

**PROGRAM-FOR-RESULTS INFORMATION DOCUMENT (PID)
CONCEPT STAGE**

Report No. PIDC0100191

Program Name	<i>Ethiopia Electrification Program (ELEAP)</i>
Region	<i>AFR</i>
Country	<i>Ethiopia</i>
Sector	<i>Energy & Extractives</i>
Lending Instrument	<i>Program-for-Results</i>
Program ID	<i>P160395</i>
Borrower(s)	<i>Ministry of Finance and Economic Cooperation (MoFEC)</i>
Implementing Agency	<i>Ethiopian Electric Utility (EEU); Ministry of Water, Irrigation and Electricity (MoWIE)</i>
Date PID Prepared	<i>11/23/2016</i>
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Concept Review Decision	
Other Decision	

I. Introduction and Context

A. Country Context

1. **Ethiopia is a large, land-locked, diverse country.** Located in the Horn of Africa, Ethiopia extends over an area of 1.1 million square kilometers - about the size of France and Spain combined. With an estimated population of 99.4 million in 2015, out of which 80.5 percent are rural dwellers, Ethiopia is the second most populous country in Sub-Saharan Africa. The country is a land of diverse nationalities and peoples, and its bio-physical environment includes a variety of ecosystems, with significant differences with regard to climate, soil properties, vegetation types, agriculture potential, biodiversity, and water resources. The natural resources base remains the foundation for most livelihoods, and is subject to considerable climate risks. Despite past progress, a historic legacy of under-investment still bears its mark as more than half of the adult population is illiterate, and the country's infrastructure deficit remains one of the largest in the world. Ethiopia is undergoing

a faster demographic transition than the rest of Africa, with a rapidly rising working age population that presents both opportunities and challenges.

2. **Ethiopia is one of the world's poorest countries, but has achieved substantial progress in economic, social, and human development over the past decade.** With a per capita income of US\$619 (2015), Ethiopia remains the 15th poorest country in the world. Nonetheless, growth averaged nearly 11 percent per year since 2004 and extreme poverty¹ fell from 55 percent in 2000 to 34 percent in 2011, which is one of the most impressive poverty reduction results recorded internationally (within Sub-Saharan Africa, only Uganda reduced poverty faster). Low levels of inequality have largely been maintained. With a few exceptions, Ethiopia attained the Millennium Development Goals. Yet, vulnerability to return to poverty remains high, especially for those engaged in rural livelihoods depending on rain-fed agriculture. Gender plays a key role in poverty, as described in the 2014 Ethiopia Poverty Assessment by the World Bank, which highlights that urban female headed households² are significantly poorer than male headed household. Addressing inequalities between men and women in term of access to education and decision making, rights, unpaid labor, land and productive resources is essential for economic growth in the country.³

3. **The GoE has embarked on a structural transformation of the economy and society.** GoE has completed its first phase of the Growth and Transformation Plan (GTP-I) (2010/11–2014/15), which set a long-term goal for Ethiopia to become a middle-income country by 2025, with a growth rate of at least 11.2 percent per year during the plan period. During 2011-15, Ethiopia grew at a rate of 10 percent. A second phase of the GTP (GTP-II) is under implementation for the period 2015-2020. The GTP-II puts a strong emphasis on structural transformation, industrialization, urbanization, and export promotion. Massive public infrastructure investment has been at the center of the country's economic strategy. Ethiopia was able to achieve a substantial expansion of energy, road, railway, and telecom infrastructure, financed by domestic and external public borrowing. In addition, public investments in basic service provision, such as education and health, have contributed to poverty reduction as did the introduction of rural safety nets. GTP II continues to commit that women and youth benefit from and participate in overall economic, political and decision-making processes in Ethiopia.

B. Sectoral and Institutional Context of the Program

4. **The past decade has witnessed a major turnaround in Ethiopia's electricity sector.** In 2005, the GoE launched the ambitious 'Universal Electricity Access Program' (UEAP) with the specific objective to provide grid-based electrification to rural towns and villages. While UEAP constitutes one of the most significant grid expansion programs in Africa; thus far, the focus has been on connecting the town and villages, but not as much on household connections. Between 2005 and 2015, electricity grid was spread to about 6,000 towns and villages from the initial 667, grid coverage reached 60 percent of the towns in the country;

¹ Extreme poverty is measured as consuming less than US\$ 1.90 (2011 PPP) a day.

² In Addis Ababa, 37% of households are female headed, and about 52% of these fall into the low income category.

³ 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.

however, the household electrification rate remains quite low at about 15 percent, with over 60 million people left without access to electricity (second highest access deficit in Africa). While the demand for electricity has been growing at more than 15 percent per annum, the GoE has also focused on expanding power generation capacity, which has nearly quadrupled within a decade from about 850 MW to 2,360 MW (by 2015).

5. **Ethiopia's clean energy based electricity sector is an outlier in the region.** Ethiopia is well endowed with renewable energy sources, with approximately 45,000 MW of exploitable hydropower potential. Currently hydropower accounts for nearly 90 percent of generation capacity. In recent years, Ethiopia has made major strides in increasing generation capacity. Large scale hydropower projects, most notably the Grand Ethiopian Renaissance Dam (GERD 6,000 MW), is in advanced stages of construction. Also, Gibe-III Hydropower Project (1,870 MW) is nearing full commissioning. In total, the installed capacity is expected to increase from 2,360 MW to 4,256 MW by the end of 2016. The GoE aims to have over 17,000 MW of installed capacity by 2020.

6. **The fast paced growth of the sector in the past decade created capacity challenges for the vertically integrated utility, Ethiopian Electric Power Corporation (EEPCo).** In 2013, the GoE unbundled EEPCo into two public enterprises: (a) the Ethiopia Electric Power Company (EEP), responsible for the generation and transmission sub-sectors; and (b) the Ethiopian Electric Utility (EEU), responsible for power distribution and sales. The implementation of UEAP moved from EEP to EEU in January 2016. In addition, the GoE established an independent regulator, the Ethiopian Energy Authority (EEA). While strategic focus on various segments of the electricity sector's value chain has improved, as new agencies, EEP and EEU, are continuing to encounter significant challenges related to implementation of numerous large-scale projects, as well as ongoing internal administrative and operational issues.

7. **Massive public sector led investments have resulted in financial imbalance of the sector.** The Ethiopian power sector is unique in that the ongoing power generation costs (based on low-cost, low-carbon sources) are quite low (no recurrent fuel costs), and the sector is still able to maintain operational financial viability. However, the high volume of borrowing (primarily domestic bonds) has created an ever growing debt service obligation for the sector. Meanwhile, the sector revenue has stagnated as the average domestic tariff rate, last revised in 2006, currently sits at US\$ 0.03/kWh. The sector utilities have prepared a draft tariff framework that would reflect full cost of service (estimated to be about US\$ 0.06-0.07/kWh) and would be adjusted every four years. The new tariff framework is currently under review by the management of the utilities and the sector regulator.

8. **In order to continue on the growth path of the sector, it is imperative that a long-term financial sustainability plan is devised and implemented** (detailed financial analysis will be presented in the Appraisal document). Appropriate domestic tariff regime forms an important element of financial sustainability, but it also includes additional revenue sources, such as, revenue from power exports (see below), possible rollover and restructuring of existing debt, and finding innovative ways of reducing the public investment obligations and introducing sustainable financing mechanisms, such as, increased private participation (see below).

9. **In the coming years, Ethiopia is poised to become a regional energy superpower which would also provide additional revenue to the sector.** Given its massive clean energy reserves, Ethiopia can become a cornerstone of the regional power market and of the East Africa Power Pool (EAPP). Large scale expansion of generation capacity is also driven by the GoE's objective to become a power export hub in East Africa, while also scaling-up its domestic power supply. Together with domestic network expansion, in the coming years, exports to Sudan, Djibouti, and Kenya could boost the country's export revenue potential, estimated to be as much as US\$500 million, per annum, by the end of the decade. By 2020, Ethiopia could achieve as much revenue from power export as it does from domestic sources. This dollar denominated revenue could be used for continued cross-subsidies for domestic consumers.

10. **The GoE also plans to aggressively develop other energy clean sources to mitigate the risk of overreliance on, and variability of hydropower, by involving the private sector.** The GoE intends to massively scale up its solar, wind, and geothermal power generation capacity. A draft regulation to adopt public-private partnership (PPP) model for power generation in the country has been prepared to support sustainable financing of these large infrastructure projects. The GoE is also preparing a transparent and competitive procurement framework (auction based bidding process) for private sector investments (independent power producers, IPPs), which would be key in ensuring a viable development of these clean energy sources.

11. **However, despite tangible results in other segments of the sector, household access remains far below GoE targets, posing a binding constraint to economic and social growth.** While significant improvements have been achieved under GTP-I in terms of transmission infrastructure, last mile connections to households have not kept pace with the rapid network expansion. GTP-I included clear sector targets, most notably that of doubling the number of household electricity connections from the current 2 million to 4 million connections. However, currently, only 2.4 million customers had been connected. In the coming years, the GoE intends to place last-mile electrification at the core of its development agenda. Expanded, affordable, and reliable access to electricity is instrumental to the structural transformation of Ethiopia's economy and society, including massive poverty reduction and a shift toward higher productivity rates and industrialization.

12. **Household connections have lagged behind for several reasons, including the absence of a least-cost, nation-wide and comprehensive rollout program.** In addition, there is also a severe lack of dedicated resources to provide electricity access to all households, economic centers, schools and clinics connections, as well as capacity constraints at the utility level in planning for access expansion and handling a growing customer base. Rolling out household connections is a top priority; it is also a high-impact, low-hanging fruit to be reaped in areas already served by the network. The resulting gap has led to an increased vulnerability of households to fall back into poverty with increasingly negative impacts on the economy.

13. **The GoE recognizes the need to focus on connecting households and has shifted the country's energy access paradigm from network access to actual connectivity.** With

GTP-II, the GoE has put strong emphasis on the need of a rapid scale-up of electricity connections in areas that are already within the immediate and short-term reach of the network and increasing connections to almost 7 million, while it has also put forward ambitious off-grid targets (Table 1).

Table 1: Energy sector related GTP-II targets (2016-2020)

<i>Indicator</i>	<i>Unit of measurement</i>	<i>Baseline (2015)</i>	<i>GTP-II targets (by 2020)</i>
Electricity service coverage (towns/villages)	Percent	60	90
Installed power generating capacity	MW	4,180	17,347
Length of power transmission system	Km	16,018	21,728
Number of customers connected to grid power	Number	2,310,000	6,955,000
Annual per capita electricity consumption	kWh	86	1,269
Improved cookstoves and biogas plants	Number	8.9 million stoves and 11,618 biogas plants	11.45 million (including 31,400 improved biogas, 20,000 households biofuel stoves)
Solar lanterns	Number	2 million	3.6 million
Household solar systems	Number	40,000	400,000

14. **In June 2016, the GoE prepared the National Electrification Strategy (NES), which paved the way for scaling-up electrification in Ethiopia.** The preparation of the NES, which translated the vision of the GTP-II targets in to an actionable strategy was supported under Phase 1 of the World Bank’s three year programmatic technical assistance: the ESMAP-funded Ethiopia Energy Sector Review and Strategy. The NES comprises eleven strategic elements organized into three pillars: ‘institutional’, ‘planning and technical’ and ‘financial’, each of which provides a specific menu of support.

15. **Based on the NES, currently, the GoE initiated the National Electrification Program (NEP) is the centerpiece of the implementation of the electrification expansion strategy in a more effective and sustainable manner.** The NEP is initially envisioned to support of the GTP-II electrification expansion/connection targets. Given that several of NES strategic elements will require substantial capacity improvements in all of the three pillars identified, the NEP will be implemented to allow for immediate support to the stringent GTP-II objectives and the urgent need to promote widespread growth in the country. Activities currently underway as part of the NEP include: (i) The establishment of a Directorate of Electrification (DoE) at the Ministry of Water, Irrigation, and Electricity (MoWIE), as well as a National Steering Committee for Electrification comprised of key sector stakeholders; (ii) the

preparation of an National Electrification Program Implementation Roadmap to guide the rapid and coordinated roll-out of grid and off-grid connections; and (iii) the establishment of central geospatial planning platform and capacity to inform and monitor NEP's effectiveness and efficiency.

16. As requested by the GoE, the proposed Ethiopia Electrification Program (ELEAP) would directly support the GoE's NEP in scaling-up electricity connections in areas within the network reach as well as providing financing to increase access to off-grid technologies in areas outside of the network. NEP will act as a 'blueprint' for the proposed ELEAP. While some of the elements of the NEP will be prepared in the medium term (e.g. detailed geospatial plans), the core elements and any related prior actions will be prepared in time for Appraisal of the proposed ELEAP.

C. Relationship to the Ethiopia Country Partnership Framework

17. **The proposed operation is fully aligned with the World Bank's ongoing Country Partnership Strategy (CPS) for FY13-16.** In particular, the proposed operation will support, under Pillar I ('fostering competitiveness and employment'), the strategic objective 'promoting enhanced public services and facilitating access to finance', by helping increase the delivery of electricity services throughout the country. In addition, the proposed operation will support the cross-cutting Pillar on 'promoting gender and youth empowerment and equity' by supporting approaches and interventions that allow both men and women to benefit from improved energy services and their associated benefits. The proposed operation will also be aligned with the World Bank's upcoming Country Partnership Framework (CPF) for FY17-21, in particular supporting Focus Area 2 ('building resilience and inclusiveness'), by providing access to electricity to the citizens of Ethiopia.

18. **The Program would also help meet the Bank's twin goals of poverty reduction and shared prosperity, and is aligned with Sustainable Development Goal 7 (SDG7), Sustainable Energy for All (SE4ALL), and World Bank's Energy Sector Directions Paper (ESDP).** Providing last mile connections under the Program will increase access to electricity services for poor households in rural and urban areas enabling opportunities to study and work, contributing to raising quality of life and improving safety at night and stimulating off-farm activity and economic interaction. Increased access to reliable electricity supply will not only lower costs and improve the profitability of business enterprises,⁴ but is also key to enabling the set-up of new private sector-led enterprises, which stimulate GDP growth. In addition, the Program will contribute to the cross cutting issues 'gender and climate change', by supporting low-emission solar home systems and solar lanterns in remote areas, which reduces women's exposure to indoor air pollution and time-burden associated with obtaining alternative energy sources. Particular attention will be paid to the ability of female headed households and enterprises to access the credit line and electricity connection. In addition, improved electricity access for social services such as clinics, has the potential to promote gender equality through gains in maternal health outcomes.

⁴ The Report *Revisiting What Works: Women, Economic Empowerment and Smart Design (2016)* indicates that rural electrification is 'proven' to be beneficial in encouraging women's entrepreneurial activities, provided that gender inequalities in the family and local economy are accounted for.

II. Program Development Objective and Results

A. Program Development Objective (PDO)

19. The PDO of the proposed Ethiopia Electrification Program (ELEAP) is to scale-up access to electricity in Ethiopia.

B. Key Program Results

20. The proposed ELEAP will contribute to three key result areas formulated under the NES which are integral to the NEP's objectives of increasing access to electricity through coordinated on- and off-grid activities. These are summarized as follows:

- a. **Results Area 1: Increased electricity connections to households.** The key intermediate indicator would be the number of customers connected to the network. In addition, increased kilometers of low voltage distribution lines erected would also be tracked.
- b. **Results Area 2: Increased access to off-grid solutions.** The main activity will be the capitalization of a credit line being implemented by the Development Bank of Ethiopia (DBE) acting as a financial intermediary to provide credit to private sector enterprises (PSEs) to promote solar home systems/lanterns and other off-grid and mini-grid technologies, and to micro finance institutions (MFIs) to provide financing to households and small businesses. The key intermediate indicators would include the amount of financing provided by the credit line as well as number of solar lanterns, solar home systems, mini-grids, and other technologies deployed by PSEs. Outcome would be the number of households with increased access to off-grid technologies, either as a pre-electrification or a long-term solution.
- c. **Results Area 3: Improved capacity of the sector utilities to manage the roll-out of customer connections.** The key indicators for this result area will be determined through the technical and fiduciary assessments to be prepared as part of the program preparation. This could include targets related to improving the technical capacity and the financial sustainability of the sector utilities.

III. Program Context and Design

A. Program Background

21. The proposed ELEAP will support the NEP, as defined by the NES. There are eleven key strategic elements organized into three functional categories ('institutional', 'planning & technical', and 'financial'), each corresponding to specific support element (see Table 2).

Table 2: Preliminary Description of the National Electrification Program

<i>NES Element</i>	<i>Description</i>
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<i>Institutional</i>	Element 1: National Electrification Program and related policy statement	The NEP and related policy statement will establish the principal objectives, the responsibilities and resources allocated to sector institutions: EEU, EEP, Development Bank of Ethiopia (DBE), Rural Electricity Fund (REF), by which public and private sector can participants in electrification programs.
	Element 2: Directorate of Electrification (DoE) within MoWIE	Establishing a DoE is a priority action to provide improved policy guidance and inter-agency coordination and oversee the implementation of the electrification program.
	Element 3: Capacity to accelerated consumer connections	Focused support would be required for sector utilities to improve their technical and financial performance. This will include support to sector utilities in building and managing a growing customer base, electrification procedures, safety practices, as well as energy-efficiency.
	Element 4: Support off-grid expansion	The NEP would include options to engage with the private sector, particularly for complementary off-grid programs. The NEP will identify towns and housing clusters to be prioritized under the off-grid electrification program in coordination with grid expansion planning priorities.
<i>Planning and Technical</i>	Element 5: Electrification planning framework	Optimal investment planning for grid and off-grid expansion facilitated by a comprehensive and geospatial planning framework. The sector would acquire hardware/software and expertise to develop and share the geospatial master planning process, leading a collaborative working relationship with other electrification stakeholders that may have relevant data or expertise in geospatial planning.
	Element 6: Densification	Densification of consumer connections in areas that have been recently electrified, with an already existing waiting list and where the network can support new connections. Densification will allow to increase connection rates at a more rapid pace and maximize the impact of the ongoing process of geographic expansion of distribution coverage. Densification will result in improved cost efficiency of the electrification program, and significantly increased economic benefits in the targeted areas. Soft financing could be considered to cover connection fees/costs and UEAP/EEU would jointly plan for ready access to low voltage expansion materials, service connections and meter materials.
	Element 7: Willingness to pay and affordability analysis	A national survey program would be designed to gather all of the data required to characterize all market segments in Ethiopia that will support electrification program planning for many years to come. This is an activity that will be managed by the newly formed DoE under the MoWIE.
	Element 8: Low-cost standards	Lowering construction costs will allow UEAP/EEU to reach significantly more consumers in a shorter period of time without sacrificing service quality or safety. Potential costs reduction of the order of 20-30 percent are realizable through improved engineering and material selection, by simplifying design of low voltage networks and by using smaller transformers and service materials, without compromising safety and security.

<i>Financial</i>	Element 9: A realistic tariff regime	In order for electrification programs to be sustainable, electric utilities and off-grid service providers must be allowed to recover operating costs. It will be necessary to establish a rational retail tariff structure and tariff levels that recover all operating costs including the cost of purchased power, and provide an allowance for end-of-life replacement of those facilities that have been constructed with grant funds.
	Element 10: Electrification fund	Establishing an on-going financing mechanism for the electrification program that draws from special-purpose levy could allow the GoE to more rapidly accomplish electrification goals and to secure ongoing funding for the NEP. In addition, a dedicated electrification fund would allow donor agencies to contribute to access program goals directly and on an ongoing basis. This financing approach has been used with success in Kenya, Uganda and Tanzania in recent years.
	Element 11: Productive uses of electricity	These programs are designed specifically to provide training, technical assistance and access to financing to promote income generation through productive use of electric service in newly electrified communities. This activity will also be led by DoE.

B. Environmental and social systems aspects

22. The Program would support increasing access to electricity for poor households with both on- and off-grid solutions; and will strengthen operational efficiency of the targeted utility company. The activities to be supported will not have significant environmental and social impacts that are sensitive, diverse or unprecedented on humans and environment and any potential activity that will have adverse impact will be excluded in this program.

23. Establishment of low-voltage lines for the densification activity generally does not represent particular environmental challenges. The main environmental, health, and safety concerns are likely to be associated with recycle and disposal of spent batteries of SHS at the end of their useful lives, which is usually three to five years after deployment. If not adequately disposed of, these batteries can create long-lasting environmental and human health impacts due largely to the heavy metals such as mercury, lead, cadmium and nickel, and acids. The recycling/disposal process, including de-manufacturing, collection, storage, recycling, transport, and disposal may be a risk. Under ENREP, both EEU and DBE have gained experience implementing off-grid activities and applying adequate mitigation instruments.

24. On the social side, the proposed Program is not expected to result in large-scale land acquisition that could result in any massive physical and/or economic displacements since densification will take place in areas already covered by the grid, and LV lines usually follow access roads, while the installation of systems will take place within existing households and public facilities.

25. To access and evaluate the risks and potential impacts on PAPs and environment as required in the OP/BP9.00 on PforR, as well as mitigate any associated program risks, the Bank will conduct an Environmental and Social Systems Assessment (ESSA), which will

include a review of systems and procedures of the targeted utility company, its regional and city level counterparts to address social and environmental issues associated with the program. The findings of the assessment will be used to establish the extent, to which the existing energy program procedures for social and environment meet the six core principals of OP9.00, and where they don't, recommends an action plan to address shortfalls. The mitigation measures will also include minimum conditions to access funds and verification protocols that will be captured in the DLIs and the Financing Agreement.

26. Further, the ESSA will include the recommended measures among others, to prepare program-specific environmental code of practice (ECOP) as a guidance on approach for the management of spent batteries, with the aim of ensuring that risks to the environment and human health are prevented or mitigated; to develop systematic procedures for acquisition of land; compensatory mechanisms and rights-of-way management in the context of the program. During PforR preparation, consultations for broader stakeholder support, citizen-engagement and gender-related considerations will be carried out, which is considered particularly important in the context of recent social unrest.

II. Tentative financing
USD 250,000,000.00

Source:	(\$m.)
Borrower/Recipient	TBD
IDA	250
Others (specify)	TBD
	Total
	TBD

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