



Project Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 12-Feb-2021 | Report No: PIDA29110

**BASIC INFORMATION****A. Basic Project Data**

Country Ethiopia	Project ID P171742	Project Name Access to Distributed Electricity and Lighting in Ethiopia	Parent Project ID (if any)
Region AFRICA EAST	Estimated Appraisal Date 15-Feb-2021	Estimated Board Date 15-Mar-2021	Practice Area (Lead) Energy & Extractives
Financing Instrument Investment Project Financing	Borrower(s) Government of Ethiopia	Implementing Agency Ministry of Water, Irrigation and Energy, Ethiopia Electric Utility, Development Bank of Ethiopia (DBE)	

Proposed Development Objective(s)

The development objective is to increase access to reliable electricity for households, social institutions, and enterprises in Ethiopia.

Components

1. Network strengthening for improved reliability of supply in urban areas
2. Solar-hybrid mini grids for rural economic development
3. Solar home systems for households (HHs), small-holder farmers and small businesses
4. Standalone solar systems for health and education facilities
5. Capacity building, technical assistance and implementation support

PROJECT FINANCING DATA (US\$, Millions)**SUMMARY**

Total Project Cost	500.00
Total Financing	500.00
of which IBRD/IDA	500.00
Financing Gap	0.00

DETAILS



World Bank Group Financing

International Development Association (IDA)	500.00
IDA Credit	500.00

Environmental and Social Risk Classification

Substantial

Decision

The review did authorize the team to appraise and negotiate

Other Decision (as needed)

B. Introduction and Context

Country Context

- Located in the Horn of Africa, Ethiopia is a populous and diverse country, with significant potential to reap the demographic dividend.** With an estimated population of over 112 million (United Nations, 2019), out of which more than 80 percent live in rural areas, Ethiopia is the second most populous country in Sub-Saharan Africa. Ethiopia is a land of 98 nationalities and peoples, with roughly 93 languages spoken. Ethiopia is undergoing a fast demographic transition with a rapidly rising working-age population that presents both opportunities and challenges.
- Ethiopia’s economy experienced strong, broad-based growth in the past decade as one of the world’s fastest-growing economies.** This period of robust growth of about 10 percent was driven by large-scale public investment in infrastructure and energy, which was made possible by favorable commodity prices and international debt-relief efforts in the mid-2000s. Extreme poverty¹ declined from 55 percent in 2000 to 25 percent in 2018, one of the most impressive poverty reduction results recorded internationally. Primary enrollment rate quadrupled, child mortality rate halved, and the number of people with access to clean water more than doubled. Average life expectancy has increased by about one year annually since 2000 and is now higher than the averages for both Sub-Saharan Africa (SSA) and low-income countries worldwide.
- Ethiopia’s recent economic success has occurred in a context of modest structural economic transformation and private-sector development.** Massive public infrastructure investment has been at the center of the country’s economic strategy. The Government has sustained high levels of public investment which has driven strong growth in agriculture and services. Ethiopia was able to achieve a substantial expansion of energy, road, railway, and telecom infrastructure, financed by domestic and external public borrowing. Nevertheless, there has been relatively slow progress in the development of a vibrant private sector especially in manufacturing and modern services, growing indebtedness including in major state-owned enterprises (SOEs), and persistent inflation. The government is shifting its focus to expand private-sector participation to

¹ Extreme poverty is measured at the international poverty line of US\$1.9 per day in 2011 purchasing-power-parity terms. 2018 poverty rate based on Macro Poverty Outlook 2018, World Bank.



enhance economic dynamism and leverage financing and technical resources to achieve national social and economic growth targets under the Growth and Transformation Plan (GTP II).

4. **Despite the progress, Ethiopia remains within the 20 poorest countries in the world, with a per capita income of US\$772 (2018).** Vulnerability to return to poverty remains high, especially for those engaged in rural livelihoods depending on rain-fed small-scale agriculture. In addition, Ethiopia hosts more than 920,000 refugees, primarily from neighboring Somalia, Sudan, South Sudan, and Eritrea, and the number of internally displaced people (IDPs) has risen from 1.6 million to 2.8 million since the beginning of 2018. Access to education has increased, but only 57 percent of children starting first grade will complete ninth grade. With regards to gender-based disparities, Ethiopia has made some significant improvements. The Global Gender Gap report of 2020 ranked Ethiopia 82 out of 149 countries, with an improvement of 35 positions compared to 2018. Nevertheless, significant and deeply engrained disparities remain, and a combination of cultural norms and socioeconomic inequality greatly increases the risks faced by women in terms of their wellbeing. The country is particularly behind in terms of economic participation and educational attainment where the rank is 125 and 140 respectively. Addressing gender inequalities in term of access to education and decision making, rights, unpaid labor, land and productive resources is a crucial ingredient for economic growth in the country.²

5. **While the extent of the impact currently remains unclear, the COVID-19 pandemic will likely have implications on the livelihoods of poor households and economically affect those living in urban and rural Ethiopia.** On the external side, the Covid-19 crisis has affected exports, remittances, and FDI. While merchandise export value grew by 12 percent (year-on-year) in FY20, this is the result of the pre-Covid-19 performance, as exports of goods have dipped in recent months. Meanwhile, private transfers and FDI declined by 10.2 percent and 19.8 percent respectively during FY20. Domestically, containment measures and transport disruptions have affected people and firms, which have reportedly experienced income losses, impacting private consumption and investment. Employment rates plunged in the early days of the pandemic, with 14 percent of respondents in a recent survey losing their job at the beginning of the outbreak. Driven by food prices, inflation continued trending up, reaching 24.6 percent in July 2020, although the upward trend was observed prior to Covid-19.

6. **The macroeconomic impact and reduction in Government revenue will put pressure on its provision of social services.** In response to the observed and anticipated Covid-19 impacts, monetary policy has been relaxed to provide liquidity to commercial banks and facilitate the reprofiling of loans for creditors under difficulties. Reserve money grew by 22.8 percent in FY20, against a pre-Covid-19 target of 12.5, supporting those liquidity injections as well as financing to the government. Tax revenue is estimated to have declined from 10 percent of GDP in FY19 to 8.6 percent of GDP in FY20, as collections of corporate income tax and VAT, among others, falter. Meanwhile, recurrent expenditure increased by 1.5 percent of GDP in FY20, driven by the increase in Covid-19 related expenses (including healthcare and food security support during the crisis). Reflecting the significant disruptions in economic activity caused by Covid-19 contention measures, as well as the weakening of household income and demand, the growth forecasts for FY20 and FY21 have been reduced to 2.3 and 0 percent, respectively.

7. **Ethiopia aims to achieve lower-middle-income status by 2025, as defined in the Government's Growth and Transformation Plan II (GTP II, 2016–2021).** GTP II, which builds on the GTP I, 2010–2016, places strong emphasis on structural transformation, industrialization, urbanization, and export promotion. The energy sector is a pivotal driver to achieving Ethiopia's GTP II targets, and universal electrification is at the core of its poverty

² World Bank (2008) estimates indicate that reducing basic gender inequalities in education and the labor market could increase the annual GDP growth in Ethiopia by around 1.9 percentage points – which would be an important contribution to poverty reduction given the elasticity of growth to poverty reduction.



reduction and development agenda. Adequate, affordable, and reliable access to electricity is vital to enable a structural transformation of Ethiopia's economy and society, including aspirations around domestic manufacturing capacity adequate for local needs and exports, industrial parks, entrepreneurship, information and communication technology (ICT), and financial sectors.

Sectoral and Institutional Context

8. **Ethiopia's power sector is underpinned by a broad policy, legal, and strategic framework, and structured by the National Energy Policy (2013).** The Ministry of Water, Irrigation and Energy (MoWIE) oversees, plans, coordinates and monitors overall energy development. In 2013 (through Council of Ministers Proclamation No.302/2013), the vertically integrated utility, Ethiopian Electric Power Corporation (EEPCo), was unbundled into two public enterprises: (a) the Ethiopian Electric Power (EEP) Company, responsible for the generation and transmission sub-sectors; and (b) the Ethiopian Electric Utility (EEU), responsible for power distribution, sales, and customer services. The Proclamation also established a regulatory agency, the Ethiopian Energy Authority (EEA), responsible for developing effective rules, directives, and standards for sector.

9. **Ethiopia has invested substantial resources in expanding generation capacity and grid network.** As a result, installed generation capacity has quadrupled within a decade from around 1,100 MW in 2009 to 4,512 MW in 2020 (90 percent hydro), the third highest available generation capacity in Sub-Saharan Africa (SSA) after South Africa and Nigeria. The GoE is also advancing efforts to diversify its energy mix with wind, solar, and geothermal sources to complement the large hydropower base and to mitigate vulnerability to fluctuations in rainfall. Given its massive clean energy reserves, Ethiopia aims at becoming a power hub in East Africa and a cornerstone of the regional power market and of the East African Power Pool (EAPP). In addition, substantial investments in grid expansion have led to the extension of the medium voltage (MV) network to about 60 percent of towns and villages in the country. In 2005, the GoE launched the Universal Electricity Access Program (UEAP) to provide grid-based electrification to rural towns and villages. UEAP ranks among the most successful grid electrification programs in Africa having expanded the electricity grid to about 6,000 towns and villages from 667, between 2005 and 2015. As a result, 90 percent of the population lives in close vicinity (5-10 km) to the medium voltage network.

Ethiopia reports third highest electricity access deficit in Sub-Saharan Africa

10. **The greatest access deficits are found in rural and deep-rural areas.** About 96 percent of urban households are connected to the grid (99.9 percent in Addis Ababa), while only 27 percent of rural households have access to electricity services. The highest deficits are experienced in deep-rural areas (beyond 25 km from the existing grid), where 5 percent of people have access to electricity; followed by rural areas (between 2.5 and 25 km from the grid), with 5 to 10 percent of access; and the peri-urban areas (within 2.5 km from existing MV lines), where 20 percent of people have access.

11. **In 2017, Ethiopia launched the National Electrification Program (NEP) to address the challenge of low electrification rate that remained at odds with infrastructure achievements.** Despite the success in connecting towns and villages, last mile connections across the country did not keep pace (20 percent access in 2015). The NEP, that sets a target of universal electrification by 2025, presents an integrated approach of grid and off-grid solutions, building on UEAP's achievements on grid expansion, placing greater focus on service delivery and last-mile electrification for households, public institutions and industries. The overall financing requirements of NEP amount US\$6 billion (US\$3.2 billion for grid, US\$2.5 for off-grid and US\$0.5 billion for technical assistance



component) expected to come from Government contribution and syndication through development partners³ and private sector resources.

12. In 2019, the GoE launched NEP 2.0, an updated full-fledged off-grid program to reach 35 percent of the population by 2025 through public and private efforts, leveraging the latest technical and analytical inputs.

The geo-spatial analysis conducted for the country identifies the least-cost technology solution by location and over time, indicating the progressive extension of the grid footprint and simultaneously the pockets for off-grid: (i) Short-term pre-electrification for 3.3 million households, for which the grid will not become available by 2025; (ii) Mid-term pre-electrification for about 5 million target beneficiaries residing between 2.5–25 km from the existing grid, expected to be connected to the grid by 2030; and (iii) Long-term off-grid/deep rural solutions for about 1 million households. Based on this, off-grid solutions are expected to service 35 percent of the population, for a total of 9 million connections. In addition, the NEP 2.0 also operationalized the Multi-Tier Framework-(MTF)- survey for the first time, with a customer-centric approach to access and identification of most appropriate technology solutions, in space and time, based on electricity needs (demand) in combination with GIS tools. The NEP 2.0 also contains an embedded commitment and strategy on closing gender gaps on off-grid value chains related to women entrepreneurs, creating jobs, and as consumers.

Challenges remain in the rapid scale-up of electricity access

13. Inadequate load planning and deterioration of reliability and quality of grid supply. Due to rapid increase in demand and inadequate load planning, the grid network witnesses high burnout of transformers, breach of thermal limits of conductors and frequent failure of protection equipment. Increased load on the electrical system is also caused by natural population growth, economic development, and a propensity to shift towards electricity from other energy sources owing to the low electricity tariffs. This phenomenon results in poor electricity supply in Addis Ababa and most regional towns. In Ethiopia, 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 week⁴.

14. A downward trajectory in sector financial viability until 2018. Over the past decade, continued reliance on publicly financed power sector investments pushed the electricity sector to its financial limits. The two main financial challenges were: (a) an eroding revenue base, due to electricity tariffs remaining nominally constant for over a decade; and (b) overreliance on short-term domestic debt to finance long-term infrastructure. In the last three years, the GoE has taken successive concrete steps towards improving financial sustainability of the power sector – (i) approval of a four-year electricity tariff reform in 2018, (ii) adoption of a phased debt restructuring plan, and (ii) working towards a power sector reform roadmap.

15. Off-grid standalone market, while active, faces a number of barriers to reach rural areas. Ethiopia has an active off-grid solar market with close to 10 companies operating and more than 1 million products sold in 2019⁵. A demand assessment carried out during project preparation found that over 11 million households, that currently have no access to the grid or a solar system, would have demand for an off-grid solar system if it came with consumer financing options. While the recent growth and massive demand is impressive, the market remains behind its potential. Off-grid solar companies have not been able to penetrate rural and deep rural areas and the market for larger systems is underdeveloped due to: (a) lack of efficient physical and digital infrastructure and distribution channels to reach the most remote, underserved areas; (b) insufficient financing options for consumers and value-chain players; (c) business, licensing and investment regulations, limiting both mini-grids and Pay-as-you-go (PAYGo) business models that have successfully scaled-up access elsewhere in East

³ Contribution to be confirmed during appraisal.

⁴ WB (2018). “Ethiopia: Beyond Connections - Energy Access Diagnostic Report Based on the Multi-Tier Framework”, May 2018.

⁵ GOGLA (2019): Global Off-Grid Solar Market Report H2 2018 and Lighting Global Country Deep Dive, December 2019



Africa; (d) intermittent market supply due to limited access to FOREX for importation; and (e) technical and institutional capacity constraints on planning and implementation. As a result, end-user prices of standalone solar solutions in Ethiopia are among the highest in the region.

16. **The mini grid ecosystem in Ethiopia remains nascent with few private players and limited success with business models.** Local companies struggle with sufficient access to finance, companies that have demonstrated rapid scale in other markets are restricted from entering the Ethiopian market, and productive use of electricity solutions such as water pumping, and irrigation have not yet found inroads into the market. Until recently, regulations providing clarity on tariff aspects, licensing requirements, quality of service benchmarks, and technical standards, all key to promoting private sector involvement and commercial investment in the sector, were missing. Major progress has been made with this regard. The World Bank has supported the Ethiopian Energy Authority (EEA) in developing a mini-grid directive, which was adopted in November 2020. Further, the EEA has developed a mini grid tariff spreadsheet tool that calculates cost-reflective tariffs for mini grids, taking into consideration subsidies and allowing for a variety of tariff structures.

The proposed ADELE is a continuation of World Bank's long-term support towards sustained universal energy access in Ethiopia backed by geospatial plan and robust data analytics

17. **The World Bank is supporting the first phase of NEP, especially the expansion of last-mile grid connections through the Ethiopia Electrification Project (ELEAP, P160395) since 2018.** The program is financing over 1 million grid connections, with EEU as the key implementing agency. ELEAP supports the first phase of NEP's grid roll-out and targets last-mile connections to households near EEU's existing network infrastructure. It also provides financing for demonstration of 12 mini-grids. In addition, institutional capacity has improved through the implementation of planning systems, the allocation of budget across the key functions in the utility, the creation of dedicated teams, and an M&E framework at both the ministry and utility level. A flagship 5-year gender and citizen engagement program are in implementation under EEU's leadership which is showing progress on women's labor force participation in the workforce and in leadership, policy gaps around sexual harassment mitigation and response and childcare provision⁶.

18. **The proposed ADELE constitutes support to NEP 2.0 primarily towards off-grid electrification and also improve the reliability of supply in key urban areas, where deficiencies in availability, quality and reliability of supply remain a challenge.** The project aims at providing Tier 1 and above solar off-grid solutions for 750,000 households, and mini-grids, designed to handle grid-level loads, for 240,000 households and 11,500 enterprises. The project also provides standalone solar systems for 1,400 health and education facilities. The implementation framework and operational design are informed by experiences of the pilot program launched in ELEAP, best practices and established international experiences, as well as recent off-grid innovations that have taken place in SSA and globally.

19. **The proposed ADELE is financing critical inputs to the COVID-19 pandemic national response by focusing on provision of electricity connections to health clinics and schools.** Healthcare facilities are at the forefront of fighting the pandemic and reliable electricity is necessary to power equipment to save lives. Moreover, COVID-19 testing centers would also need electricity to test and trace affected patients, and COVID-19 vaccine distribution will require reliable cold chain, which requires electricity. Since access to reliable electricity connection is a necessary condition for lifesaving prenatal services provided by rural healthcare centers, this support will have a greater impact in contributing to the GoE's effort of reducing maternal and child mortality. Furthermore, distance learning during such crises needs to be supported by electrified households, thus

⁶ For more information see Ethiopia Broadens Opportunities for Women in the Energy Sector
<https://www.worldbank.org/en/news/feature/2020/02/03/ethiopia-broadens-opportunities-for-women-in-the-energy-sector>



emphasizing the role of electricity in providing quality education. In post COVID-19 context, reliable electricity service is needed at health clinics for sustainable and effective service provision by the health system. Similarly, electricity is needed in schools to leverage e-teaching solutions, and to run computers and other equipment.

20. The proposed project will support delivery of energy services with potential to enable productive use in peri-urban, rural, and deep-rural areas thus contributing to post-COVID recovery. The delivery of energy services through off-grid solutions can support productive and income-generating activities in agriculture (i.e. irrigation, and processing) and commercial sectors, improving the livelihoods of fragile and vulnerable communities, and opening opportunities for women and youth, disproportionately affected by unemployment and lack of productive opportunities. In addition, sustainable electricity access for health facilities, schools, as well as farmers and households will help build resilience to future shocks.

Relevance to Higher Level Objectives

21. The proposed operation is consistent with Ethiopia’s Country Partnership Framework (CPF) 2018-2022 and supports the World Bank’s approach to addressing the pandemic’s impact. The CPF remains valid and adjustments have been made to meet the challenges posed by COVID-19. Its focus areas and objectives continue to provide a platform for implementing the World Bank Group global approach to addressing the pandemic’s impact. Support is being provided across four pillars, consistent with the overall World Bank Group approach⁷: (i) Saving Lives, (ii) Protecting Poor and Vulnerable People, (iii) Ensuring Sustainable Business Growth and Job Creation, and (iv) Strengthening Policies, Institutions and Investments. World Bank Group support under these pillars is geared to three expected stages of crisis response: *relief*—emergency assistance to confront the immediate threat to public health, as well as short-term economic, financial and social impacts; *restructuring*—strengthening health systems, restoring human capital, and pursuing economic reforms, debt resolution, and recapitalization of firms and financial institutions; and *resilient recovery*—exploiting new opportunities for more inclusive, resilient, and sustainable longer-term development.

22. The proposed operation is directly linked to both the CPF and the COVID-19 response adjustments, contributing directly to the economic recovery phase of the COVID-19. First, the project helps achieving Objective 1.2. Increased access to reliable energy supply, under Focus Area 1 of the CPF: Promote Structural and Economic Transformation Through Increased Productivity. The CPF explicitly includes a target to increase electricity access rate (including both on-grid and off-grid) to 50 percent by 2021. Universal access to energy is at the center of the socioeconomic development agenda, aiming to close the access deficit between urban and rural areas, electrify health and education centers and power productive opportunities for small-holder farmers, and business, commercial, and industrial users.

23. The operation supports the government’s transformation and energy goals under GTP II by taking actions to achieve universal electricity access through improved service delivery on the grid and the rollout of the off-grid electrification program. The energy sector is a pivotal driver to achieving Ethiopia’s GTP II targets, and universal electrification (connectivity) is at the core of its 2025 poverty reduction and development agenda. Adequate, affordable, and reliable access to electricity is vital to enable a structural transformation of Ethiopia’s economy and society, including aspirations around domestic manufacturing capacity adequate for local needs and exports, industrial parks, entrepreneurship, information and communication technology (ICT), and financial sectors. The proposed project will also contribute towards transformations that the GoE envisioned on gender equality under GTP II. These goals include increasing women’s benefit from micro and small enterprises,

⁷ Saving Lives, Scaling-up Impact and Getting Back on Track: The World Bank Group COVID-19 Crisis Response Approach Paper, 2020.



increasing women's decision-making role, benefiting women from vocational education programs, participation and benefits for women in improving crop productivity, and improving maternal health.

24. **The proposed project also aligns with Ethiopia's goals to digitize the economy.** GoE has released various plans, including the Digital Ethiopia 2025 strategy document, designed to encourage the adoption of digital tools and services. Electricity is fundamental to the rollout of many of these projects, as widespread digital technology relies on access to electricity. This project can serve as a key enabler of digitization by increasing access to electricity more widely. It will also take advantage of existing digitization efforts to expand access to electricity. Synergies will be pursued with relevant stakeholders in technology, finance, and telecommunications sectors.

25. **The proposed project also supports the World Bank Group's agenda on maximizing financing for development by providing a platform to attract private solutions to expand access.** NEP 2.0 calls for combined private and public efforts to deliver around 9 million off-grid connections by 2025, with an estimated investment requirement of US\$6 billion. The public sector alone will not be able to deliver solutions and deploy investments at the pace and scale required to achieve universal access by 2025. Leveraging private participation in off-grid energy access is crucial to achieve the universal access target. The proposed project entails engaging in a policy dialogue with sector agencies to promote the creation of an enabling environment to bring in private sector capital and sustainable financing structures, to augment technical knowhow, and to help improve the speed and reach of energy service delivery to households, small-holder farmers, economic centers, and social institutions (health and education centers). One fifth of the project resources (US\$100 million) are expected to be channeled to the private sector to support delivery of new or improved electricity services. The project will provide a platform for increased private sector participation and mobilization of private capital in mini grids development and expansion of access to off-grid solar systems.

26. **The proposed operation will support GoE's commitment to nationally determined contribution (NDC).** Ethiopia currently sources its grid electricity completely from renewable sources, overwhelmingly from hydroelectric power. Through its Climate Resilient Green Economy (CRGE) Strategy and NDC to the United Nations, GoE is committed to further scale investment in renewable energy to expanding electricity access in the country and beyond. The proposed operation will primarily support solar-based electrification, which contributes to Ethiopia's ambition for fully renewable-based energy systems. It will also contribute to the delivery of the Bank's New Generation Africa Climate Business Plan by scaling the use of low-carbon renewable energy and strengthen the climate resilience through enhanced access to energy.

C. Proposed Development Objective(s)

Development Objective(s)

27. The development objective is to increase access to reliable electricity for households, social institutions, and enterprises in Ethiopia.

Key Results

28. PDO level indicators:

- a. People provided with new or improved electricity service (Corporate Results Indicator, Number)
- b. Enterprises provided with new or improved electricity service through mini grid and off-grid electricity solutions (Number)
- c. Institutions provided with new or improved electricity service through mini grid and off-grid electricity solutions (Number)
- d. Interruption Frequency per 100 km MV network length per year in Addis Ababa (Number)



D. Project Description

29. **The project will increase access to new and improved electricity services for households, small-holder farmers, commercial and industrial users, and social institutions in urban, peri-urban, rural and deep-rural areas through on-grid, off-grid and mini grid solutions by leveraging public and private delivery modalities.**

The project has five components: (1) Network strengthening for improved reliability of supply in urban areas; (2) Solar-hybrid mini grids for rural economic development; (3) Solar home systems for households, small-holder farmers and small businesses; (4) Standalone solar systems for health and education facilities; and (5) Capacity building, technical assistance and implementation support. These five components provide a synergetic package of investments to ensure that reliable electricity services are made available to all Ethiopians regardless of their location and economic status. Component 1 will ensure that grid-connected urban households are receiving electricity services with adequate reliability and quality, while Components 2 and 3 will ensure that remote and poor households, as well as farmers and small businesses in rural areas are able to access electricity services, provided through off-grid solutions (mini grids or stand-alone off-grid systems). Component 4 will expand the benefits of electrification in communities by supporting improved delivery of education and healthcare services.

Table 1: Proposed Project Components and Financing Under the Project

Components and Sub-components	Description	IDA Financing
Component 1: Network strengthening for improved reliability of supply in urban areas		100
Improve the reliability of supply in Addis Ababa and ten other regional capitals and key zonal towns. The network upgrade and rehabilitation will include infrastructure investments in EEU’s jurisdiction, including medium voltage and low voltage equipment as well as support for the Revenue Protection Program (RPP)		
Component 2: Solar-hybrid mini grids for rural economic development		265
<i>Sub-Component 2.1: EEU-led mini-grids</i>	Rollout of greenfield solar-hybrid mini grids through Engineering, Procurement and Construction (EPC) and short-term Operation and Maintenance (O&M) contracts. In addition, this sub-component will include the hybridization of existing diesel-fueled mini grids currently operated by EEU across Ethiopia.	215
<i>Sub-Component 2.2: Private sector-led mini-grid pilot</i>	Support demonstration of different private sector-led approaches to leverage local and international private sector financing for mini-grid scale-up potentially through the piloting of two potential approaches: (i) a Minimum-Subsidy Tender; and (ii) a performance-based affordability gap financing per-connection.	50
Component 3: Solar home systems for households (HHs), small-holder farmers and small businesses		50
<i>Sub-Component 3.1: Incentivizing market expansion into deep-rural areas innovation</i>	Results-Based Financing (RBF) facility offering competitively awarded incentives to off-grid solar companies with a focus on deep-rural areas.	10
<i>Sub-Component 3.2: Access to finance to increase off-grid solar penetration</i>	Credit facility providing foreign exchange for the importation of off-grid systems and local currency for working capital to businesses along the off-grid solar value-chain, and consumer financing for end-users.	40
Component 4: Standalone solar systems for health and education facilities		55
Supply and installation of standalone solar systems for health and education facilities. The project will target health centers and secondary schools that are located in underserved and remote rural areas.		
Component 5: Capacity building, technical assistance and implementation support		30



<i>Sub-Component 5.1: Enhancing EEU's institutional, technical and planning capacity</i>	Technical assistance to support EEU in actively and effectively managing the implementation of the electrification program under ADELE, both on-grid and off-grid, during the duration of this project, and with the aim of creating longer-term capacity and sustainability.	14
<i>Sub-Component 5.2: Enhancing MoWIE's monitoring and technical capacity</i>	Capacity strengthening, training and knowledge transfer for MoWIE to oversee the efficiency and effectiveness of ADELE in general, and specifically to increase their capacity as implementing agency for sub-component 3.1. Relevant sector studies and background technical analyses are also included.	14
<i>Sub-Component 5.3: Enhancing DBE's capacity to manage the financing facility</i>	Technical assistance to the Development Bank of Ethiopia (DBE), participating financial institutions (PFIs) including commercial banks and MFIs, and other financial sector stakeholders to enhance their role providing financing opportunities for the off-grid solar energy sector.	2
Total		500

Legal Operational Policies

Triggered?

Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Assessment of Environmental and Social Risks and Impacts

Environment and social impacts: Even though Solar PV systems are considered not to emit significant greenhouse gases (GHG) at operation, it is expected that limited amount of GHG will be emitted during disposal of materials and appliances of solar system.

Solar photovoltaic (PV) systems have proved the best option for electricity access in remote, rural areas. They provide quality lighting for evening study, household chores and community gatherings, freeing up productive daylight hours. Accessible electricity also enables simple home appliances such as radios, TVs and refrigerators. Developing remote, rural areas can provide an alternative to urban migration. Moreover, a PV system avoids the use of expensive and harmful petroleum fuels. However, PV systems need care and maintenance for a long life, which requires households to save money. If the PV system is not maintained, such as buying replacement batteries, it can fail. And if a system fails, the community can then perceive the technology itself negatively and may shift blames to the project.

PV systems are often mounted on rooftops, but larger or multiple systems require more space, away from trees, which can raise land use right and access issues. The project activities during installation of the PV systems and its electrical appliances will have a potential to generate wastes, known as electronic wastes (e-wastes) that are not biodegradable. These are, electrical equipment, damaged or leftover solar panels, and used batteries will contaminate the nearby biophysical environment by releasing chemicals that will enter and stay in the food chain. Such wastes are released to the environment, they can harm plants, animals, fish and people, polluting the environment for many years. Yet there is no specific national laws regarding e-waste, the project is required to comply with the existing national waste management and pollution control legislations.

An e-waste component usually contains an assorted stock of hazardous chemicals that can cause multiple damages to land, air and humans. Hence as the volume of e-waste components increases, the lethality of the solid waste is amplified. Improper e-waste management is an escalating problem all over Ethiopia but eluding necessary attention.



Projects and organizations that promote PV systems, especially in rural and remote areas, must plan safe waste disposal. Used batteries and inverters will need replacing, proper waste management such as batteries must not be opened or drained, and the lead must be prevented from entering the environment disposal as per the national and international best practice methods. The project shall develop a strategy and/or plan for hazardous waste management to ensure that hazardous materials including batteries disposed of appropriately at the designate disposal site authorized by the institution in charge of hazardous waste management. If not possible, the project should develop a mechanism to replace batteries or return to the manufacturer. Moreover, workers are also exposed to health and safety risks due to working at height during installation and maintenance of roof top solar panel and due to electrocution during electrical work.

The Solar mini grids for rural economic development through mini-grids component will finance the roll-out of mini-grids with local LV networks and powered by appropriate renewable energy resources (solar photovoltaic in combination with battery or diesel). The hybrid system can optimize the system that auto-regulates itself depending on the energy demand per time. This optimization helps in the reduction of emissions from carbon, and toxic waste, hence a modification of the greenhouse effect and global warming gearing towards a smart environmentally friendly system. With the development of a hybrid system, it compensates for the noise produced by diesel generators, hence controlling noise pollution while achieving the same purpose of energy satisfaction however, one primary adverse environmental effect of a hybrid power system is that it's not emission free. There are still some quantities of toxic substances that are emitted to the environment, though minimal. These toxic substances can still bio-accumulate in the human system and cause public health issues. The emission of greenhouse gases always accompanies hybrid systems.

The proposed project may induce involuntary resettlement, land acquisition and restriction of access and use of natural resources. Impacts may be temporary or permanent but will be limited in scale and scope of land requirement. The project will be implemented throughout the country, it involves Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities (IPSHUTLC) in underserved regions of Afar, Benishangul Gumuz, Gambella, Somali and parts of SNNP and Oromia. The project design and implementation should consider the cultural appropriateness, affordability of technologies, maintenance (after service) alternatives, that may not be catered due to remoteness. The delivery of the project activities may require assessment of affordability of the household level technologies in the Ethiopian context, including those historically underserved and vulnerable groups. Beyond introduction of new energy technologies in these areas the operation and maintenance, including availability, affordability of parts and regulatory procedures should be put in place. While the results-based incentives will enhance access to energy in remote rural areas, an indicative site selection criterion should be defined for mini grids.

The deployment of workers/technical labor in rural and pastoral underserved areas may lead to undesirable relationships with communities. Further, the project indicated implementation in refugee areas. As a result, potential risks may include Gender Based Violence (GBV), sexual abuse and exploitation, unfair wages to local labor, discriminatory labor recruitment, etc.

E. Implementation

Institutional and Implementation Arrangements

30. **The project will be implemented by the Ministry of Water, Irrigation and Energy (MoWIE), the Ethiopian Electric Utility (EEU) and the Development Bank of Ethiopia (DBE) over six years.** MoWIE will provide overall coordination of the Project. The Directorate of Electrification at MoWIE will be responsible for the overall coordination and project oversight including: (a) defining, jointly with the respective agency, the project areas based on technical and policy development priorities; (b) resolving challenges requiring high level intervention facing the project; (c) monitoring the implementation of the project; and (d) consolidating information from



agencies and reporting on progress of implementation and evaluating the project.

31. **EEU will be the implementing agency for Component 1.** EEU will be responsible for the design of network strengthening investments based on analysis of maintenance records, future demand projections, and load flow studies. EEU will also be responsible for tendering and management of supply and installation contracts. Further, EEU will be responsible for periodic collection and reporting of system reliability information and other indicators. EEU will also implement initiatives to enhance collections by leveraging the equipment installed under ADELE for the Revenue Protection Program.

32. **EEU will implement Component 2.** EEU will serve as the implementing entity and will oversee the day-to-day implementation of the EEU-led and PPP business models, with support from an Independent Verification Agent (IVA). EEU is establishing an Off-Grid Unit (OGU), which will be tasked with leading the rollout of the mini grids under both sub-components. The establishment of the OGU has been approved by the EEU Board of Directors, and the recruitment of the OGU staff is underway.

33. **Component 3 will be implemented by MoWIE and DBE.** Sub-component 3.1 will be implemented by MoWIE, who will engage an experienced firm to provide fund administration support and relevant capacity strengthening support for MoWIE's PIU. MoWIE will also engage an Independent Verification Agency (IVA). For sub-component 3.2, DBE will be the implementing agency under an APEX (wholesale lending) structure. DBE was assessed against the criteria put forward in the World Bank Operational Policy (OP) 10.00 and qualifies to be an intermediary for the credit line.

34. **EEU will be the primary implementing agency for Component 4,** responsible for supply, installation, O&M, and ownership of the standalone solar systems. MoWIE will lead the creation of an inter-ministerial steering committee with representatives from EEU, Ministry of Health and Ministry of Education to efficiently identify the institutions to be electrified under this component.

35. Technical assistance, capacity building, and implementation support will be provided under **Component 5,** implemented jointly by EEU, MoWIE and DBE.

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