



United Nations
Economic Commission for Africa



Regulatory Review of the Electricity Market in Ghana:

Towards Crowding-in Private
Sector Investment





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Executive Summary

This report provides an analysis of Ghana's electricity sector policies, laws, and regulations in relation to crowding-in private sector participation in developing national electricity infrastructure. The report is part of the United Nations Economic Commission for Africa and RES4Africa Foundation joint program on *Regulatory Review of the Electricity Sector in Africa: Towards Crowding-in Private Sector Investment*.

Ghana's power sector reforms were initiated in the 1990s to open the system to private participation, introduce competition, and enhance the efficiency of electricity service provision. The reforms introduced far-reaching policy and institutional changes to stimulate the transformation of the sector to meet international standards. Before the reform, the prevailing system was a vertically integrated, monopolistic system in which the main power utility, the Volta River Authority, owned and operated all the electricity generation and transmission, and a significant part of the distribution assets. The reforms resulted in unbundled generation, transmission, and distribution services controlled by separate independent utilities. At the center of the reformed electricity market is the National Interconnected Transmission System, owned and operated by the National Grid Company (GRIDCo).

The review of the policy and regulatory framework indicates that Ghana has been quite successful in defining an enabling legislative environment to govern the electricity supply industry. All the regulations governing the value chain originate from a primary enabling law (Energy Commission Act 541) that seeks to promote private sector participation. Provisions to ensure transparency, guarantee fairness, and define the rules of engagement for all industry participants (without discrimination) are adequately in place for each segment of the electricity market.

Private sector participation in Ghana's electricity market has been mostly confined to generation, where several independent power producers are active. The law prohibits more than one operator to be licensed for transmission at any time, and the license is held by the public company GRIDCo, the owner of the transmission system, until 2035, but the distribution sector is open to private participation. The Energy Commission Act also envisages private sector participation in electricity brokerage, sale and exports. Nevertheless, the private sector appears not to have made substantial inroads into the value chain beyond the generation segment. Ghana has also opted for a public-led model for the development of mini-grids as alternative electricity supply solutions, limiting private sector contribution in the off-grid space.

The purpose of this regulatory review is to pinpoint the main strengths and gaps of the policy and regulatory framework 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 towards attaining a competitive, resilient, and sustainable electricity market.

The regulatory analysis 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 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

Regarding policies and regulations relevant to private investments in the electricity generation segment, Ghana appears to have reached, overall, a high degree of *openness*. The assessment confirms the good governance of the electricity sector by national regulatory authorities, the successful reform of the market framework through the introduction of the unbundling, well managed system planning regulation, as well as the ability to adopt competition-friendly legislation and successfully introduce diversified models for private sector participation. The adoption of clear rules for the economic regulation of the sector and the extensive coverage of its technical regulation by the Grid Code, explain the moderate to high level of performance in the other Dimensions, respectively the *attractiveness* and *readiness*. However, areas where further development may be beneficial have been identified for the *energy strategy*, due to an outdated national energy policy, and *off-taking options*, where generators still benefit from limited routes-to-market. The country also possesses only limited regulation concerning *incentives* and *indirect incentives* for generators, which play an important role in supporting the economic viability of investments.

Main findings related to the Transmission segment

Ghana's Grid Code allows for private participation through engineering, procurement and construction contracts and private ownership of transmission assets, but the Energy Commission Act only allows one transmission operator to be licensed and any time, with the current operator being the national utility GRIDCo. The weaker performance in this segment is a direct consequence of the current limitations on private sector participation in the transmission service. The limitation in the *openness* Dimension is partially compensated by better performance in *attractiveness*, where the country benefits from the definition of clear rules for determining transmission service tariffs and related charges as well as a clear definition of the conditions and requirements to be included in the transmission license. For *readiness*, Ghana also performs very well in the transmission segment. Overall, from a regulatory perspective the country seems fairly prepared to crowd-in private investment in this segment of the value chain, if and when this will be possible; but would benefit from the definition of dedicated *credit enhancement* instruments and better access to necessary *authorizations and permits*.

Main findings related to the Distribution segment

Ghana policies and regulations related to the distribution segment display moderate to good performance in all the Dimensions covered. The regulation provides for private sector participation in the distribution service, as well as in electricity brokerage operations and retail, and a private distributor, Enclave Power Company, is currently operating in the country, along with the two public distributors, NEDCo and ECG. Distribution and retail licenses are accessible to private operators, and private sector participation can take a variety of forms, from concession to divestiture and privatization, as well as involvement in the construction of new assets. Rights and obligations of electricity distributors and retailers are well defined by

the current regulation in terms of standards of performance, metering, billing and payments, complaints and dispute resolution, and tariff setting rules are also available from the Public Utilities Regulatory Commission. Here, private investors may benefit from better defined and diversified credit enhancement instruments to increase the bankability of their projects and better access to necessary *authorizations and permits*.

Main findings related to the Off-grid segment

The government has opted for a public sector-led business model for mini-grid assets and has severely limited private sector participation in this space. As a result, the review of policies and regulations for the off-grid market shows a lower performance in all three Dimensions. The country lacks a public agency dedicated to overseeing and implementing the national electrification agenda, potentially affecting the governance of this market segment, and specific commercial and technical regulations for the operation of mini-grids are still under development, leaving key aspects such as rules for *off-grid system integration* with the main grid currently uncovered. The uniform electricity tariff policy currently in force applies also to mini-grid operators, with potential impacts on the financial viability of these assets that may require further and more in-depth evaluations from Ghana's electricity sector authorities.

To address the identified challenges and gaps in the policy and regulatory environment and move towards more effective private sector participation, the following measures are recommended for Ghana.

To enhance the *Openness* of the electricity market

- ⚡ Pursue a comprehensive review and update of its energy policy to provide overall guidance on the evolution of the national electricity supply industry and drive investments along the value chain; energy policy update must continue over the years to align with Ghana's socio-economic progress.
- ⚡ Set ambitious yet realistic energy policy targets, compatible with the realities of national social and economic development ambitions and backed by appropriate legislation to ensure their enforceability and an effective oversight of their implementation.
- ⚡ Strengthen the link between indicative electricity system plans and the public procurement of new infrastructure, notably generation assets, to ensure an effective system development and avoid cost inefficiencies.
- ⚡ Ensure coordination and encourage investments in the off-grid space through a *national electrification plan* and related *investment plan*.
- ⚡ Explore the possibility of adopting an *electricity law* as a foundational law to define sector governance, electricity service operators' regimes, and rights and obligations for all market players.
- ⚡ Explore the opening of the mini-grid space to private companies and adopt a dedicated licensing regime for mini-grid operators to ease and regulate market entry by investors.

- ⚡ Adopt dedicated legislation to support the implementation of *national policy on public-private partnership* and set rules for public-private partnerships in the electricity supply industry to support investments in the relevant infrastructure.

To enhance the *Attractiveness* of the electricity market

- ⚡ Develop and adopt standard guidelines for power purchase agreements to increase market transparency and reduce transaction costs in negotiating contracts.
- ⚡ Review the national legislation on the public supporting schemes dedicated to renewable energy to align it with government objectives through the amendment of the Renewable Energy Act.
- ⚡ Proceed towards full cost-reflectiveness of final electricity tariffs by progressively reducing all remaining subsidies (direct and indirect), as a necessary step for the financial sustainability of utilities.
- ⚡ Evaluate the impact of the current uniform tariff policy on the financial sustainability of mini-grid technologies and explore new tariff policies for mini-grids based on the principle of cost-reflectiveness and on the use of a standard calculation tool for mini-grid tariff definition.
- ⚡ Considering that financing is a major challenge for energy investors, enhance market *attractiveness* by improving accessibility of credit enhancement instruments, especially for the distribution and off-grid segments of the market.

To enhance the *Readiness* of the electricity market

- ⚡ Institute a one-stop-shop, or a single-window, to coordinate and facilitate authorizations and/or permit applications accessible to investors.
- ⚡ Integrate off-grid technologies and service expansion into national electricity system planning, along with distribution system extension, for a better coordination of electrification efforts.
- ⚡ Adopt a National Distribution Code detailing procedures that govern distribution service and the relationship between a distributor and users of its distribution system to enhance clarity and ensure accountability of distributors.
- ⚡ Adopt clear rules on commercial options for mini-grid business continuity, or exit options, in anticipation of main grid arrival.
- ⚡ Develop and enforce dedicated technical standards for mini-grids, which can offer mandatory and optional grid-compatible standards to ensure safety, stability, and reliability of mini-grid system integration without undue costs to investors.

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



Introduction





Accra city skyline, Ghana
Photo credit: Shutterstock

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.

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. Latest 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 about USD 1.3 trillion per year. Africa would require USD 32 billion per year through 2030 on universal electricity access-related investments (AfDB, 2019), with additional investment requirements on energy infrastructure. According to the Infrastructure Consortium for Africa, 37 percent of infrastructure investments in the continent was undertaken by African governments in 2018, with the private sector accounting for 11 percent (ICA, 2018). Given the major infrastructure investment gap and the limited investment role of the private sector so far, addressing the crowding-in of private sector investment in the electricity market is crucial.

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.

Ghana has already made significant progress in providing access to electricity over the past ten years in which the electrification rate increased from 65 percent in 2010 to over 82 percent in 2018, according to the World Bank (n. d.). This is despite the occurrence of several power crises, that jeopardized the integrity of the power system and was partly blamed on an overreliance on hydro generation. Ghana has successfully restructured its markets in 2006, through the restructuring of its public utility and the creation of an independent transmission company, GRIDCo, which took over the transmission operation from the previously monopolistic incumbent, the Volta River Authority (VRA). Even though the VRA still produces most of the electricity in the country, a number of IPPs are already operational. The distribution service has also been unbundled and open to private sector participation. Even though Ghana's electricity market has undergone significant reforms with the specific

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.

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

objective to attract private sector participation, the market is currently unable to enjoy the full benefits of private investments and faces significant challenges in terms of overcapacity and financial stability of public utilities. This situation emphasizes the importance of moving further with the reform process to support a reliable, competitive and sustainable development of electricity infrastructures to fuel social and economic growth.

This regulatory review examines these and additional issues in-depth concerning the crowding-in of private sector investment in the electricity market of Ghana, from generation to networks and off-grid market segments. The goal is, through regulatory improvement and expected increase in private sector participation, to promote the achievement of SDG7 goals and developing a resilient, competitive, diverse, 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





*Akosombo Dam on the Volta River, Ghana
Photo credit: Nataly Reinch*

2 Country Overview

Ghana is located on the coast of the Gulf of Guinea bordering Ivory Coast, Togo and Burkina Faso. After its independence in 1957, Ghana struggled with mismanagement and military rule, from which it recovered and is now cited as an example for successful economic recovery (Fage et al., 2021).

The country is experiencing rapid population growth and urbanization similarly to other African countries. In 2019, it had a population of about 30.4 million, up from 24.8 million in 2010, representing an annual growth rate of over 2 percent (UNDESA, 2019). During this period, the country also became increasingly urbanized, going from 50.7 percent of the population living in urban areas in 2010 to 56.7 percent in 2019 (UNDESA, 2018).



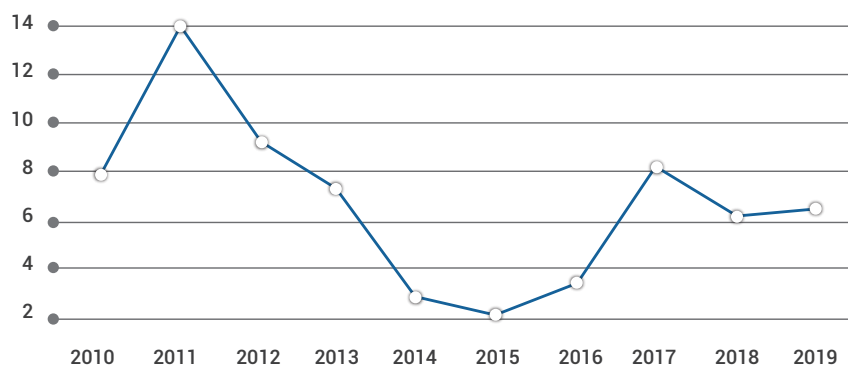
Map of Ghana credit: Peter Hermes Furian
 Map of Africa credit: Geo Atlas Graphi Ogre

2.1 Macroeconomic overview

Although Ghana's economy is growing, its complexity is not increasing. The country is rich in natural resources, particularly gold and crude oil. Along with cocoa beans, they have accounted for the majority of its exports. The declining contribution of manufacturing to the value-added and the early peaking of employment in the sector suggest that the country may be experiencing premature deindustrialization (Nxumalu and Raju, 2020).

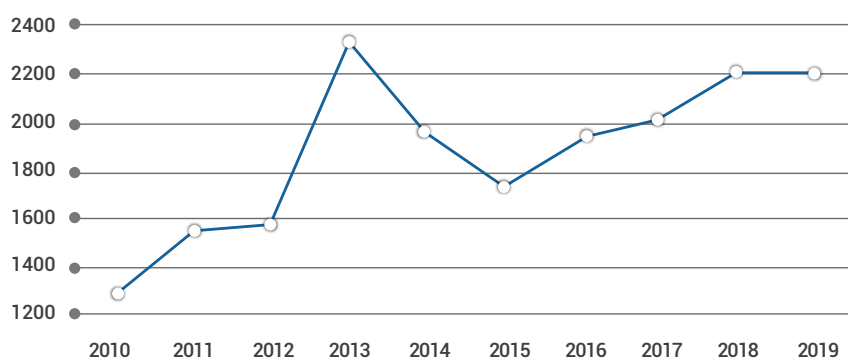
Over the past decade, Ghana experienced variable economic growth, registering a range of growth rates between 14 percent at its highest (2011) and 2.2 percent at its lowest (2015) (World Bank Data, n. d.). Following an economic slowdown associated with macroeconomic challenges starting in 2012, the Ghanaian economy made a recovery in 2017, returning to growth rates of over 6 percent. This put Ghana among the ten fastest-growing economies in Africa. However, as a result of the COVID-19 pandemic, the overall economic growth slowed to an estimated 0.9 percent in 2020 (IMF, 2021). Throughout the past decade, Ghana also accrued more debt as a share of GDP, as highlighted in Figure 3.

Figure 1: GDP growth (% , 2010-2019)



Source: World Bank (n. d., accessed 2021)

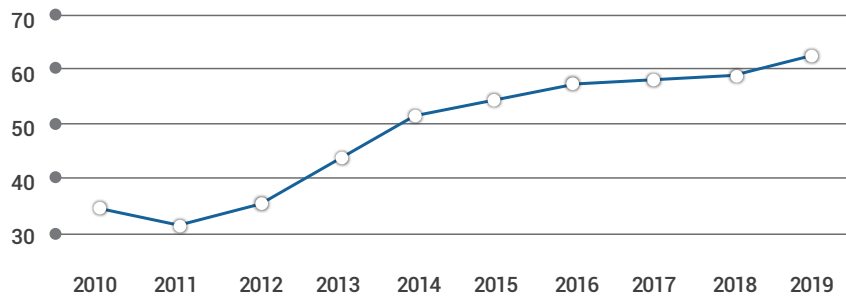
Figure 2: GDP per capita (USD, 2010-2019)



Source: World Bank (n. d., accessed 2021)

Over the past decade, Ghana experienced variable economic growth, registering a range of growth rates between 14 percent at its highest (2011) and 2.2 percent at its lowest (2015)

Figure 3: Debt-to-GDP ratio (% 2010-2019)



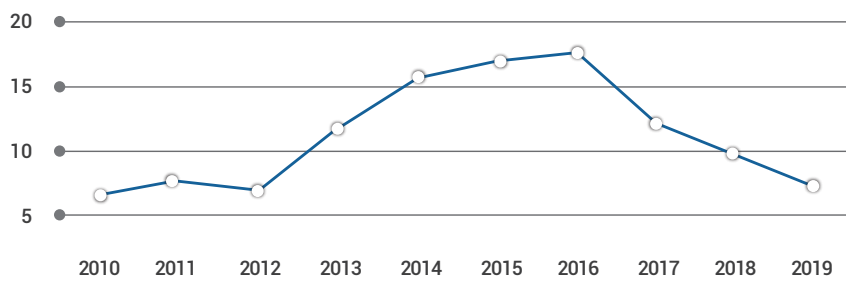
Source: IMF (2021)

Inflation and exchange rate stability

The Ghanaian currency is the Cedi (GhC), which was referred to as “the world’s best-performing currency against the dollar” in 2020 (Dzawu, 2020). It earned its title due to a rapid comeback at the beginning of 2020 after it had weakened by 13 percent in 2019. Mr. Steve Opata, the head of financial markets at the Bank of Ghana, also identifies the central bank’s tight monetary stance as well as market reforms, such as the introduction of forward-rate foreign exchange auctions, as key factors in the recovery of the cedi (*ibid.*).

Ghana’s inflation rate rose by over 10 percentage points between 2012 and 2020, peaking at 7.46 percent. Over the past years it steadily recovered to just over 7 percent in 2019 (IMF, 2021).

Figure 4: Inflation rate (% , 2010-2019)



Source: IMF (2021)

Business climate

Ghana is ranked 118th worldwide and 13th in sub-Saharan Africa in the World Bank’s *Ease of Doing Business 2020* index with an overall score of 60 (World Bank, 2020). Similarly, for 2018, the *Global Competitiveness Index* put Ghana 7th in Sub-Saharan Africa, while the *World Investment Report* reported Ghana as the 3rd largest recipient of Foreign Direct Investment (FDI) in the region (UNCTAD, 2018). Ghana’s good performance in these international indexes confirms the country’s ability to provide attractive conditions for businesses to invest and prosper.

International investors in Ghana benefit from an appreciable level of protection, ensured by the Ghana Investment Promotion Centre (GIPC). This institution, established by the GIPC Act 865, has the mandate to ensure that transparency, equity, and the rule of law prevail in the business environment in Ghana. Under Section 26 (4) of the Act, specific incentive packages may be negotiated for in addition to the incentives and benefits available under other legislation such as customs and taxation laws. Other guarantees for enterprises include convertibility of currency, repatriation of dividends, and profits after tax.

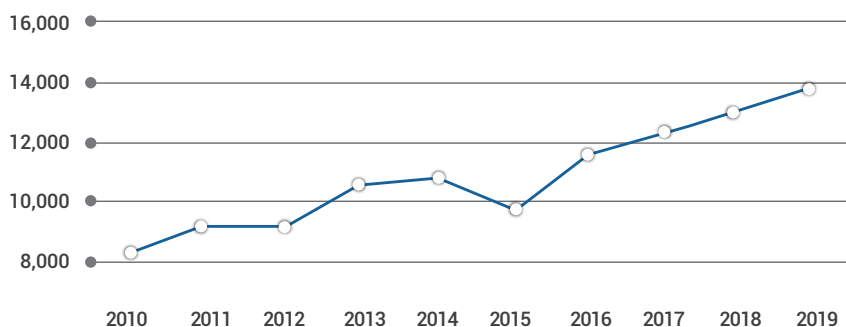
2.2 Electricity sector overview

A central feature related to the growth and development of the Ghanaian economy (as it is for all developing economies) is its close correlation with the consumption of electricity. Following the introduction of reforms in the mid-1990s, aimed at reorganizing the electricity sector governance and market structure, the sector has undergone a continuous and major structural transformation. These efforts are related to the industrialization and economic modernization efforts of Ghana.

Electricity consumption

Ghana's electricity demand has been rapidly growing in the past decades, showing a close correlation with GDP growth. A significant drop in electricity consumption was observed in 2015, when drought led to a power shortage and load shedding.

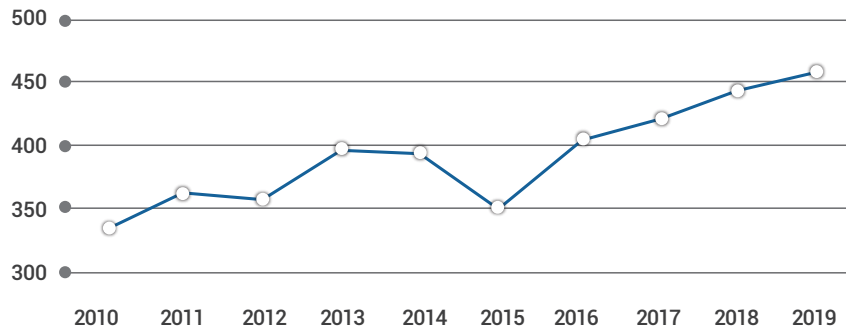
Figure 5: Electricity consumption, total (GWh, 2010-2019)



Source: Energy Commission (2020), World Bank (n. d., accessed 2021)

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Figure 6: Electricity consumption, per capita (kWh, 2010-2019)



Source: Energy Commission (2020), World Bank (n. d., accessed 2021)

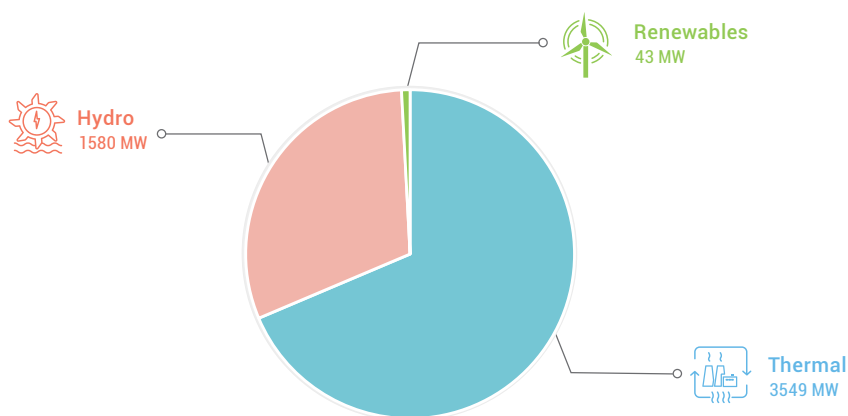
On-grid installed capacity and electricity production

Prior to the implementation of the power sector reforms, the only existing electricity generation plants were the 1,020 MW Akosombo and the 160 MW Kpong hydroelectric power plants. These hydropower plants, both owned by the Volta River Authority (VRA), sustained the growth of the economy and population until the mid-1990s when the country started experiencing electricity shortages. This vulnerability resulting from dependence on solely hydropower generation was brought to the fore in 1998 when the country suffered a major power crisis due to a prolonged drought leading to water levels in the reservoirs of the hydropower plants being well below their designed operating levels. The crisis led to severe load shedding and power rationing, imposing costly constraints on the national economy.

This bitter experience led the government to shift its energy policy from overreliance on a single electricity generation resource (hydro) to the introduction of a power generation mix. This was implemented particularly by introducing thermal generation to complement the hydro systems, with the active involvement of independent power producers (IPPs). Between 1997 and 1998, the first thermal power plant, with a capacity of 330 MW, was commissioned by the government at Aboadze, in the Western Region. The following year, the government facilitated a joint venture project between the VRA and CMS Energy Corporation to construct the second thermal plant with a capacity of 220 MW, which was also located at Aboadze.

Following the successful introduction of power sector reforms, Ghana experienced an upsurge of private sector investments in the electricity supply industry. This was particularly the case in the generation segment with several IPPs entering the market, namely: the Sunon-Asogli Power Plant (360 MW) in operation since 2007; the Cenpower Power Plant (340 MW) since 2015; the Powership (450 MW), owned by Turkish company Karpowership, which currently supplies 26 percent of Ghana's total electricity needs (Karpowership, n. d.), since 2015; and the Ameri Power Plant (240 MW), built on a Build, Operate, and Transfer (BOT) model over five years.

Figure 7: Installed generation capacity (MW, 2020)

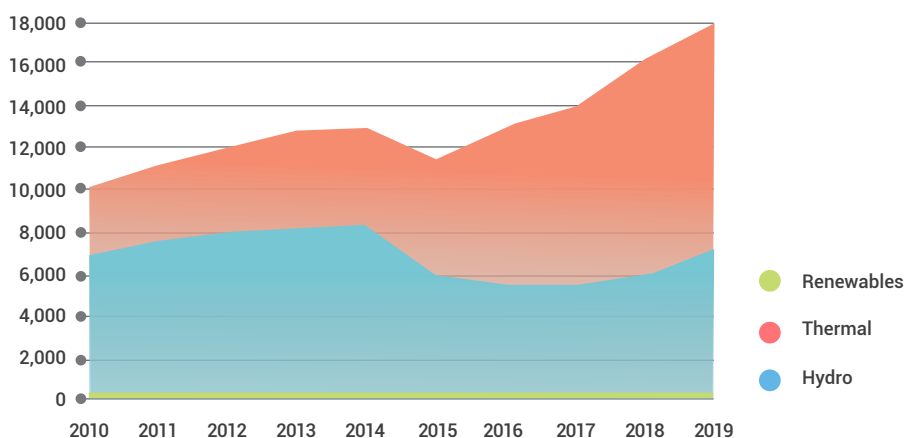


Source: Energy Commission (2020)

The Ghanaian power system has evolved from a hydro-based system to one with a generation mix containing both hydro and thermal components; the latter being added from 1998 onwards. Today, the national power system is made up of more thermal generation than hydropower stations and has a total installed capacity of 5,172 MW (see Annex A for a breakdown). Currently, the total installed hydro capacity is 1,580 MW, accounting for 31 percent of the total installed capacity. Generation capacity from thermal sources, including from IPPs, stands at 3,549 MW, or 69 percent of the national capacity. A handful of small-scale solar PV installations complete Ghana's generation mix.

Electricity production also grew during the last decade, reaching about 18 TWh in 2019, approximately 79 percent higher than in 2010. Between 2014 and 2015, total generation fell around 1.5 TWh but rebounded quickly after. After 2016, natural gas-based generation grew in importance, increasing its share in the thermal generation.

Figure 8: Electricity production (GWh, 2010-2019)



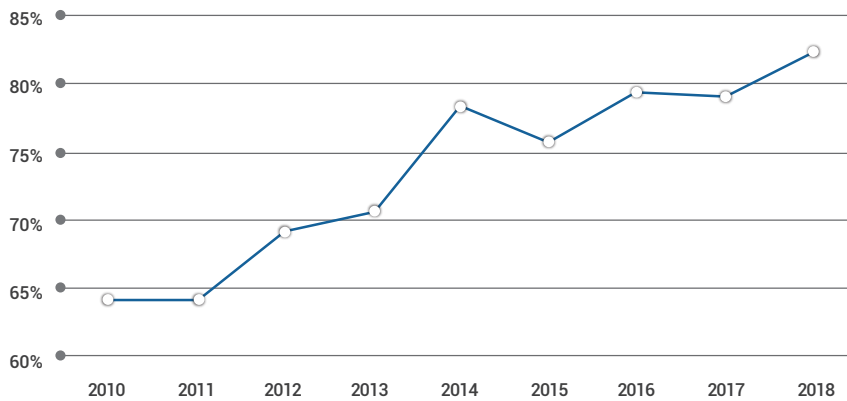
Source: Energy Commission (2020)

Access to electricity

Ghana launched its first comprehensive National Electrification Planning Study in 1989, and again in 1991, upon which the first National Electrification Master Plan was developed. At that time, the electrification rate was less than 5 percent for the rural population and about 10 percent at the national level. The Master Plan identified communities with populations over 500 to be connected to the national grid, as a first phase of expansion. For the second phase, a National Rural Electrification Program (NREP) was launched in 1991. To expedite the expansion of the program, an innovative Self-Help Electrification Project (SHEP) was introduced in parallel with the NREP. Implementation of the SHEP resulted in the connection of thousands of rural communities to the national grid. Through this program, electricity access increased steadily, from just over 40 percent in 2000 to 79.3 percent in 2016 (World Bank, n. d.).

In general, electricity consumers and new connections in Ghana are showing appreciable growth. Data from the Electricity Company of Ghana (ECG), the electricity distributor serving about 80 percent of national demand, shows the number of customers growing by an average of 8.3 percent per year between 2016 and 2019 (see Annex B).

Figure 9: Electrification rate (% , 2010-2018)



Source: World Bank (n. d. accessed 2021)

In general, electricity consumers and new connections in Ghana are showing appreciable growth. Data from the Electricity Company of Ghana (ECG), the electricity distributor serving about 80 percent of national demand, shows the number of customers growing by an average of 8.3% per year between 2016 and 2019

Electricity service quality and reliability

In 2019 Ghana’s recorded losses amount to 4.7 percent in transmission and 24.7 percent in distribution networks (Energy Commission, 2020), which places a significant financial burden on utilities. With regards to the quality of service, the number of outages and outage duration per year is assessed using the measures of the System Average Interruption Frequency Index (SAIFI), the System Average Interruption Duration Index (SAIDI), and the Customer Average Interruption Duration Index (CAIDI).

From 2017 to 2019, the SAIFI has been steadily improving for all customer categories (see Annex C). Additionally, it is observed that, in general, there are fewer interruptions in the metro areas, followed by the urban and rural areas, respectively. Similarly, the SAIDI indicator attests

to the improving trend related to power interruptions. For all consumer groups, the average interruption duration is consistently less than two minutes over the years. Therefore, the quality of service, with regards to outages and interruptions, is steadily improving over time and in all customer categories.

Off-grid electricity market

In 2007 the government of Ghana deployed the Ghana Energy Development and Access Project (GEDAP) funded by the World Bank. The project aims to increase the population's access to electricity while helping to transition the country to a low-carbon economy through the reduction of greenhouse gas emissions. The GEDAP project is designed to expand electrification to communities living in remote areas, such as island and lakeside communities (along Lake Volta). In these areas, electricity demand is low, and extending the national grid would be more costly. Hence, through an off-grid approach, mini-grids and stand-alone renewable energy solutions are being deployed to further expand electricity access.

Presently, there are five operational mini-grids on Lake Volta managed by the VRA, which are located at Atigagome, Kudakope, Aglakope, Wayokope, and Peditorkope. In addition to these, fifteen solar-powered mini-grid projects were implemented by a private developer, Black Star Energy Limited, as a pilot project of the Energy Commission (EC). These projects operate under a special and temporary licensing regime issued by the EC, which ceased to exist after the end of the projects. Those licenses were issued before the establishment of a proper regulatory environment for mini-grids, allowing the licensee to undertake the pilot project over several years, and in several communities. This type of license ceased to exist after the end of the project.

In addition, the Scaling-up Renewable Energy Program (SREP) is being implemented by the Ghanaian government in partnership with the private sector to facilitate the achievement of the universal electricity access goal by 2030. The SREP comprises four projects, including the development of 55 mini-grids and 30,000 stand-alone solar PV systems in rural off-grid areas.

The Scaling-up Renewable Energy Program (SREP) is being implemented by the Ghanaian government in partnership with the private sector to facilitate the achievement of the universal electricity access goal by 2030.

2.3 Electricity sector governance and market structure

Overview of electricity sector reforms

The growing demand in the face of a constrained power supply coupled with difficulties in securing financing from traditional sources, particularly the World Bank, pushed Ghana to undertake a Power Sector Reform Program (PSRP) starting in 1995.

The reforms were targeted at reducing the country's reliance on multilateral organizations and development financial institutions (DFIs) to finance electricity infrastructure investments. Furthermore, the reforms were aimed at increasing the sector's ability to attract private investments by enabling greater competition in the electricity market and increasing the efficiency of the power system.

Power Sector Reform Program

The PSRP focused on achieving these objectives by reorganizing the market governance, restructuring the public utility, and unbundling the existing vertical monopoly. It also focused on creating an appropriate regulatory environment for the sector. The results were the creation of the two regulatory institutions: the PURC, established by Act 538, and the EC, established by Act 541, both in 1997.

The EC has led the process of market reform over the years, being responsible for:

- The issuance of licenses for every operator along the sector value chain, from wholesale suppliers of electricity, the transmission utility, to wholesale consumers;
- The unbundling of the various segments of the electricity supply industry;
- The promotion of competition in generation through the development of a Wholesale Electricity Market and the creation of a conducive environment for retail competition.

The reform program resulted in the restructuring of the VRA, the creation of an independent transmission utility, and the adoption of a competitive Wholesale Electricity Market mechanism. The reforms also set out structures and policies to remove monopolistic tendencies and market dominance.

The Volta River Development Act 692 of 2005 separated the transmission function of the VRA and placed its functions and core staff in the limited liability company GRIDCO, which currently holds the license for transmission (only one entity can hold it at a time). The approval and implementation of the Electricity Regulation (L.I. 1937, 2008) established the Wholesale Electricity Market and marked the implementation of unbundling, with GRIDCO becoming fully operational as a transmission utility company.

The PURC has also played its part in addressing economic regulation issues by guiding the market towards the attainment of economically efficient tariffs. This was pursued through relevant regulations, such as the Electricity Rate-Setting Guidelines and the Electricity Transmission Ancillary Services Pricing Policy and Guidelines.

The approval and implementation of the Electricity Regulation (L.I. 1937, 2008) established the Wholesale Electricity Market and marked the implementation of unbundling, with GRIDCO becoming fully operational as a transmission utility company.

Energy Sector Recovery Program (2019)

The Energy Sector Recovery Program has been initiated by the Ministry of Energy to achieve financial sustainability of the state-owned energy utilities and ensure a sustainable energy sector. A key element of the program is addressing the high cost of generation overcapacity - a result of uncoordinated procurement during Ghana's energy crisis - through the restructuring of take-or-pay agreements.

The ESPR outlines a comprehensive recovery program for the energy sector between 2019 and 2023. The actions are differentiated into three phases. Phases I and II will reduce the annual electricity shortfalls and prevent future imbalances, thereby reducing the need for increasing electricity tariffs and sector stabilization payments by the government. Phase III will cover

additional actions to reduce the remaining shortfall until no sector stabilization payments are needed and will be defined by the Energy Sector Task Force (ESTF) within the first 18 months of the program. More details about the program are available in Annex B.

Institutions governing the electricity sector

The governance of Ghana's electricity sector is ensured by three key institutions: the Ministry of Energy (MoE); the Energy Commission (EC); and the Public Utilities Regulatory Commission (PURC). The Electricity Market Oversight Panel (EMOP) complements the market governance structure and supervises the operation and administration of Ghana's wholesale electricity market.

Table 1: Institutions governing the electricity sector

Ministry of Energy (MoE)	The Ministry of Energy is responsible for formulating, monitoring, and evaluating policies, programs, and projects in the energy sector. The Ministry handles, as part of its mandate, the implementation of the National Electrification Scheme (NES), which seeks to extend the reach of electricity to all communities in the long-term.
Energy Commission (EC)	The Energy Commission, established through Act 541 of 1997, is the technical regulator of Ghana's energy sector. In this regard, the Commission is tasked with licensing all actors in the electricity supply industry. The Commission is also responsible for sector planning and acts as the technical adviser to the Minister for Energy.
Public Utilities Regulatory Commission (PURC)	The PURC, established through Act 538 of 1997, is responsible for the economic regulation of the electricity supply industry. It is responsible for approving and setting tariffs for all the industry players along the entire value chain. The PURC also monitors compliance with performance standards by service providers in the power sector.
Electricity Market Oversight Panel (EMOP)	<p>The Electricity Regulation (L.I. 1937, 2008) established the Wholesale Electricity Market (WEM) to facilitate wholesale trading and the provision of ancillary services in the National Interconnected Transmission System (NITS). In line with the regulatory provisions, the EC established an Electricity Market Oversight Panel (EMOP). The EMOP supervises the administration and operation of the wholesale electricity market to ensure fairness and transparency. It is composed of eleven members with the following main functions:</p> <ul style="list-style-type: none"> • Monitoring the general performance of the market administration functions of the transmission utility; • Ensuring the smooth operation of the wholesale electricity market; and • Reviewing the operation of the wholesale electricity market and studies related to the development of the market.

Market players

Policymaking institutions and public regulatory authorities oversee a plethora of market players active in the generation, transmission, and distribution services. Besides the state-owned generation, transmission, and distribution companies, several IPPs and two private distribution utilities currently operate in the country.

Table 2: Market players

Volta River Authority (VRA)	The state-owned Volta River Authority, which operates the Akosombo and Kpong Hydropower Stations, as well as the Takoradi Thermal Power Plant (TAPCO).
Bui Power Authority (BPA)	The Bui Power Authority (BPA), another state-owned company that generates hydropower for the national grid.
Independent Power Producers (IPPs)	Several independent power producers supply power to the grid. These include Cenit, Sunon-Asogli, Ameri, Karpowership, AKSA, and TICO (owned and operated by TAQA, a private energy company with the VRA as a minority partner).
Ghana Grid Company Ltd. (GRIDCo)	GRIDCo is the publicly owned national transmission company, which owns and operates Ghana's NITS. GRIDCo was established in 2006, in accordance with the Energy Commission Act 541 of 1997 and the VRA (Amendment) Act 692 of 2005 and began operations in 2008. GRIDCo is, by its license, mandated to provide open access transmission and interconnection services to other licensees in the Ghanaian electricity supply industry in a non-discriminatory manner. It is also empowered to conduct the dispatch of all electricity generated by plants connected to the NITS, based on the economic merit order principles.
Electricity Company of Ghana (ECG), Northern Electricity Distribution Company (NEDCO)	State-owned distribution utilities serving final customers in the residential, commercial, and industrial sectors.
Enclave Power	A private distribution utility licensed by the EC to distribute power with a concession in the Free Zones Enclave in the Tema industrial city. Currently, Enclave Power buys about 80 GWh of power from VRA annually and supplies electricity to over 50 customers (including large companies such as Cargill Ghana and Rider Steel Ghana Ltd).

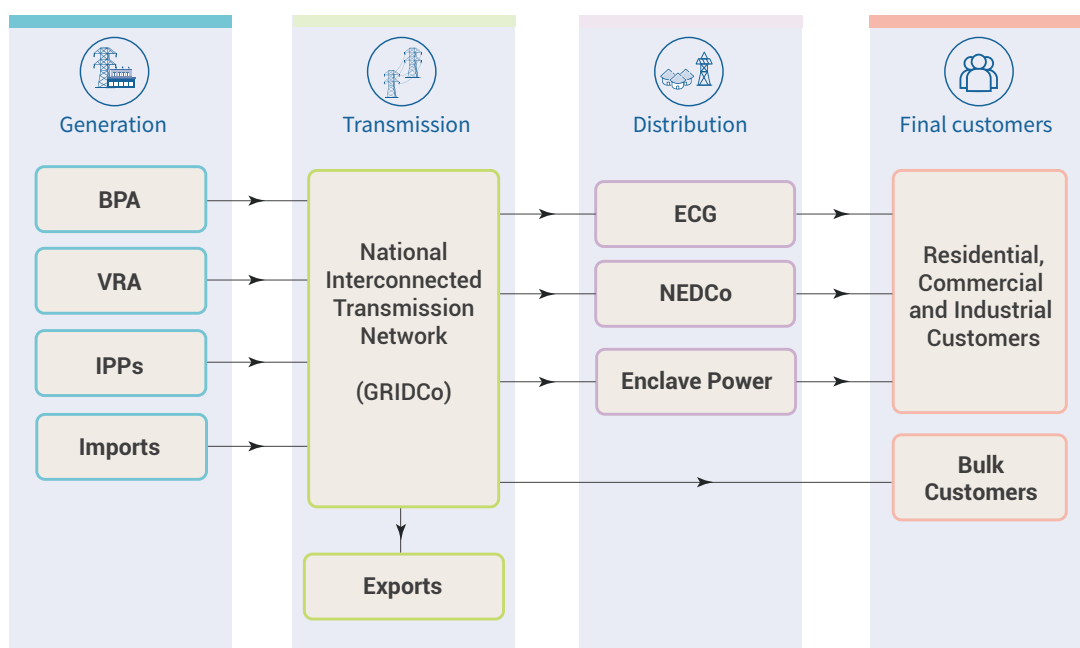
Electricity market model

The previously vertically integrated monopolistic system, in which the Volta River Authority (VRA) owned and operated generation and transmission assets in their entirety, as well as a large share of distribution, was replaced by the current market structure with unbundled generation, transmission, and distribution assets.

On one side of the NITS are various generating stations (both publicly and privately owned), and on the other side are wholesale power customers (the regulated market), bulk power consumers (the deregulated market), and the export market.

GRIDCO transmits the power to numerous licensed bulk customers for their own consumption, as well as to the export market (Togo, Benin and Burkina Faso). Power is also transmitted to three distribution companies (ECG, NEDCO, and Enclave Power), which together distribute electricity to final customers in the residential, commercial, and industrial sectors. Unlike these customers, whose power purchases are regulated through tariffs set by the economic regulator (PURC), those in the deregulated market (bulk customers) are free to enter into long-term and bilateral trading arrangements with wholesale suppliers. The purchase of power directly from them is determined through negotiated prices agreed on in contracts, or power purchase agreements (PPAs).

Figure 10: Structure of the electricity supply industry



As per regulation 5(1) of the Electricity Regulations, 2008 (L.I. 1937), the Ghana Wholesale Electricity Market is structured to consist of:

- A Bilateral Contracts Market (BCM), involving contracts between wholesale suppliers and other market participants; and
- A Spot Market to provide for additional electricity requirements by market participants beyond contracted capacity to make up the shortfalls and enable balancing.

The WEM consists of the market operator, the Electricity Transmission Utility (ETU), and authorized market participants (sellers and buyers of electricity, or wholesale suppliers and customers). As per regulation 8(1) of L.I. 1937, an authorized market participant is any entity that: (i) has an operating license from the EC; (ii) is registered with the ETU; and (iii) has entered

into a contractual arrangement with the ETU. These include wholesale electricity suppliers (including power generating utilities and the IPPs), distribution companies, electricity brokerage enterprises, and bulk customers. While the bilateral contracts market involves contractual relationships between wholesale sellers (including IPPs) and wholesale buyers, the Spot Market is reserved only for incremental trading.

Regulation 7(2) of L.I. 1937 directs that the spot market price for electricity be based on the system marginal cost of supply and a merit-order dispatch. Related to the spot market for ancillary services, the implementation and management regime is still under development. Towards this end, the PURC has developed the Electricity Transmission Ancillary Services Pricing Policy and Guidelines for the procurement of ancillary services within the WEM. To this same end, a Market Regulations Manual and the Electricity Market Rules are under preparation.

The administration and operation of the WEM by GRIDCO, as defined by L.I. 1937, is to be supervised by the Electricity Market Oversight Panel (EMOP) which will advise the Energy Commission accordingly. It is worth noting that Ghana's WEM was selected as a model for the Regional Electricity Market by the ECOWAS Regional Electricity Regulatory Authority (ERERA) (EMOP, 2019).

2.4 Policies and regulations governing the electricity supply industry

The electricity market of Ghana is governed through numerous strategy papers, policies, and laws, summarized in the section below (see further information in Annex F).

Table 3: Energy sector strategies, policies, and plans

National Energy Policy (2010)	The National Energy Policy (NEP) outlines the country's energy sector goals, challenges, and required actions. It states the aim of developing an "energy economy" that would ensure a reliable supply of high-quality energy services for all sectors of the Ghanaian economy in line with its mid-term macroeconomic goals. A new National Energy Policy was drafted in 2018; however, it has not yet been finalized and adopted (Ministry of Energy, 2019).
Renewable Energy Master Plan (2019)	The Renewable Energy Master Plan (REMP) provides the first national roadmap for the long-term development of renewable energy resources in the country, aiming to increase renewable generation capacity to about 1,360 MW by 2030. The REMP represents a \$ 5.6 billion investment plan, with more than 80 percent of funding expected to come from the private sector. To encourage investment, the Plan will continue to create opportunities through RE-FiTs, competitive procurement of renewable energy projects (tenders), and purchase obligations. Additionally, the government will give financial incentives and procurement preferences to private sector actors engaged in the local assembly and manufacturing of renewable energy technologies, and related services.

Strategic National Energy Plan (2019)	This second edition of the Strategic National Energy Plan (SNEP) provides indicative energy plans as a framework to guide decision-makers to ensure that national energy demand is met sustainably. The SNEP covers the period 2020-2030 and provides estimates for energy demand up to 2030 under two distinct socioeconomic scenarios, based on which it provides a set of recommendations to the government, including the postponement of the universal access to electricity target from 2020 to 2025 and the aim of achieving 10 percent penetration of renewables (not including hydropower over 100 MW) in the national energy mix by 2030.
Integrated Power Sector Master Plan (2019)	The Integrated Power Sector Master Plan (IPSMP) is a subset of the SNEP and provides a comprehensive view of the future development of electricity generation and transmission facilities in Ghana. To ensure conformity across the value chain, the IPSMP provides the overall guidance and assumptions that all the other planning documents, namely the Annual Supply/Demand Plans, the Transmission Master Plan, and the Distribution Plan, are expected to mirror. The Plan proposes a least-cost long-term generation capacity expansion plan to adequately meet projected national electricity demand. The Energy Commission is responsible for updating the IPSMP.

2.4.1 Key laws and regulations for the electricity supply industry

Foundational legislation

Two primary laws govern Ghana's energy sector: the Energy Commission Act; and the Public Utilities Regulatory Commission Act.

The Energy Commission Act, 1997 (Act 541) establishes the Energy Commission and clarifies its functions, which are the regulation and management of the utilization of energy resources in Ghana and the coordination of policies in relation to them. Under the Act, the EC is expected, among others, to:

- Recommend policies for the development of indigenous energy resources;
- Advise the Minister of Energy on policies for the supply of electricity and natural gas;
- Assess applications and grant licenses to public utilities for the transmission, wholesale supply, distribution, and sale of electricity and natural gas;
- Establish and enforce, in consultation with the Public Utilities Regulatory Commission, standards of performance for public utilities engaged in the transmission, wholesale supply, distribution, and sale of electricity and natural gas; and
- Promote and ensure uniform rules of practice for the transmission, wholesale supply, distribution, and sale of electricity and natural gas.

As per the Energy Commission Act, the Commission can, by the legislative instrument, prescribe standards of performance for the supply, distribution, and sale of electricity, and issue technical and operational rules of practice for electricity and natural gas public utilities

The Energy Commission Act, 1997 (Act 541) establishes the Energy Commission and clarifies its functions, which are the regulation and management of the utilization of energy resources in Ghana and the coordination of policies in relation to them.

The Public Utilities Regulatory Commission Act, 1997 (Act 538) provides for the establishment of a Public Utilities Regulatory Commission (PURC) to regulate and oversee the provision of utility services to consumers, and to provide guidance on related matters.

licensed under the Act. It also enables the Minister of Energy to make regulations by legislative instrument at the advice of the Energy Commission. As a result, much of the legislation relating to the power sector in Ghana follows from the Energy Commission Act.

The Public Utilities Regulatory Commission Act, 1997 (Act 538) provides for the establishment of a Public Utilities Regulatory Commission (PURC) to regulate and oversee the provision of utility services to consumers, and to provide guidance on related matters. The PURC is responsible for:

- Determining guidelines for rates to be charged for the provision of utility services;
- Examining and approving water and electricity rates;
- Protecting the interest of consumers and providers of utility services;
- Monitoring and enforcing standards of performance for provision of utility services; and
- Promoting fair competition among utilities.

Another important law, the Renewable Energy Act, 2011 (Act 832), governs the development of Ghana's renewables sector. This Act aims to create an enabling regulatory environment to engage the private sector in the development, management, and utilization of renewable energy efficiently and sustainably. Key provisions in the Act include:

- Renewable Energy Purchase Obligations under which power distribution utilities and bulk electricity consumers must purchase some percentage of their electricity from electricity generated from renewable energy sources;
- Definition of the licensing regime for commercial activities in the renewable energy industry;
- The establishment of a Renewable Energy Fund to provide incentives for the promotion, development, and utilization of renewable energy resources; and
- The establishment of a Renewable Energy Authority (yet to be implemented).

Grid Code and technical regulations

The generation segment is bound by the terms and conditions of the operating license, besides relevant portions of the Grid Code, and the Electricity Regulations (such as Rules 2(1) (b) (i) and Rule 9 under the Compliance with WEM rules) which govern the wholesale electricity market.

Electricity transmission service is regulated mainly through:

- The Electricity Transmission Rules, 2008 (L. I. 1934) define the National Interconnected Transmission System, set the technical and operational standards for the transmission service, and provide the legal framework for open, fair, and non-discriminatory access to the electricity transmission network for all industry players.
- The National Electricity Grid Code, 2009 establishes the requirements, procedures, practices, and standards that govern the development, operation, maintenance, and use of the high voltage transmission system in Ghana. The grid code also defines important rules for the generators, such as Responsibilities of Wholesale Suppliers (Art. 3.14), Obligations of Wholesale Suppliers (Art. 8.08 under the Connection Sub-

Code), Compliance with Connection Requirements (Art. 9.43), and Responsibilities of Wholesale Suppliers (Art. 10.09 under the Scheduling and Dispatch Sub-Code).

- The Electricity Regulations, 2008 (L.I.1937) establish the Wholesale Electricity Market to facilitate the wholesale trading of electricity and the provision of ancillary services in the National Interconnected Transmission System.
- The Renewable Energy Sub-Code for Transmission System (NITS), 2015 proposes minimum technical connection conditions for variable renewable plants to the transmission network, in line with the National Electricity Grid Code.

The distribution side of the WEM is overseen by the following key regulations:

- Electricity Supply and Distribution (Technical and Operational) Rules, 2005 (L.I. 1816) provide for, among others, the supply and metering of electricity, the quality of supply of electricity, electricity billing and payments, complaints and dispute resolution, electricity tariff-setting, and tie-in agreements of embedded generators.
- Electricity Supply and Distribution (Standards of Performance) Regulations, 2008 (L.I. 1935) provide for performance benchmarks for electricity supply and distribution in conformity with the provisions of L.I. 1816.
- Similarly to transmission, the Renewable Energy Sub-Code for Distribution Network, 2015 proposes minimum technical connection conditions for variable renewable plants to the Distribution Network.

For private sector operators in the distribution segment of the market, all the rules and conditions apply equally, as detailed in Chapter 10 of the EC's License Application Manual (for Service Providers in the Electricity Supply Industry), May 2012. The critical step is to identify an area, zone, or enclave where their services would be needed for a thriving business, as in the case of the private distributor Enclave Power.

While the off-grid segment lacks dedicated legislation and regulation, however, the technical requirements of operating a mini-grid in Ghana are that:

- It shall have an electricity generator, or generators, from one or more renewable energy sources within its network;
- At least 70 percent of the electricity supplied from the system, in a calendar year, shall be from renewable energy sources;
- The mini-grid system shall be designed, constructed, and operated in compliance with the same standards used for rural electrification projects;
- It must also comply with the technical requirements of the National Distribution Code and the Renewable Energy Sub-code for the Distribution Network;
- Pricing and metering the standard of performance, and customer service issues are regulated in the same way by the PURC and EC; and
- Tariff setting shall follow the Uniform Tariff Policy by which every consumer everywhere within a given consumption bracket pays the same rate.

Tariff regulation

The PURC Rate Setting Guidelines for Electricity Distribution and Supply set out the tariff philosophy, as well as the methodology and approval process for end user tariffs in Ghana. The guidelines define the key principles behind the tariff determination, including the recovery of efficiently and prudently incurred costs, and the provision of proper economic signals through regular reviews and adjustments.

End-user tariffs are set in two broad categories: (a) residential customers, and (b) non-residential customers.

- The residential customer category is further divided into three classes based on the level of consumption: (i) Lifeline Supply for the low-income bracket; (ii) Energy First Threshold (EFT); and (iii) Energy Second Threshold (EST). The per unit cost of electricity increases as consumers move to the higher brackets.
- Non-residential customers also pay electricity tariffs based on consumption and are grouped into two classes: (i) Special Load Tariff – low voltage (SLT-LV) customers and (ii) medium voltage (SLT-MV) and high voltage (SLT-HV) customers.

PURC applies an Automatic Adjustment formula to the tariff regime every quarter and conducts a major tariff review once every two years, after consultations with the utilities.

2.4.2 Other regulation for private sector participation

Private sector participation models

There are several private sector participation models in use in Ghana's power sector. There are no clear preferences with regards to their application since no firm guidelines are published as of yet. They are expected, however, to comply with the tenets of the Public Procurement Law.

For the generation segment, several projects have been undertaken based on various Public-Private Partnership (PPP) models. This includes the Build-Own-Operate (BOO) model, as in the Chinese Sunon-Asogli and the Turkish Karpowership Power Plants, and the Build-Operate-Transfer (BOT), as in the Emirati Ameri Emergency Power Plant. Furthermore, IPPs can freely invest in merchant generation facilities.

For the distribution segment, the government anticipates the use of two types of models (Millennium Development Agency 2015):

- The Concession model, whereby the electricity distribution network and other assets of the state-owned utility are leased to a Concessionaire, and the utility becomes an Asset Holding Company. At the end of the concession (20 or 25 years), all assets revert to the utility. This model is envisaged for the Electricity Company of Ghana.
- The Management Contract Model, whereby the Operator is required to put in place improved systems for the day-to-day operations of the utility, including collection of revenues, and is paid an agreed-upon fee by the utility. This model is envisaged for Northern Electricity Distribution Company.

Procurement processes

All public procurements are conducted in accordance with the Public Procurement Law (Act 663, 2003). The law provides for transparent public procurement, the institutional arrangements for the procurement process, and stipulates tendering procedures. It requires the tendering procedure to rely on a Tender Committee through which tenders are transparently and competitively conducted.

Procurement under the law can take different permitted forms, including national competitive tendering, international competitive tendering, and other international procedures. Electricity infrastructure procurement is managed by the entities themselves, under Act 663. Private players can freely invest in the market outside of capacities tendered by public authorities if they can find a reliable off-taker and negotiate a mutually acceptable Power Purchase Agreement (PPA).

Incentives

Incentives and benefits are granted to investors through the Ghana Investment Promotion Centre (GIPC), the government agency for the encouragement and promotion of investments established through the GIPC Act 865. GIPC has the mandate to ensure that transparency, equity, and the rule of law prevail in the business environment in Ghana.

Under Section 26 (4) of the Act, specific incentive packages may be negotiated, in addition to the incentives and benefits available under other pieces of legislation, such as customs and taxation laws. Some other guarantees for enterprises include convertibility of currency, repatriation of dividends, and profits after tax. The Council is also empowered to assist investors in taking advantage of various financial packages that may be available to them, including tax reduction, exemption of materials/components/equipment and machinery from import duty and value-added tax (VAT), as well as exemption of import duty on plants and plant parts for electricity generation or equipment related to renewable technologies.

For the off-grid sector, which is receiving much government and international attention, the Ghana Renewable Energy Master Plan (REMP) lists incentives to renewable energy manufacturing and assembling firms, including tax breaks, capital subsidies, and loan guarantees. Other stated incentives include:

- Tax reduction for manufacturing and assembly;
- Exemption of materials, components, equipment, and machinery for manufacturing or assembly from import duty and VAT up to the year 2025; and
- Exemption of import duty on plants and plant parts for electricity generation from renewable energy resources.

Incentives and benefits are granted to investors through the Ghana Investment Promotion Centre (GIPC), the government agency for the encouragement and promotion of investments established through the GIPC Act 865. GIPC has the mandate to ensure that transparency, equity, and the rule of law prevail in the business environment in Ghana.



Analysis of Electricity Market Policy and Regulatory Framework



*Akosombo Hydroelectric Power Station on the Volta River, Ghana
Photo credit: Sopotnicki*

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.




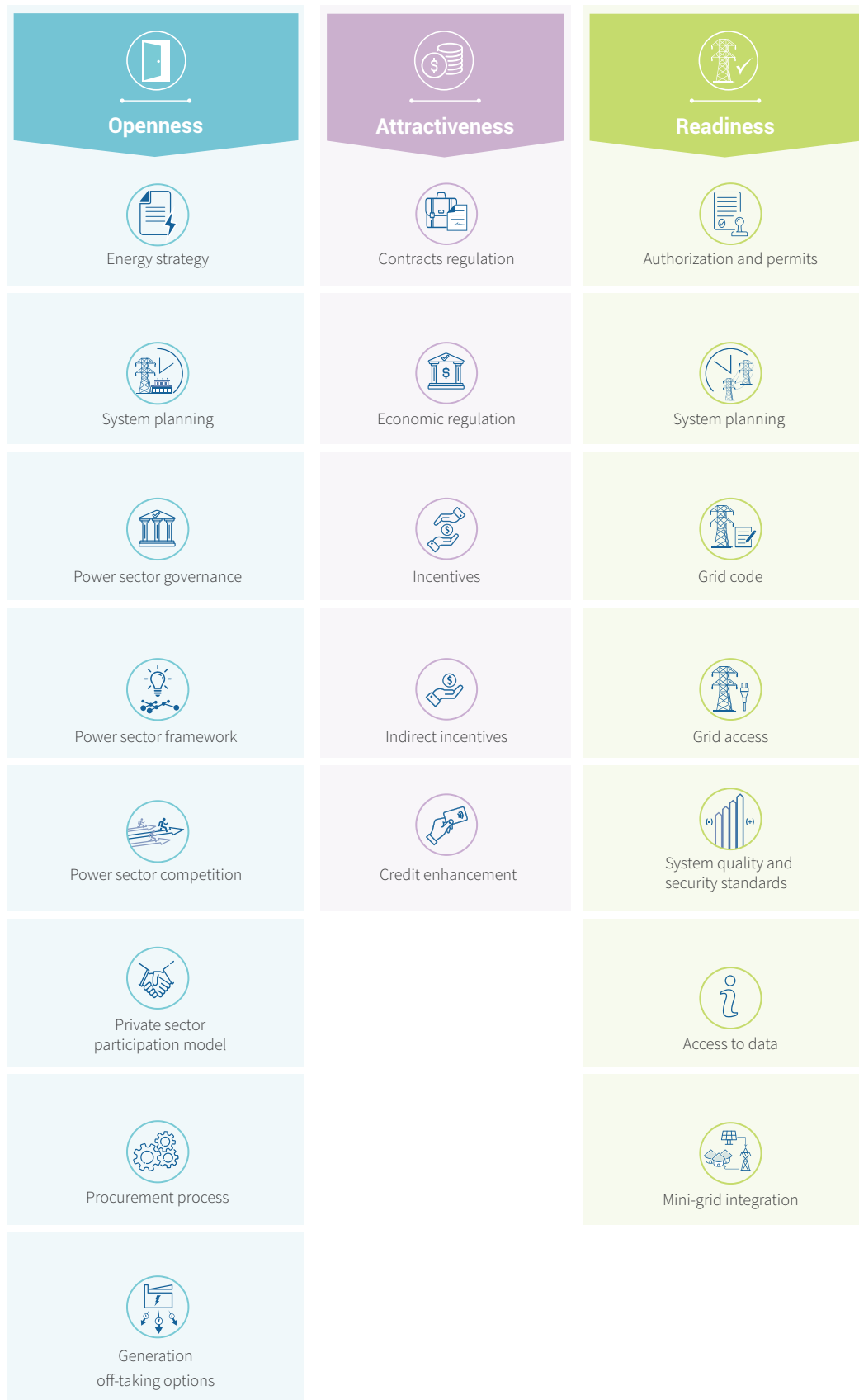
 <p>Openness</p>	<p><i>Openness</i> – or power sector structure and governance. This Dimension covers policies, laws, and regulations meant to define energy policy and strategy priorities, market entry, infrastructure planning, sector governance, market structures, and related considerations. These instruments combined provide an overall view of the <i>openness</i> of the electricity market to investors.</p>
 <p>Attractiveness</p>	<p><i>Attractiveness</i> – or sector economics. This Dimension assesses policies, laws, and regulations that ensure the economic viability of electricity infrastructure investments, as well as fair competition among market operators. A review of these instruments provides an overall synthesis of the <i>attractiveness</i> of the electricity market to private sector investors.</p>
 <p>Readiness</p>	<p><i>Readiness</i> – or sector maturity. This Dimension investigates technical regulations designed to ensure the effective implementation and efficient integration and management of electricity infrastructure within the electricity system. A review of these elements of the Dimension provides an overall picture of the <i>readiness</i> of the electricity market to investors along the value chain.</p>

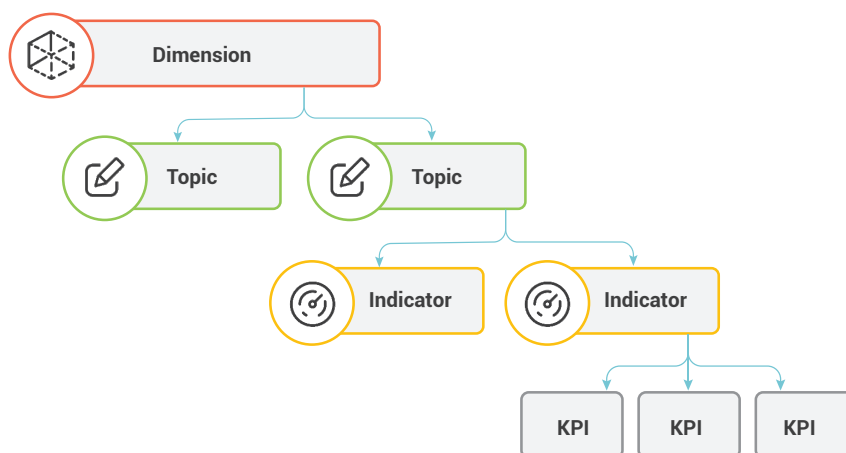
Figure 11: Overview of the topics assessed within each dimension



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 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.

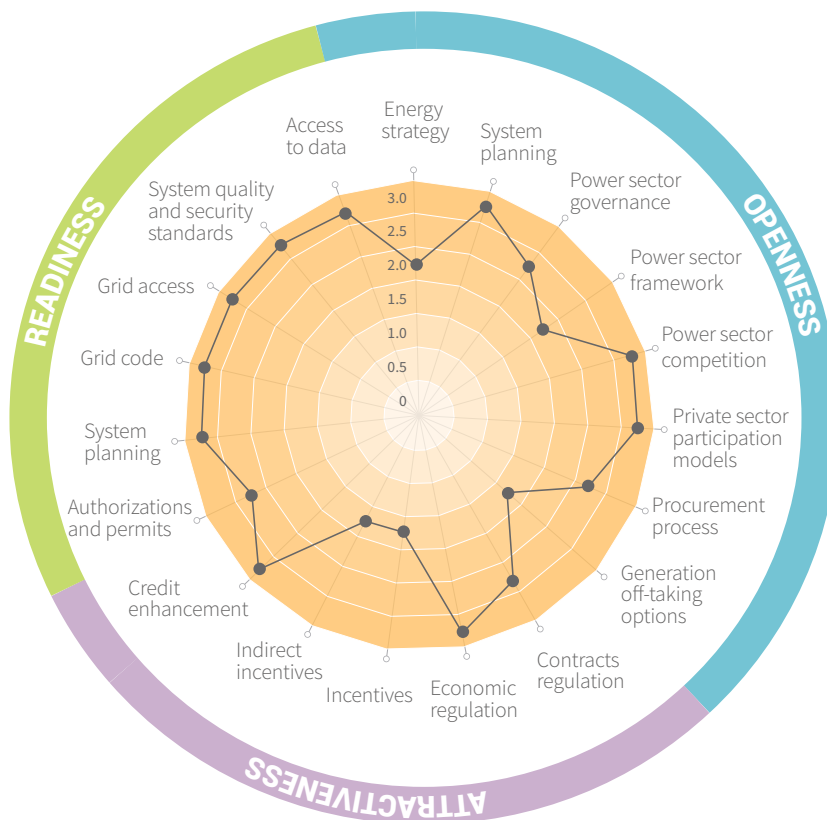
The quantitative results, therefore, are presented at the Topics level and use a scoring system based on a 0 to 3 point-scale, where 0 is the lowest score – indicating a lack of regulatory preparedness on the assessed Topic related to private sector investment participation – and 3 is the highest – indicating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

3.2 Main findings

The section below presents the quantitative results of the performed assessment of South Africa’s electricity policy and regulatory framework related to the crowding-in of private investors to the electricity market.

3.2.1 Generation segment

Figure 13: Overview of the Generation segment



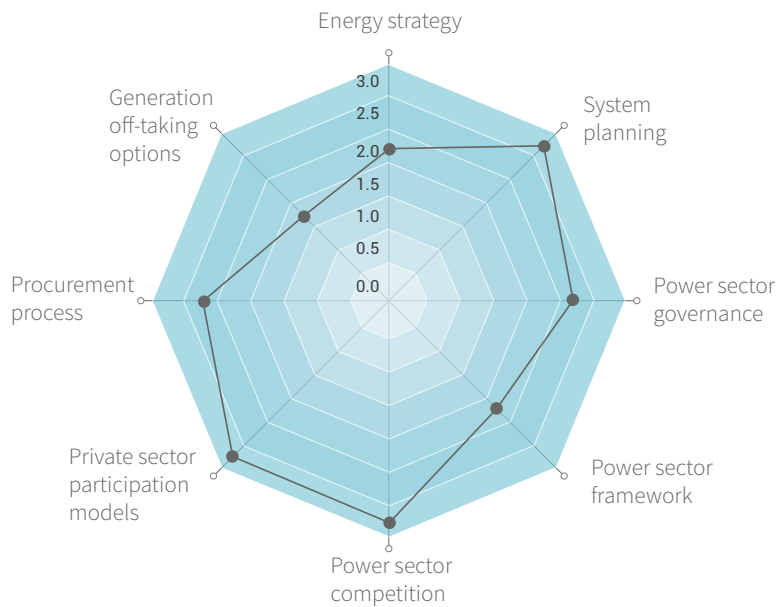
Concerning policies, laws, and regulations relevant to the electricity generation segment, Ghana appears to have reached, overall, a satisfying level of effectiveness in responding to private investors’ requirements (as shown in figure 13). Ghana performs well in almost all the Topics investigated in the three Dimensions: namely the *openness*, *attractiveness*, and *readiness* Dimensions. The successful integration of IPPs in Ghana’s electricity market and their share in national electricity production confirm these results.

However, Ghana still faces shortcomings in key policy and regulatory areas such as the adequacy of the *energy strategy*, the *power sector framework*, and the *generation off-taking options* in the *openness* Dimension. Similarly, private sector investors looking for direct and indirect *incentives* generally experience challenges towards the *attractiveness* of the market. These gaps are reflected in the scores obtained by Ghana in the related Topics, which tend to be lower than most other scores in the generation segment.



A deep dive into the Openness dimension

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



Overall, the Topics within the *openness* Dimension scored very well, with the exception of *energy strategy*, *power sector framework*, and *generation off-taking options*.



Energy strategy

Ghana’s National Energy Policy is issued by the Ministry of Energy, setting strategic priorities and orientations for energy sector development, in line with the national macroeconomic agenda. However, the relatively low score related to *the energy strategy* could be explained by several factors. First, the absence of a legislative backing of the national energy policy priorities, as well as the national climate change policy, which reduces the enforceability of the targets defined in these documents. Second, both Ghana’s energy and climate policies do not state clear targets for renewable energy development and greenhouse gas (GHG) emission reductions. Furthermore, policy reviews and updates are done at the insistence of the competent Ministries, which reduces the predictability of policy changes for investors. For instance, the currently available national energy policy has been adopted in 2010 and has been under review for the past few years.

 <p>System planning</p>	<p>Ghana has adopted a comprehensive framework for electricity system planning, able to define a clear hierarchy of planning exercises that cover the entire value chain and establish clear regulatory oversight on the process. The Integrated Power System Master Plan is publicly available and regularly updated by a technical committee under the oversight of the regulator. The generation investment plan is also contained in the Strategic National Energy Plan. Progress in these areas explains the highest possible score of Ghana in the <i>system planning</i> Topic for the generation segment.</p>
 <p>Power sector governance</p>	<p>As shown above, Ghana's electricity sector is governed by multiple laws, mainly the Energy Commission Act and the Public Utilities Regulatory Commission Act, which clearly state the roles and responsibilities of the technical and economic regulatory bodies. Both regulators benefit from an acceptable level of political and financial autonomy and have the power to enforce their decisions. However, Ghana's decision to regulate the governance of the electricity sector through a set of different laws, instead of adopting a comprehensive Electricity Law, which states the roles and responsibilities of governing bodies and market operators along the entire value chain, may reduce the clarity of existing legislation for private investors. This explains the slightly poorer performance in the <i>power sector governance</i> Topic.</p>
 <p>Power sector framework</p>	<p>Ghana has also unbundled its electricity system through the creation of GRIDCo. As a state-owned transmission utility, GRIDCo is the only authorized transmission service operator licensee. The regulation allows for the creation of several distribution companies, both public and private. Ghana scores well in the <i>power sector framework</i> Topic, with the only limitation of having bundled the transmission asset ownership and management with the system operation service provider.</p>
 <p>Private sector participation model</p>	<p>In terms of <i>power sector competition</i> and <i>private sector participation models</i> available to generation investors, Ghana is a top performer, having successfully introduced competition at both wholesale and retail market levels. This is undertaken through the implementation of the WEM and making available to investors all possible models to enter into the generation market: from concession to engineering, procurement, and construction (EPC) contracts; and from divestiture of public assets/companies to merchant investment opportunities.</p>
 <p>Power sector competition</p>	
 <p>Procurement process</p>	<p>Even though the National Policy on PPP, approved in 2011, provides guidelines and defines responsibilities for PPPs that include implementation guidelines, the policy lacks a proper legislative backing. A PPP Advisory Unit (PAU) has been established within the Public Investment Division of the Ministry of Finance and Economic Planning (MoFEP) to oversee the procurement of PPPs. In parallel, public procurement is ruled by the Public Procurement Act, which defines competitive tendering as the norm for public procurement procedures.</p>



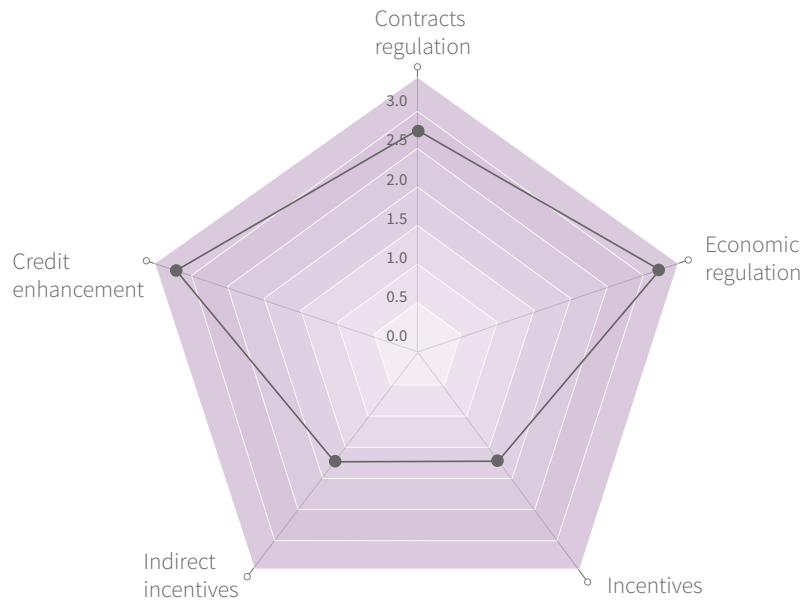
Generation off-taking options

Ghana’s WEM works around bilateral contracts between wholesale suppliers and bulk clients (mainly distributors) and a spot market for ancillary services. Direct retail between generators and bulk final consumers, through private PPAs, is also possible, as are self-production/consumption schemes for captive generation units. However, market rules for the functioning of the WEM are still under development, also in close coordination with ECOWAS for the West-Africa Power Pool, lowering Ghana’s *generation off-taking options*.



A deep dive into the Attractiveness dimension

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



Contracts regulation

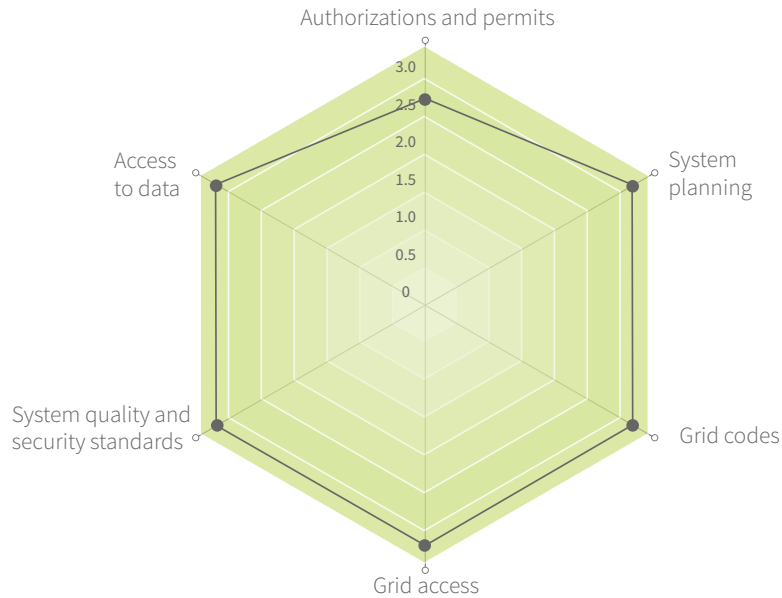
Ghana has been able to attract numerous private investments into the generation segment where several IPPs are currently operational. All of them sell directly to the public distributors through power purchase agreements (PPAs), negotiated on a case-by-case basis. These agreements consider clauses and provisions (such as inflation indexation, foreign currency, frequency of payment, dispute resolution, and termination provisions) that ensure the bankability of the contracts. However, the lack of a standardized PPA with public energy off-takers reduces the transparency of the negotiation process and limits Ghana’s regulatory effectiveness related to *contracts regulation*.

 <p>Economic regulation</p>	<p>Clear regulation on tariff-setting, defined in the Electricity Rate Setting Guidelines available on the PURC website, and clear rules for tariff revisions (automatic adjustment formula applied to tariff adjustments every quarter and major tariff reviews every two years) are clear advancements in Ghana's <i>economic regulation</i>.</p>
 <p>Incentives</p>  <p>Indirect incentives</p>	<p>The <i>incentives</i> and <i>indirect incentives</i> are Topics in which Ghana scores the lowest in the <i>attractiveness</i> Dimension.</p> <p>In terms of direct incentives, and supporting schemes for generation technologies, Ghana is undergoing reform in its renewable energy supporting scheme. It is moving from a Feed-in-Tariff policy, which is no longer available, to a renewable energy source (RES)-specific auctions for the procurement of new renewable capacities. Specific auctions have already been used successfully, offering PPAs to support the bankability of the projects. No other supporting schemes for RES (such as the green certificate or quota systems) are currently available, even if the Renewable Energy Act foresees renewable energy purchase obligations for distribution utilities and bulk customers.</p> <ol style="list-style-type: none"> a. Take-or-pay clauses and firm capacity payment components are common standards for PPAs in Ghana, providing support to the development of capacities, including for fossil fuel-based generation. b. In terms of indirect incentives for generators, Ghana doesn't offer subsidies (such as results-based financing and direct capital expenditure (CAPEX) support) to private generation investors. National carbon price mechanisms are also not available. Only VAT exemption for machinery and equipment is available through the GIPC Act.
 <p>Credit enhancement</p>	<p>The presence of multiple credit enhancement mechanisms (including a recent cash waterfall mechanism, concessional lending, government guarantees for qualifying projects, and multilateral guarantees upon specific application to appropriate financing institutions) demonstrate confidence in Ghana's <i>credit enhancement</i> instruments.</p>









A deep dive into the Readiness dimension

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



Ghana performs excellently in the *readiness* Dimension related to the generation market. The assessment shows that it performed excellently in five out of six explored Topics.

 <p>Authorization and permits</p>	<p><i>Authorizations and permits</i> are the exception, due to a lack of a one-stop-shop where investors can access all permits and authorizations needed (such as for water rights, construction permits, environmental approval, and rights to land). However, there are clear rules for all authorizations and permits with dedicated issuing institutions. Land access rules are the responsibility of the Lands Commission, however, are handled at the local level. The well-defined national rules for construction permits are the domain of the licensing authority, the Energy Commission.</p>
 <p>System planning</p>	<p><i>System planning</i>, as already assessed in the <i>openness</i> Dimension, is comprehensive and with good regulatory oversight. Such regulation also covers the planning of network infrastructure, with transmission network planning being part of the IPSMP. GRIDCo regularly carries out assessments of network expansion needs with the support of the EC, and RES integration studies have also been carried out in the past.</p>
 <p>Grid code</p>	<p>The national Grid Code, adopted by the EC, defines system operation rules and grid connection rules, including rules on dispatch and ancillary services provision. The Grid Code is publicly accessible on the EC website. These factors mainly explain Ghana's top performance in the <i>grid code</i> Topic.</p>

 <p>Grid access</p>	<p>Furthermore, the national Grid Code provides a mandatory connection by the Transmission Service Operator (TSO) to all licensed entities, ensuring access to the national grid in a fair, transparent, and non-discriminatory manner. Connection rules and allocation for connection costs are aspects governed by the Grid Code, providing clarity on <i>grid access</i>.</p>
 <p>System quality and standards</p>	<p>Finally, the national Grid Code, as well as other regulations issued by the EC, provide clear guidance on the <i>quality and security standards</i> for planning and operating the transmission network.</p>
 <p>Access to data</p>	<p>Ghana also ensures transparent and fair access to fundamental data for electricity market operators, enabling good performance under <i>access to data</i>. While socio-economic data is made available on the website of the Ministry of Finance and Economic Planning (MoFEP), power sector-related data, as well as financial information on public utilities, is published under the guidance of the EC.</p>

3.2.2 Transmission segment

Figure 17: Overview of the transmission segment

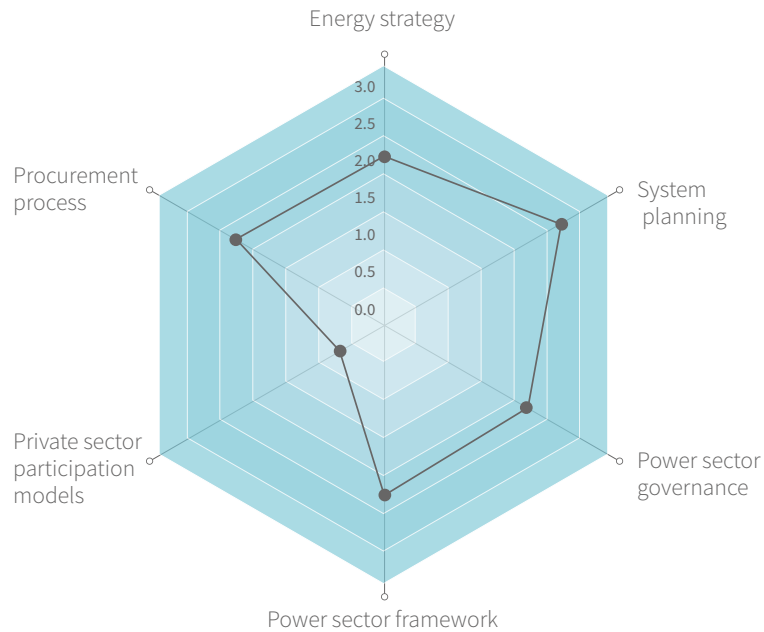


Generally, the current policy and regulatory framework seems to be fairly well adapted to answer to the requirements of potential private investors in transmission assets, underlining Ghana’s ability to reform its electricity market towards greater private sector participation. However, private sector participation in Ghana’s electricity sector has been mostly confined to the generation segment and remains restricted in the transmission segment. Concerning the electricity transmission assets and service, the current legislation allows for private ownership of assets; however, the national Grid Code restricts obtaining the transmission license only to the public transmission utility, GRIDCo. This is well reflected in the results of our assessment, which illustrates Ghana’s low performance in the *private sector participation models* Topic considered in the *openness* Dimension.



A deep dive into the Openness dimension

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






Ghana’s mitigated performances in the Topics covered by the *openness* Dimension related to the transmission service reflects the current restrictions to private sector participation. In this section, we will focus on those Topics that differ significantly from the score achieved by the country in the generation segment. For more details on the *energy strategy* and *power sector framework* results, refer to the comments provided in the generation segment section.



Energy strategy

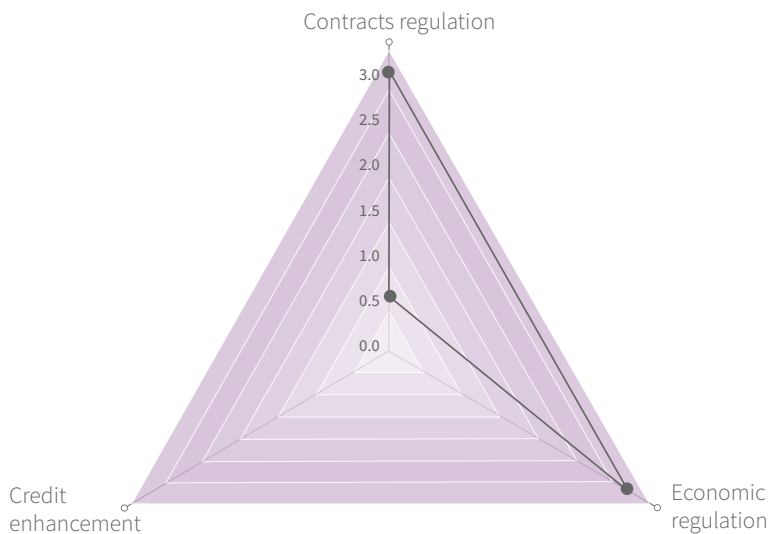
Ghana’s performance in the *system planning* Topic is related to the absence of a publicly available transmission system investment plan, detailing both technical and financial information on the pipeline of new transmission assets to be developed. Such an investment plan nonetheless exists as an internal GRIDCo document.

 <p>Power sector governance</p>	<p>The <i>power sector governance</i> score is related to the current private sector restrictions in transmission services. In fact, obtaining a transmission license, as required by the Energy Commission Act, is restricted only to GRIDCo. No more than one transmission license, effectively covering the national interconnected transmission system, can be issued by the EC. This excludes de facto any private participation in the transmission service but not the possibility for private companies to own (or invest in) transmission assets. Such possibility is also reflected in the available models for private sector participation.</p>
 <p>Private sector participation model</p>	<p>Only EPC-type contracts are available and are mainly used by GRIDCo to build new transmission assets. Private network companies, such as Enclave Power, own transmission assets. All the other models, that also encompass the operation of the service (such as concession agreements, independent transmission operators, or merchant lines) are not authorized and considered by the current legislation. Thus, explaining the low score in <i>private sector participation models</i>.</p>
 <p>Procurement process</p>	<p><i>Procurement process</i> of new transmission assets is managed following the rules for public procurement. This is often implemented through international competitive tenders for the building of assets (through EPC-type contracts) directly managed by GRIDCo in compliance with the Public Procurement Act. Transmission assets, however, seem to be excluded from PPP possibilities, which normally foresee active private sector participation in the operation of the undertaking.</p>






A deep dive into the Attractiveness dimension

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



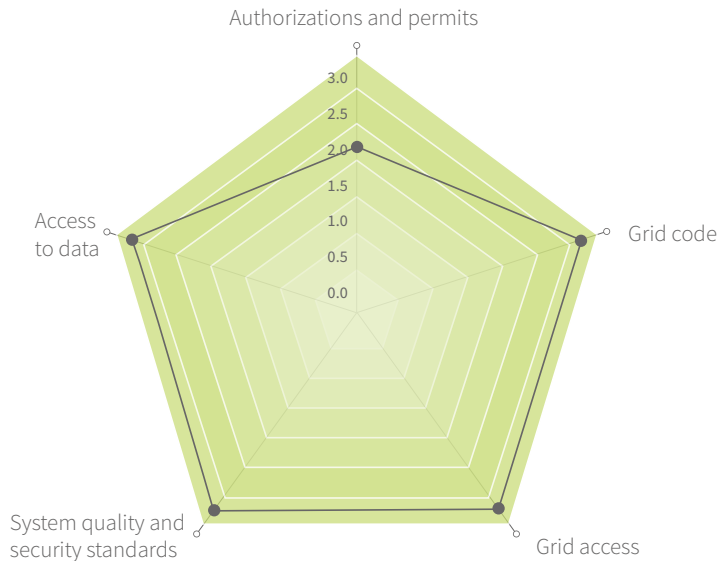
Overall, Ghana achieves a good performance in the regulatory Topics covered by the *attractiveness* Dimension for the transmission segment, reaching the highest score in 2 out of 3 Topics.

 <p>Contracts regulation</p>	<p>The good performance in <i>contract regulation</i> is mainly explained by the clarity of the EC Act concerning the conditions and requirements to be included in the transmission license, such as:</p> <ul style="list-style-type: none"> • The safe, reliable, economic dispatch and operation of the national interconnected systems for the transmission of electricity; • Economic compensation for the transmission company tariffs to be charged by the licensee for its services under the approval of the Public Utilities Regulatory Commission; and • The procedure for obtaining and terminating transmission and interconnection services for electricity.
 <p>Economic regulation</p>	<p>The network tariff is established by PURC under a hybrid method combining cost plus revenues principles and performance-based incentive mechanisms. This is aimed at encouraging regulated utilities to work towards achieving the Commission’s regulatory performance benchmarks. The Electricity Rate Setting Guidelines are available on the PURC website. These elements explain Ghana’s high performance in <i>economic regulation</i>.</p>
 <p>Credit enhancement</p>	<p>On the opposite spectrum, the poor performance related to <i>credit enhancement</i> can be explained by the unavailability of such mechanisms for private investors in transmission assets.</p>







A deep dive into the Readiness dimension

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

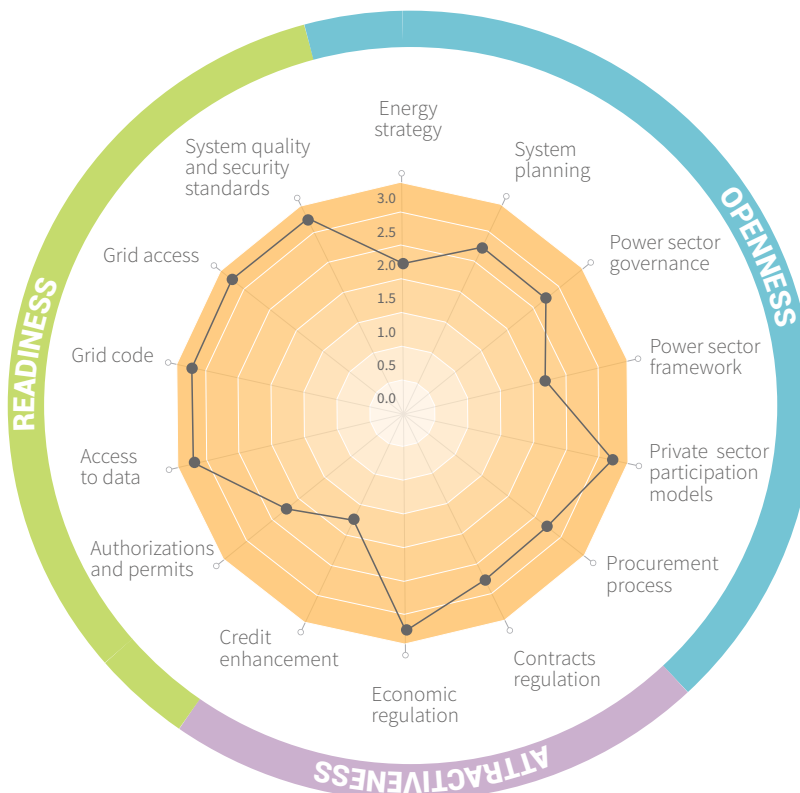


Ghana performs well overall in the *readiness* Dimension. Of the five Topics covered, *authorizations and permits* management is the only area requiring further improvements.

 <p>Authorization and permits</p>	<p>Even though there are clear rules for all authorizations and permits with dedicated institutions, the issuance of required permits is decentralized to each of the respective authorities (see <i>Generation – Readiness</i>). The Right-of-Way is only available for transmission operators licensed by the EC.</p>
 <p>Grid code</p>  <p>Grid access</p>	<p>Ghana’s national Grid Code, as well as the L.I. 1934, set the technical and operational standards of performance for the transmission service. It also provides the legal framework for open, fair, and non-discriminatory access to the electricity transmission network for all industry players. Grid connection rules, as well as grid access procedures for both wholesale suppliers (generators) and final customers, are well established and clarified by the two regulations. Regarding grid connection rules for final customers, the regulation distinguishes two forms: for bulk consumers connecting directly to the transmission grid; and for residential, commercial, and industrial customers connecting to the distribution network. These elements explain the top scores related to <i>grid code</i> and <i>grid access</i> regulation for the transmission segment.</p>
 <p>Access to data</p>	<p>Finally, in addition to transparent and fair access to fundamental data for electricity market operators, data regarding transmission grid operations and quality is reported to the EC. This is part of the condition of the transmission license. Data is also made public, resulting in better <i>access to data</i>.</p>

3.2.3 Distribution segment

Figure 21: Overview of the distribution segment

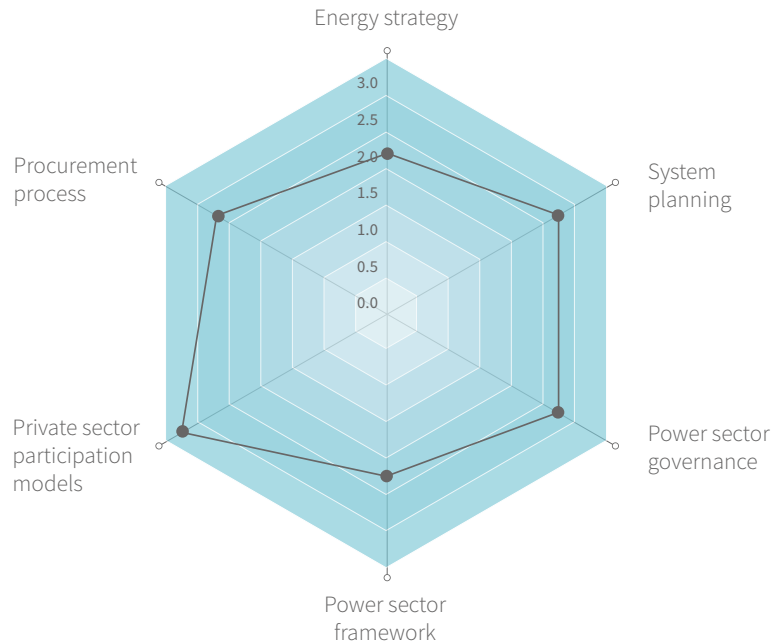


Overall, Ghana’s regulatory environment related to private sector participation (PSP) in the electricity distribution market is well developed. The EC law envisages private sector participation in the distribution service, as well as in electricity brokerage operations and retail. However, the private sector appears not to have made many inroads in the distribution segment. Exceptions are the execution of EPC contracts and the presence of a private distributor, Enclave Power Company, which is serving the Tema Free Zones Enclave. While the assessment of the Topics in the *readiness* Dimension confirms Ghana’s very good performances, the *openness* and *attractiveness* Dimensions show some room for further regulatory improvements.



A deep dive into the Openness dimension

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






All Topics score relatively high in the *openness* Dimension, in line with the respective scores seen in the previous segments. Most of the elements have already been explained in previous sections (see *Generation – Openness*, and *Transmission – Openness*); however, additional points can be made related to relevant elements for the distribution segment



Energy strategy

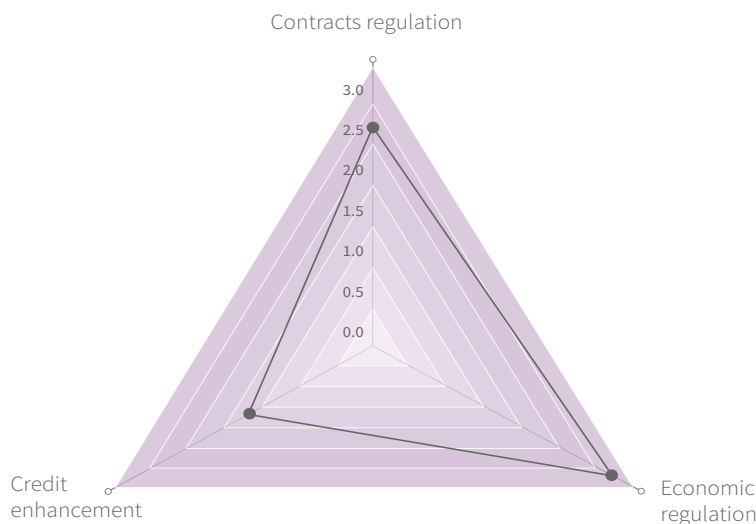
Ghana has not set targets to increase electricity access per annum; however, the National Energy Policy states the objective to achieve universal access to electricity to all communities by 2020, which is now extended to 2025. Other targets defined in the national energy policy do not benefit from legislative backing. This would imply that they can be considered as indicative policy ambitions with limited enforceability, which explains the relatively low score under the *energy strategy* Topic.

 <p>System planning</p>	<p>Concerning <i>system planning</i>, public distribution utilities (GRIDCo and NEDCo) are integrated into the planning exercise whereby they are requested to prepare a distribution network development plan. However, Ghana lacks an integrated electrification plan. The available plan was put in place in 1989 when an electrification strategy was put in place for the first time. Furthermore, a related investment plan meant to support the country in achieving its universal electrification target is also lacking.</p>
 <p>Power sector governance</p>	<p>The Energy Commission Act allows private parties to invest in distribution assets and to operate parts of the distribution service, subject to possession of a distribution license. More detailed information about procedures and requirements to obtain licenses, as well as rights of the licensees, are available in the License and Permit Application Manual for Service Providers in the Electricity Supply Industry, publicly available on the EC's website.</p>
 <p>Private sector participation model</p>	<p>Numerous models of private sector participation in the distribution segment are permissible by the existing regulation (such as concessions, privatization, and EPC-type contracts). We are also able to find examples of those in Ghana's current electricity market. These explain the good performance of Ghana related to the permissibility of various <i>private sector participation models</i>.</p>
 <p>Procurement process</p>	<p>The first attempt at introducing a PPP agreement in the distribution service, foreseeing the attribution of GRIDCo assets and client base to a private concessionaire, failed. This is due to the decision of the Government of Ghana to suspend the concession agreement a few months after its attribution in mid-2019. Consequently, procurement in the electricity distribution sector remains managed by the public distribution utilities, following the Public Procurement Act rules. The uncertainty about PPP agreements for distribution services motivates a relatively low performance under <i>procurement process</i>.</p>






A deep dive into the Attractiveness dimension

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



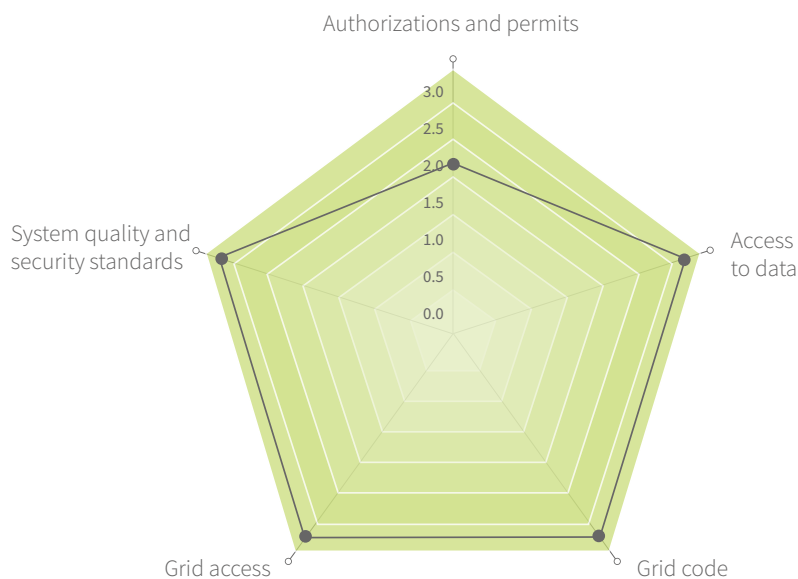
Ghana overall performs well related to regulations that determine the *attractiveness* of the distribution market to investors. Of the three regulator Topics reviewed, only the *credit enhancement area of assessment* is observed to be relatively low.

 <p>Contracts regulation</p>	<p>The EC Act and L.I. 1816 (Technical and Operational rules for electricity supply and distribution) define rights and obligations of electricity distributors and retailers. The Act covers key aspects such as standards of performance, metering, billing and payments, complaints and dispute resolution, and electricity tariff-setting. All licensed distributors, public or private, must respect these provisions, which ensure a transparent and clear contractual framework for distributors. However, related to <i>contracts regulation</i> there is a lack of clarity on how the rights and obligations of the distributor will change in response to changes outside their control. For example, change in tariffs set by the PURC, or reducing the potential flexibility of distributors in adjusting their business model to the new conditions.</p>
 <p>Economic regulation</p>	<p>As already discussed, (refer to <i>Transmission – Attractiveness</i>), PURC’s Electricity Rate Setting Guidelines motivate Ghana’s performance in the <i>economic regulation</i> Topic.</p>
 <p>Credit enhancement</p>	<p>Electricity distribution companies, including potential private distributors, have access to multilateral guarantees and concessional lending as credit-enhancing instruments. However, escrow accounts and other forms of government guarantees are not yet considered, and are currently unavailable to distributors, explaining the low performance related to <i>credit enhancement</i>.</p>






A deep dive into the Readiness dimension

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

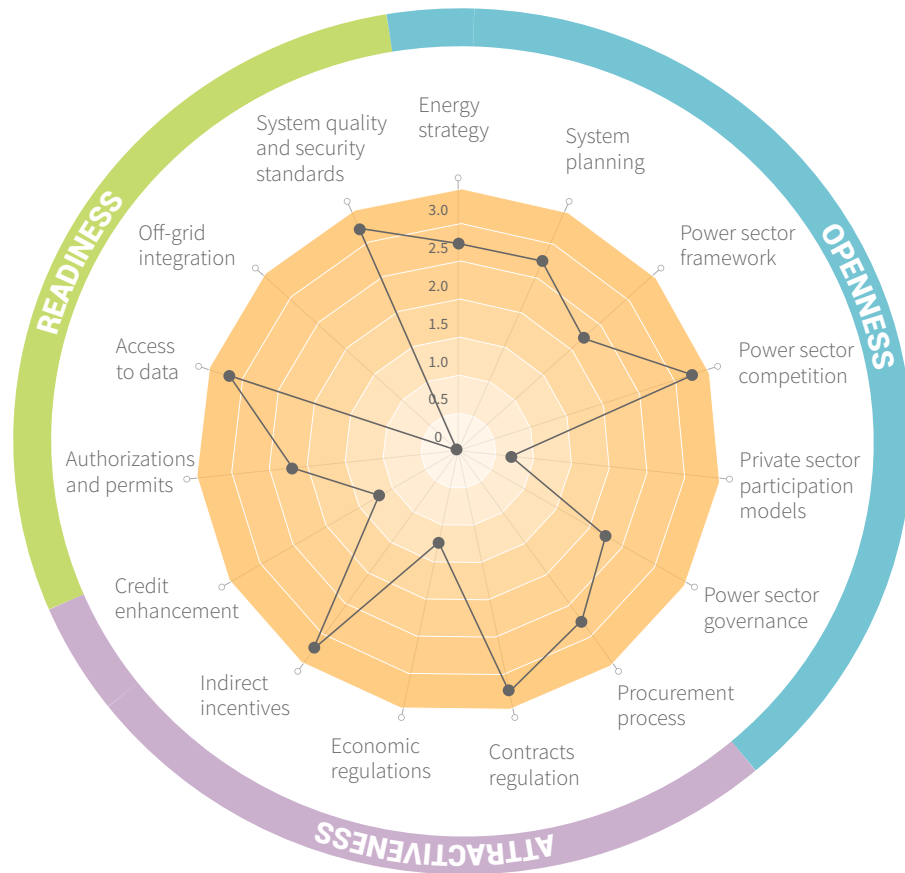


Similarly to the Generation and Transmission market segments, Ghana performs excellently in almost all the *readiness* regulatory Topics in Distribution. A remaining gap is related the *authorizations and permits* Topic, due to the lack of a one-stop-shop for the issuing of all permits and required authorizations (see both *Generation – Readiness* and *Transmission–Readiness* for more detailed assessment).

 <p>Grid access</p>	<p>The EC is working on a national Distribution Grid Code, rules, and provisions related to distribution system operation. Access to the network and connection agreements to the distribution network is currently regulated by the national Grid Code, the L.I. 1816, and some parts of L.I. 1934. This explains Ghana’s top performance both in putting in place a Grid Code and clarification on <i>grid access</i>.</p>
 <p>Access to data</p>	<p>The ECG and NEDCO, as well as the Electricity Market Oversight Panel (EMOP) of the EC, compile data regarding distribution grid operations and quality. This practice has ensured transparency on fundamental market data, which justifies the performance related to <i>access to data</i>.</p>
 <p>System quality and standards</p>	<p>The L.I. 1816 and the L.I. 1935 both deal with system quality and security standards, as well as performance and benchmarking for quality of electricity supply and distribution service. As a result, Ghana performs well in the <i>system quality and security standard</i> regulatory area for the distribution segment.</p>

3.2.4 Off-grid segment

Figure 25: Overview of the off-grid segment

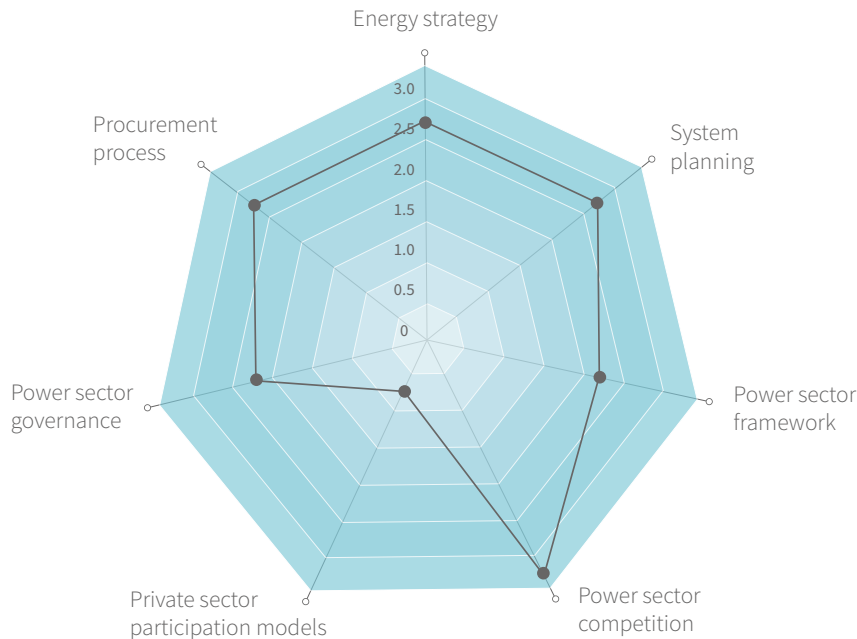


The Ghana government has opted for a public sector-led business model for mini-grids, with responsibilities for the investment and ownership of assets. By this policy, only the public power utilities VRA, ECG, and NEDCO are the designated entities to lead the development of mini-grids in the country. This would mean that the same regulations mentioned in the previous sections would also cover the off-grid segment. Specific regulations for the development and operation of mini-grids are still under development and going through the necessary approval processes. However, Ghana still faces challenges as shown by the low scores in key regulatory areas such as *private sector participation models* under the *openness* Dimension, *economic regulation* and *credit enhancement*” under the *attractiveness* Dimension, and *off-grid system integration* under the *readiness* Dimension. Indeed, out of the four segments analyzed, the off-grid segment is the one in which policies and regulations seem to be less effective in answering to private sector’s requirements.





A deep dive into the Openness dimension

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



Ghana’s performance in most of the regulatory Topics covered by the *openness* Dimension shows a moderate to high level of effectiveness of related policies and regulations. In addition to the comments already provided in the previous sections (refer to *Openness - Generation, Transmission, and Distribution*), further points are discussed below.

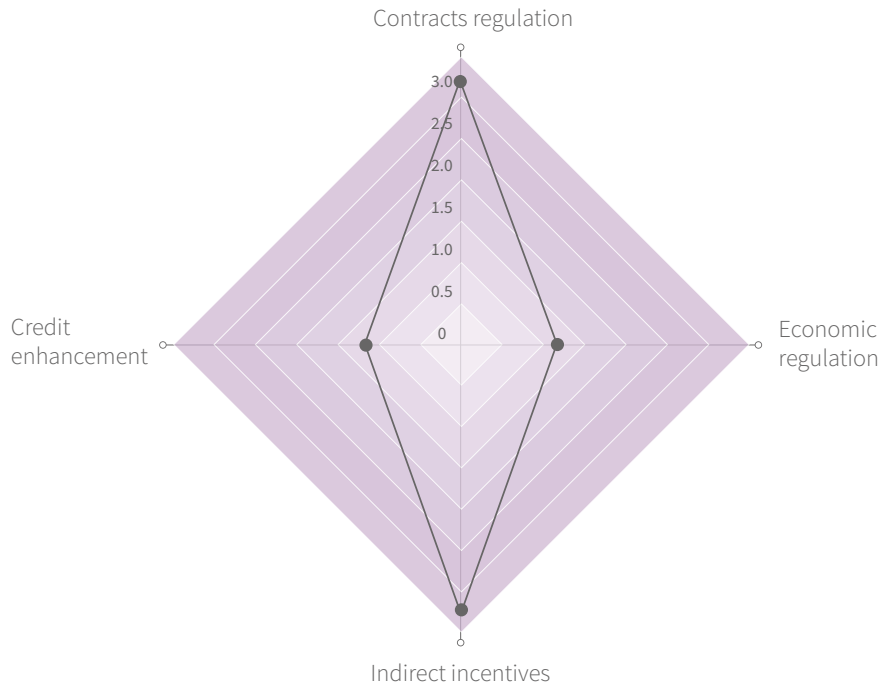
 <p>Energy strategy</p>	<p>Ghana has implemented a National Electrification Policy for the first time at the beginning of the ‘90s, followed by the adoption of a national Electrification Master Plan. The policy and plan aim to identify energy access targets and implement solutions to expand access. Electrification targets have always been included in the national Energy Policy; however, as for all the other targets, only as indicative policy objectives without legislative backing or other enforcing mechanisms. The gap in the <i>energy strategy</i> Topic emanates from this point.</p>
 <p>System planning</p>	<p>A national Electrification Master Plan is in place. Network extension at the distribution level is considered in the national planning regulation, with national distributors mandated to prepare development plans for their own networks and integrating them in the IPSMP. However, the current planning exercises do not consider investments in off-grid infrastructures. The Electrification Master Plan scenarios today are outdated, thus the gap in <i>system planning</i>.</p>

 <p>Power sector governance</p>	<p>The lack of a dedicated Electrification Agency mandated to oversee and support the development of electrification technologies can explain the relatively lower performance under <i>power sector governance</i>. So far, electrification policy definition and implementation, as well as planning, are mandated to a department within the Ministry of Energy. The EC remains responsible for setting the technical specifications, licensing, and compliance for off-grid operators. Moreover, the current licensing regime for market operators does not explicitly mention off-grid operators. In the absence of a specific regulation on licensing for off-grid operators, this theoretically implies that mini-grid operators shall follow the same rules for licensing as all market operators, obtaining different licenses for electricity generation, distribution, and sale. A potential cumbersome process that will add administrative costs to mini-grid development. To solve this challenge, the EC has developed a draft regulation dedicated to a mini-grid licensing framework, which is yet to receive official approval at the time of this analysis.</p>
 <p>Power sector framework</p>	 <p>Power sector competition</p> <p>Ghana's very good performances related to <i>power sector framework</i> and <i>power sector competition</i> follows a similar discussion in the sections dedicated to these Topics in the generation segment.</p>
 <p>Private sector participation model</p>	<p>Ghana's low performance related to <i>private sector participation models</i> for the off-grid segment is related to the government's decision to limit private sector participation in the mini-grid segment. As for the current policy, Ghana has opted for a public-led model for mini-grids, where public utilities are responsible for the investment, ownership of assets, as well as operation of the service. Private sector participation is, then, admitted only through EPC contracts. The few private-managed mini-grids operate under a special license regime that is not available anymore, representing a unicity in Ghana.</p>
 <p>Procurement process</p>	<p>The <i>procurement process</i> for the off-grid segment generally reflects the results obtained under the same Topic for all the other market segments. The public-led model adopted by Ghana for mini-grid development gives the responsibility of procurement of mini-grid assets to the public utilities, and places it under the rules of the Public Procurement Act. Mini-grids are not considered as an asset category, or a service, covered by the PPP National Policy, as private sector participation is limited to an EPC role. To build mini-grid assets, competitive procurement and international tendering procedures are applied by public utilities, in conformity with the Public Procurement Act.</p>





A deep dive into the Attractiveness dimension

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



Ghana’s scores in the *attractiveness* Dimension for the off-grid segment reflect the current limitations on private sector participation, notably in the mini-grid space.

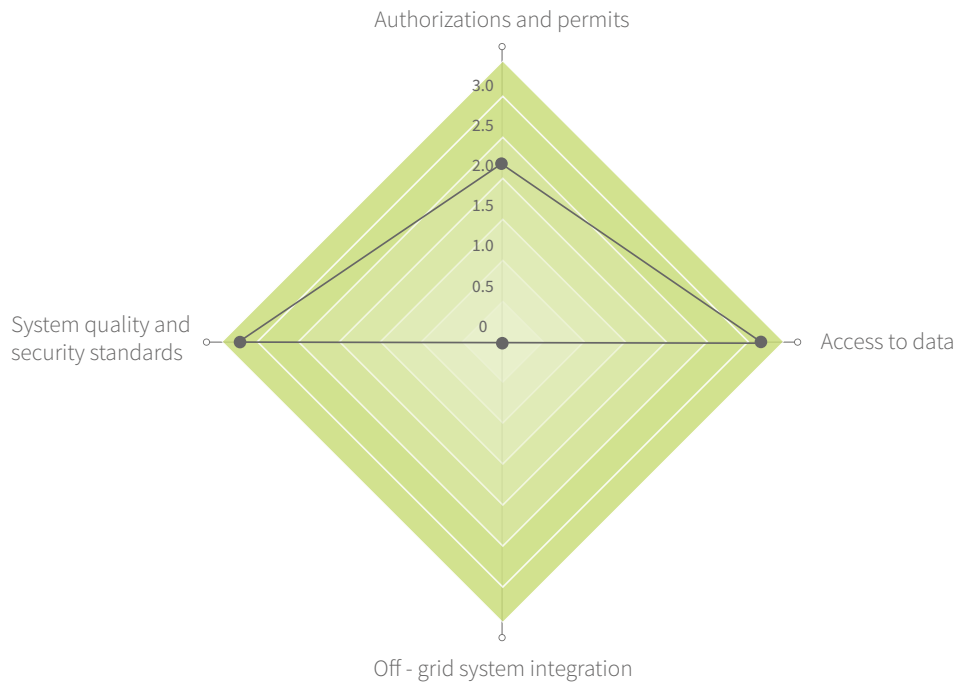
	<p>With the exception of the privately-managed mini-grids of Black Star Energy, all the other operational mini-grids in Ghana (five of them funded through a World Bank-led initiative) are based on the public model. They must follow the Uniform Tariff Policy set by the PURC. This same approach is expected to be pursued by the Government in the forthcoming future for all new mini-grid assets.</p>
	<p>The application of the uniform national approach to electricity tariffs to both on-grid and mini-grid customers is behind the low performance in <i>economic regulation</i>. Ghana’s government position is to ensure a fair application of the Uniform Tariff Policy (UTP) so that customers enjoy the same pricing policy as those on the main electricity grid, while public funds are used to cover any gap between revenues and operating costs. If this decision seems to be justified by a matter of social justice, such policy may be problematic for privately funded and operated mini-grids. These operators are not able to use cross-subsidization to cover the capital and operational costs of their mini-grids. Without being able to freely set tariffs or access public subsidies or grants, the financial sustainability of their business models could potentially be endangered.</p>

 <p>Indirect incentives</p>	<p>Ghana performs well in <i>indirect incentives</i> for off-grid operators. These incentives are provided through VAT and import duties relief mechanisms for generation equipment and renewable technologies available through the GIPC Act.</p>
 <p>Credit enhancement</p>	<p>While acknowledging the critical role that donors are playing in supporting mini-grid development, directly funding the bulk of the current mini-grid pipeline, the beneficiaries of these resources have been public utilities. Due to the current restrictions, off-grid private players couldn't access these funds, or any other <i>credit enhancement</i> instruments, so far. The lack of government and multilateral guarantees, as well as concessional lending for private off-grid operators, explain the relatively low score under <i>credit enhancement</i> for investment in the off-grid segment.</p>



A deep dive into the Readiness dimension

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



Of the four Topics under the *readiness* Dimension, Ghana performs very well in *system quality and security standards* as well as in *access to data* Topics. The Topic *authorizations and permits* shows some areas of improvement, while the low score in *off-grid systems integration* reflect the lack of dedicated regulation for mini-grid assets.



System quality and security standards

The current service, quality, and technical regulation, defined by the national Grid Code, covers all electricity services without differentiation between off-grid and on-grid assets. This means that all mini-grids have to comply with the current main grid standards. This extends to the quality of the supply service, the quality of products, as well as the technical standards mainly in terms of equipment, generation synchronization, and interoperability. While having main grid standards in place for mini-grids may entail higher costs for developers, such an option can ensure efficient integration of the mini-grids to the main grid without jeopardizing the safety, stability, and reliability of the power system. This explains Ghana’s high performance under *system quality and security standards*.



Access to data

Access to socioeconomic data is of importance for off-grid developers. They often require a detailed evaluation of socioeconomic conditions of their potential clients to back their business cases and plans and assess the willingness to pay of potential clients. In Ghana, the Ministry of Finance and Economic Planning publishes socio-economic data on their website regularly, which explains Ghana’s top performance related to *access to data*.



Authorization and permits

Overall rules for both access to land and construction permits issuing are well defined; however, the lack of a single-shop available for investors remains an area of improvement.



Mini-grid integration

The absence of a dedicated regulation for mini-grid integration with the main grid is also a challenge for *off-grid systems integration*. Defining clear rules on commercial options for mini-grid business continuity, or exit options, if the main grid arrives is key to reduce off-grid investors’ risks. The arrival of the main grid poses challenges to investors, which may result in assets being stranded or expropriated. Defining clear rules about commercial options available for mini-grid operators and asset owners in such circumstances reduces these risks and provides investors with clarity about the continuation of revenues after the main grid arrives. Currently, the MoE and EC are developing such a regulation, which is expected to also cover grid arrival dispositions and stranded assets disposal.



Conclusions and Recommendations





*Power lines with green grass background. Ghana West Africa.
Photo credit: Nataly Reinch*

4 Conclusions and Recommendations

In general, it is observed that Ghana's electricity market is fairly well-organized. The country has demonstrated its ability in leading a thorough reform program established in the mid-90s and continued in the following decades. The program, meant to increase private sector participation in electricity infrastructures development and enhance the reliability and quality of the electricity service, succeeded in most of its defined objectives.

Overall, the results of the assessment confirm the ability of Ghana to successfully restructure the governance of the electricity sector and to build a policy and regulatory framework capable of crowding-in investors, especially in the generation segment of the electricity market. Ghana's high electrification rate of about 86 percent, among the highest in the African continent, as well as the high IPPs contribution to national electricity production, above 50 percent, confirm the success of the implemented reforms.

Overall, the results of the assessment confirm the ability of Ghana to successfully restructure the governance of the electricity sector and to build a policy and regulatory framework capable of crowding-in investors, especially in the generation segment of the electricity market.

Ghana has been able to reform the governance of its electricity sector through the creation of the Energy Commission, the technical regulator, and the Public Utilities Regulatory Commission, the economic regulator, as well as through the restructuring of its public utility, the Volta River Authority and its unbundling. Today, Ghana's electricity market is vertically unbundled in the generation, transmission, and distribution (including retail) segments. Private sector participation has also been introduced, at least for the generation and distribution market segments.

However, even two decades after the introduction of the first round of reforms, the specific objectives to ensure long-term sustainability of the power sector and attract effective private sector participation appear not to have achieved their full potential. The launch of the Energy Sector Recovery Programme in 2019 raises the need to achieve financial sustainability of the state-owned energy utilities, facilitate an efficient and reliable energy sector development, and solve the current issue of over-capacity that menaces long-term development perspectives.

In the generation segment, Ghana has recently implemented a moratorium on unsolicited proposals for new energy supply and service contracts and stopped its Feed-in-Tariff regime for renewable capacities. However, the lack of competitive procurement plans for generation technologies, both traditional and renewables, may hamper future expansion plans. In the downstream activities of the value chain, the recent failure of introducing private participation in the distribution service through a concession agreement for GRIDCo assets and client base shows that private investors continue to face barriers that prevent their effective engagement. These difficulties continue also in the off-grid space, where Ghana has adopted a public sector approach with limitations on private sector participation in mini-grids. The result of such a policy decision is that all mini-grids must be government-owned, and private participation is limited to an EPC role.

As noted, Ghana achieved a national electrification rate of about 86 percent. However, rural access is around 70 percent, which may imply that the most attractive areas for grid extension have already been covered, leaving behind the remote areas and small communities where

grid extension may not be economically feasible. A fair development of the off-grid sector is then of importance to achieve the national target of universal electrification and the role that the private sector can play towards this goal.

Acknowledging all the efforts put in place by the Government of Ghana in the last three decades to ensure the safety, reliability, and competitiveness of the national electricity service, this assessment helps to pinpoint policy and regulatory areas where improvements and reforms are still needed to bring the system up to international standards and ensure reliable, affordable, and sustainable electricity for all by 2030 – or 2025 as set by the government.

The assessment pinpointed major strengths and weaknesses of the policy and regulatory framework currently in force.

4.1 Takeaways from the regulatory review

Related to the *Openness of electricity market*

- ⚡ Regulatory and policy gaps related to the generation market segment include the lack of an updated national energy policy, the need for a comprehensive electricity law, the current state of implementation of the Wholesale Electricity Market with the absence of operational rules for electricity trading, as well as the lack of clear legislation about the use of PPP agreements for the development of new generation plants.
- ⚡ The transmission segment of the market offers narrow scope for private sector participation, which is excluded from the right of obtaining a transmission license – exclusive right of the national transmission utility GRIDCo. Private sector participation models are then limited to only the EPC role, while transmission service is excluded from national PPP policy and procurement.
- ⚡ On the contrary, the distribution segment of the market is open to private sector participation – asserted also by the presence of a private distributor, Enclave Power. Distribution licenses can be obtained by private companies, and they can obtain the right to operate a distribution network and distribute electricity to consumers within a designated area or concession. Regulation also foresees the possibility for electricity sale activity to consumers within a designated area. However, distribution services and retail remain mostly in the hands of public utilities. A recent attempt to expand private sector participation in this segment, through a concession agreement covering GRIDCo's asset and client base, failed just a few months after a concession. While electrification development and distribution infrastructure expansion are of key importance to achieve universal electrification, they receive narrow scope in the national energy policy and national system planning. Distribution network expansion and renovation are delegated to distribution utilities, which manage procurement internally and there is a lack of coordination between distribution network expansion and electrification efforts and investment plans.

The distribution segment of the market is open to private sector participation – asserted also by the presence of a private distributor, Enclave Power. Distribution licenses can be obtained by private companies, and they can obtain the right to operate a distribution network and distribute electricity to consumers within a designated area or concession.

- ⚡ In the off-grid sector, private sector participation is limited so far. The government opted for a public sector-led business model for mini-grids, where the public sector is responsible for the investment and the ownership of the assets. By this policy, only the public power utilities VRA, ECG, and NEDCO are the designated entities to lead the development of mini-grids in the country, and private sector participation is limited to only the EPC role. The lack of a dedicated regulation for mini-grid, including special licensing and permit regime, adds additional administrative costs to developers. Finally, the lack of a dedicated Electrification Agency reduces Ghana's ability to coordinate electrification efforts and governmental support to the off-grid market development.

Related to the *Attractiveness* of electricity market

Ghana managed to attract numerous private investments in generation assets through IPPs. These IPPs enter the market through PPAs negotiated and signed bilaterally with bulk purchasers, most often the public distributors (ECG and NEDCO).

- ⚡ The *attractiveness* of Ghana's electricity market to private investors in the generation segment is well ensured by a fairly advanced regulatory framework in terms of tariff regulation and available credit enhancement instruments. Ghana managed to attract numerous private investments in generation assets through IPPs. These IPPs enter the market through PPAs negotiated and signed bilaterally with bulk purchasers, most often the public distributors (ECG and NEDCO). Negotiated PPAs between private generators and bulk purchasers have demonstrated their bankability; however, PPAs negotiation can be a cumbersome and risky process if standard guidelines or blueprints for PPAs are not available. The availability and accessibility of supporting mechanisms, in terms of incentives and indirect incentives, can be further improved and this is particularly relevant for low-carbon technologies.
- ⚡ Overall, Ghana achieves a good performance in the Topics covered by the *attractiveness* Dimension for the transmission segment, mainly explained by the clarity of the EC Act concerning the conditions and requirements to be included in the transmission license, the good practice of network tariff methodology, set by the PURC, based on a hybrid method combining cost-plus revenues principles and performance-based incentive mechanisms. On the opposite spectrum, credit enhancement mechanisms for private investors in transmission assets are not available.
- ⚡ Distributors benefit from a transparent and clear contractual framework, defined by the regulation in force. However, it can be improved by better clarifying how the rights and obligations of distributors can adapt in response to changes outside their control, such as modification of tariffs. Distributors have access to multilateral guarantees and concessional lending as credit enhancing instruments, but escrow accounts and other forms of government guarantees are not yet considered and are currently unavailable.
- ⚡ The assessment of off-grid related policies and regulations market reflects the current limitations on private sector participation, notably in the mini-grid space. Customers of mini-grids are considered equal to main grid customers and benefit from the same treatment and conditions in terms of supply contracts and tariffs. Such policy does present a challenge for potential privately funded and operated mini-grids. Off-grid operators can access indirect incentives, as VAT and import duties relief mechanisms, for generation equipment and renewable technologies.

Related to the *Readiness* of electricity market

- ⚡ The *readiness* in terms of policies and regulations for Ghana’s generation market segment is outstanding. Particularly thanks to its comprehensive system planning regulation and the coverage of its national Grid Code regarding aspects such as system operation rules and grid connection rules, as well as rules on dispatch and ancillary services provision. Clear rules are also available for all authorizations and permits required with dedicated issuing institutions. However, Ghana lacks a one-stop shop to access all permits and authorizations, potentially increasing the administrative risk for investors.
- ⚡ Ghana’s *readiness* is also observed for the electricity transmission segment. In compliance with international good practices, Ghana’s national grid code is composed of sub-codes dedicated to planning, connection, system operations, scheduling, and dispatch; metering; as well as standards for power quality and reliability. Data about transmission service quality is reported to the Energy Commission as a condition of the transmission license. However, the absence of a one-stop-shop for permits and authorizations prevents the country from achieving the best performance.
- ⚡ Similar to the other sub-sectors, the results also show a fairly advanced regulatory framework for distribution. In the absence of a dedicated distribution code, currently under-progress by the EC, rules and provisions related to distribution system operation, access to the network and connection agreements are regulated by the L.I. 1934, the L.I. 1816 and L.I. 1935. These deal with system quality and security standards criteria, as well as performance and benchmarking criteria for quality of electricity supply and distribution service. Here again, the lack of a one-stop-shop for the issuing of all permits and authorizations is noticed.
- ⚡ The absence of a dedicated regulatory framework for mini-grids, dealing with both technical standards for main grid integration and commercial options for mini-grid operators and asset owners in case of main grid arrival, represents a high risk for potential private investors. Mini-grids have to comply with main grid standards related to the quality of the supply service, the quality of products as well as technical standards, which can increase project costs.

Acknowledging the efforts put in place by national institutions for reforming Ghana’s electricity sector policy and regulatory framework, the analysis shows that further action and further reforms (or improvements) are needed to ensure enhanced *openness*, *attractiveness*, and *readiness* of Ghana’s electricity market through policies and regulations to crowd-in private investors effectively.

Recommendations for potential reforms and system improvements to address remaining policy and regulatory challenges are suggested below.

The *readiness* in terms of policies and regulations for Ghana’s generation market segment is outstanding. Particularly thanks to its comprehensive system planning regulation and the coverage of its national Grid Code regarding aspects such as system operation rules and grid connection rules, as well as rules on dispatch and ancillary services provision.

4.2 Recommendations



To enhance the *Openness* of electricity market



Energy strategy

Notwithstanding the advancement and apparent maturity of the Ghanaian electricity industry, there are gaps related to updating the national Energy Policy to guide the direction of electricity services. The Energy Policy is also not backed by appropriate legislation to enforce the defined targets and priorities. It is, therefore, recommended to:

- ⚡ Pursue a comprehensive review of the Ghana Energy Policy and undertake the updating of the national policy.
- ⚡ Set ambitious yet realistic targets, compatible with the realities of the social and economic development ambitions of Ghana, along with instituting systems to support and overview their implementation.
- ⚡ Institute a periodic energy policy review process, considering that the market environment is dynamic due to rapid changes in technology and innovations that affect the supply/demand conditions.
- ⚡ Consider legal backing, or legislation, to strengthen the enforceability of the Energy Policy set targets – similarly to the Renewable Energy Law.



System planning



Procurement process

Planning instruments, such as the sectorial master plan, are fundamental in providing long-term market signals to potential investors. Ghana’s electricity system planning is fairly advanced with clear regulatory responsibility and overview from the EC. However, there is the opportunity to strengthen the link between indicative system planning and procurement of new infrastructures, notably generation, to ensure a fair and effective system development.



System planning

Ghana’s Electrification Plan looks outdated and does not cover, in a comprehensive way, all technology options available for electrification (particularly mini-grids). To ensure a more coordinated approach, and to explore all electrification solutions towards achieving Ghana’s electrification goal:

- ⚡ Expand ECG and NEDCO distribution grid planning to off-grid technologies.
- ⚡ Ensure integration of all available electrification technologies in the planning exercise and the definition of the consequent investment plans, either for public utilities or for private sector investors.
- ⚡ Ensure coordination of electrification investments, which today are the responsibility of the public utilities, through a national Electrification Investment Plan, potentially able to also attract positive responses from private investors.



Power sector governance

Today, Ghana lacks an Electricity Law that defines the overall governance of the electricity sector. The EC Act and the PURC Act govern the sector to some degree. However, the Energy Commission is guided by its Act to answer to the directives of the sector minister for which reason, sometimes, its actions might be exposed to political influences. Therefore:

- ⚡ The possibility to adopt an Electricity Law could be explored to clarify the legislation on market operators' regime, market governance and structure and pursue the separation of the roles and responsibilities between government, regulators, public utilities, and other market operators to improve governance.



Private sector participation model

With regards to private sector participation models, Ghana has opted to limit private sector participation with regards to the electricity transmission service and the off-grid market. The private sector, however, can invest in transmission lines and also own transmission assets. Without prejudice to the role of GRIDCo as the only transmission system operator for Ghana's NITS, the potential role for the private sector in transmission development can be pursued by taking the following actions:

- ⚡ Clarifying the permissibility for private operators to build and own transmission assets.
- ⚡ Define remuneration mechanisms to support the private development of transmission assets, when authorized.



Power sector governance



Private sector participation model

Regulatory clarity is required to support the development of the off-grid market. In this regard:

- ⚡ Define a dedicated license regime for mini-grid operators, or review the current regime to include mini-grid operators, to ease market entry barriers.
- ⚡ Introduce simplified procedures for small mini-grids, based on capacity thresholds.
- ⚡ Review and pursue PPP models and concession agreements for the operation of mini-grids by private operators in predetermined areas.



Procurement process

Public-private partnerships in the electricity sector are still limited, with some successful experiences in the generation and more limited results in the distribution segments. However, public-private partnerships present vast opportunities for both the public and private sectors in supporting the expansion of electricity infrastructures and services. Therefore:

- ⚡ Back the National Policy on PPP with appropriate legislation and define appropriate rules for PPPs in the electricity market.
- ⚡ Enhance information access and transparency related to public procurements by gazetting PPP project calls locally and internationally, and/or publishing them on the websites of relevant institutions.



To enhance the *Attractiveness* of electricity market



Contracts regulation

As long as the Wholesale Electricity Market is not fully operational, IPPs enter the market through PPAs negotiated and signed bilaterally with distributors (ECG and NEDCo). This is a potentially cumbersome and risky process. Consequently, private sector participation in the generation segment is strengthened by the following measures:

- ⚡ Adopt standard guidelines, or a blueprint, for PPAs with public distributors that will enhance market transparency and reduce red-tapes in negotiating contracts.
- ⚡ Organize competitive tenders for new generation capacities led by the public distributors and overviewed by the EC, to cover their demand needs.



Incentives

For the development of specific generation technologies, such as renewables, Ghana's government has expressed its will to move from the FiT regime to a dedicated RE-specific auction as a way to enhance competition and reduce costs. Moreover, implementing regulations for the Renewable Purchase Obligation defined for distributors and bulk customers is still missing. To succeed in developing the renewable market:

- ⚡ Review and amend the Renewable Act to modify the currently FiT regime in force and move towards a RE-specific auction model for the procurement of new renewable capacities.
- ⚡ Adopt a comprehensive regulation for the organization, management, and awarding of RE-specific auctions in compliance with the WEM rules.
- ⚡ Adopt and implement regulation related to Renewable Purchase Obligations as defined by the Renewable Act.



Economic regulation

Tariff definition is a key component for the *attractiveness* of business models. As for now, Ghana has implemented a fairly advanced regulation for tariff definition and review mechanism, managed by the economic regulator, the PURC. In this regard the country should continue to sustain the move towards full cost-reflectiveness of electricity tariffs.



Economic regulation

The Uniform Tariff Policy in force may represent a barrier to the effective development of the off-grid sector, and most notably of mini-grids, reducing their financial sustainability in the long-term in the absence of public cross-subsidization or other forms of subsidies. Moreover, the requirement to charge a uniform tariff may preclude the private sector from financing mini-grid assets. Without prejudice to Ghana's government policy position to pursue a public-led model for mini-grid development, there is a need to:

- ⚡ Better understand the implications of the current tariff system on the development of mini-grids, considered as a fundamental technology option to achieve national electrification targets.
- ⚡ Evaluate and quantify the need for subsidies to ensure the financial sustainability of foreseen mini-grid assets.
- ⚡ Adopt the principle of cost-reflectiveness also for off-grid tariffs, by adopting a standard tariff calculation tool for mini-grids.



Indirect incentives

The availability of indirect incentives and credit enhancement instruments also play a key role in de-risking investments and enhance projects' bankability conditions. Acknowledging Ghana's good performances in these areas for the generation market, the availability of credit enhancement instruments seems to be much more limited, notably for distribution and off-grid investors. Therefore:



Credit enhancement

- ⚡ Enhance the accessibility of credit enhancement instruments, such as multilateral and government guarantees, to distribution and off-grid investors through the facilitation of public agencies.



To enhance the *Readiness* of electricity market



Authorization and permits

Setting clear rules for authorizations and permits issuing and related procedures is a crucial aspect of the *readiness* of the market. These include access to land, construction, and environmental permits, as well as rights of way (particularly relevant for network investments). Ghana has set clear rules, dedicated issuing institutions, and publicly available procedures for investors. However, the placement of competencies among different institutions can delay the issuing process and the project clearance from the institutions. This adds administrative costs for projects. Therefore:

- ⚡ Consider the adoption of a one-stop-shop, or a single-window, for coordination and facilitation of authorizations and/or permit applications accessible for investors.



System planning

Ghana's system planning regulation related to system *readiness* is fairly advanced, with regulatory oversight by the Energy Commission, a good consultative practice of market players and involved institutions, and formal procedures and timeline for review. Distribution network development plans are also part of the integrated system planning approach but are carried out by distributors and, up to now, remain internal documents of the distribution utilities. Therefore:

- ⚡ Integrate distribution and off-grid plans in a comprehensive integrated electrification plan, detailing distribution network expansion plans and off-grid development to increase clarity to industry players.



Grid code

Grid codes are indispensable to ensure the stable and safe operation of the electricity networks and to make the system ready to expand, connect new generation and demand points, as well as ensure the quality of supply. Ghana has adopted a comprehensive national Grid Code that defines responsibilities and obligations associated with all the functions involved in the supply, transmission, and delivery of electricity over the transmission system. However, a comprehensive distribution code covering the technical aspects relating to the connection and use of the electricity distribution licensees' distribution networks remains a gap. Therefore:

- ⚡ Adopt a Distribution Code detailing procedures that govern distribution service and the relationship between a distributor and users of its distribution system to enhance clarity and ensure accountability of distributors.



Mini-grid integration

Ghana lacks dedicated regulation for mini-grids, dealing with both technical standards for main grid integration and commercial options available for mini-grid operators and asset owners in case of main grid arrival. Therefore:

- ⚡ Adopt clear rules on commercial options for mini-grid business continuity, or exit options, in the event of main grid arrival to reduce risks and provide investors with clarity about business continuity.
- ⚡ Institute dedicated technical standards for mini-grids, which can offer mandatory and optional grid-compatible standards that will ensure safety, stability, and reliability of the power system without adding unnecessary burdens and costs on developers.

4.3 Way forward

The results of the assessment confirm the ability of Ghana to successfully restructure the governance of its electricity sector and to build a policy and regulatory framework capable of crowding-in investors. The success in expanding electricity access and the generation assets confirms Ghana's ability to ensure a fair development of its electricity sector. In the last years, however, Ghana has also experienced setbacks in crowding-in private investments to support the expansion of its electricity supply industry and enhance financial sustainability. The recent launch of the Electricity Sector Recovery Program manifests the need to continue on the road of reforms to facilitate an efficient and reliable energy sector development and achieve universal electricity access for all.

As Ghana enters a new phase of sectoral reform and seeks greater participation of private sector actors, policies and regulations play a key role in ensuring success. Towards this end, this report 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 Ghana 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.

Ghana's vibrant economy will need a reliable electricity supply to sustain its future growth and its population will need affordable power to thrive. The UN Economic Commission for Africa and the RES4Africa Foundation remain committed to supporting Ghana in addressing any of the identified regulatory and policy gaps, investing in the necessary regulatory capacity development, as well as any area of particular reform interest of Ghana towards greater *openness*, *attractiveness*, and *readiness* of the 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 Ghana in this reform process, guided by its public institutions, aimed at economic transformation and achievement of SDG7 goals.

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Acronyms

BCM	Bilateral Contracts Market
BOO	Build-Own-Operate
BOT	Build Operate and Transfer
BOT	Build-Operate-Transfer
BPA	Bui Power Authority
CAIDI	Customer Average Interruption Duration Index
CAPEX	Capital Expenditure
DFIs	Development Financial Institutions
EC	Energy Commission
ECG	Electricity Company of Ghana
ECOWAS	Economic Community of West African States
EFT	Energy First Threshold
EMOP	Electricity Market Oversight Panel
EPC	Engineering Procurement and Construction
ERERA	ECOWAS Regional Electricity Regulatory Authority
EST	Energy Second Threshold
ESTF	Energy Sector Task Force
ETU	Electricity Transmission Utility
FDI	Foreign Direct Investment
FiT	Feed-in-Tariff
GDP	Gross Domestic Product
GEDAP	Ghana Energy Development and Access Project
GhC	Ghanaian Cedi
GHG	Green House Gas
GIPC	Ghana Investment Promotion Council
GRIDCO	Ghana Grid Company Limited
GWh	Giga Watt hours
IPPs	Independent Power Producers
IPSMP	Integrated Power Sector Master Plan
ISOs	Independent System Operators
KPIs	Key Performance Indicators
MoE	Ministry of Energy
MOFEP	Ministry of Finance and Economic Planning
MW	Mega Watt
NEDCO	Northern Electricity Distribution Company
NEP	National Energy Policy
NES	National Electrification Scheme
NGOs	Non-Governmental Organizations
NITS	National Interconnected Transmission System

NITS	National Interconnected Transmission System
NREP	National Rural Electrification Program
PAU	PPP Advisory Unit
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PSP	Private Sector Participation
PSRP	Power Sector Reform Program
PURC	Public Utilities Regulatory Commission
PV	Photovoltaic
RE	Renewable Energy
RE-FiTs	Renewable Energy Feed-in-Tariffs
REMP	Renewable Energy Master Plan
RES	Renewable Energy Source
ROAR	Regulatory Review of Openness, Attractiveness and Readiness
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SDGs	Sustainable Development Goals
SHEP	Self-Help Electrification Program
SLT-HV	Special Load Tariff – High Voltage
SLT-LV	Special Load Tariff – Low Voltage
SLT-MV	Special Load Tariff – Medium Voltage
SNEP	Strategic National Energy Policy
SREP	Scaling-up Renewable Energy Program
TAPCO	Takoradi Power Company
TICO	Takoradi International Company
TSO	Transmission Service Operator
TT1PP	Tema Thermal 1 Power Plant
TT2PP	Tema Thermal 2 Power Plant
TWh	Terawatt-hour
UTP	Uniform Tariff Policy
VAT	Value-Added Tax
VRA	Volta River Authority
WEM	Wholesale Electricity Market

Annexes

Annex A

Installed Grid Electricity Generation Capacity (End of December 2018)

Plant	Installed Capacity (MW)	Dependable Capacity (MW)
HYDRO		
Akosombo	1,020	900
Kpong	160	140
Bui	400	360
TOTAL	1,580	1,400
THERMAL		
Takoradi Power Company (TAPCO)	330	300
Takoradi International Company (TICO)	340	320 (IPP)
Tema Thermal 1 Power Plant (TT1PP) Cenit Energy Ltd	110	100
Sunon Asogli Power (Ghana) Limited Tema Thermal 2 Power Plant (TT2PP)	110	100 (IPP)
Kpone Thermal Power Plant	560	520 (IPP)
Karpowership	80	70
Ameri Plant 250	220	200 (IPP)
Trojan*	470	450 (IPP)
Genser*		
AKSA	250	230 (IPP)
Cenpower		
	44	40 (IPP)
	22	18 (IPP)
	370	350 (IPP)
	360	340 (IPP)
TOTAL	3,266	3,038
RENEWABLES		
Safisana Biogas* 0.1	0.1	0.1 (IPP)
VRA Solar* 2.5	2.5	2.0 (IPP)
BXC Solar* 20	20	16 (IPP)
Mienergy* 20	20	16 (IPP)
TOTAL	42.6	34.1
GRAND TOTAL	4,888.6	4,472.1

*Connected at the sub-transmission level.

Source: Electricity Supply Plan Committee, Electricity Supply Plan, 2020

Annex B

Growth of customer base (new connections) per year

Active customer numbers					Regional growth rates
Region	2016	2017	2018	2019	2018 to 2019
Accra East	319,727	391,288	457,814	493,056	7.7%
Accra West	523,247	516,414	545,746	575,836	5.5%
Tema	329,024	354,162	371,687	398,349	7.2%
Ashanti	619,694	710,165	747,792	817,173	9.3%
Western	375,057	413,399	436,236	467,318	7.1%
Central	338,680	364,765	396,033	436,310	10.2%
Eastern	262,513	286,179	311,769	339,080	8.8%
Volta	225,093	245,417	257,801	274,583	6.5%
Total	2,995,052	3,283,805	3,524,878	3,801,705	7.9%
Growth Rate		9.64%	7.34%	7.85%	

Source: Electricity Company of Ghana internal records

Annex C

Number of outages and duration per annum (2017-2019)

Item Description	Sector	Year		
		2017	2018	2019
System Average Interruption Frequency Index (SAIFI in number of times)	Metro	47.7	36.28	26.53
	Urban	87.63	73.00	45.05
System Average Interruption Duration Index (SAIDI in minutes)	Rural	104.25	82.05	60.43
	Metro	77.34	55.94	37.67
	Urban	114.77	90.54	63.41
Customer Average Interruption Duration Index (CAIDI in minutes)	Rural	134.99	100.61	80.03
	Metro	1.62	1.54	1.42
	Urban	1.31	1.24	1.41
	Rural	1.29	1.23	1.32

Source: Electricity Company of Ghana internal records

Annex D



Energy Sector Recovery Program Phases (2019-2030)

Phase I (actions taken immediately)	<p>Make full and timely payment of Ministries, Departments, and Agencies electricity bills;</p> <p>Institute a least-cost fuel procurement strategy;</p> <p>Adopt a competitive procurement policy for Energy Supply and Service Contracts, including placing a moratorium on unsolicited proposals;</p> <p>Establish an Energy Sector Task Force to further develop, implement, and monitor the impact of the Energy Sector Recovery Program.</p>
Phase II (actions taken in first 12 months)	<p>Address excess take-or-pay generation capacity payments;</p> <p>Address the oversupply of gas by matching supply and demand;</p> <p>Complete gas infrastructure, pricing, and policy actions to reduce the gas tariff to the power sector;</p> <p>Support the technical and operational performance of the electricity transmission infrastructure;</p> <p>Adoption of the cash waterfall and any other appropriate mechanism to ensure equity and transparency in disbursement of energy revenues;</p> <p>Institute tariffs and regulations on street lighting;</p> <p>Adopt a funding plan for on-going Sector Arrears.</p>
Phase III	To be developed by Energy Sector Task Force within the first 18 months of the program for review and approval by the Cabinet sub-committee

Annex E

An overview of the Topics assessed

 <p>Openness</p>	Energy Strategy	The existence and characteristics of energy and climate policies.
	System Planning (also <i>readiness</i>)	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 <i>Generation</i>)	The existence of a spot market or single-buyer as well as the regulatory characteristics of private PPAs and captive generation.

 Attractiveness	Contracts Regulation	The structure and characteristics of public PPAs, TSAs, DSAs, and standard retail contracts for off-grid operators.
	Economic Regulation	The structure and definition of the retail and network tariff.
	Incentives	The existence of instruments incentivizing private investors to operate in the power sector (e.g. FiT, capacity payments, green certificates, RES quotas)
	Indirect Incentives	The existence of policies or instruments indirectly incentivizing private investors to operate in the power sector (e.g. carbon pricing, result-based financing, tax relief)
	Credit Enhancement	The existence of lending agreements or guarantees that reduce risk or costs for private investors entering the power sector.
 Readiness	Authorizations and Permits	The existence and characteristics of permits needed for the construction of assets in the power sector (e.g. land & 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.

Annex F

Policies, Plans and Regulations (Accessed 19/04/2021)

National Energy Policy, 2010	http://www.ecowrex.org/system/files/repository/2010_national-energy-policy_ministry-of-energy.pdf
Renewable Energy Master Plan, 2019	http://www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf
Strategic National Energy Plan, 2019	http://www.energycom.gov.gh/files/SNEP%20Demand%20Oct2019_SNEP2030_Final.pdf
Integrated Power Sector Master Plan 2019	<p>Volume 1 http://www.energycom.gov.gh/files/Integrated%20Power%20System%20Master%20Plan%20Vol.%201.pdf</p> <p>Volume 2 http://www.energycom.gov.gh/files/Integrated%20Power%20System%20Master%20Plan%20Vol.%202.pdf</p>

Energy Commission Act, 1997 (Act 541)	http://extwprlegs1.fao.org/docs/pdf/gha93004.pdf
PURC Act, 1997 (Act 538)	https://opencontentghana.files.wordpress.com/2013/11/public-utilities-regulatory-commission-act-1997-act-538.pdf
Renewable Energy Act, 2011 (Act 832)	http://www.energycom.gov.gh/files/RENEWABLE%20ENERGY%20ACT%202011%20(ACT%20832).pdf
Electricity Supply and Distribution (Technical and Operational) Rules, 2005 (L. I. 1816)	http://www.energycom.gov.gh/files/Electricity%20Supply%20and%20Distribution%20(%20Technical%20and%20Operational)%202005%20,%20LI%201816.pdf
Electricity Transmission (Technical, Operational and Standards of Performance) Rules, 2008 (L.I. 1934)	http://www.energycom.gov.gh/files/LI%201934.pdf
Electricity Supply and Distribution (Standards of Performance) Regulations, 2008 (L.I. 1935)	http://www.energycom.gov.gh/files/Standards%20of%20Performance%20%20LI%201935.pdf
Electricity Regulations, 2008 (L.I. 1937)	http://www.energycom.gov.gh/files/LI%201937.pdf
National Electricity Grid Code, 2009	http://www.energycom.gov.gh/files/National%20Electricity%20Grid%20Code.pdf
Renewable Energy Sub-Code for Distribution Network, 2015	http://www.energycom.gov.gh/files/Renewable%20Energy%20Sub-Code%20for%20the%20Distribution%20Network,%202015.pdf
PURC Rate Setting Guidelines, 2017	https://purc.com.gh/attachment/438724-20201119111122.pdf
Public Procurement Law, 2003 (Act 633)	https://www.ppaghana.org/documents/Public%20Procurement%20Act%202003%20Act%20663.pdf
Ghana Investment Promotion Centre Act, 2013 (Act 865)	http://extwprlegs1.fao.org/docs/pdf/gha168827.pdf



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