grid assets;
- Assess the feasibility of creating a risk mitigation facility dedicated to de-risking investments in energy infrastructure.

To enhance the *Readiness* of the electricity market



Authorization and permits

Angola benefits from a comprehensive set of rules covering electricity infrastructure permitting requirements, land access, environmental authorization, right-of-way, construction rights, and others. However, the complexity of obtaining land rights and rights-of-way and the diffusion of institutional responsibilities for the processing and issuing of *authorizations and permits* result in potentially high transaction costs and project implementation delays. Therefore:

- Simplify land access procedures for private entities;
- Streamline investment processes by establishing a one-stop-shop/single window for the application and issuance of all permits for energy projects.



System quality and standards

The off-grid market segment does not benefit from established quality standards for products such as solar home systems. To remedy this challenge:

- Establish and enforce standards for off-grid products based on national certificates.



Off-grid system integration

Isolated systems have a great role to play in bridging the gap to the national electricity access target of 60 percent by 2025. However, the lack of regulatory clarity regarding available options in the event of main grid arrival to mini-grid operation areas may prevent private investors from entering the off-grid market. To overcome this barrier:

- Adopt clear regulation on commercial options available for mini-grid business continuity, or exit options, in the event of main grid arrival and to avoid the possibility of stranded mini-grid assets.

4.3 Way forward

The review of policies, laws, and regulations of Angola related to the electricity supply industry confirms the ability of national authorities to reform the regulatory environment to support greater private sector participation in the sector. Since the early 2010s, Angola has made considerable strides in rendering its power sector governance framework more transparent and robust, working to overcome the technical and financial challenges plaguing the sector, and promoting the development of renewable technologies. These efforts resulted in the unbundling of the former vertically integrated utility and the restructuring of the sector, as well as in policy and regulatory reforms to create a more conducive environment for private investment. In particular, the Amendment of the General Electricity Law in 2014 and the adoption of a comprehensive Regulation on the Generation, Transmission, Distribution, and Commercialization of Electricity (Presidential Decree No. 76/21) have ensured a clear regulatory framework for all operators in the electricity market, offering a wide array of options for private participation across the value chain. These reforms, alongside comprehensive and robust technical regulations, have made Angola one of the most *open* and *ready* countries for private investment in the continent.

However, Angola has a limited track record of private sector participation in the electricity market and continues to face structural challenges that prevent private entities from successfully participating in electricity infrastructure development at a much larger scale. These challenges are elaborately highlighted in this regulatory review covering the generation, transmission, distribution, and off-grid market segments.

As Angola strives to further develop its electricity market through private sector investment, policies and regulations play a pivotal role in enabling effective private sector contribution to the expansion and development of the national energy supply industry. Towards this end, this regulatory review evaluated the *openness*, *attractiveness*, and *readiness* of the current national policy and regulatory framework across the value chain. Areas of strength as well as areas of

further improvement have been identified, and key recommendations are offered to support Angola in achieving its goals. Towards this end, this regulatory review offers constructive identification of areas of reform and policy and regulatory enhancement for a competitive, resilient, and sustainable electricity sector. Economic recovery and long-term sustainable growth will continue to require a reliable electricity supply to thrive.

The UN Economic Commission for Africa and the RES4Africa Foundation remain committed to supporting Angola in addressing any of the identified regulatory and policy gaps, investing in necessary regulatory capacity development, as well as any area of particular reform interest of Angola towards greater *openness*, *attractiveness*, and *readiness* of the electricity market. They also call on the development community, NGOs, ISOs, national organizations, and the private sector to play their constructive role in supporting the efforts of the Government of Angola in this reform process, guided by its public institutions, aimed at economic transformation and the achievement of SDG7 goals.

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Acronyms

AfDB	African Development Bank
ALER	Associação Lusófona de Energias Renováveis
ASAER	Angolan Association of Renewable Energy
EDEL	Empresa de Distribuição de Energia Eletrica
ENDE	Empresa Nacional de Distribuição de Electricidade
ENE	Empresa Nacional de Electricidade
EPC	Engineering, Procurement, and Construction
ESEEP	Energy Sector Efficiency and Expansion Program
ESMAP	Energy Sector Management Assistance Program
GAMEK	Gabinete de Aproveitamento do Médio Kwanza
GDP	Gross Domestic Product
GHG	Greenhouse Gas
ICA	Infrastructure Consortium for Africa
IEA	International Energy Agency
IMF	International Monetary Fund
INEP	Integrated National Electrification Program
IPPs	Independent Power Producers
IPT	Independent Power Transmission
IRSEA	Instituto Regulador dos Serviços de Electricidade e de Água
KPIs	Key Performance Indicators
MINEA	Ministério da Energia e Águas
MW	Megawatt
NDCs	Nationally Determined Contributions
NDP	National Development Plan
NESPS	National Energy Security Policy and Strategy
PPAs	Power Purchase Agreements
PPPs	Public-Private Partnerships
PRODEL	Empresa Pública de Predicator de Electricidade
PTSE	Programa de Transformação do Sector Eléctrico
RES	Renewable Energy Sources
RNT	Rede Nacional de Transporte
ROAR	Regulatory review of the Openness, Attractiveness, and Readiness

SAPP	Southern African Power Pool
SDG	Sustainable Development Goal
SEFA	Sustainable Energy Fund for Africa
SENV	Sistema Eléctrico Não Vinculado
SEP	Sistema Eléctrico Público
SHS	Solar Home Systems
TWh	Terawatt-hour
UNDESA	United Nations Department of Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value-Added Tax

Annexes

Annex A: Policies, Plans and Regulations (Accessed xx/06/2022)

National Energy Security Policy and Strategy	https://www.minea.gv.ao/index.php/legislacao/category/83-decretos-ii-legislatura?download=525:decreto-presidencial-politica
Decreto Presidencial 256/11 approving the National Energy Security Policy	https://leap.unep.org/countries/ao/national-legislation/presidential-decree-no-25611-approving-national-energy-security
Atlas and National Strategy for New Renewable Energies (2014)	https://gestoenergy.com/wp-content/uploads/2018/04/ATLAS-AND-NATIONAL-STRATEGY-FOR-THE-NEW-RENEWABLES.pdf
Angola 2025	http://extwprlegs1.fao.org/docs/pdf/ang184675.pdf
Angola Energia 2025	https://angolaenergia2025.gestoenergy.com/sites/default/files/editor/livro_angola_energia_2025_baixa.pdf
National Development Plan 2018-2022	https://www.cabri-sbo.org/en/documents/national-development-plan-pnd-2018-2022
Decreto Presidencial 313/20 approving the National Development Plan 2018-2022	https://www.fao.org/faolex/results/details/en/c/LEX-FAOC200165/
Energy and Water Sector Action Plan 2018-2022	https://gestoenergy.com/wp-content/uploads/2019/04/Angola-action-plan-of-the-energy-water-sector-2018-2022.pdf
Electricity Law	https://www.climate-laws.org/geographies/angola/laws/law-no-27-15-amending-law-no-14-a-96-on-the-basic-law-on-electricity
Basic Law on Planning	https://gazettes.africa/archive/ao/2011/ao-government-gazette-dated-2011-01-14-no-9.pdf
Regulation on Planning	http://www.ucm.minfin.gov.ao/cs/groups/public/documents/document/aw4x/mjg5/~edisp/minfin1289055.pdf
National Strategy for Climate Change	https://info.undp.org/docs/pdc/Documents/AGO/ENAC%202018-2030_14082017.pdf
Decreto Presidencial 8/22 monitoring and evaluation system for climate change	http://extwprlegs1.fao.org/docs/pdf/ang207672.pdf
MINEA organic statue Presidential Decree No. 223/20	http://www.ucm.minfin.gov.ao/cs/groups/public/documents/document/aw4x/mjg5/~edisp/minfin1289074.pdf

Independent Generation Regulation	https://gestoenergy.com/wp-content/uploads/2021/04/Decreto-Presidencial-43_21.pdf
Public Contracts Law	http://www.ucm.minfin.gov.ao/cs/groups/public/documents/document/zmlu/mduy/~edisp/minfin052628.pdf
Amendment of the Private Investment Law	https://www2.deloitte.com/content/dam/Deloitte/ao/Documents/tax/Tax%20News%20Flash/2021/Lei%2010-21%20de%2022%20de%20Abril.pdf
Law on Public-Private Partnerships	http://extwprlegs1.fao.org/docs/pdf/ang190924.pdf
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Decreto Presidencial 76/21 approving the Regulation on Electric Energy Production, Transport, Distribution and Commercialization	https://www.fao.org/faolex/results/details/en/c/LEX-FAOC205084/

Annex B: An overview of the Topics assessed

Openness	Energy Strategy	The existence and characteristics of energy and climate policies.
	System Planning (also *Readiness*)	The existence and characteristics of plans for generation expansion, network development and electrification.
	Power Sector Governance	The existence of an Energy Act or Law defining the operational regime of market agents, and the existence and role of an energy regulatory authority.
	Power Sector Framework	The degree of unbundling of generation, transmission, and distribution services.
	Power Sector Competition	The Openness of the electricity market to competition.
	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	Contract 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 & 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.



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