



United Nations
Economic Commission for Africa



Regulatory Review of the Electricity Market in Ethiopia:

Towards Crowding-in Private
Sector Investment





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Sector Investment**



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Executive Summary

This report provides an analysis of Ethiopia's electricity sector policies, laws, and regulations in relation to crowding-in private sector participation in developing national electricity infrastructures. 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*.

The electricity market of Ethiopia is undergoing changes. This is demonstrated by shifts in the organization and structure of the electricity market, major leaps in generation capacity expansion, network development, improvement in electricity access, and a degree of openness to the private sector. Acknowledging these positive steps, the electricity market today is also constrained by challenges, including the financing of infrastructure development. Public investment was the prime vehicle to finance Ethiopia's power sector development. However, such a form of financing remains insufficient compared to the growing electricity demand resulting from economic growth and access expansion, and the investment demand to meet capacity expansion goals. Expanding the scope of investment and finance requires broadening the policy and regulatory space for private sector participation. A prime challenge to the effective participation of the private sector in the electricity market remains the sector regulation.

This report examines the regulation of the electricity market in-depth concerning the crowding-in of private sector investment in generation, networks, and off-grid assets. The goal is to encourage private sector participation in the market through addressing regulatory impediments towards the achievement of SDG7 goals. It further aims to support the development of a resilient, competitive, diverse, and vibrant energy sector in Ethiopia. Such measures are expected to sustainably attract private sector investment for sector development, supplementing scarce public sector resources. This is particularly crucial in a post-COVID environment where public resources are even more constrained due to priorities in public health and social protection, as well as public spending on economic recovery and revival.

It is expected that this report will contribute, through its rigorous regulatory analysis and recommendations, towards the ongoing reform process in the electricity market of Ethiopia, which is aiming to achieve the following goals: (1) development of a sustainable electricity market; (2) planning and promotion of efficient investments in generation and networks to meet security of supply and enable exports; (3) deliver a reliable and quality electricity supply to support economic growth; and (4) achieve financial sustainability in the electricity value chain through cost-reflective and affordable tariffs.

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

Related to the *openness* of the electricity market, the generation segment of the market features areas of strength in the areas of procurement (guided by a PPP law), generation planning with an investment plan, transparency related to planning information, and aspects of market governance related to instituting a regulator coupled with a credible dispute resolution mechanism following the adoption of the New York Convention. However, the market faces challenges arising from the *power sector framework*, limited *off-taking options* under the single-buyer model, the exercise of limited *private sector participation models*, and limited track record of effective private sector engagement. Related to the *attractiveness* of the electricity market, Ethiopia demonstrates regulatory strength in the areas of *contract regulation*, particularly standardization of PPAs, credit enhancement, possibility of guarantees and concessional loans, revenue escrow agreements, as well as provision of certain incentives such as foreign currency-denominated contracts. However, private generation investors should expect to participate in an environment with less cluster of incentives. Furthermore, *economic regulation* around tariff levels, though under review and adjustment, remains a major impediment to the *attractiveness* of the market. Related to the *readiness* of the electricity market, the *permitting and authorization* process is well developed, specially related to environmental approval, which is supported by clear and publicly available procedures facilitated by a one-stop-shop. However, land, water and construction permitting process has key challenges. The power sector is also guided by a network development plan, through a master plan which includes a transmission expansion plan, as well as a system integration study. The *readiness* of the market is constrained by *grid access*, availability of a *grid code* (a draft code is now developed, but not yet adopted), *quality and security standards* (draft developed), and to a limited degree clarity in the *system planning*.

Main findings related to the Transmission segment

The transmission and distribution segments of the market, though features network development and investment plan, offers narrow scope for international private sector participation through the *power sector framework*, and further faces the challenges of limited *private sector participation models*. The national private sector is permitted in transmission operation. The international private sector is restricted in such operation, unless it is related to the import and export of electricity, through a joint venture model. In the transmission segment, the *grid code* remains a major impediment (a draft code is already developed), since it is not yet in place. Adopting the grid code is expected to close key gaps.

Main findings related to the Distribution segment

Similar to the transmission segment, the distribution segment features network development and investment plan but offers narrow scope for international private sector participation. The limitations in accessing distribution licenses and the restriction on international private sector participation on distribution assets investments, reduce the *openness* of the distribution

segment. In the key area of *contract regulation*, there is no standard distribution service agreement (DSA), along with performance requirements, indexation, dispute resolution, and termination provisions. For distribution investment, potentially through a joint venture, multilateral guarantees may be available, along with concessional lending. However, revenue escrow agreements, and government guarantees are not available to investors. These limitations constrain the *attractiveness* of the Ethiopian distribution market to private investors. Related to the grid code, the adoption of the draft grid code is expected to address key challenges, including rules for system operation rules and metering services. Draft quality and security standards are developed, even though not yet adopted. These regulatory gaps today constrain the overall *readiness* of the distribution segment of the market to crowding-in private sector investment.

Main findings related to the Off-grid segment

The off-grid segment of the market offers better options through *private sector participation models*; however, challenges in *power sector framework*, *power sector governance*, and *system planning* limit *openness* to private sector participation. The off-grid market is relatively more attractive related to *incentives* and *credit enhancement* opportunities. However, similarly faces challenges of *contract regulation* standardization and *economic regulation*. The off-grid market similarly demonstrates challenges of *system quality and security standards*, though a draft standard is completed. A new (2021) approved Off-grid Directive providing better clarity on *off-grid system integration* related to grid arrival.

On the basis of these and other detailed assessments, the following measures are recommended to reform and improve the regulatory environment for the electricity market of Ethiopia towards enhancing the *openness*, *attractiveness*, and *readiness* of the market to private sector investment.

To enhance *Openness* of the electricity market

- ⚡ Address the lack of formal review procedure with established targets, ensure public access to such information, and schedule planned investments to improve the openness of the Ethiopian electricity market.
- ⚡ Address the lack of publicly available regulatory decisions (transparency).
- ⚡ Reform the lack of sufficient independence of the regulator from political authorities (such as autonomous mode of appointment of leaders and board members).
- ⚡ Resolve the lack of sufficient financial independence of the regulator and enforceability of its decisions.
- ⚡ Acknowledging the broader space for national private investors to participate in network investment, review mechanisms and consider the enabling of the participation of international private parties to invest in, or operate, transmission and distribution assets beyond current import/export-related models.
- ⚡ Incorporate clear generation and renewables targets, their formal review procedure, and a monitoring framework during the next policy and strategy development window.

- ⚡ Reform transmission and distribution services unbundling, separation of transmission assets management from system operation, and wholesale and retail market competition constraints to facilitate effective private sector participation.
- ⚡ Address regulatory barriers on off-taking by enabling the adoption of models such as private (corporate) PPAs, or mechanism for two private parties to negotiate power transactions, and self-consumption coupled with a net metering regulation.
- ⚡ Expand the regulatory space for alternative electricity generation models, such as merchant generation (including off-grid) and concessions, to enhance the openness of the electricity market to generation investors.
- ⚡ Institute better scheduling of tenders and developing a track record of competitive and credible tendering.

To enhance *Attractiveness* of the electricity market

- ⚡ Pursue tariff reform towards cost-reflectivity to enhance the *attractiveness* of the electricity market to private sector investors and ensure financial sustainability.
- ⚡ Pursue fair competition in the electricity market to reduce the need of offering more incentive packages to investors, with the exception of emerging markets such as off-grids, or certain technologies.
- ⚡ Related to *contracts regulation*, address the gaps in capacity components and indexation of contracts.
- ⚡ Adopt, along with appropriate regulatory reform, Transmission and Distribution Service Agreements.
- ⚡ Pursue standardization of retail contracts for off-grid market operators.
- ⚡ Strengthen the system of financing options with innovative private sector financing instruments for energy infrastructure development.

To enhance *Readiness* of the electricity market

- ⚡ Address constraints in the *authorization and permitting* process through efficient and clear processes, better coordination, and establishment of one-stop shops.
- ⚡ Adopt formal review procedures for reviewing network development plans.
- ⚡ Undertake periodic network expansion assessment, along with grid flexibility and network integration studies.
- ⚡ Related to the *grid code*, ensure the draft code addresses:
 - system operation rules, including the dispatch of ancillary services.
 - connection rules for generation investors, including on a clear and defined procedure for getting authorization.

- efficient dispatch that would enable public availability of market settlement rules, market settlement information, and management of investor exposure to imbalance risks.
 - curtailment, including on compensation to generation investors and specification of limitations on curtailment to generation investors.
 - ancillary services management, such as reactive power, black start capacity, spinning reserves, and governing rules and regulations.
- ⚡ Review and address *grid access* regulation to enhance the *readiness* of the electricity market to private sector participation.
- ⚡ Adopt the finalized quality and security standards on networks, including off-grid systems, and enter them into force.

As Ethiopia 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 Ethiopia 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 Ethiopia towards greater *openness*, *attractiveness*, and *readiness* of the electricity market.



Introduction





Addis Ababa at night
Photo credit: Dereje Belachew

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.

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

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.

The electricity market of Ethiopia is undergoing changes. Some of the achievements in recent years include shifting the organization, or structure, of the electricity market through related regulatory provisions, developing and expanding transmission and distribution networks, expanding generation and power supply capacity, enabling electricity access to thousands of new customers, and some indications of openness to private sector participation in energy investments.

The electricity market, however, is constrained by remaining challenges, including the development of an independent, accountable, transparent, and predictable regulatory system, tariff reforms, and industry structure that enables and promotes engagement of the private sector in a competitive power market. There have been some reform measures to address some of these challenges. Investment in energy capacity is required to sufficiently respond to the growing domestic and regional demand for electricity services. Public finance was the preferred model of financing for decades, which remained inadequate relative to the planned

generation capacity expansion need of Ethiopia. This necessitates a closer look at regulation and private sector investment.

This regulatory review examines these and additional issues in-depth concerning the crowding-in of private sector investment in the electricity market of Ethiopia, 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



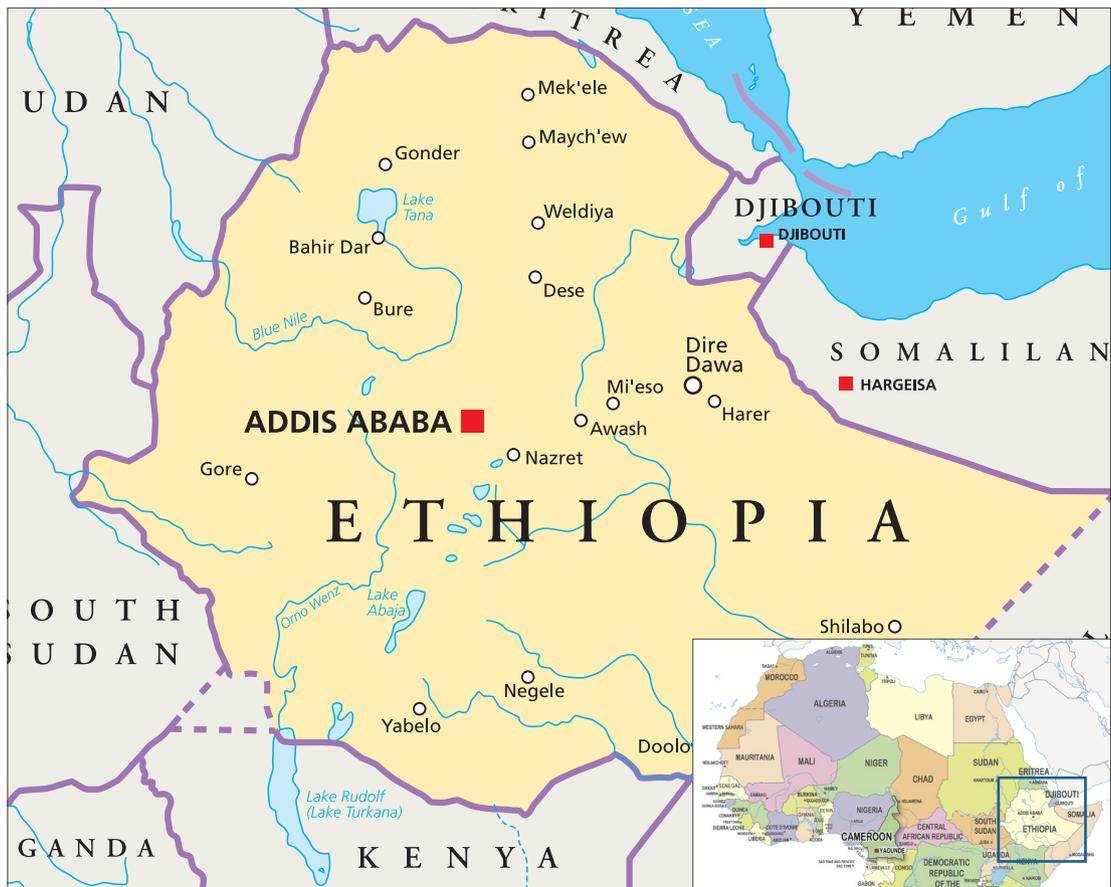
*Blue Nile Falls, Tis Issat, Ethiopia
Photo credit: Aleksandra H Kossowska*

2. Country Overview

Ethiopia, located in the Horn of Africa, has borders with Eritrea to the north, Djibouti to the northeast, Somalia to the east, Kenya to the south, and South Sudan and Sudan to the west. It is the second-most populous country in Africa, and one of the fastest-growing economies in the region (World Bank, 2021). The economic growth is driven by public investment in infrastructure, as well as sustained progress in the agricultural and service sectors. However, COVID 19 has dampened growth in 2020.

More than 75 percent of Ethiopia’s population is employed in the agricultural sector (USAID, 2021), even if services have surpassed agriculture as the principal contributor to GDP.

In 2019, the government announced its economic reform program designed to increase foreign exchange availability, create jobs, and enable a more conducive environment for private investment focusing on foreign direct investments (FDIs). The reform also aspired to transform the economy away from the public sector, and foreign debt-driven system, to equity-based investment by the private sector, including through public-private partnerships (PPP), to drive development (Office of the Prime Minister, 2019).

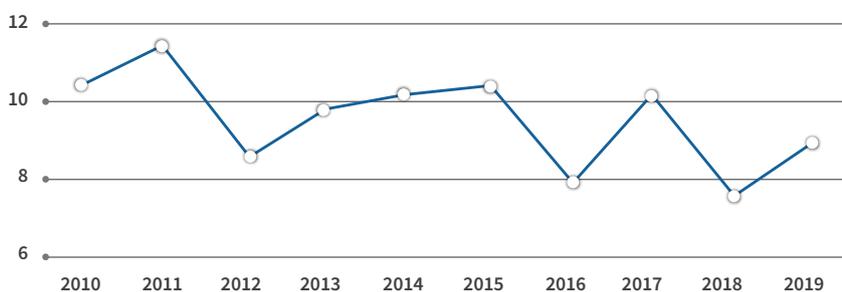


Map of Ethiopia credit: Peter Hermes Furian
 Map of Africa credit: Geo Atlas Graphi Ogre

2.1 Macroeconomic overview

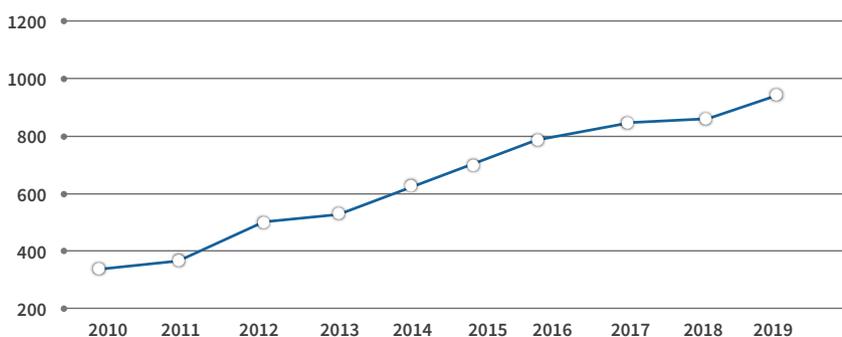
Over the past decade, Ethiopia's economy has demonstrated outstanding growth, averaging over 9 percent yearly GDP growth. This decade-long economic development has been associated with a rise in per capita income, which has grown from USD 559 in 2013 to USD 985 by 2019 (National Bank of Ethiopia, 2020). This progress has enabled policymakers to envision Ethiopia reaching middle-income status in the next few years.

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



Source: National Bank of Ethiopia, 2020

Figure 2: GDP per capita (USD, 2012/13-2018/19)

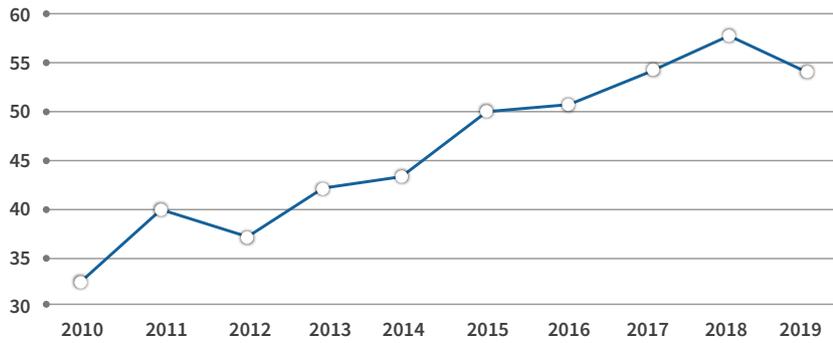


Source: National Bank of Ethiopia, 2020

Debt-to-GDP

Economic growth necessitated major public investment, especially in infrastructure. As a result, the level of public debt increased through 2018. Debt as a share of GDP increased from 32.4 percent in 2010 to 57.5 percent by 2018. This was the year Ethiopia experienced a major political crisis and a change of government. Since then, the share of debt in GDP has declined to 51.8 percent in 2020 (IMF, 2021). The effect of COVID-19 on this trend is expected to be negative.

Figure 3: Debt-to-GDP ratio (% , 2010-2020)



Source: IMF World Economic Outlook database, 2021

Inflation and exchange rate stability

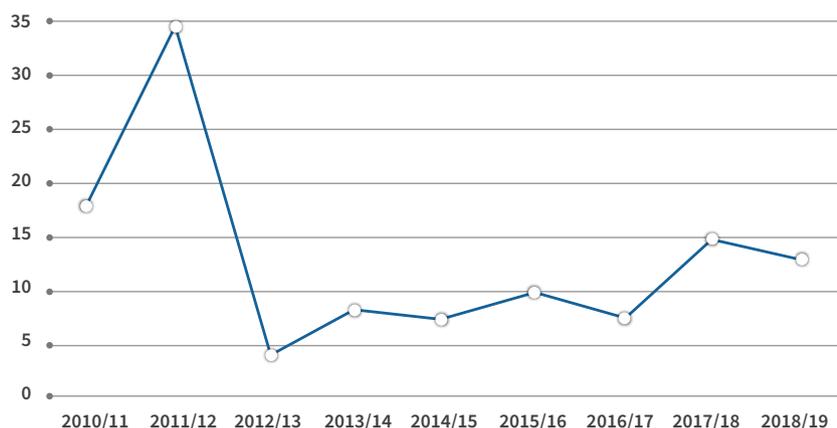
The Ethiopian currency is the Birr (ETB) and is issued by the National Bank of Ethiopia. The data provided by the National Bank indicates that the marginal exchange rate of Birr per USD increased from 21.1 in 2015/16 (National Bank of Ethiopia, 2017) to 28.1 by 2018/19 (National Bank of Ethiopia, 2020), further depreciating to by 2019/20 (National Bank of Ethiopia, 2020). By the end of 2020, the exchange rate increased to 39 Birr/dollar. At last, a general trend of depreciation of the Birr against the dollar has been registered.

Recently, steps have been taken to restructure the legal framework and improve some laws to stabilize the forex market. These include the updating of the investment law, streamlining procedures under the trade law, easing hurdles in issuing permits and licenses to businesses, signing the New York Convention on Recognition and Enforcement of Arbitral Awards (in February 2020), and the taking of other major steps towards strengthening investor confidence. Though the investment law provides a guarantee to foreign investors to repatriate remittances in hard currency, convertibility is still a major challenge, largely due to limitations in the availability of foreign exchange resulting from negative trade balances.

Coming to inflation, even though the national economy has registered impressive GDP growth over the years, inflation remains a continuing challenge. Several measures, including fiscal and monetary price stabilization, have been put in place to alleviate inflation which, in the end, is expected to be addressed through productivity improvements in the agricultural sector, and through investment in more productive economic sectors.

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Figure 4: Inflation rate (% , 2010/11-2018/19)



Source: National Bank of Ethiopia, 2020

Business climate

Ethiopia, as per the World Bank Ease of Doing Business annual rankings, exhibits a challenging overall business environment (World Bank, 2020). Its standing was at 132 in 2015, which rose many places to 161 by 2018, and slightly improved by 2020 with a ranking of 159th. Key areas of concern are in starting a business, administration of construction permits, electricity access, access to finance, trading across borders, and resolving insolvency. In the latest ranking, Ethiopia's position has slightly improved. However, critical constraints remain, posing challenges to the realization of a conducive business climate.

2.2 Electricity sector overview

Ethiopia has copious renewable energy resources and has the potential to generate over 60,000 MW of electric power from hydroelectric, wind, solar and geothermal sources. However, despite its large potential, the country is suffering energy shortages and load shedding, struggling to serve a population of over 110 million people and to meet the growing electricity demand (ITA, 2020).

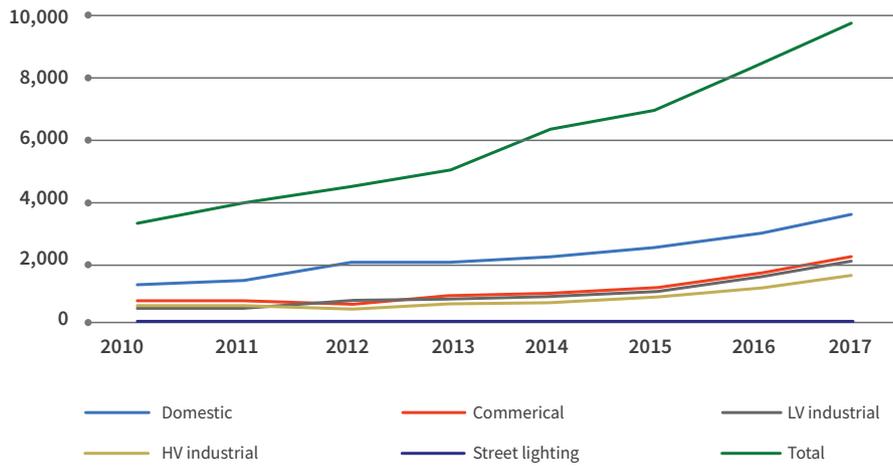
Electricity consumption

Based on the Revised Powers Systems Expansion Master Plan (2014), for the base case total system demand forecast from 2018 to 2030, the total demand growth rate is 14.3 percent per year. This estimate includes a significant increase in power export, as well as projected improvement in transmission losses. The 2030 total interconnected system peak demand forecast is projected to be 11,569 MW, with an annual peak demand growth of 13.8 percent. This is higher than the growth rate of the last decade.

Per capita electricity consumption is also growing rapidly, albeit starting from a low level of about 41 kWh in 2010, reaching about 99 kWh by 2017 (Figure 6). In many cases, a higher per capital electricity consumption is associated with better economic development outcome.

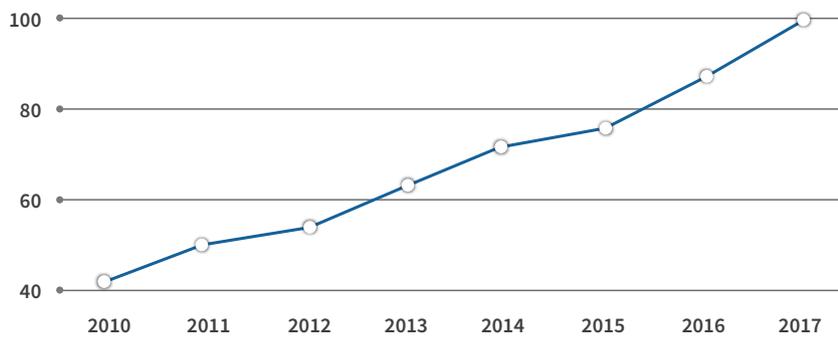
The 2030 total interconnected system peak demand forecast is projected to be 11,569 MW, with an annual peak demand growth of 13.8 percent. This is higher than the growth rate of the last decade.

Figure 5: Electricity consumption, total (GWh, 2010-2017)



Source: EEP and Grid Management Support Program (USAID), system integration study, May 2019

Figure 6: Electricity consumption, per capita (kWh, 2010-2017)

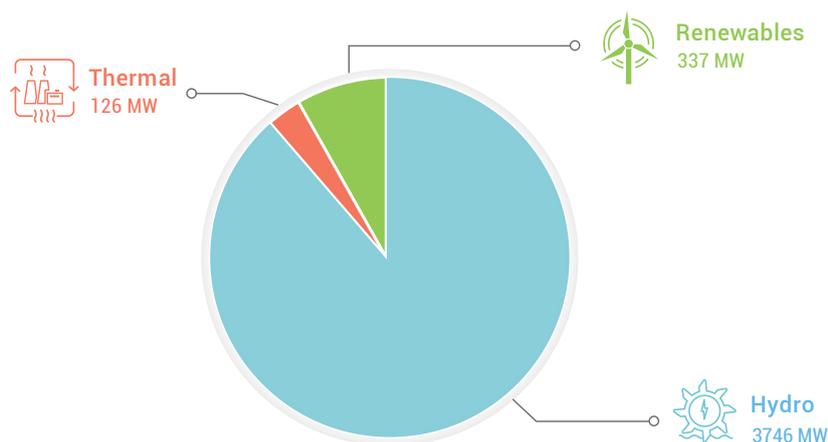


Source: Based on EEP electricity data and Central Statistical Agency, Ethiopia population data

On-grid installed capacity and electricity production

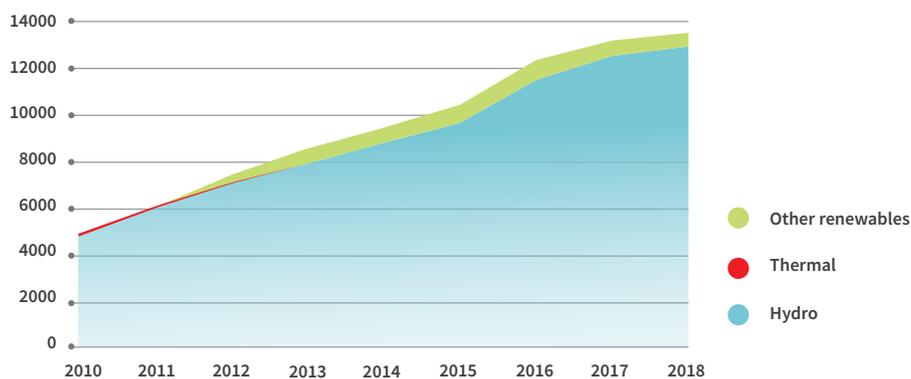
Data from the Energy Policy, Strategy, and Information Directorate of the Ministry of Water and Energy indicates that electricity generation in 2019 (13,840 GWh) increased by 4.7 percent from the level in 2018 (13,214 GWh), and peak demand increased by 7.4 percent. Between 2010 and 2017, gross generation capacity grew rapidly by nearly 218 percent, demonstrating major public investment in electricity generation capacity. Electricity exports also expanded from 332 GWh in 2012 to more than 1,300 GWh by 2017. Currently, 89 percent of the installed generation capacity in the country is hydropower, while the remaining 8 percent and 3 percent is from non-hydro renewables (notably wind) and thermal sources, respectively. As of yet, no IPPs are operating in the country; all nineteen existing power plants are operated by Ethiopian Electric Power (EEP), the state-owned utility responsible for the construction and administration of power plants (see Annex A).

Figure 7: Installed generation capacity (MW, 2020)



Source: USAID, Power Africa factsheet, 2020

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



Source: IEA, Key energy statistics 2018

Access to electricity

Currently, the national grid connects 3.29 million customers. New customer connections per year demonstrates that compared with 2011, the rate doubled by 2018 (see Annex B). From 101,317 customers connected in 2011 to 198,181 in 2018, electricity access is growing. The trend has slowed down in 2019.

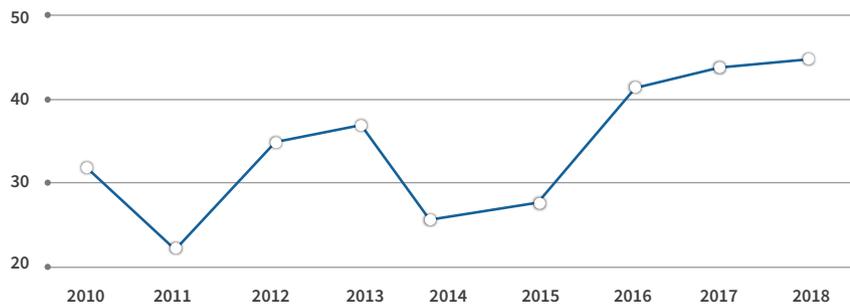
Given its population size, electricity access is a major challenge in Ethiopia. Therefore, it has embarked on an eight-year electrification roadmap from 2017 to 2025 to achieve universal electrification (NEP 2) by connecting 65 percent of households to the national grid and 35 percent to off-grid solutions. The Multi-Tier Framework (MTF), developed by the World Bank within the SE4ALL initiative in 2016, is used to assess households' access to electricity through various sources of electricity and improved cooking solutions. Technologies, attributes, tiers, and key indicators are applied to classify households for assessment within the framework.

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The MTF household survey was conducted nationally in 2017 in both urban and rural areas. It demonstrates the six tiers, ranging from Tier 0 (no access) to Tier 5 (full access) along a continuum of improvement (see Annex C). Although 57 percent of households have access to electricity, not all of them meet the criteria to be in Tier 1, and only 44.3 percent are in Tier 1, or above basic access to electricity.

Majority of the households (55.7 percent) are in Tier 0 of access, and most electrified households are in Tier 3. Therefore, the electricity access rate of Ethiopia, from Tier 1 to Tier 5, is at 44.3 percent (see Annex D). Grid connected access accounts for 33 percent, whereas off-grid solutions provide 11.3 percent access. However, rural and urban access to the grid differs drastically, with urban grid-connected access ranging between 80 to 90 percent, and reaching 99.9 percent in Addis Ababa. Rural grid-based electricity access ranges from 5 to 20 percent. Access to electricity in Ethiopia has increased from 23 percent in 2011 to 45 percent by 2018, as depicted in Fig. 9 below.

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



Source: Based on World Bank data

Electricity service quality and reliability

Currently, the total stretched high voltage transmission lines ranging from 132 kV to 500 kV across the country, owned and operated by the Ethiopian Electric Power (EEP), has reached more than 17,000 Kms. (EEP, 2021).

In addition, 1,978 km (66 kV and 45 kV) transmission lines, and 262,543,000 km medium and low voltage distribution network including (33 kV and 15 kV medium voltage) transmission lines, owned and operated by the Ethiopian Electric Utility (EEU), are stretched throughout the country (EEU, 2021).

Currently, EEP and the EEU are unable to distinctively address electricity transmission and distribution losses in their respective mandated systems. This is mainly due to the lack of data related to energy flows between the two utilities emanating from the lack of metering. Therefore, there is no metered information regarding allocation of system losses between transmission and distribution.

The total system losses decreased in 2016 and 2017 (see Annex E). This could be due to new and better connections for new customers, and partially to the increased amount of exports. The 2019 loss was calculated to be about 23.4 percent, which remained high. The estimate includes total system loss and pilferage (comprising both technical and non-technical losses). Technical losses

(transmission and distribution) are 14 percent of generation, with the major share attributable to design challenges in the distribution network. Non-technical losses are an additional 9.4 percent.

Short and sustained interruptions measurements have been conducted at the feeder level in substations owned by the utilities (EEP and EEU). However, the auto-reclosure feature of the breakers at many substations is disabled, and most interruption cases are changed into sustained interruptions. There is no uniform practice of measuring reliability indices such as SAIF (System Average Interruption Frequency) and SAID (System Average Interruption Duration). The availability attributes of the multi-tier framework (MTF) of electricity supply prevent some grid-connected households from moving to a higher tier (ESMAP, 2018). Electricity is available at least 23 hours a day and 7 days a week for 20.9 percent of households. About 5.2 percent of households receive less than 4 hours of service per day. In rural areas, unreliability is more acute. Only 9.6 percent of rural households receive more than 22 hours of supply a day, and 60.1 percent receive less than 8 hours a day (see Annex I). About 54.7 percent of households nationwide receive electricity for 4 hours during the evening, when lighting is required the most. An estimated 57.6 percent of grid-connected households face 4–14 outages a week, and 2.8 percent of households face more than 14 outages a week (World Bank, 2018).

Reliability of supply is holding back these grid-connected households from moving to a higher tier of access to electricity.

Off-grid electricity market

In the off-grid market segment, Ethiopia's solar energy market is well developed, with at least eight players in the market, offering a range of solar photovoltaic (PV) household solutions (pico-solar). This market segment has shown strong growth in the last few years, with systems ranging in size of up to 1.5 Wp. However, there has been no sale of large systems of over 20 Wp recorded in 2017-2018 (see Annex F).

From mid-2014 until late 2017, portable lanterns with single lights, or single lights with mobile charging (up to 3 Wp) sold well in Ethiopia followed by solar home systems (SHS) (3 to 20 Wp). Systems with more than 21 Wp have not been sold in Ethiopia. Sales of SHS have been increasing throughout the years. Most portable lantern products and multi-light systems are sold on a cash basis, with a small fraction sold using the PAYGO + cash model (see Annex G). The number of solar home system unit sales is still relatively small compared to the lanterns. The program experienced growth mainly due to concessional financing from the World Bank that has a majority quota for imports of SHS than lanterns.

Currently, only two private companies licensed by the regulator (EEA), Ethio Resource Group and Rensys Engineering Trading are in the mini-grid sector operating two mini-grids, and with four more assets under construction (see Annex H). There are also off-grid systems such as solar PV off-grid systems owned and operated by EEU, providing service for off-grid rural communities.

Power Africa geospatial analysis demonstrate that the communities with high concentrations of high consumer power households that are beyond 10 km from medium voltage grid lines could be particularly attractive sites for mini-grids development. These are communities where grid expansion is less likely to cover, or where the expansion of the national grid may not be completed for several years. Off-grid power generation for productive uses is another unserved market in which few companies are operating, using technologies such as solar pumps, in limited areas.

In the off-grid market segment, Ethiopia's solar energy market is well developed, with at least eight players in the market, offering a range of solar photovoltaic (PV) household solutions (pico-solar).

2.3 Electricity sector governance and market structure

Overview of electricity sector reforms

Power sector reform in Ethiopia can be traced back to the reforms that took place in mid-1990s. The government economic strategy (industrial development) set out the policy intention to promote private sector investment in the generation segment of the electricity market within the national grid, and full liberalization and commercialization off-grid systems (Industry Development Strategy, 2002).

Consequently, the Electricity Proclamation (Proclamation n. 86/1997) was passed. The reform program was aimed at introducing corporatization, commercialization, and decentralization of the power system. The intent of this reform was also to transform the state-owned vertically integrated public entity model, and restore financial sustainability and operational efficiency of the sector. The then Ethiopian Electric Light and Power Authority (ELPA), which bundled all activities around electricity in a single organization, was separated into the Ethiopian Electric Power Corporation (EEPCo), a state-owned utility, and the Ethiopian Electricity Agency (EEA) as the sector regulator. The regulator was accorded the mandates of issuing licenses, assessing operational performances, reviewing tariff applications, and submission of tariff recommendations to the government. This was an attempt to separate the ownership, operation, and regulation functions of the electricity market.

Again in November 2013, as part of an institutional reform process, the vertically integrated national utility, EEPCo, was restructured. The restructuring resulted in the creation of the Ethiopian Electric Power (EEP), taking over government-owned generation and transmission businesses, and the Ethiopian Electric Utility (EEU), which is responsible for power distribution and retail business. In that same year, based on existing national and regional electricity regulation demand, the Electricity Proclamation was replaced by a new proclamation, the Energy Proclamation n. 810/2013. On the basis of this proclamation, the Ethiopian Electricity Agency was re-established as the Ethiopian Energy Authority (EEA) by the Council of Ministers Regulation n. 308/2014 with an additional mandate. This added mandate included energy efficiency and conservation and the inclusion of EEA Board of Directors on EEA structure, which were not part of the electricity structure before.

The EEA has also been given additional responsibilities in geothermal resource regulation by the Geothermal Law issued in 2016. Also in 2016, a reform was introduced at the utility level, particularly in distribution utility (EEU), through horizontal unbundling following the political boundaries of regional states. Attempts were also made towards the modernization of utility operations by deploying enterprise resource management systems and smart technologies in the sales business. The horizontal unbundling of EEU is not a legal unbundling yet. It is the accounting and administrative unbundling of the nine regions under the structure of the EEU. Horizontal legal and institutional unbundling of EEU is not stipulated in the short-term, neither has this been indicated in the ongoing electricity market reform.

Institutions governing the electricity sector

The electricity market of Ethiopia is governed by two main institutions, the Ministry of Water, Irrigation and Energy (MoWIE) and the Ethiopian Energy Authority (EEA), providing policy guidance and regulation, market organization and operation. The MoWIE oversees the EEA and together they both monitor the market players in Ethiopia's electricity sector.

Table 1: Institutions governing the electricity sector

Ministry of Water, Irrigation and Energy (MoWIE)	<p>The mandate of the MoWIE is to promote the development of water resources and the growth and expansion of electricity supply in Ethiopia.</p> <p>The Ministry is structured into three directorates:</p> <ul style="list-style-type: none"> • Energy Policy, Strategy and Information Directorate (responsible for energy policy and strategy studies, formulation, interpretation, and national energy data base information system); • Alternative Energy Technology Development and Promotion Directorate (responsible for off-grid electrification and alternative energy technology development and dissemination); and • Hydropower Design and Study Directorate (responsible for large-scale hydropower resource study and design).
Ethiopian Energy Authority (EEA)	<p>The EEA, established by EEA Establishment Regulation No. 308/2014, regulates Ethiopia's electricity sector. The mandate of the EEA includes, among others, issuing licenses, regulating tariffs, issuing directives and codes, approving agreements, and resolving disputes.</p>

Market players

The MoWIE and the EEA currently oversee two state-owned market players active in the electricity sector value chain, Ethiopia Electric Power (EEP) and Ethiopia Electric Utility (EEU).

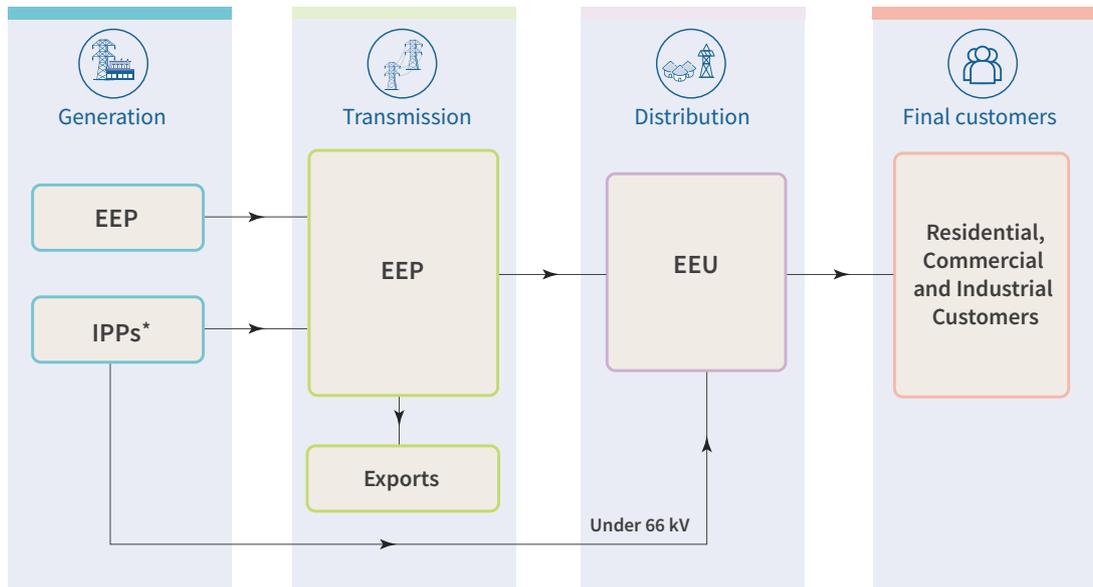
Table 2: Market players

Ethiopia Electric Power (EEP)	<p>EEP owns and operates all existing generation capacity and the transmission network (over 66kV). It is the designated single buyer in Ethiopia's electricity market, with the responsibility to buy power from IPPs entering the market.</p>
Ethiopia Electric Utility (EEU)	<p>EEU owns and operates sub-transmission and distribution networks, and distributes and retails electricity to end customers using a regulated tariff. It also has a mandate to procure bulk power at 66 kV and below from IPPs.</p>

Electricity market model

The prevailing electricity market structure is a single buyer model where the public utilities own generation assets, own and operate transmission assets, and undertake wholesale and retail electricity distributor services. EEP represents the single buyer within this model, but as of yet, there are no IPPs operating in the country.

Figure 10: Structure of the electricity supply industry



*No IPPs are currently operational in Ethiopia.

2.4 Policies and regulations governing the electricity supply industry

The electricity market of Ethiopia is governed through numerous position papers, strategies, policy documents, and laws summarized in the next section (see Annex J for further information).

Table 3: Energy sector strategies, policies, and plans

<p>National Energy Policy (1994)</p>	<p>The National Energy Policy aims to promote the development of the energy sector in a coordinated manner with overall national economic development. The policy focuses on ensuring efficiency, increasing access to electricity, improving the security of supply, addressing the financial viability of the sector institutions, promoting energy efficiency and conservations, encouraging the development of renewable energy, commercial pricing of energy resources, encouraging electricity export, improving reliability and service quality, and introducing technical and commercial service standards.</p>
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Climate-Resilient Green Economy (CRGE) Strategy (2001)	It aims to expand electricity generation capacity from renewable sources by five-folds from 2015 - 2020 for domestic and export electricity markets.
Growth and Transformation Plan II (GTP II 2016)	It defines strategic directions which incorporate CRGE implementation arrangements and sets economic development targets to be achieved by the end of GTP II (2025), including electricity sector development targets. The strategy aimed at expanding electricity services coverage to 90 percent, increasing generation capacity to 17,314 MW, increasing the distribution network to 21,728 kms, and increasing the per capita annual consumption of electricity to 1,269 kWh.
National Electrification Program 2 (NEP2; 2019)	It is a program with an action plan for achieving universal electricity access by 2025, through 65 percent grid-based connections and 35 percent with off-grid technologies (solar off-grid and mini-grids). This strategy drove Ethiopia's implementation of electricity access initiatives.
PPP Policy (2017)	It sets the policy direction to benefit from PPP-based project implementations, provides guidance on PPPs implementation. The policy focuses on expanding generation capacity from hydro, wind, geothermal, and solar energy. The policy further aims to reduce project delays and cost overrun, knowledge transfer to the local private sector, and to improve efficiency in asset utilization.
Rural Development Policy and Strategy (2003)	It stipulates strategic development directions of rural Ethiopia. Encouraging the private sector, cooperatives, and others to supply electricity using available sources. These are recognized as part complementing the public sector effort to expand electricity services among rural communities.
Environmental Policy (1997)	It stipulates sectoral and cross-sectorial policies and other macro policies to be checked against environmental protection principles defined in this policy to ensure sustainability. Concerning the energy sector, this policy aims to ensure that feasibility studies for hydroelectricity and other significant generating facilities include rigorous environmental impact assessments to allow informed decision-making. This is aimed at eliminating, or at least minimizing, damages to natural resources and the environment.

2.4.1 Key laws and regulation for the electricity supply industry

Foundational legislation

The parent law governing the electricity sector in Ethiopia is the Energy Proclamation No. 810/2013, which is supplemented by EEA Establishment Regulation No. 308/2014, Energy Regulation No. 447/2019, and additional directives.

The Energy Proclamation, as amended in 2018 by Proclamation No.1085/2018, regulates the energy generation and distribution market segments, containing provisions for:

- The establishment of the Ethiopia Energy Authority and its powers and duties,
- Licensing requirements;
- Electricity supply activities and their use of land;
- Energy efficiency and conservation; and
- Criminal penalties for offences related to energy efficiency and licensing.

As per the Energy Proclamation, the Ethiopian Energy Authority Establishment Regulation No. 308/2014 establishes the EEA and sets out its objectives as promoting competitiveness in the energy sector; ensuring efficient, reliable, fair, economical, and safe electricity supply; and promoting energy efficiency and conservation. Under the provisions of the Proclamation, the Authority is responsible, among others, for:

- Issuing licences and overseeing licensees,
- Regulating tariffs,
- Formulating energy efficiency and conservation strategies,
- Approving power purchase and network services agreements; and
- Resolving disputes.

The Energy Regulation supplements the Energy Proclamation with further, more detailed provisions for licensing, tariff setting, energy efficiency and conservation, and dispute resolution.

In order to implement the Energy Proclamation and Regulation, the EEA has issued several directives for electricity sector activities, including the Directive for the Issuance of Licenses for Electricity Supply in the National Grid n. 007/2012, adopted in 2020. It sets out the types and characteristics of licenses and the requirements for applying for and holding a license. Investors engaged in grid related operations require the following licenses:

- Generation License, including embedded generation;
- Wholesale Supply License, covering bulk generation supply license, electricity import license, and electricity export license;
- Electricity Transmission License; and
- Electricity Distribution and Sale License.

To obtain licenses, applications along with support data, proposed tariff as may be appropriate, credentials, and related documents as specified in the licensing directive are required. Depending on the type of license, permits or clearances from relevant government offices should also accompany the license per the energy regulation and the licensing Directive.

Also in 2020, a Mini Grid Directive n. 268/201 has been adopted by EEA, defining licensing, technical and service quality standards, and tariff guidelines and methodology for the mini-grids. Off-grid market entrants requiring licenses are required to submit: a feasibility study; environmental impact assessment; the estimated cost of implementing the project, applicant's financial condition, technical competence, and experience; construction and installation designs; source of electricity; project site map; land use permit; water use permit as appropriate; and power purchase agreement where relevant. The current licensing process is not light-handed and involves relatively costly and lengthy procedures. There is no license-exempt procedure and all commercial operators, regardless of size, location, or technology,

are required to procure licenses. The licensing regime of the off-grid system is still based on first-come-first-serve basis, which is similar to the practice on grid-based investments. As a result, the regulation is centralized and often costly.

Grid Code and technical regulations

Ethiopia does not currently have an approved national grid code regulating transmission, connection to and use of the grid. A draft Grid Code was published by the EEA in 2018 but is still awaiting approval. Consequently, these aspects are contractually determined in the power purchase agreements concluded between the EEP and the private operators, generally in line with the draft grid code.

Furthermore, several technical documents and directives have been enacted, namely: the Directive on Uniform System of Account (USOA), which provides a framework of accounting (collection, recording and reporting) financial information, and the Directive for Quality of Service Standard for Grid Supply, 2020, which determines the quality standards for electricity services that are provided by a licensee in Ethiopia.

Tariff regulation

As per the Energy Proclamation and Energy Regulation, it is the EEA's duty to regulate tariffs for both on-grid and off-grid operators. In the case of the former, the Authority reviews national grid related tariffs and submits its recommendations to the government for approval, while for the latter it directly approves tariffs. The Energy Regulation also sets out the general principles and procedure of tariff setting.

Furthermore, in line with the provisions of the Proclamation and Regulation, the EEA has issued a Directive for Electricity Tariff Setting Methodology & Guideline, 2020 for on-grid tariffs to:

- Provide the basis for developing unbundled tariffs for the generation, transmission and distribution/sale segments of the electricity supply sector;
- Provide the basis for implementing timely tariff adjustment and implement a multi-year tariff regime; and
- Establish the tariff-setting process and procedures for reviewing licensees' tariffs.

Off-grid tariff setting guidelines are defined in the Mini Grid Directive, 2020.

2.4.2 Other regulation for private sector participation

Private sector participation models

The sector is also subject to other, non-sector specific regulatory instruments, including Public-Private Partnership Proclamation No. 1076/2018 and investment laws (Proclamation No 1180/2020 and Regulation No 474/2020).

Private sector participation in the electricity market in Ethiopia is regulated by the Energy Proclamation and the Investment Proclamation, as well as related Regulations.

However, private sector participation in the electricity market in general (generation, transmission, and distribution) is mostly through the construction of different power system

Over the years, a substantial increase in electricity demand has necessitated significant capacity expansion across the value chain which has encouraged exploration of private sector participation models.

assets with EPC schemes and supply of equipment and consultancy services. Over the years, a substantial increase in electricity demand has necessitated significant capacity expansion across the value chain which has encouraged exploration of private sector participation models. Ethiopia's energy and investment laws permit participation of the private sector in the electricity generation market, opening to independent power producers under a single-buyer model. As a result, Ethiopia procured the first IPPs projects: a 100 MW solar project (Metehara Project) procured under a competitive procedure; two geothermal projects directly negotiated, outside of competitive bidding process. These projects were all procured before the promulgation of the PPP Law, which introduced rules for the procurement of public-private projects.

Private sector participation in the other segments of the electricity market (transmission, and distribution) remains limited by the restriction for private operators to obtain licenses to operate these services. In this case, private sector participation is mostly invited through EPC contracting, consultancy services, equipment and appliance manufacturing, and supply for different energy transformation and conversion technologies.

Other than large-scale power systems in the national grid, the off-grid sector is fully liberalized by the Investment Proclamation. The private sector can participate in off-grid generation, distribution, and sales. To date, however, there are very few mini-grid developers in the market.

There is also no procedure developed to issue concessions following competitive processes. As a result, a large-scale offer by the private sector has not yet been presented. There are few mini-grid licensees now operating supplying few hundred households in off-grid areas. Support services for off-grid/mini-grid electrification ranging from ease of regulation, availing of subsidy packages, and addressing the potential risk of dislocation in the event of grid arrival is yet to be clearly defined and implemented by an appropriate instrument.

Procurement processes

The PPP Proclamation (Proclamation No. 1076/2018) is the governing law for the procurement of public-private projects, along with its subsidiary regulations issued by the Ministry of Finance and Economic Cooperation (MoF). The PPP Proclamation establishes the competent authorities for overseeing the public procurement procedures, the PPP Directorate General (PPP DG) established under the MoF to facilitate the development and implementation of PPPs. The PPP Proclamation promotes competitive procurement as the preferred choice for public procurement (Article 19); it also qualifies conditions where direct negotiation, as a method of PPP project procurement, could be pursued when approved by the PPP Board (Article 39). It streamlines the process for running procurement procedures and defines institutional responsibilities. Additional instruments to run a competitive procurement process are developed for solar PV power projects. The PPP projects are prioritized by the Public-Private Partnership board. Currently, solar and hydro pipeline projects are identified.

Before the enactment of the PPP proclamation, the electricity market by a private sector generation investment was largely through submission of unsolicited procurement. This approach lengthens the time and involved prolonged negotiations, increasing uncertainty, and a lack of confidence of the financial market to support such infrastructure development projects. Engagement of the single buyer EEP, which itself is a utility company that generates electricity, has not been encouraging to the private sector.

Incentives

Investors in energy infrastructures may benefit from incentives stated in the provisions of Investment Regulation n. 270/2012. These include tax reliefs, including tax holidays, import duty relief of capital equipment, and repatriation of profits. The additional incentives include provision of land with competitive lease prices (less than 1 USD/m²), investment credit supports, guarantee against expropriation or nationalization, and privilege to full repatriation of profits, dividends, principal, and interest payments on the external loan in convertible currency. The right to employ expatriate managers and experts are also additional incentives.

Investment Regulation n. 270/2012 has been partially replaced by Investment Regulation n. 474/2020, which states that the provisions of the former relating to incentives will remain in place until further dedicated regulation is enacted.

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Analysis of Electricity Market Policy and Regulatory Framework





*Power Pole and Power Lines in the Amhara Region, Ethiopia
Photo credit: Miles Astray*

3. Analysis of Electricity Market Policy and Regulatory Framework

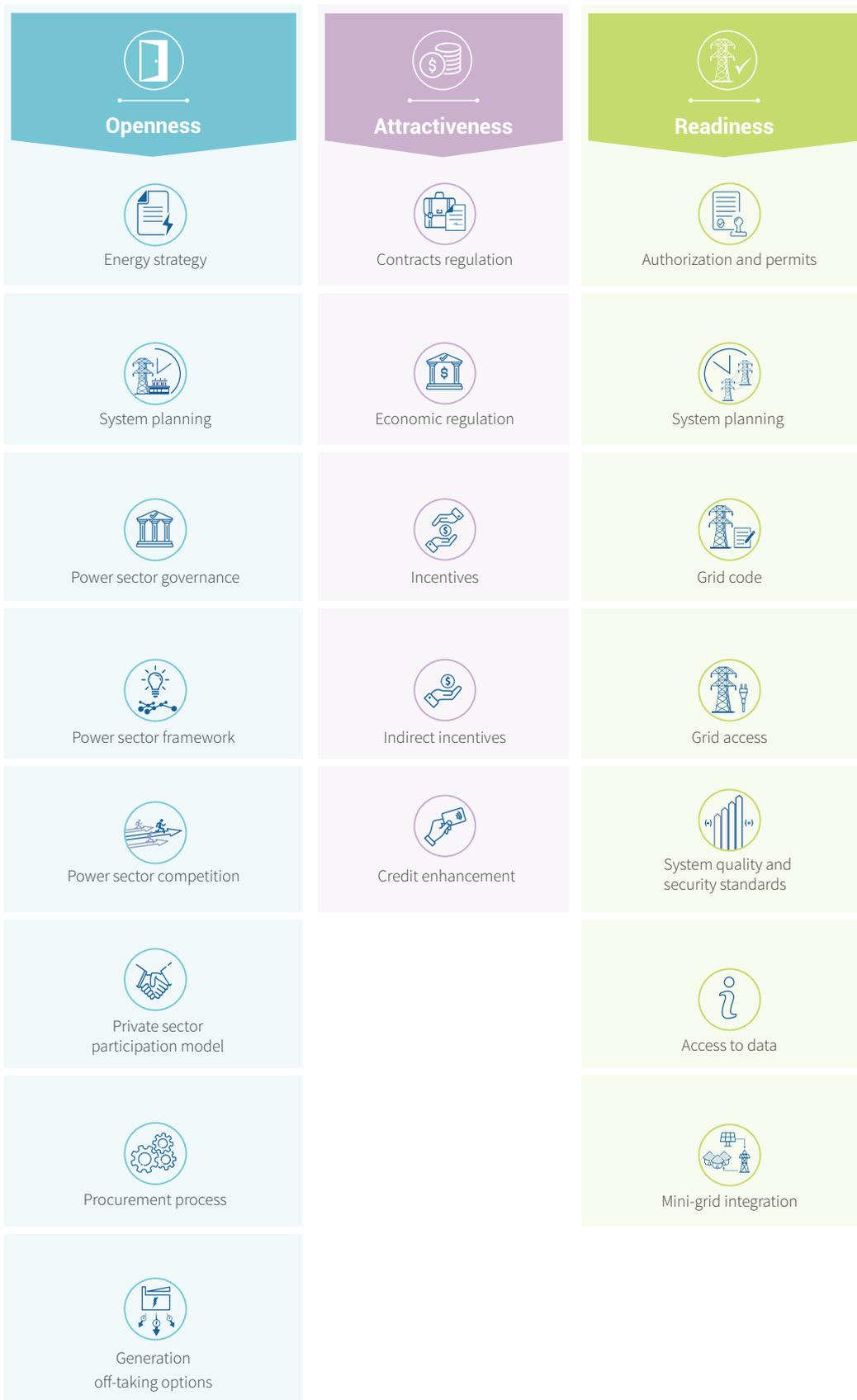
UNECA and RES4Africa Foundation have developed a custom methodology to assess countries' policy, legislative, and regulatory frameworks in their ability to encourage the participation of private sector investors. The approach encompasses the entire electricity supply industry value chain, covering the 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>Openness – or power sector structure and governance. This Dimension covers policies, laws, and regulations meant to define energy policy and strategy priorities, market-entry, infrastructure planning, sector governance, market structures, and related considerations. These instruments combined provide an overall view of the <i>openness</i> of the electricity market to investors.</p>
 <p>Attractiveness</p>	<p>Attractiveness – or sector economics. This Dimension assesses policies, laws, and regulations that ensure the economic viability of electricity infrastructure investments, as well as fair competition among market operators. A review of these instruments provides an overall synthesis of the <i>attractiveness</i> of the electricity market to private sector investors.</p>
 <p>Readiness</p>	<p>Readiness – or sector maturity. This Dimension investigates technical regulations designed to ensure the implementation into, and efficient integration and management of electricity infrastructure within the energy system. A review of these elements of the Dimension provides an overall picture of the <i>readiness</i> of the electricity market to investors along the value chain.</p>

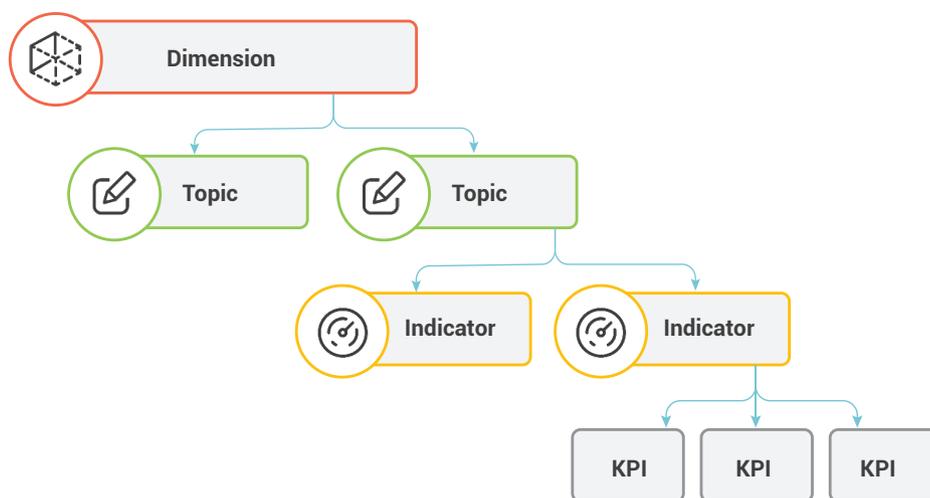
Figure 11: Overview of the Topics assessed within each Dimension



Each of these Dimensions in the methodology is 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 K 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 international and African policy and regulatory 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

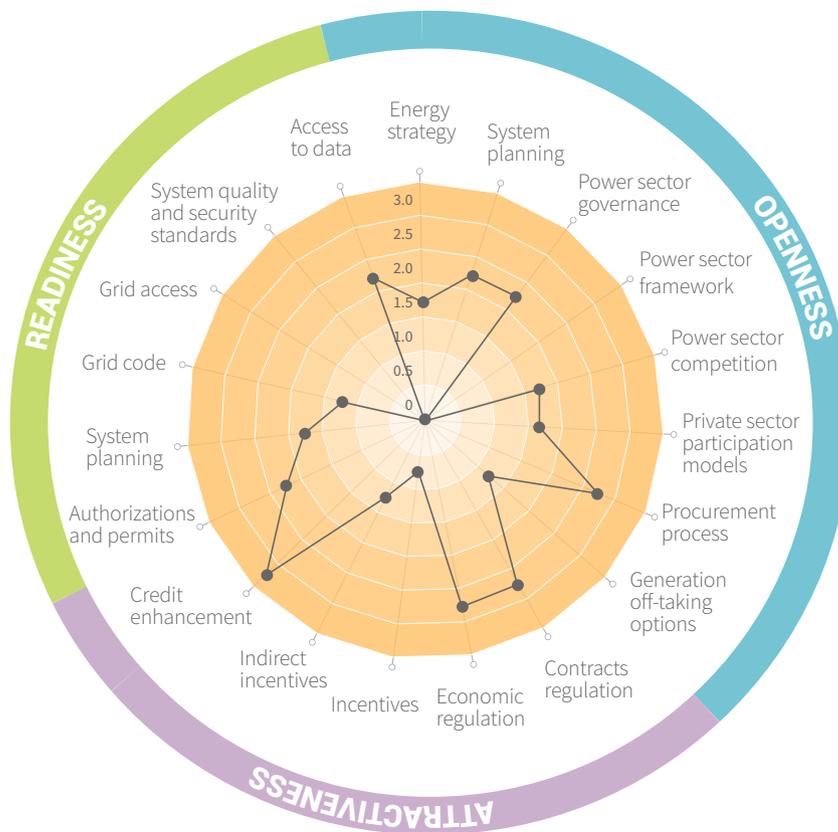
Readiness) tool. The ROAR tool computes results by country based on country data inputs and a defined weighting methodology.

3.2 Main findings of the regulatory review

The section below presents the quantitative results of the performed assessment of Ethiopia’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

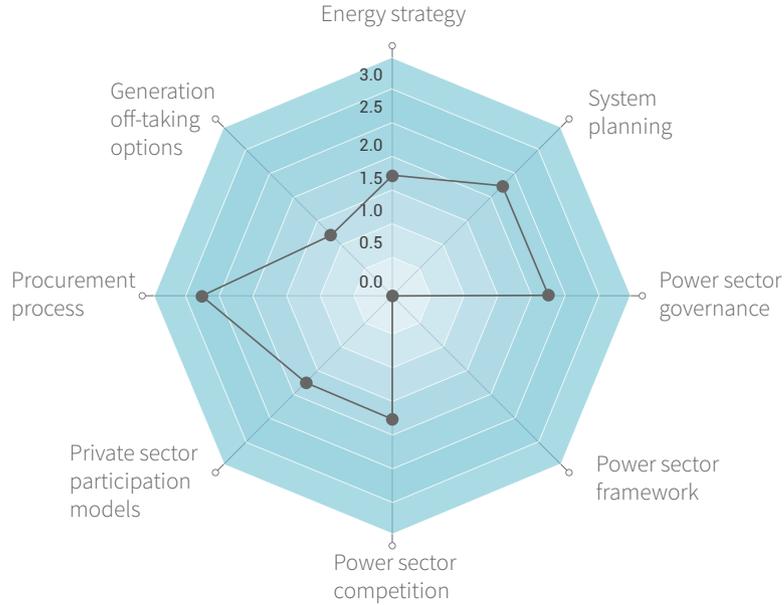


Overall, Ethiopia benefits from a moderate level of *openness*, *attractiveness*, and *readiness* of its electricity market to private investors nesured by the current legislative and regulatory environment. Thanks to recent reforms, the country is well positioned in few areas, as *procurement process*, *contracts regulation* and *economic regulation*. However, improvements in key aspects as *energy strategy*, *power sector framework*, *generation off-taking options*, *incentives* and *indirect incentives*, as well as *grid code* and *grid access* are fundamental to increase its ability to crowd-in generation investors.



A deep dive into the Openness dimension

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



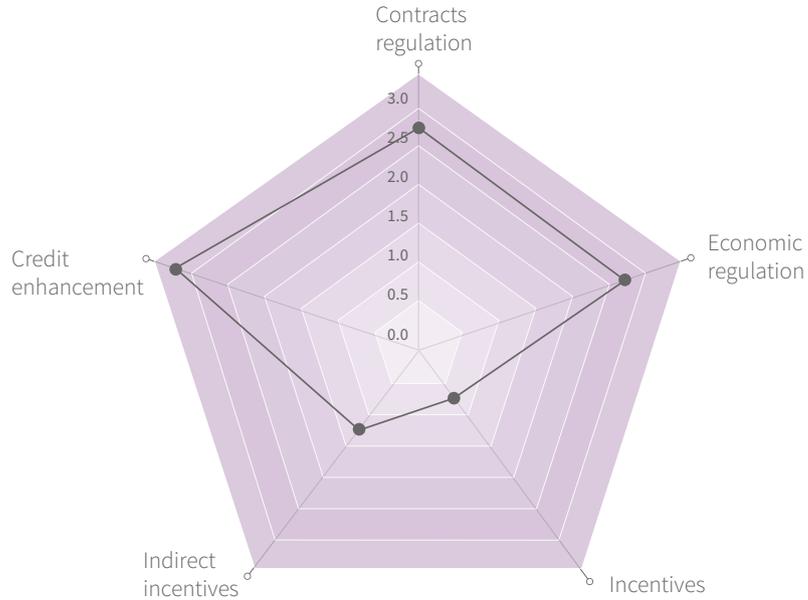
 <p>Procurement process</p>	<p>Regulation of the electricity market of Ethiopia exhibits key areas of strength in terms of attributes of market <i>openness</i>. Ethiopia’s regulatory environment is well developed in the area of procurement, which is guided by a governing PPP law and a public institutional unit for PPPs. Furthermore, clear PPP processes and availability of PPP models such as BOO, BOOT, and BTO signal progress in procurement management. These models open opportunities for the private sector to participate in PPP-based energy projects. Furthermore, opportunities are also available to the private sector through EPC+finance models in a generation project.</p>
 <p>System planning</p>	<p>Modest regulatory performance is observed in generation planning. The presence of a power sector masterplan, inclusion of technology-specific generation plans, and assessment of renewable energy sources and their mapping are indicative of planning competence in the sector. Furthermore, a generation investment plan is developed. A formal review procedure for generation expansion and investment is an area of further improvement towards better <i>system planning</i>, along with better transparency related to public access to <i>system planning</i> information.</p>
 <p>Power sector governance</p>	<p>Electricity market governance is crucial to private sector investment in generation assets. Ethiopia’s power sector has made modest progress in instituting a regulatory authority with a clear definition of responsibilities of the regulator, following the 2013 Energy Proclamation instituting the Ethiopian Energy Authority. This progress is coupled with a dispute resolution mechanism for electricity market operators, including through the recently adopted New York Convention. While these are positive</p>

	<p>developments, the lack of publicly available regulatory decisions (transparency) and the lack of sufficient independence of the regulator from political authorities (such as autonomous mode of appointment of leaders and board members) are key impediments. Furthermore, the lack of sufficient financial independence of the regulator and gaps in the enforceability of its decisions remain areas of regulatory reform necessary for effective market governance.</p>
 <p>Energy strategy</p>	<p>Ethiopia performs fairly when it comes to energy strategies (energy and climate policy). Even though there are policies in place, there is a lack of clear generation capacity (including from renewables) expansion targets and a lack of formal procedures for energy policy review and monitoring of targets. Similarly, while a climate change policy is articulated, with greenhouse gas (GHG) reduction targets, formal procedures for climate policy review are not in place. The energy policy and strategy could further be improved by articulating generation and renewables targets, and by instituting review procedures and periodic monitoring of progress towards set targets.</p>
 <p>Power sector framework</p>  <p>Power sector competition</p>	<p>The <i>power sector framework</i> of Ethiopia is among the major impediments to <i>openness</i> towards effective private sector participation in generation investments. Current regulatory provisions permit private parties to operate generation assets, including through ownership, by acquiring licenses. There is also general <i>openness</i> to the presence of IPPs. However, the poor regulatory performance related to the <i>power sector framework</i> emanates from the lack of transmission and distribution services unbundling, lack of separation of transmission assets management from system operation, and lack of wholesale and retail market competition. Regulatory reform can guide the <i>power sector framework</i> towards greater inclusivity and <i>openness</i> to market players across the value chain.</p>
 <p>Generation off-taking options</p>	<p>The regulatory environment of Ethiopia avails very limited options to <i>generation off-taking options</i>. The market operates under a single buyer system through EEP and EEU establishment regulations of 2015. Even though there are rules and procedures for accessing regional spot markets, such a mechanism is currently unavailable to investors. Private (corporate) PPAs, or mechanisms for two private parties to negotiate power transactions, are not permitted, limiting the <i>off-taking options</i>. Self-consumption-related generation is permitted, with no capacity limits; however, regulation is not in place to sell excess capacity to the national grid due to the lack of a net metering option. By addressing these regulatory impediments, <i>generation off-taking options</i> can be improved, with expected positive effects on inducing private sector investment in generation assets.</p>
 <p>Private sector participation model</p>	<p>The performance related to regulations permitting various <i>private sector participation models</i> in generation investment is fair, with notable limitations. Divestiture, or privatization and share ownership, in generation assets are permissible. However, participation models through merchant generation investment model (independent generation assets) and generation concession are not currently permitted by existing regulation. Addressing these constraints would enhance the <i>openness</i> of the Ethiopian electricity market to generation investors.</p>



A deep dive into the Attractiveness dimension

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



Contracts regulation

Contracts regulation is key in defining the *attractiveness* of the electricity market. Regulatory practice related to *contracts regulation* in Ethiopia demonstrates good performance. Such regulation is assessed largely on aspects related to the management of public PPAs in a standardized fashion. Progress is observed towards standardization of PPAs in Ethiopia, especially for solar PV and geothermal projects. The standardization includes provisions such as project validity and terms, key performance indicators (including commissioning and availability), frequency of payments, expression (or indexing) to foreign currency, force majeure, dispute resolution mechanism, and termination provisions, including for transfer obligations and early termination. Addressing a capacity component and indexation of contracts to inflation, two issues often inquired by generation investors, would lead to consideration of Ethiopia as a best-case in contracts regulation and management.



Economic regulation

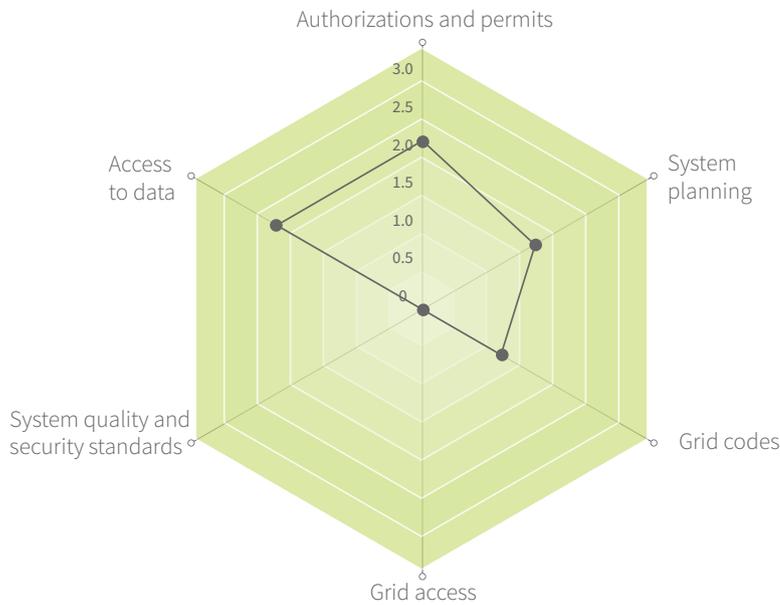
Economic regulation, or tariffs administration, is similarly crucial. Ethiopia performs well in *economic regulation* at large. Though not yet publicly available, the electricity sector of Ethiopia applies a clear methodology of retail tariff structure, as per the Directive for Electricity Tariff Setting, Methodology, and Guideline of the Ethiopian Electric Authority. The tariff methodology splits the tariff among generation, transmission, and distribution (GTD) components. The Directive also provides an avenue for periodic review and revision of the tariff. However, the tariff regime remains non-cost reflective, limiting the degree of *attractiveness* of the market to private investors. Tariff reform towards cost-reflectivity would significantly increase the *attractiveness* of the Ethiopian electricity market to investors.

 <p>Credit enhancement</p>	<p>Financing is a major constraint in energy investments, therefore, <i>credit enhancement</i> matters. In this regard, the electricity market of Ethiopia is very attractive. There are possibilities for revenue escrow agreements for private generation investors, government and multilateral guarantees, and concessional lending.</p>
 <p>Indirect incentives</p>  <p>Incentives</p>	<p><i>Direct and indirect incentives</i> matter to private sector investors. The Ethiopian power market offers limited <i>incentives</i>, such as renewable energy development auctions and foreign currency-denominated contracts. Feed-in regimes are no longer extended. Furthermore, capacity payments, green certificates, and renewable quotas are not offered. <i>Indirect incentives</i> such as carbon pricing through a carbon market and subsidies such as results-based financing and direct subsidy are not available. Private generation investors should expect to participate in an environment with less cluster of <i>incentives</i>. It will be important, in such an environment, to improve on market competition.</p>



A deep dive into the Readiness dimension

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





Authorization and permits

The degree of *readiness* of the electricity market of Ethiopia to generation investors is constrained by a range of factors. *Authorization and permit* issuance process and efficiency, determining administrative and transaction costs, are crucial for effective engagement of the private sector. Ethiopia performs moderately in this regulatory administration area.

- Environmental approval processes are relatively well developed, with clear rules, established at the national level. There are clear and publicly available procedures for authorization and licenses facilitated by a one-stop-shop.
- Water rights rules are in place, with national-level application; however, there is no publicly available clear procedure to get such authorizations. There is also an absence of a one-stop-shop.
- Land rights similarly enjoy clear rules, with private investors enjoying access to land. However, such rules are at the regional level, with no publicly available clear procedures to seek authorizations.
- Construction permits are governed by rules that are also defined at the regional level. There are clear rules for certificates of competencies. However, the lack of publicly available procedures to seek such permits and the absence of a single-stop-shop limits the degree of *readiness* of the market to private investment.



System planning

Related to the *system planning*, the assessment focuses on the network development plan, where Ethiopia performs moderately. The power sector is guided by a network development plan, through a master plan which includes a transmission expansion plan, as well as a system integration study. Such a plan is articulated at the national level. Limitations in the current *system planning* include formal procedures for reviewing generation and network expansion plans, carrying out regular assessments of network expansion needs, grid flexibility, and network integration studies. These capacities would further improve the power sector system planning and therefore *readiness*.



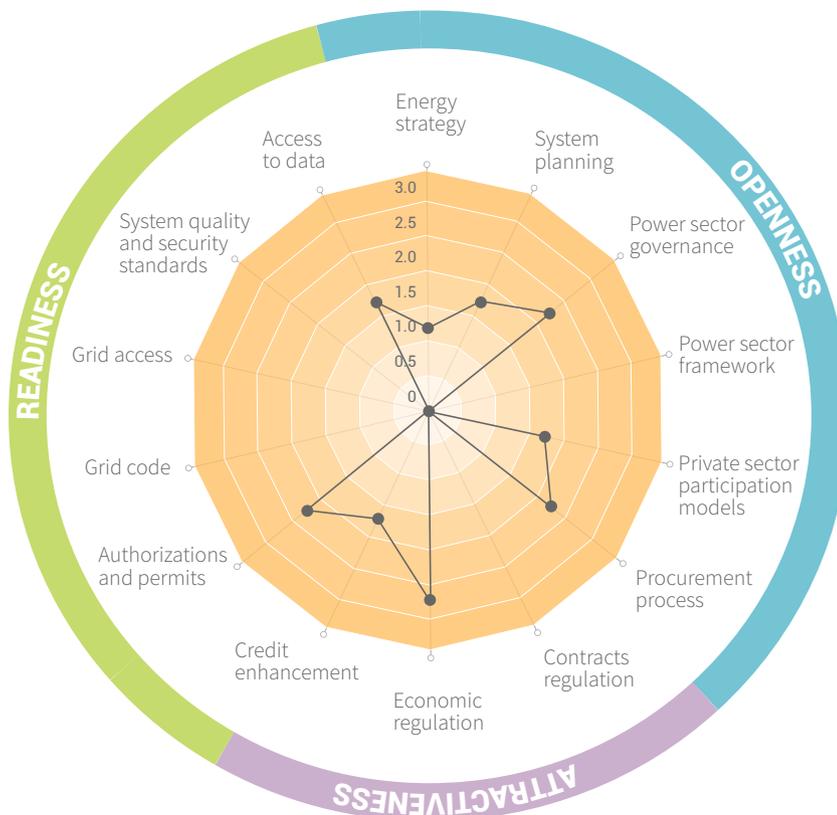
Grid code

There is need to put in place a *grid code*, which currently is under development (the Ethiopia National Electricity Transmission Grid Code). The code will require to provide clarification in numerous areas relevant to the market, including the following. First, it will need to define systems operation rules, including the dispatch of ancillary services. Second, connection rules for generation investors need to be well developed, including clarity on procedures on getting authorization. Third, dispatch rules will need to be clarified, along with publicly available market settlement rules, market settlement information, and management of investor exposure to imbalance risks. Fourth, curtailment clarification under the *grid code* is also crucial. Currently, curtailment compensation to generation investors is not practiced. Specification of limitations on curtailment to generation investors is also not established. Finally, ancillary services management such as reactive power, black start capacity, spinning reserves, and governing rules and regulations will need to be clarified. Regulatory clarity in these areas would enhance the utility of the *grid code*, and contribute towards improving the *readiness* of the grid to generation investors through more regulatory certainty, and connection and services management.

	<p><i>Grid access</i>, or grid connection and operation agreements, is a major impediment resulting in poor performance of the regulatory environment in Ethiopia. Currently, rules related to providing mandatory connection by the transmission system operator are not well developed. The contractual framework for connections and use of the transmission network is also not clarified, along with rules for allocation of connection costs. <i>Grid access</i> remains a key area of regulatory development in the Ethiopian electricity market.</p>
	<p><i>System quality and security standards</i> are part of the grid readiness. Currently, the gap in <i>quality and security standards</i> could be bridged through the adoption of the draft grid-based standards. System transparency, through <i>access to data</i>, is established as demonstrated by the public availability of generation and socioeconomic data. The sharing of operational data of public utilities should also be encouraged to institute broader transparency.</p>

3.2.2 Transmission segment

Figure 17: Overview of the Transmission segment

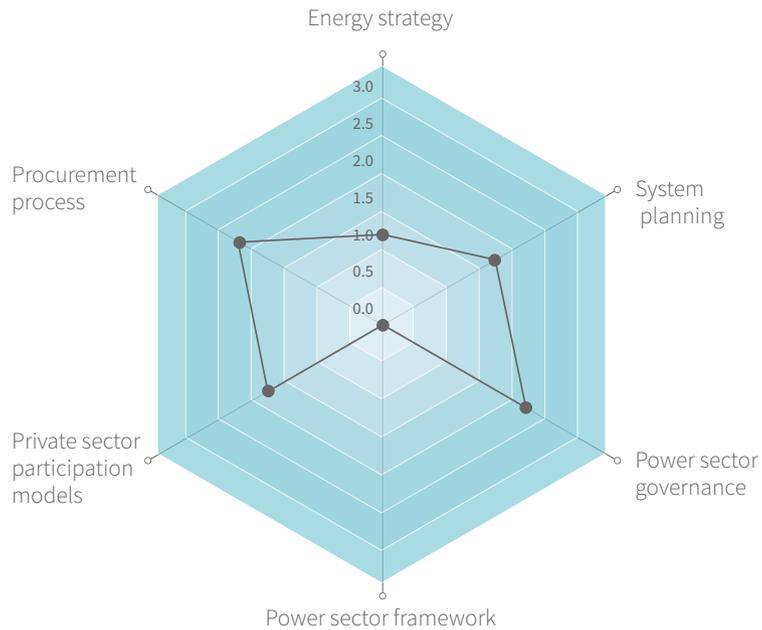


Overall, the analysis of the policy and regulatory environment for the transmission segment confirms its moderate preparedness in crowding-in private investors. Addressing the impediments to greater *openness*, *attractiveness*, and *readiness* is needed especially in key areas, such as: *power sector framework*, *contracts regulation*, *grid code*, *grid access* and *system quality and security standards*.



A deep dive into the Openness dimension

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




Energy strategy


System planning

Private sector participation in transmission infrastructure in Africa is often limited, even though this segment of the electricity market is witnessing increasing *openness* with the application of traditional and new models of attracting private investment. The transmission segment of the market in Ethiopia exhibits a limited degree of regulatory *openness* to private investment in transmission assets, along with impediments. Key features of the market related to energy and climate policies, system planning capacity, and network development plans are already discussed (see *Openness – Generation*). In the network development plan, it is worth noting the national transmission investment plan, developed by the EEP Corporate Planning Directorate, complementing existing planning competencies.


Power sector governance

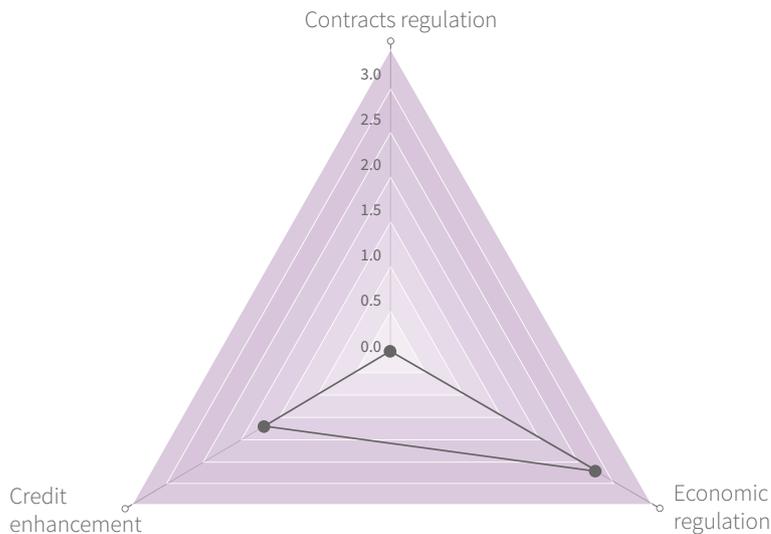
Power sector governance and *framework* are also evaluated (see *Openness - Generation*). However, the *power sector framework* related to market entry by the private transmission asset investors requires attention. Current electricity market regulations require transmission companies to obtain a license, with rules to impose penalties and removal of such licenses. However, Ethiopia performs poorly in relation to the *power sector framework*, largely due to the

 <p>Power sector framework</p>	<p>restriction of private parties to invest in, or operate, transmission assets, or obtain transmission licenses. This has in effect largely cordoned private sector investment role in transmission infrastructure development. To maximize investment resources deployed into network development in the medium to long-term periods, a comprehensive regulatory rethink about modalities of private sector partnership is required. International and continental experiences in this regard can offer useful regulatory lessons and models.</p>
 <p>Private sector participation model</p>	<p>Even though investment and operation of the transmission segment of the electricity market in Ethiopia are not directly open to the international private investors, there are, nonetheless, different models of private sector participation. The local private sector is permitted to transmit and distribute electricity. International private sector investors are permitted to participate in electricity import and export operations through a joint venture with government (Investment Regulation No. 474/2020). Merchant transmission investments and independent power transmission (IPT) models remain unavailable to private investors.</p>
 <p>Procurement process</p>	<p>The <i>procurement process</i> offers private sector participation opportunities in transmission investment. The regulation on procurement administration is fairly well developed. However, there is currently no schedule of transmission tenders, and competitive tendering for transmission investment. There are also no defined PPP models for transmission asset investment, such as BOO, BOOT, or BTO. However, the EPC+finance model for transmission investment is available for private sector investors. Addressing these areas of regulatory gaps will improve the <i>openness</i> of the transmission market to investors.</p>



A deep dive into the Attractiveness dimension

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

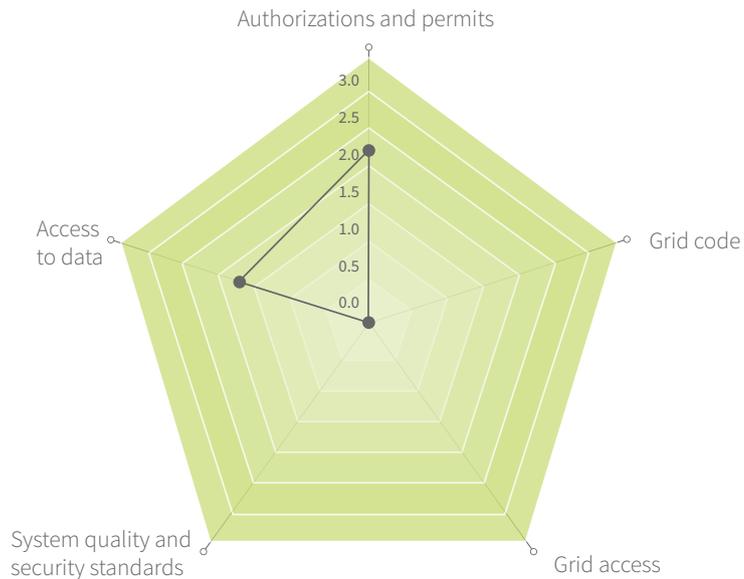


 <p>Contracts regulation</p>	<p><i>Contracts regulation</i> constitutes an area of major regulatory gap in the transmission segment of the market in Ethiopia. It is often guided by a Transmission Service Agreement (TSA). A standard TSA is currently not available, along with performance requirements, payment modalities, indexation for hard currency and inflation, as well as termination and dispute resolution. This is largely due to the regulatory restriction in place on the direct participation of the private sector in transmission investment in Ethiopia.</p>
 <p>Economic regulation</p>	<p>Ethiopia performs well on <i>economic regulation</i> in the transmission market. <i>Economic regulation</i> of the transmission system operates under a clear definition of regulated network tariffs, regulated on cost-basis with in-built periodic revisions. These are good practices to emulate.</p>
 <p>Credit enhancement</p>	<p><i>Credit enhancement</i> is one of the attractive features of the transmission investment space in Ethiopia, with the possibility of an escrow agreement for transmission investors, multilateral guarantees, and concessional lending. However, government guarantees are not extended to transmission investors under any model.</p>



A deep dive into the Readiness dimension

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

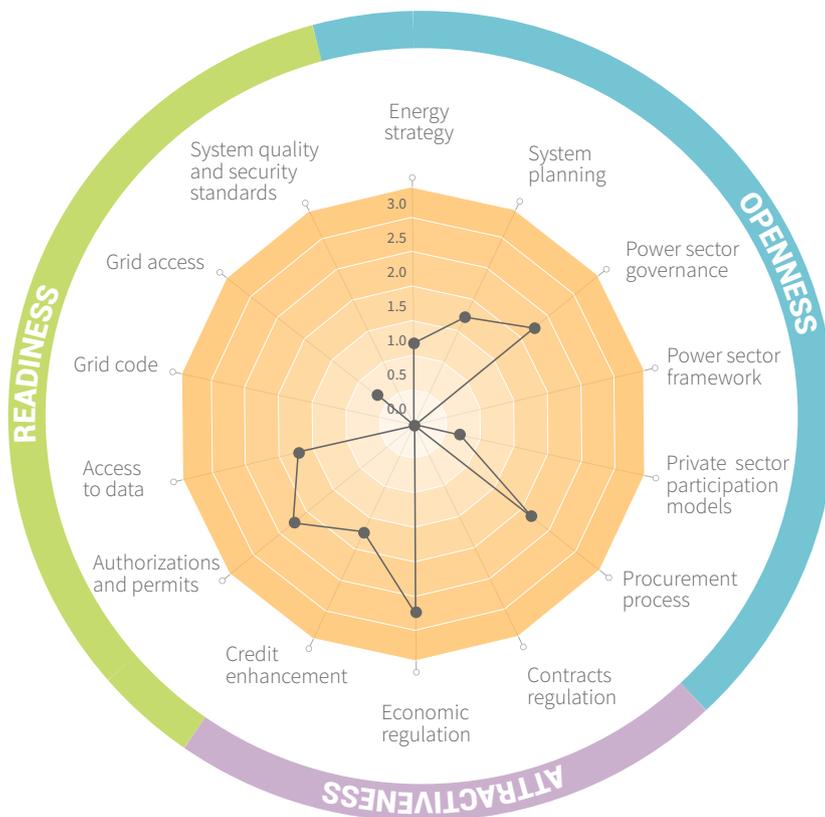


Aspects of *readiness* related to *authorizations and permits*, the *grid code* (though the draft code is expected to bridge this gap when adopted), *grid access*, and *data access* are already discussed (see *Readiness – Generation*). Overall, there are limitations for transmission potential

investors related to connection rules and frameworks, third-party access to the grid, and public access to transmission operation and quality data. Regulatory improvements in these areas would enhance the *readiness* of the transmission segment of the market.

3.2.3 Distribution segment

Figure 21: Overview of the Distribution segment

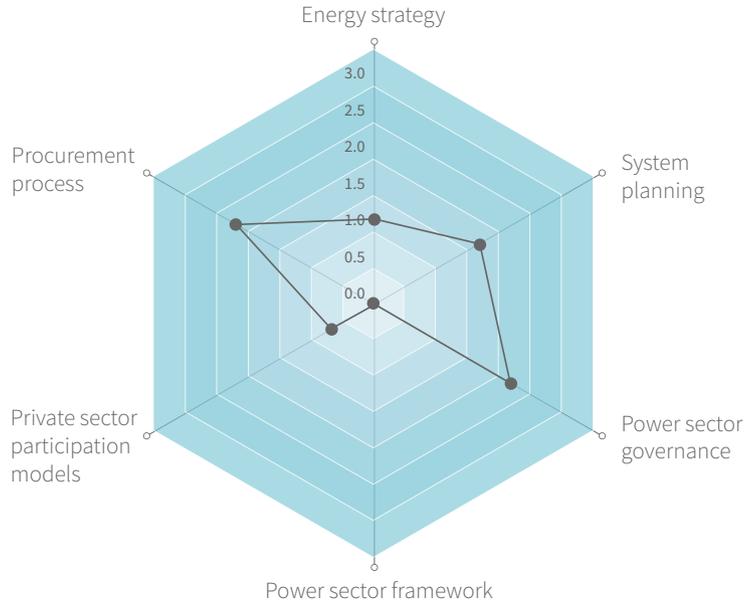


The analysis of key policy and regulatory Topics related to the distribution segment confirms some areas of strengths, notably in the *economic regulation*, as well as in the *power sector governance* and *procurement process*. However, the policy and regulatory environment demonstrates overall a moderate to low level of preparedness to crowd-in private investments.



A deep dive into the Openness dimension

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



Power sector governance



Power sector framework



Private sector participation model

There is an overall limited *openness* of the distribution segment of the electricity market to private investment. Key challenges related to the energy policy and strategy and systems planning are already assessed (see *Openness – Generation*). Challenges related to *power sector governance* and *framework* are also assessed for the entire energy system in previous discussions. However, in the *power sector framework*, particular attention to market entry in the distribution segment of the market is relevant. In general, national private investors are permitted to participate in the investment in and operation of distribution assets. However, international private investors are not permitted in such operation, unless it is related to the import and export of electricity through a joint venture model with the government. This regulatory barrier restricts the scope of private investment in the distribution market.

This challenge is further assessed through review of other *private sector participation models* for distribution investment. The current regulation restricts international private investors in a whole-of-grid concession model. It also disallows privatization of distribution assets, or share ownership by private parties. While these are major limitations for private sector participation, there are options to enable some form of private sector crowding-in. The local private sector is permitted to operate distribution services. Through a joint venture approach with the government, under the new Investment Law of February 2020, the international private sector can participate in electricity import and export operations.



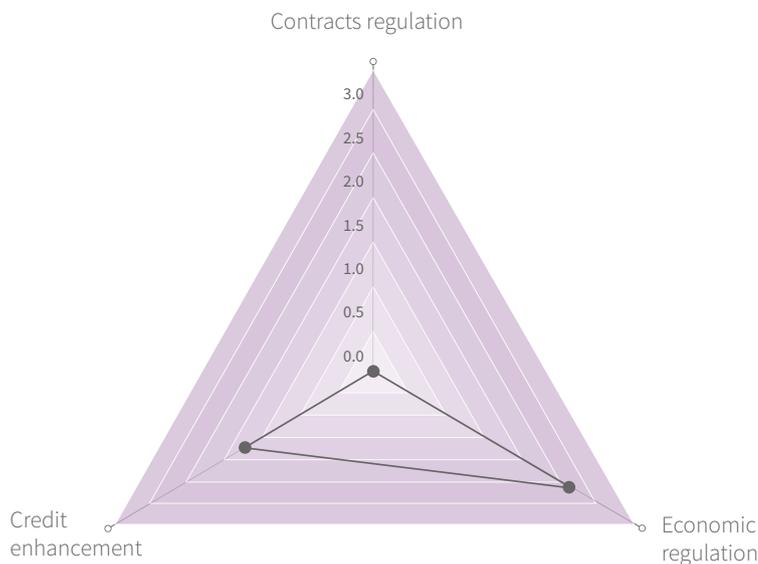
Procurement process

There are procurement limitations for private sector participation through PPP models, such as BOO, BOOT, and BTO. Competitive tenders for distribution investments are currently not applied. However, the *procurement process* permits EPC+finance models for private parties.



A deep dive into the Attractiveness dimension

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

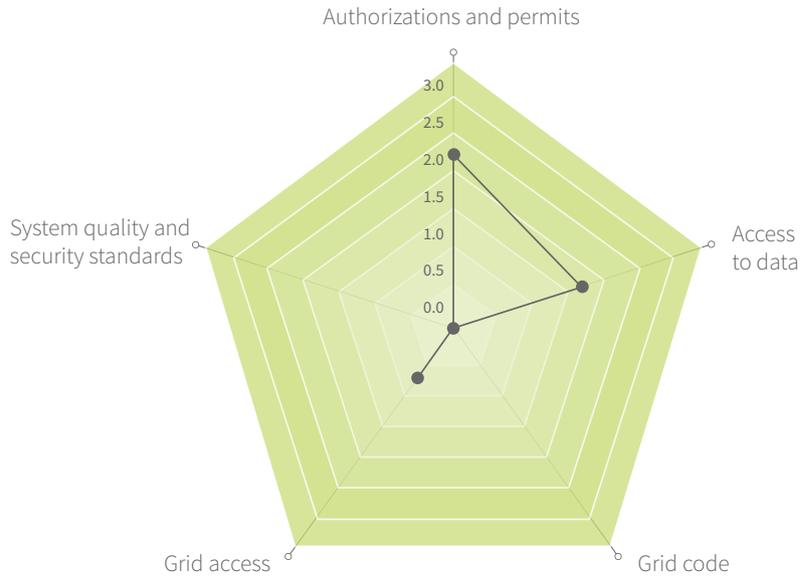


Economic regulation is already assessed in previous segments of the electricity market (see *Attractiveness – Generation, Transmission*). For distribution investment, potentially through a joint venture, revenue escrow agreements, and government guarantees are not available to investors. Multilateral guarantees may be available, along with concessional lending. In the key area of *contract regulation*, there is no standard distribution service agreement (DSA), along with performance requirements, indexation, dispute resolution, and termination provisions that would otherwise be the case in a vibrant and attractive distribution segment of the electricity market. These limitations constrain the *attractiveness* of the Ethiopian distribution market to private investors.



A deep dive into the Readiness dimension

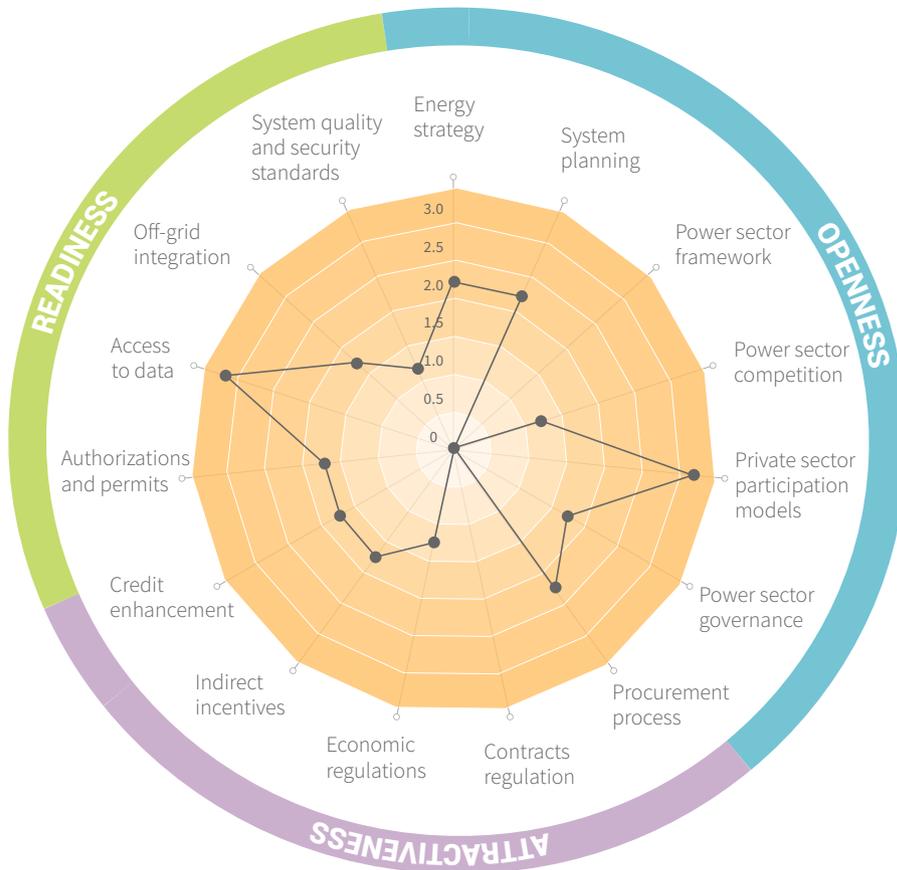
Figure 24: A deep dive into the Readiness dimension for Distribution



The regulatory performance related to the *readiness* of the Ethiopian electricity market is already discussed (see *Readiness – Generation, Transmission*), along with transparency and *data access*. The limitations in the *grid code* (though expected to be addressed through the adoption of the draft code) and third-party grid access regulatory restrictions are also evaluated. *System quality standards* are already put in place, addressing such gaps before 2020. The remaining regulatory gaps constrain the overall *readiness* of the distribution segment of the market to crowding-in private sector investment.

3.2.4 Off-grid segment

Figure 25: Overview of the Off-grid segment



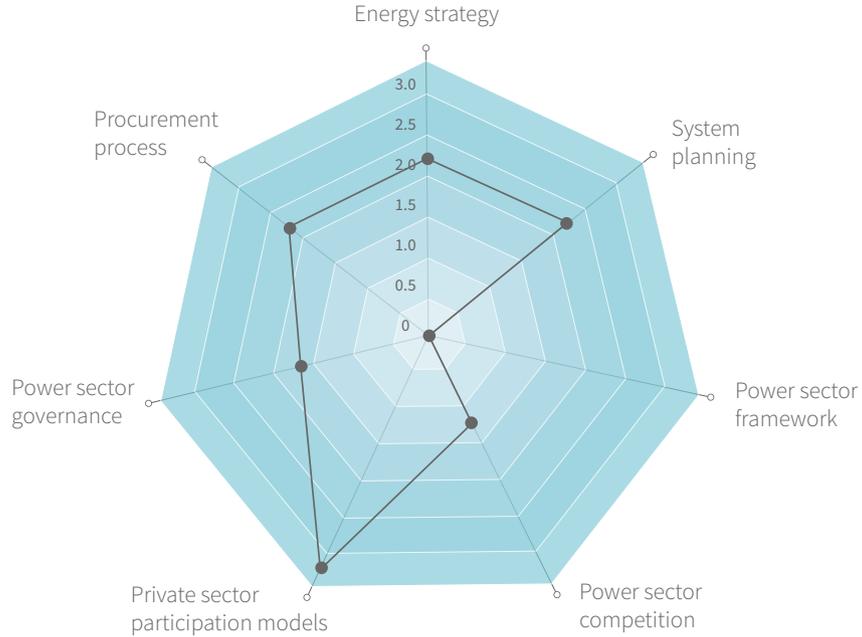
Off-grid market development is a crucial part of the strategy to achieve universal access to energy under the SDG7 goal by 2030. Assessing and addressing the regulatory challenges in this segment of the electricity market, and encouraging private sector investors to complement public sector investment is crucial in remaining on target. The off-grid market is largely nascent in Africa, with regulatory uncertainty, market development potential, and financing challenges. The national electrification effort of Ethiopia also places importance on the development of the off-grid market, including on the potential role of the private sector.

The web diagram in figure 25 represents key areas of regulatory development and remaining areas of regulatory constraints towards the development of the off-grid electricity market in Ethiopia.



A deep dive into the Openness dimension

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



<p>Energy strategy</p>	<p>Electricity systems planning communicates to investors planned generation, networks, and other investments, and if properly scheduled, would enhance predictability and facilitate private sector participation. While generation and network planning are currently undertaken, there is a need to address the lack of formal review process with established targets, public access to such information, and planned projects scheduling to improve <i>openness</i>.</p>
<p>Power sector governance</p>	<p>The <i>power sector framework and governance</i> is already evaluated (see <i>Openness - Generation, Transmission, Distribution</i>), along with the critical regulatory bottlenecks. In terms of market entry, the regulatory performance is superb. Private off-grid sector investors are required to obtain licenses, with the public availability of the procedure and rules to follow to obtain such licenses. The regulation places no capacity limit on off-grid investment, which is based on license conditions. Temporary exclusivity over an area is also offered. These conditions signal <i>openness</i> to off-grid investors.</p>
<p>Private sector participation model</p>	<p>The private sector can also participate under different models, including EPC contracts, a concession model (even though the relevant framework is under development), and merchant off-grid investment, which is unavailable in other segments of the market.</p>



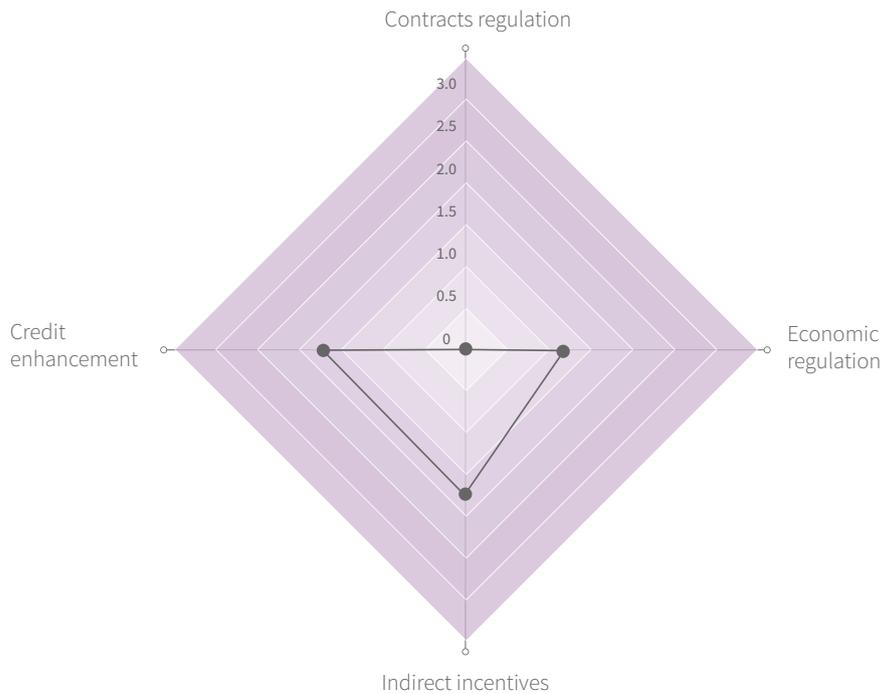
Procurement process

Procurement is an important area for private sector participation in off-grid markets. There are no defined PPP models to date, including EPC+finance. Similarly, there are no competitive tenders. However, solicited and unsolicited proposals are accepted.



A deep dive into the Attractiveness dimension

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



Contract regulation

The off-grid market regulation currently faces a major constraint related to *contract regulation*, which is not yet well developed. There is no standardization of retail contracts for operators. Furthermore, the rules for metering and billing in the off-grid market are not yet well defined, increasing market uncertainty. Resolving these regulatory gaps will improve contract regulation and administration, and provide better clarity and mitigated risks to investors in this market.



Economic regulation

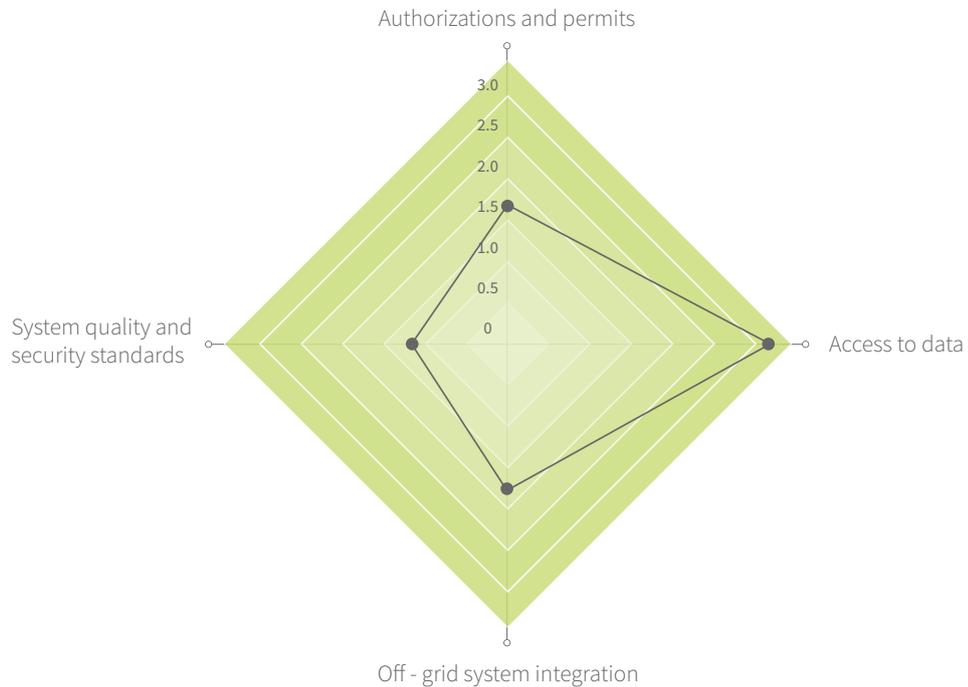
Economic regulation is a key determinant of the pace and trajectory of the off-grid electricity market. Off-grid tariffs are not deregulated, and operators are not free to set their rates. The EEA has developed an off-grid tariff methodology, offering standard tariff calculation for off-grid energy. It is worth noting that the off-grid tariff is not regulated under a national uniform tariff approach, even though publicly owned off-grid systems are influenced by the national uniform tariff. Filling gaps in the current off-grid market *economic regulation* will enhance the *attractiveness* of the market to the private sector.

 <p>Incentives</p>	 <p>Indirect incentives</p>	<p>The nascent nature of off-grid markets often attracts interest in <i>incentives</i> that may be offered. In the Ethiopian context, such incentives are limited. There is no VAT relief for generation assets in off-grid systems. However, import duty relief for generation assets and off-grid components is provided; guided by the Investment Regulation 27/2012.</p>
 <p>Credit enhancement</p>	<p>In terms of <i>credit enhancement</i>, an escrow agreement for private generation investors is potentially available. Similarly, concessional lending for off-grid operators, through development finance institutions (DFIs), is also available. However, government and multilateral guarantees are not extended to off-grid investors so far.</p>	



A deep dive into the Readiness dimension

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



 <p>Authorization and permits</p>	<p>As assessed in other market segments, there are challenges in the <i>authorization and permits</i> process, particularly related to clarity on the non-environmental approval processes. Simplifying the administrative and permitting processes would reduce transaction costs to investors and improve overall market <i>readiness</i>.</p>
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System quality and security standards

System quality and security standards are relevant aspects of the *readiness* of an electricity market. Quality standards are defined in the draft standards awaiting approval. Adopting such standards will help close the prevailing gap.



Mini-grid integration

The Off-Grid Directive of 2021 provides clarity on *off-grid system integration*, particularly related to grid arrival. The Energy Proclamation 810/2013 and the Energy Regulation 447/2019 provide room for mini-grids to operate as small power producers (SPPs), subject to agreement, but not as small power distributors (SPDs); and to sell eligible assets to the national utility. These functions are further supported by the Directive. Furthermore, the regulation permits mini-grids to coexist with the main grid and permits the decommissioning and removal of assets. The regulatory advancement in these areas have enhanced the *readiness* of the Ethiopian off-grid market to private investors.



Conclusions and Recommendations





*Turbines at Ashegoda wind farm in Ethiopia's northern Tigray region.
Photo credit: JENNY VAUGHAN/AFP via Getty Images*

4. Conclusions and Recommendations

The Ethiopia country regulatory review provides analysis and observations of the electricity market relative to the sector policies, laws, and regulatory frameworks towards crowding-in private investments. The analysis is conducted using defined three Dimensions that investigate fundamental attributes relevant to attracting private sector participation. These are the degree of *openness* of the electricity market in Ethiopia (power sector structure and governance), the *attractiveness* of the market to investment (sector economics), and the degree of *readiness* of the market (sector maturity). Assessment is undertaken across these three Dimensions.

As the country aspires to industrialize, expand electricity generation, consumption, and export, and achieve universal access to electricity by 2025, the demand for energy is expected to increase rapidly.

In general, it is observed that notable improvements in power generation and network expansion have been registered in Ethiopia. As the country aspires to industrialize, expand electricity generation, consumption, and export, and achieve universal access to electricity by 2025, the demand for energy is expected to increase rapidly. The indicated demand projection in the power system expansion master plan demands significant capacity additions throughout the value chain. Projections estimate a 14.3 percent growth in electricity demand over the next 10 years. Meeting this demand requires mobilizing investment resources, therefore, effective participation of the private sector.

The electricity supply in Ethiopia is dominated by the public sector. Private sector role is currently limited to off-grid activities. This is despite the fact that existing regulations allow for private investment in electricity generation under a single buyer model. Recently, two solar PV projects and one geothermal project concluded PPAs and Implementation Agreements with the contracting entity EEP. However, there is no commissioned IPP in Ethiopia so far. Despite this limited private sector experience in the market, there is expressed interest by the public sector to attract direct participation of, and partnership with, the private sector.

The Energy Policy (1994 Policy), the Climate-Resilient Green Economy strategy, the Environmental Policy, and the Growth and Transformation Plan II and other development policies all promote cleaner production and energy efficiency in the industry.

Though the regulatory frameworks, laws, regulations, and subsidiary instruments (some at draft stage) are in place to ensure the economic viability of the electricity market and a level-playing field for investors, there are numerous constraints to attracting investment to the market.

4.1. Takeaways from the regulatory review

Related to the *Openness* of the electricity market:

- ⚡ The generation segment of the market faces challenges arising from the *power sector framework*, lack of clear generation expansion targets in the national policy, limited *off-taking options* under the single-buyer model, and the exercise of limited *private sector participation models*, and lack of a track record of effective private sector engagement.
- ⚡ The transmission segment of the market offers scope for national private sector participation, with limitations on international investors. However, international investors

can participate in electricity import and export operation based on a partnership with the public sector through a joint venture model.

- ⚡ The distribution segment of the market also faces *openness* constraints, similar to the transmission segment, to international private sector investors, unless such investment is related to electricity import and export operations. In such as case, joint venture model with the public sector is permissible. *Procurement processes* offer some avenue for private sector participation related to construction and maintenance.
- ⚡ The off-grid segment of the market offers better options through private sector participation models; however, challenges in *power sector competition*, *power sector framework*, and *power sector governance*, along with *system planning*, and *quality and security standards* constraints limit the degree of private sector participation in this segment of the market.

Related to the *Attractiveness* of the electricity market:

- ⚡ The generation segment attracts very limited *direct and indirect incentives*. Furthermore, *economic regulation* around tariff levels, though under review and adjustment, remains a major impediment to the *attractiveness* of the market. Better performance in *credit enhancement* and *contract regulation* would improve the *attractiveness* of the market.
- ⚡ The transmission and distribution segments face major challenges of *attractiveness* emanating from *contracts regulation* framework, *credit enhancement*, and *economic regulation* challenges.
- ⚡ The off-grid market is relatively more attractive related to *incentives* and *credit enhancement* opportunities. However, similarly faces challenges of *contract regulation* standardization and *economic regulation*.

Related to the *Readiness* of the electricity market:

- ⚡ The generation segment faces constraints of *grid access*, availability of a *grid code* (a draft is already developed, but not adopted), and clarity in the *system planning*. Improvements could also be registered in the *authorization and permits* process.
- ⚡ In the transmission segment, the *grid code* remains a major impediment, as it doesn't provide scope and clarity on private sector participation in transmission investments.
- ⚡ Similar challenges in the generation market are also relevant to the transmission and distribution segments of the market.
- ⚡ The off-grid market similarly demonstrates challenges emanating from *contracts* standardization and *quality and security standards*.

Despite notable progress and attempts at reform in the Ethiopian electricity market, these challenges limiting the *openness*, *attractiveness*, and *readiness* of the market will impede the

scale of private sector crowding-in in the electricity market. Therefore, regulatory and policy measures that address these challenges would constitute positive steps towards strengthening the sector to support Ethiopia’s ambition to industrialize, develop, and secure universal access to electricity. Recommendations for potential reforms and system improvements to address remaining policy and regulatory challenges are suggested below.

4.2 Recommendations



To enhance the *Openness* of the electricity market



System planning

Electricity system planning communicates to investors planned generation, networks, and other infrastructure investments. Properly scheduling investments would facilitate private sector participation. While generation and sector planning are effectively undertaken, it is recommended to:

- ⚡ Address the lack of formal review procedure with established targets, ensure public access to such information, and schedule planned investments to improve the *openness* of the Ethiopian electricity market.



Power sector governance

Power sector governance has improved in Ethiopia with instituting the Ethiopian Energy Authority, adopting relevant proclamations and regulations, coupled with a dispute resolution mechanism by adopting the New York Convention. To strengthen the governance system further:

- ⚡ Address the lack of publicly available regulatory decisions (transparency);
- ⚡ Reform the lack of sufficient independence of the regulator from political authorities (such as autonomous mode of appointment of leaders and board members and decision making as in tariffs);
- ⚡ Resolve the lack of sufficient financial independence of the regulator and enforceability of its decisions; and
- ⚡ Review mechanisms to enable the participation of private parties to invest in, or operate, transmission and distribution assets, akin to provisions for local investors.



Energy strategy

The energy policy and strategies of Ethiopia (energy and climate policy) exhibit limitations related to the articulation of generation expansion targets, renewables targets, and formal procedure for energy policy review and monitoring of targets. To improve the *openness* of the market from a policy perspective:

- ⚡ Incorporate clear generation and renewables targets, their formal review procedure, and a monitoring framework during the next policy and strategy development window.



Power sector framework

The *power sector framework* of Ethiopia is a major constraint to *openness* towards the participation of the private sector in the electricity market. Indeed private parties are permitted to operate generation assets, including through ownership, by acquiring licenses. Off-grid investors face no capacity limits and are offered exclusivity over an area. To further improve this framework:



Power sector competition

- ⚡ Address transmission and distribution services unbundling, separation of transmission assets management from system operation, and wholesale and retail market competition constraints to facilitate effective private sector participation.



Generation off-taking options

The degree of *openness* of the Ethiopian electricity market is constrained by the limited *generation off-taking options*, due to over-reliance on a single buyer system. Even though there are rules and procedures for accessing regional spot markets, such mechanism is currently unavailable. Therefore:

- ⚡ Address regulatory barriers on off-taking by enabling the adoption of models such as private (corporate) PPAs, or mechanism for two private parties to negotiate power transactions, and self-consumption coupled with a net metering regulation.



Private sector participation model

Private sector participation models in Ethiopia are not diverse. In the generation segment, divestiture/privatization and share ownership are permissible. However, participation models through merchant generation investment model (independent generation assets), including merchant off-grid investment, and generation concession are not currently permitted by existing regulation. Therefore:

- ⚡ Expand the regulatory space for alternative electricity generation models to enhance the *openness* of the electricity market to generation investors.



Procurement process

Procurement administration in Ethiopia has shown advancement. There is a governing PPP law and a public institutional unit for PPPs. Clear PPP processes and availability of PPP models such as BOO, BOOT, and BTO highlight progress in procurement management. Opportunities to the private sector are also available through EPC+finance models in generation projects. These opportunities to engage the private sector across the value chain need to be further strengthened through:

- ⚡ Instituting better scheduling of tenders and developing a track record of competitive and credible tendering.



To enhance *Attractiveness* of the electricity market



Economic regulation

Economic regulation, or tariffs administration, is vital to market *attractiveness*. The Ethiopian Energy Authority applies a clear methodology of retail tariff structure, with a split among generation, transmission, and distribution components. It also employs a periodic review and revision of the tariff. These good practices need to be supplemented by a tariff regime that is cost-reflective. Therefore:

- ⚡ Pursue tariff reform towards cost-reflectivity to enhance the *attractiveness* of the electricity market to private sector investors and ensure financial sustainability.



Incentives

Direct and indirect incentives encourage private sector participation. The Ethiopian regulatory system offers limited *incentives* such as renewable energy development auctions and foreign currency-denominated contracts. Feed-in regimes have never been extended. Furthermore, capacity payments, green certificates, and renewable quotas are not offered. *Indirect incentives* of carbon pricing through a carbon market; and subsidies such as results-based financing and direct subsidy are not available. Private generation investors should expect to participate in an environment of less cluster of *incentives*. Therefore, in the absence of key *incentives*:

- ⚡ Pursue fair competition in the electricity market to reduce the need for offering more incentive packages to investors, with the exception of emerging markets such as off-grid, or certain technologies.



Indirect incentives



Contracts regulation

Contract regulation partly defines the *attractiveness* of the electricity market in Ethiopia. Progress is observed towards the standardization of PPAs in Ethiopia, especially for solar PV and geothermal projects. To further improve *contracts regulation*:

- ⚡ Address the gaps in capacity components and indexation of contracts;
- ⚡ Adopt, along with appropriate regulatory reform, Transmission and Distribution Service Agreements;
- ⚡ Pursue standardization of retail contracts for off-grid market operators.



Credit enhancement

Financing is a major constraint in energy investments. The Ethiopian electricity market accords possibilities for *credit enhancement*, revenue escrow agreements for private investors, government and multilateral guarantees, and concessional lending.

- ⚡ Strengthen the system of financing options with innovative private sector financing instruments for energy infrastructure development.



To enhance the *Readiness* of the electricity market



Authorization and permits

Authorization and permits management is a crucial aspect of the *readiness* of the market. Ethiopia's environmental approval process is relatively well developed facilitated by a one-stop-shop. Water rights rules are in place; however, there is no publicly available clear procedure to get such authorizations, including the absence of a one-stop-shop. Land rights are similarly supported by clear rules, however, such rules are at the regional level, with no publicly available clear procedures to seek authorizations. Construction permits are governed by rules, also defined at the regional level. There are clear rules for certificates of competencies. However, the lack of publicly available procedures to seek such permits and the absence of a one-stop-shop for authorizations limits the degree of *readiness* of the sector to private investment. Therefore:

- ⚡ Address these constraints in the authorization and permitting process through efficient and clear processes, better coordination, and establishment of one-stop shops.



System planning

Related to *system planning* and *readiness*, the power sector is guided by a network development plan, through a master plan which includes a transmission expansion plan, as well as a system integration study. Limitations in the current *system planning* include formal procedures for reviewing generation and network expansion plans, carrying out regular assessments of network expansion needs, grid flexibility, and network integration studies. Therefore:

- ⚡ Adopt formal review procedures for reviewing network development plans.
- ⚡ Undertake periodic network expansion assessments, along with grid flexibility and network integration studies.



Grid code

In closing a major gap in the electricity market, a grid code is under development. The code will be best suited to the market if it provides clarity in the following areas:

- ⚡ System operation rules, including the dispatch of ancillary services.
- ⚡ Connection rules for generation investors, including on a clear and defined procedure for getting authorization.
- ⚡ Efficient dispatch that would enable public availability of market settlement rules, market settlement information, and management of investor exposure to imbalance risks.
- ⚡ Curtailment compensation to generation investors, including specification of limitations on curtailment to generation investors.
- ⚡ Ancillary services management, such as reactive power, black start capacity, spinning reserves, and governing rules and regulations.



Grid access

Grid access, or grid connection and operation agreements and rules related to providing mandatory connection by the transmission system operator are not well developed. Contractual frameworks for connections and use of the transmission network is also not clarified, as well as rules for allocation of connection costs. Metering services are also not well defined in the distribution segment. Therefore:

- ⚡ Review and address *grid access* regulation to enhance the *readiness* of the electricity market to private sector participation.



System quality and standards

Quality and security standards for planning and operation of transmission networks was a major gap. A draft standard is already developed to close this gap. Adopt and enter such standards into force.



Mini-grid integration

Particular to off-grid systems, the regulation permits mini-grids to coexist with the main grid, and permits decommissioning and removal of assets. There was a gap in the regulatory provision for *off-grid system integration* which is now addressed through the 2021 adopted Off-grid Directive. Enter such regulation into force.

4.3. Way forward

The Ethiopian electricity market is at the cusp of transformation. The confluence of development needs, including industrialization, economic transformation, and regional market integration, and domestic universal electricity access goals have made the development of the energy sector a priority. This commendable policy attention and long-term sector development strategy require major investments in generation, transmission, distribution, and off-grid system capacities. Ethiopia has entered a new era of reforms in the macro-economy at large, and the energy sector in particular. One spirit of the reform process is to crowd-in private sector actors to supplement public resources in sustaining investment in energy infrastructure.

Towards this end, this regulatory assessment evaluated the *openness*, *attractiveness*, and *readiness* of the current electricity market of Ethiopia across the value chain relative to the crowding-in of the private sector. Key areas of regulatory system strength as well as gaps and areas of further improvement are carefully identified. Key recommendations are offered to enable the further development of an electricity market with the effective participation of the private sector mainly to the Ministry of Water, Irrigation; and Energy, and the Ethiopian Energy Authority, but also to the Ethiopian Electric Power, Ethiopia Electric Utility, as well as other relevant energy institutions.

As Ethiopia enters a phase of energy sector reform and greater participation of private sector actors, regulatory and policy instruments play key roles. Towards this end, this report offers constructive identification of areas of reform and system enhancement for a competitive and resilient electricity market with vibrant participation of the private sector.

The UN Economic Commission for Africa and the RES4Africa Foundation remain committed to supporting Ethiopia in addressing any of the identified regulatory and policy gaps, supporting the necessary regulatory capacity development, as well as engaging in any area of particular reform interest of Ethiopia towards greater *openness*, *attractiveness*, and *readiness* of the market. They also call on the development community, NGOs, ISOs, national organizations, and the domestic and international private sector to play their constructive role in supporting Ethiopia in this reform process, aimed at economic transformation and achieving the SDG7 goal.

References

1. African Development Bank (AfDB). 2019. *Estimating Investment Needs for the Power Sector in Africa: 2016-2025*. [online] Available at: <https://www.afdb.org/en/documents/estimating-investment-needs-power-sector-africa-2016-2025> [Accessed 19 April 2021].
2. EEP. 2021. *Power Transmission – Transmission Lines Under Operations*. [online] Available at: <https://www.eep.com.et/en/power-transmission/> [Accessed 13 May 2021].
3. EEU. 2021. *Ethiopian Electric Utility – Overview*. [online] Available at: <http://www.eeu.gov.et/index.php/com-youtubegallery-menu/about/management-team> [Accessed 14 May 2021].
4. Energy Sector Management Assistance Program (ESMAP). 2020. *Regulatory Indicators for Sustainable Energy (RISE): Sustaining the Momentum*. World Bank, Washington DC. [online] Available at: <https://rise.esmap.org/data/files/reports/2020-full-report/RiseReport-010421.pdf> [Accessed 19 April 2021].
5. IEA. 2018. *Ethiopia – Data browser* [online]. Available at: <https://www.iea.org/countries/ethiopia> [Accessed 14 May 2021].
6. IEA, IRENA, UNSD, World Bank, WHO. 2020. *Tracking SDG 7: The Energy Progress Report*. World Bank, Washington DC. [online] Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/May/SDG7Tracking_Energy_Progress_2020.pdf [Accessed 19 April 2021].
7. Industry Development Strategy of Ethiopia. 2002. *Industry Development Strategy of Ethiopia*. [online] Available at: <https://www.tralac.org/files/2012/12/Industry-Development-Strategy-of-Ethiopia.pdf> [Accessed 13 May 2021].
8. Infrastructure Consortium for Africa (ICA). 2018. *Energy Financing Trends*. [online]. Available at <https://www.icafrica.org/en/topics-programmes/energy/energy-financing-trends> [Accessed 19 April 2021].
9. International Monetary fund (IMF). 2021. *World Economic Outlook database: April 2021*. [online] Available at: https://www.imf.org/en/Publications/WEO/weo-database/2021/April/weoreport?c=644,&s=GGXWDN_NGDP,&sy=2010&ey=2021&ssm=0&scsm=1&ssc=0&ssd=1&ssc=0&sic=0&sort=country&ds=.&br=1 [Accessed 14 May 2021].
10. International Trade Administration (ITA). 2020. *Ethiopia – Country Commercial Guide*. [online] Available at: <https://www.trade.gov/knowledge-product/ethiopia-energy#:~:text=2020%2D07%2D20,Overview,electricity%20has%20been%20steadily%20increasing> [Accessed 6 May 2021].
11. Jajimo, A. L. 2020. *Ethiopia's commitment to reform not in question*. [online] Available at: <https://www.politico.eu/article/ethiopias-commitment-to-reform-not-in-question/> [Accessed 6 May 2021].
12. National Bank of Ethiopia. 2017. *Annual Report 2016-2017*. [online] Available at: <https://nbebank.com/wp-content/uploads/pdf/annualbulletin/NBE%20Annual%20report%202016-2017/NBE%20Annual%20Report%202016-2017.pdf> [Accessed 14 May 2021].

13. National Bank of Ethiopia. 2020. *Annual Report 2018-2019*. [online] Available at: <https://nbebank.com/wp-content/uploads/pdf/annualbulletin/report-2018-2019.pdf> [Accessed 14 May 2021].
14. Office of the Prime Minister, Ethiopia, 2019. "A Homegrown Economic Reform Agenda: a Pathway to Prosperity." Office of the Prime Minister, Addis Ababa, Ethiopia.
15. UNDESA. 2019. *World Population Prospects 2019* [online]. Available at: <https://population.un.org/wpp/Download/Standard/Population/> [Accessed 19 April 2021].
16. USAID. 2021. *Agriculture and Food Security*. [online] Available at: <https://www.usaid.gov/ethiopia/agriculture-and-food-security> [Accessed 6 May 2021].
17. USAID. 2019. *Off-Grid Solar Market Assessment Report, Ethiopia. Power Africa Off-grid Project*. [online] Available at: https://www.usaid.gov/sites/default/files/documents/1860/PAOP-Ethiopia-MarketAssessment-Final_508.pdf [Accessed 18 May 2021].
18. World Bank. 2021. *Ethiopia Overview*. [online] Available at: <https://www.worldbank.org/en/country/ethiopia/overview> [Accessed 6 May 2021].
19. World Bank. 2017. *The Global Findex Database*. [online] Available at: https://globalfindex.worldbank.org/sites/globalfindex/files/2018-04/2017%20Findex%20full%20report_0.pdf [Accessed 18 May 2021].
20. World Bank. 2021. *Doing Business 2020*. [online] Available at: <http://documents1.worldbank.org/curated/en/688761571934946384/pdf/Doing-Business-2020-Comparing-Business-Regulation-in-190-Economies.pdf> [Accessed 14 May 2021].
21. World Bank, Energy Sector Management Assistance Program (ESMAP). 2008. *Ethiopia – Beyond Connections: Energy Access Diagnostic Report Based on the Multi-Tier Framework*. [online] Available at: <https://www.esmap.org/node/170494> [Accessed 13 May 2021].
22. World Bank, Energy Sector Management Assistance Program (ESMAP). 2020. *Regulatory Indicators for Sustainable Energy: Sustaining the Momentum*. [online] Available at: https://www.esmap.org/rise_2020_report [Accessed 13 May 2021].

Acronyms

BOO	Build, Own, and Operate
BOOT	Build, Own, Operate, and Transfer
BTO	Build, Transfer, and Operate
CRGE	Climate Resilient Green Economy
DFIs	Development Finance Institutions
DSA	Distribution Service Agreement
EEA	Ethiopian Energy Authority
EEP	Ethiopian Electric Power
EEPCo	Ethiopian Electric Power Corporation
EEU	Ethiopian Electric Utility
EIA	Environmental Impact Assessment
ELPA	Ethiopian Electric Light and Power Authority
ENDGC	Ethiopian National Distribution Grid Code
ENTGC	Ethiopian National Transmission Grid Code
EPC	Engineering, Procurement, and Construction
ESMAP	Energy Sector Management Assistance Program
FDI	Foreign Direct Investment
FIT	Feed-In-Tariff
GDP	Gross Domestic Product
GMSP	Grid Management Support Program
GoE	Government of Ethiopia
GOGLA	Global Off-Grid Lighting Association
GTD	Generation, Transmission, and Distribution
GTP	Growth and Transformation Plan
GWh	Giga watt-hours
HV	High Voltage
IA	Implementation Agreement
IDA	International Development Association
IPPs	Independent Power Producers
JV	Joint Venture
km	kilometer
KPI	Key Performance Indicators
kV	Kilo-Volt

LV	Low Voltage
MV	Medium Voltage
MoF	Ministry of Finance
MoWIE	Ministry of Water Irrigation and Energy
MOU	Memorandum of Understanding
MTF	Multi-Tier Framework
MW	Mega Watt
NBE	National Bank of Ethiopia
NEP2	National Electrification Program 2
PLC	Private Limited Company
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PV	Photovoltaic
REs	Renewable Energy
RES4AFRICA	Renewable Energy Solutions for Africa Foundation
REER	Real Effective Exchange Rate
ROAR	Regulatory Review of Openness, Attractiveness and Readiness
SDGs	Sustainable Development Goals
SAID	System Average Interruption Duration
SAIF	System Average Interruption Frequency
SDG7	Sustainable Energy Goal #7 on Energy
SE4ALL	Sustainable Energy for All
SHS	Solar Home System
TSA	Transmission Service Agreement
TSO	Transmission System Operator
UNECA	UN Economic Commission for Africa
USoA	Uniform System of Account
USD	United States Dollar
Wp	Watt-peak

Annexes

Annex A

Existing on-grid installed power plants owned by the public utility (EEP)

No.	Name of the power plant	Installed capacity in MW	Number of units	Type of Dam
Hydro Power Plants				
1	Gilgel Gibe III	1870MW	10	Concrete gravity
2	Tana Beles	460MW	4	Natural (lake Tana)
3	Gilgel Gibe II	420MW	4	Diversion dam
4	Tekeze	300MW	4	Concrete gravity
5	Gilgel Gibe I	184MW	3	Concrete gravity
6	Melka wakena	153MW	4	Concrete gravity
7	Fincha	134MW	4	Gravel dam
8	Amerti Neshi	95MW	2	Concrete gravity
9	Tis Abay II	73MW	2	Natural dam
10	Koka	43 MW	3	Concrete gravity
11	Awash II	32MW	2	Concrete gravity
12	Awash III	32MW	2	Concrete gravity
13	Tis Abay I	14.4MW	3	Natural dam
14	Abba Samuel	6.6MW	4	Concrete gravity
15	Genale Dawa III	254MW		Concrete gravity
Wind Farm Power Plants				
16	Adama II	153MW		Wind turbine
17	Ashegoda	120MW		Wind turbine
18	Adama I	51MW		Wind turbine
19	Aluto geothermal	7.3MW		
Total installed capacity 4,402.3MW				

Source: Ministry of Water and Energy of Ethiopia.

Annex B

Grid-connections per year (2011 -2019)

Number of customers	2011	2012	2013	2014	2015	2016	2017	2018	2019
Post-Paid	71,229	99,963	83,479	75,927	72,590	108,826	156,606	106,926	31,640
Pre-paid	30,088	29,740	44,935	29,537	56,181	86,766	79,410	91,255	62,963
Total	101,317	129,703	128,414	105,464	128,771	195,592	236,016	198,181	94,603

Source: ICT Directorate, Ethiopia Electric Utility.

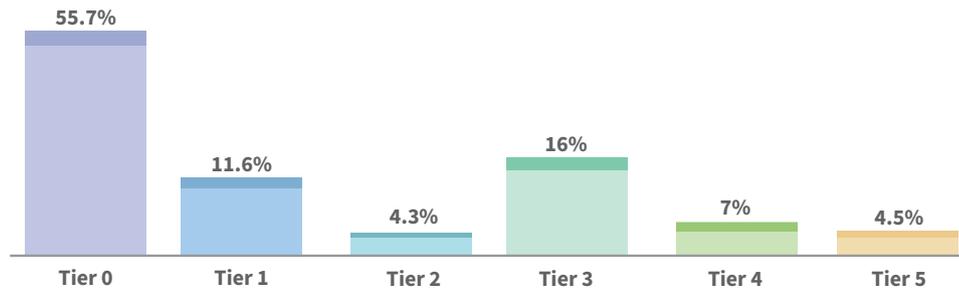
Annex C

The multi-tier framework for measuring access to household energy supply

Tiers	Range of technologies, availability and capacity attributes of the tiers
Tier 0	Electricity is not available or is available for less than 4 hours per day (or less than 1 hour per evening). Households cope with the situation by using candles, kerosene lamps, or dry-cell-battery-powered devices (flashlight or radio).
Tier 1	At least 4 hours of electricity per day is available (including at least 1 hour per evening), and capacity is sufficient to power task lighting and phone charging or a radio. Sources that can be used to meet these requirements include an SLS, a solar home system (SHS), a mini-grid (a small-scale and isolated distribution network that provides electricity to local communities or a group of households), and the national grid.
Tier 2	At least 4 hours of electricity per day is available (including at least 2 hours per evening), and capacity is sufficient to power low-load appliances—such as multiple lights, a television, or a fan—as needed during that time. Sources that can be used to meet these requirements include rechargeable batteries, an SHS, a mini-grid, and the national grid.
Tier 3	At least 8 hours of electricity per day is available (including at least 3 hours per evening), and capacity is sufficient to power medium-load appliances—such as a refrigerator, freezer, food processor, water pump, rice cooker, or air cooler—as needed during that time. In addition, the household can afford a basic consumption package of 365 kWh per year. Sources that can be used to meet these requirements include an SHS, a generator, a mini-grid, and the national grid.
Tier 4	At least 16 hours of electricity per day is available (including 4 hours per evening), and capacity is sufficient to power high-load appliances—such as washing machines, iron, hairdryer, toaster, and microwave—as needed during that time. There are no frequent or long unscheduled interruptions, and the supply is safe. The grid connection is legal, and there are no voltage issues. Sources that can be used to meet these requirements include a diesel-based mini-grid.
Tier 5	At least 23 hours of electricity per day is available (including 4 hours per evening), and capacity is sufficient to power very high-load appliances—such as an air conditioner, space heater, vacuum cleaner, or electric cooker—as needed during that time. The most likely source would be a mini-grid or the national grid.

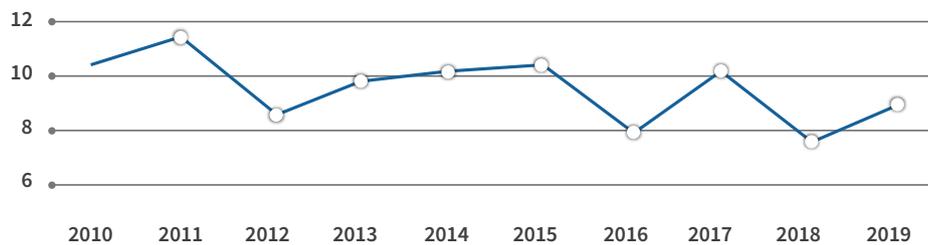
Source: Ethiopia National Electrification Plan 2.

Annex D Multi-tier framework electricity access status in Ethiopia



Source: ESMAP, the World Bank, 2018.

Annex E Electricity losses (% , 2010-2017)



Source: EEP and Grid Management Support Program of USAID, system integration study, May 2019.

Annex F GOGLA sales data by product and category

Period	Total	0-1.5 WP	1.5-3 WP	3-10 WP	11-20 WP
Total	2,478,383	835,452	380,896	454,310	13,620
July-December 2014	416,242	-	-	-	-
January-June 2015	346,000	-	-	-	-
July-December 2015	363,950	227,050	119,099	11,801	-
January-June 2016	231,097	98,940	18,588	111,904	-
July-December 2016	265,723	125,792	76,610	53,483	-
January-June 2017	210,913	104,745	42,406	63,761	-
July-December 2017	158,634	54,802	44,487	59,320	-
January-June 2018	147,647	-	69,639	63,694	-
July-December 2018	338,177	224,123	10,067	90,347	13,620

Source: Global Off-Grid Lighting Association Summary of Sales Report, 2019.

Annex G

GOGLA market value by product category and business model

Sales Volumes	Business Model		
	Cash+Paygo	Cash only	Paygo only
Total	2,478,383	410,245	75,579
July-December 2014	416,242	-	-
January-June 2015	346,000	-	-
July-December 2015	363,950	-	-
January-June 2016	231,097	-	-
July-December 2016	265,723	-	-
January-June 2017	210,913	-	-
July-December 2017	158,634	-	-
January-June 2018	147,647	121,227	26,420
July-December 2018	338,177	289,018	49,159

Source: GOGLA Summary of Sales Report, 2019.

Note: For cash products, the value is calculated using the reported Free on Board (FOB), while for PAYGO products, the value is the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

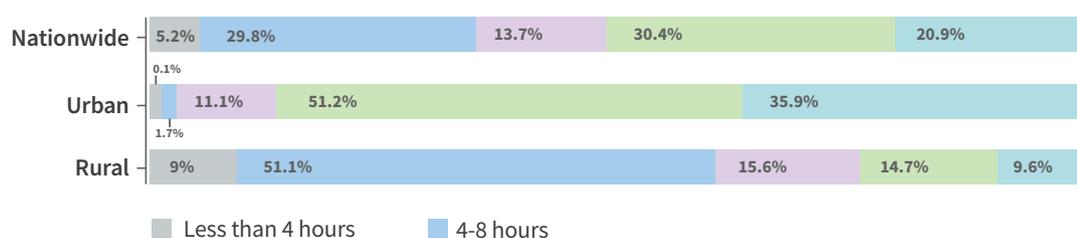
Annex H

Status of private sector owned mini-grids

Company	Years of operation	Regions of operation	Number of developed mini-grids
Ethio Resource group	2	Amhara	1
Rensys Engineering Trading PLC	3	Amhara and Tigray	5 (1 operational and 4 under construction)

Annex I

Electricity supply (hours)



Source: ESMAP, the World Bank, 2018.

Annex K

Policies, plans, and regulations

Climate-Resilient Green Economy (CRGE) strategy	http://gggi.org/site/assets/uploads/2017/11/2015-08-Sectoral-Climate-Resilience-Strategies-for-Ethiopia-1-Agriculture-and-Forestry-Climate-Resilience-Strategy.pdf
Growth and Transformation Plan II (GTP II)	https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/ETHIOPIA%29%20Growth%20and%20Transformation%20Plan%20II%2C%20Vol%20I.%20%20%282015%2C16-2019%2C20%29.pdf
National Electrification Program 2 (NEP2)	https://www.powermag.com/wp-content/uploads/2020/08/ethiopia-national-electrification-program.pdf
Rural Development policy and strategy	http://extwprlegs1.fao.org/docs/pdf/eth144892.pdf
Environment Policy	http://archive.basel.int/legalmatters/natleg/documents/ethiopia01.pdf
Energy Proclamation No. 810/2013	http://www.eea.gov.et/media/attachments/LAWS%20AND%20REGUALTIONS/Energy%20laws%20and%20regualtions/proclamation-no-810-2013-energy-proclamation.pdf
Energy Regulation No. 447/2019	http://www.eea.gov.et/media/attachments/directive/DRAFT%20DIRECTIVES/Energy/2019/04energy%20regulation%20NO.%20447%202019.pdf
Investment Proclamation No. 1180/2020	http://www.eea.gov.et/media/attachments/proclamation/3Investment-Proclamation-No.-1180_2020.pdf
Investment Regulation No. 474/2020	http://www.eea.gov.et/media/attachments/2020/09/10/investment-regulation-no.-4742020.pdf
Public Private Partnership Proclamation No. 1076/2018	http://extwprlegs1.fao.org/docs/pdf/eth182196.pdf
Ethiopian National Electricity Transmission Grid Code (Draft)	http://www.eea.gov.et/media/attachments/directive/DRAFT%20DIRECTIVES/TECHNICAL/4national%20grid%20code%20for%20power%20%20transmission.pdf
Uniform System of Accounts (USOA)	http://www.eea.gov.et/media/attachments/directive/DRAFT%20DIRECTIVES/Economic/4UNIFORM%20SYSTEM%20OF%20ACCOUNT.pdf
Directive for the Issuance of Licenses for Electricity Supply in the National Grid	http://eea.gov.et/media/attachments/directive/DRAFT%20DIRECTIVES/Economic/077Directive%20007_2012-The%20Issuance%20of%20License%20%20for%20Electric%20Supply.pdf
Directive for Electricity Tariff Setting Methodology and Guideline	http://www.eea.gov.et/media/attachments/directive/DRAFT%20DIRECTIVES/Economic/088Directive%20008_2012-Electricity%20Tariff%20Setting%20Methodology.pdf
Directive for Quality of Service Standards for Grid Supply	http://www.eea.gov.et/media/attachments/directive/DRAFT%20DIRECTIVES/TECHNICAL/011Directive%20001_2012-Quality%20of%20Service%20Standards%20for%20Grid%20Supply.pdf
Mini Grid Directive	http://eea.gov.et/media/attachments/DRAFT%20STRATEGY%20AND%20PROGRAM/MINI%20GRID%20DIRECTIVE%20FINAL%20Verstion%20JUNE%202020.pdf

Annex L

An overview of the Topics assessed

 Openness	Energy Strategy	The existence and characteristics of energy and climate policies
	System Planning	The existence and characteristics of plans for generation expansion, network development, and electrification.
	Power Sector Governance	The existence and characteristics of an Energy Act or Law, and an energy regulatory authority.
	Power Sector Framework	The openness of the power sector to competition (e.g. presence of IPPs).
	Power Sector Competition	The degree of unbundling of generation, transmission, and distribution services.
	Private Sector Participation Model	The number of available models for private parties to participate in the power sector.
	Procurement Process	The characteristics of PPP procurement policy, competitive tenders, and solicited/ unsolicited proposals.
	Off-taking Options (<i>for 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.

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



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