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March 11, 2019

Closing Date: Thursday, March 28, 2019 at 6:00 p.m.

FROM: Vice President and Corporate Secretary

Mozambique - Mozambique Energy for All (ProEnergia) Project

Appraisal Document

Attached is the Project Appraisal Document regarding a proposed grant to Mozambique for a Mozambique Energy for All (ProEnergia) Project (IDA/R2019-0057), which is being processed on an absence-of-objection basis.

Distribution:
Executive Directors and Alternates
President
Bank Group Senior Management
Vice Presidents, Bank, IFC and MIGA
Directors and Department Heads, Bank, IFC, and MIGA

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Report No: PAD2873

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT
ON A
PROPOSED GRANT

IN THE AMOUNT OF SDR 58.6 MILLION
(US$82.0 MILLION EQUIVALENT)

AND A GRANT

FROM THE MOZAMBIQUE ENERGY FOR ALL MULTI-DONOR TRUST FUND
IN THE AMOUNT OF US$66 MILLION

TO THE

REPUBLIC OF MOZAMBIQUE

FOR THE

MOZAMBIQUE ENERGY FOR ALL (ProEnergia) PROJECT

March 7, 2019

Energy and Extractives Global Practice
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 31, 2019)

Currency Unit =	Mozambique Metical (MZN)
MZN 62.15 =	US$1
SDR 0.71392875 =	US$1

FISCAL YEAR
January 1 - December 31

Regional Vice President:	Hafez M. H. Ghanem
Country Director:	Mark R. Lundell
Senior Global Practice Director:	Riccardo Puliti
Practice Manager:	Sudeshna Ghosh Banerjee
Task Team Leaders:	Zayra Luz Gabriela Romo Mercado, Mariano Salto

ABBREVIATIONS AND ACRONYMS

AECF	Africa Enterprise Challenge Fund
ARAP	Abbreviated Resettlement Action Plan
ARENE	Energy Regulatory Authority *(Autoridade Reguladora de Energia)*
BCI	Commercial and Investments Bank *(Banco Comercial e de Investimentos)*
BRILHO	Energy Africa
CAPEX	Capital Expenditure
CMS	Commercial Management System
CPF	Country Partnership Framework
CTM	Maputo Thermal Power Plant *(Central Termica Maputo)*
CTRG	Ressano Garcia Thermal Power Plant *(Central Termica Ressano Garcia)*
DA	Designated Account
DES	Directorate of Social Energy *(Direcção de Energia Social)*
DFID	United Kingdom's Department for International Development
DP	Development Partner
DSCR	Debt Service Coverage Ratio
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest and Tax, Depreciation, and Amortization
EC	European Commission
EDAP	Energy Development and Access Project
EDM	Electricity of Mozambique *(Electricidade de Moçambique)*
EIRR	Economic Internal Rate of Return
EPC	Engineering, Procurement and Construction
ERP	Enterprise Resource Planning
ESMAP	Energy Sector Management Assistance Program
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FHHs	Female Headed Households
FM	Financial Management
FSP	Financial Strengthening Plan
FUNAE	Energy Fund (*Fundo de Energia*)
FY	Fiscal Year
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GoM	Government of Mozambique
GPN	Good Practice Note
GRS	Grievance Redress Service
HCB	Cahora Bassa Hydropower (*Hidroeléctrica de Cahora Bassa)*
IDA	International Development Association
IFC	International Finance Cooperation
IPF	Investment Project Financing
IPP	Independent Power Producer
JIP	Joint Implementation Plan
KfW	German State-owned Development Bank
M&E	Monitoring and Evaluation
MDTF	Multi-Donor Trust Fund

MIREME	Ministry of Mineral Resources and Energy *(Ministerio de Recursos Minerais e Energia)*
MT	Monthly Household
MTF	Multi-tier Framework
MV	Medium Voltage
MZN	Mozambique Metical
NES	National Electrification Strategy
NPV	Net Present Value
O&M	Operation and Maintenance
OCF	Operating Cash Flow
OPEX	Operating Expenditure
PAYGO	Pay-As-You-Go
PERIP	Power Efficiency and Reliability Improvement Project
PIU	Project Implementation Unit
POG	Human Resources Directorate
PPA	Power Purchase Agreement
PPP	Public-private Partnership
PPSD	Project Procurement Strategy for Development
PV	Photovoltaic
RAP	Resettlement Action Plan
RBF	Result-based Finance
RERD	Rural Energy for Rural Development
RFB	Request for Bids
RoE	Return on Equity
RoIC	Return on Capital Invested
RPF	Resettlement Policy Framework
SDG	Sustainable Development Goal
SDR	Special Drawing Rights
SE4ALL	Sustainable Energy for All
SHS	Solar Home System
SIGEM	Integrated Management System (*Sistema Integrado de Gestão*)
SOE	State-owned Enterprise
SWER	Single-wire Earth Return
TA	Administrative Court *(Tribunal Administrativo)*
US$	United States Dollars
VAT	Valued Added Tax
WBG	World Bank Group
WTP	Willingness to Pay
ZESCO	Zambia Electricity Supply Corporation

TABLE OF CONTENTS

DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Mozambique	Mozambique Energy For All (ProEnergia)	
Project ID	**Financing Instrument**	**Environmental Assessment Category**
P165453	Investment Project Financing	B-Partial Assessment

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[ ] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[✓] Fragile State(s)
[ ] Disbursement-linked Indicators (DLIs)	[ ] Small State(s)
[ ] Financial Intermediaries (FI)	[ ] Fragile within a non-fragile Country
[ ] Project-Based Guarantee	[ ] Conflict
[ ] Deferred Drawdown	[ ] Responding to Natural or Man-made Disaster
[ ] Alternate Procurement Arrangements (APA)	

Expected Approval Date	Expected Closing Date
28-Mar-2019	31-Dec-2023

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The Project Development Objective is to increase access to electricity service in Mozambique.

Components

Component Name	Cost (US$, millions)

Peri-urban and Rural Electrification	126.00
Off-grid Electrification	13.00
Technical Assistance and Implementation Support	9.00

Organizations

Borrower:	Ministry of Economy and Finance
Implementing Agency:	Fundo de Energia (FUNAE) Electricidade de Moçambique (EdM)

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	148.00
Total Financing	148.00
of which IBRD/IDA	82.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	82.00
IDA Grant	82.00

Non-World Bank Group Financing

Counterpart Funding	0.00
Borrower/Recipient	0.00
Trust Funds	66.00
Miscellaneous 1	66.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Guarantee Amount	Total Amount

National PBA	0.00	82.00	0.00	82.00
Total	**0.00**	**82.00**	**0.00**	**82.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2019	2020	2021	2022	2023	2024
Annual	0.64	11.25	21.41	21.63	17.44	9.64
Cumulative	0.64	11.89	33.29	54.92	72.36	82.00

INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Gender Tag

Does the project plan to undertake any of the following?	
a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF	Yes
b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment	Yes
c. Include Indicators in results framework to monitor outcomes from actions identified in (b)	Yes

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	Substantial

4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Substantial
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other	
10. Overall	Substantial

COMPLIANCE

Policy

Does the project depart from the CPF in content or in other significant respects?

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	✓	
Performance Standards for Private Sector Activities OP/BP 4.03		✓
Natural Habitats OP/BP 4.04	✓	
Forests OP/BP 4.36		✓
Pest Management OP 4.09		✓
Physical Cultural Resources OP/BP 4.11	✓	
Indigenous Peoples OP/BP 4.10		✓
Involuntary Resettlement OP/BP 4.12	✓	
Safety of Dams OP/BP 4.37		✓
Projects on International Waterways OP/BP 7.50		✓
Projects in Disputed Areas OP/BP 7.60		✓

Legal Covenants

Sections and Description
The Recipient shall cause FUNAE to, not later than three (3) months from the Effective Date, appoint an independent verification agent, with qualifications, experience and under terms of reference acceptable to the Association, in accordance with the Procurement Regulations.

Sections and Description
The Recipient shall cause EDM and FUNAE to, maintain, throughout Project implementation, and publicize the availability of a grievance and feedback mechanism, in form and substance satisfactory to the Association, to hear and determine fairly and in good faith all complaints raised in relation to the Project, and take all measures necessary to implement the determinations made by such mechanism in a manner satisfactory to the Association.

Conditions

Type	Description
Effectiveness	The Co-financing Agreement has been executed and delivered and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals under it (other than the effectiveness of this Agreement) have been fulfilled.
Effectiveness	The Subsidiary Agreements have been executed and delivered and all conditions precedent to their effectiveness or to the right of the Recipient to make withdrawals under it (other than the effectiveness of this Agreement) have been fulfilled.
Effectiveness	The Project Implementation Manual has been adopted by EDM and FUNAE, in form and substance acceptable to the Association.
Disbursement	Under Category (1), unless and until, evidence, in form and substance satisfactory to the Association, is provided to the Association that adequate measures have been adopted by the Recipient to ensure that the rights of people located within the PPZ are not adversely affected by the application of the Recipient's Land Law to electricity distribution networks being supported under Part A of the Project.
Disbursement	Under Category (4), unless and until: (i) an independent Fund Manager is selected and appointed as provided in Section I.A.5 of Schedule 2; and (ii) an independent verification agent is selected and appointed as provided in Section I.A.6 of Schedule 2.

I. STRATEGIC CONTEXT

A. Country Context

1. **Mozambique is a low-income country in Southeast Africa with a gross domestic product (GDP) of US$417 per capita and a population of 29.6 million.** It is in the south-eastern corner of southern Africa, with four of the six neighboring countries landlocked and is bordered by the Indian Ocean to the east. The country is endowed with ample arable land, water, energy, as well as mineral resources and newly discovered natural gas offshore; three deep seaports; and a relatively large potential pool of labor. The economy is still strongly influenced by agricultural sector that accounts for 22 percent of Mozambique's GDP but employs about 71 percent of the population.[1] Close to 94 percent of the poor are engaged in agriculture and most of them are rural residents.[2] The extractive sector has been a driver of the recent improvement in GDP growth, maintaining double-digit output growth in 2016 and early 2017, with a 41 percent expansion in output mostly driven by mineral exports.

2. **Mozambique has experienced a prolonged period of sustained growth; however, its macroeconomic stability has been compromised by an untenable debt situation, resulting in a tight fiscal context**. After registering 7 percent GDP growth on average since 2011, Mozambique's economic performance experienced a sharp downturn, triggered by falling commodity prices, adverse climate conditions, and the discovery of US$1.4 billion in previously undisclosed public debt (equal to about 10 percent of GDP). The Government of Mozambique (GoM) responded to the economic slowdown and debt accumulation with a revised budget, restructured spending program, and overtures to creditors to begin restructuring talks. The authorities have started tackling difficult reforms such as fuel subsidies and state-owned enterprise (SOE) reform and are also developing a new state-owned enterprise law to strengthen the SOE's management. This is accompanied by a tight fiscal context, and with both credit and investment levels continuing at a low level. Therefore, improving the efficiency and impact of existing social and government spending has become even more of an imperative.

3. **The pace of poverty reduction in Mozambique is accelerating but with significant spatial variation.** Poverty has been on a declining trend (poverty headcount fell from 60.3 percent in 2002/2003 to 48.4 percent in 2014/2015) accompanied by progress on related development indicators such as health and education. However, growth became less inclusive in recent years, with many low-income households missing out on the benefits of such growth. Poverty would have fallen by twice as much since 2002 had growth been more equally shared.[3] Education levels are slowly increasing in Mozambique, although from low levels of school attainment and quality of education overall, with a large gap between rural and urban areas, preventing a more inclusive development of human capital. As per the Human Capital Index, Mozambique reached 0.361 points in 2017, lower than the average for its region and income group and it ranks 148 out of 157 countries. In addition, the distribution of poverty is uneven across the country, with rural provinces in the center and the north accounting for a disproportionate share of the poor (about 70 percent). The three poorest provinces - Zambezia, Niassa and Nampula – are all located in north and central Mozambique provinces. Mozambique's ability to boost growth and reduce poverty depends on the working age population having access to productive jobs in the formal and informal sector (including smallholder agriculture and non-farm "household enterprises" which are typically located in peri-urban areas).

[1] World Bank. (2018). Mozambique Economic Update. October.
[2] World Bank. (2018). Strong but not Broadly Shared Growth – Mozambique Poverty Report.
[3] Idem.

4. **Mozambique's rapidly growing population, together with its high youth dependency ratio, is and will continue to pose increasing pressure on public service delivery and infrastructure**. Urban growth continues to rapidly unfold in Mozambique with increasing concentration of people and economic activity in urban areas. Yet, despite rapid growth in urban employment, the urbanization process in Mozambique continues to be gradual relative to the pace of urbanization in other African countries. Natural population growth accounts for much of the current increase in the urban population.[4] The country's fertility rate is estimated at 5.9 children per woman, and children aged 0 -14 represented more than 45 percent of the population in 2015. A large majority of girls marry before age 18 and start childbearing at a very early age.[5] Rapid population growth will continue to put pressure on existing infrastructure, requiring higher rates of investment to enhance capacity and efficiency of service delivery to sustain growth in the medium term.

5. **Mozambique's five-year Government Plan (2015–2019) highlights agricultural and industrial development as the basis for socioeconomic development of the country**. The five-year Government Plan presents five strategic pillars to achieve accelerated economic growth and social development. It also targets expanded infrastructure as a key element to enhance the productive sectors of the economy, economic diversification, and improve access to markets. This calls for expanding access to electricity services to all Mozambicans by 2030 to support the young and growing population with productive opportunities.

B. Sectoral and Institutional Context

6. **The current institutional structure of the power sector derives from the 1997 Electricity Law**. The Ministry of Mineral Resources and Energy (*Ministerio de Recursos Minerais e Energia*, MIREME) is the government entity responsible for energy policy and planning, as well as monitoring sector performance and governance. Electricity of Mozambique (*Electricidade de Moçambique*, EDM) is the state-owned, vertically integrated utility with operations in generation, transmission, and distribution countrywide. Cahora Bassa Hydropower (*Hidroeléctrica de Cahora Bassa*, HCB) is the largest power generation company, in charge of operating the 2,075 MW Cahora Bassa power plant and the associated transmission system; the generation sector is complemented by independent power producers (IPP) that have signed power purchase agreements (PPAs) with EDM. In May 2017, the Parliament approved the creation of Energy Regulatory Authority (*Autoridade Reguladora de Energia*, ARENE) in an effort to separate regulatory and policy functions in MIREME. The new regulatory body has been given the authority – inter alia – to regulate the electricity tariff, promote and monitor competition in the power sector, and monitor and enforce the terms and conditions of the licenses or concession contracts in the power sector. The Energy Fund (*Fundo de Energia*, FUNAE) is a public body subordinated to MIREME with the aim of promoting the development and use of different forms of low-cost energy and the sustainable management of energy resources. Initially setup as a fund, FUNAE today mostly implements off-grid access projects. In addition to the Electricity Law, private investments in the electricity sector are also governed by the Public-private Partnership (PPP) Law (2011).

Sector Achievements are Manifold Across the Value-chain

7. The Mozambican power sector has been developed with a two-fold objective to meet domestic electricity demand through EDM and to develop the export market as an anchor demand to exploit the large indigenous energy resources. Both these strategic objectives have competing needs due to the large investment requirements.

[4] World Bank. (2017). Mozambique Urbanization Review (Report AUS15538).
[5] As of 2011, about 40 percent of adolescents were mothers or pregnant, and this percentage has barely changed in the last fifteen years.

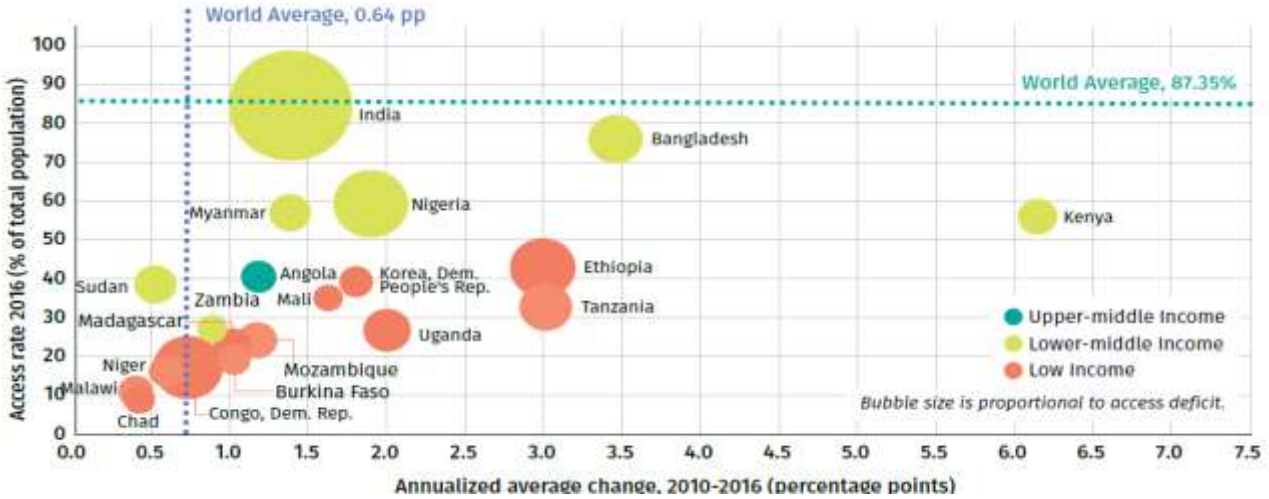
8. **Mozambique is rich in conventional and renewable energy sources and has emerged as a regional energy hub**. Mozambique has 7.5 GW of renewable energy potential, including 5.6 GW of hydro, 1.1 GW of wind and 0.6 GW of solar.[6] The country has also significant experience with gas through the Pande/Temane fields. Furthermore, gas reserves in the Rovuma Basin, offshore in Northern Mozambique, are sufficiently large to be used simultaneously for exports, major industry and power generation. Mozambique also has world class reserves of coal. Part of these reserves have sufficient quality to be exported, while a significant portion can be used for domestic power generation. Mozambique's vast energy resources are far in excess to satisfy domestic demand (historically growing at 10 percent annually), including access expansion; the country is also well positioned to engage in significant regional trade. The country is well interconnected with South Africa, the country's largest purchaser of electricity - mostly from Cahora Bassa Hydropower plant (1,330 MW of HCB's total capacity is committed to the South African electricity utility (ESKOM), under a long-term PPA, that ends in 2029) – and with other neighboring countries, with opportunities for onward trade with the wider region forming the Southern African Power Pool. Currently, Mozambique's installed capacity largely constitutes of hydro (56 percent) and thermal (42 percent) – signaling a substantial contribution of base-load renewable energy.

9. **Private sector has played an important role in Mozambique's generation capacity expansion since 2014**. EDM has mobilized private and public financing for several generation projects[7] in the form of state-owned power plants or PPP. The commissioning of these power generation projects has enabled Mozambique not only to meet its domestic demand, removing emergency generation supply, but also to position the country as an important player in the regional electricity market, with the possibility – and risk – to boost EDM's revenues in hard currency through electricity exports. Out of the 415 MW of new generation commissioned since 2014, 315 MW (76 percent) have been developed through independent power producers IPPs models with PPAs signed with EDM.

10. **Access to grid electricity has expanded more than three times in past 10 years through grid extension and off-grid energy market is starting to emerge.** EDM has increased access to electricity services from 8 percent in 2006 to 31 percent in 2018; reaching through the grid all administrative centers across the country while also serving some isolated areas, in the absence of a nationally interconnected grid system.[8] Currently, EDM serves more than 1.89 million customers, including around 1.76 million with prepaid meters. In the off-grid space, in the past two years, emerging new players have started providing high-quality certified solar products with more flexible payment schemes such as pay-as-you-go (PAYGO) model. The PAYGO providers in Mozambique are currently serving about 15,500 customers. Among the 20 countries in the world with largest access deficit, Mozambique increased electricity access at a rate faster than the global average (Figure 1).

[6] Renewable Energy Atlas of Mozambique, 1st Edition 2014.
[7] Operational: Ressano Garcia Thermal Power Plant (*Central Termica Ressano Garcia*, CTRG) (175 MW, gas), Gigawatt (100 MW, gas), Kuvaninga (40 MW, gas), *Central Termica Maputo* (CTM) (100 MW, gas), Mucuba (40 MW, solar).
[8] Mozambique has a total of 128 administrative centers.

Figure 1. The 20 Countries with the Largest Access-deficit over the 2010 - 2016 Period



Source: World Bank, Tracking SDG7[9].

11. **The affordability of consumers has been an important attribute of tariff design**. EDM's social tariff (Mt 1.07/kWh = US$c1.7/kWh) is adequate to ensure the affordability of subsistence level (about 30 kWh) of electricity service – at about 1.3 percent of a low-income household's expenditure. This is true for all provinces of Mozambique, even in poor provinces, households can afford subsistence volumes of electricity (Annex 3). Under the GoM's universal tariff policy, this tariff would apply for both grid connection and mini-grid connection, ensuring that the electricity service is affordable to the poor segments of Mozambican population.

12. **There is a sizable yet nascent market for standalone off-grid solutions dominated by private solar companies.** These solutions are widely recognized in Mozambican households as alternative sources of energy that can replace candles, batteries and kerosene. However, due to the low purchasing power of households, the market has been dominated by low-quality products which are traded in informal (untaxed) markets. This has negatively affected the consumer confidence in solar solutions. High quality solar products are available in Mozambique, but prices are not affordable for most of the population. Some enterprises offering high quality products have adopted the PAYGO option to reduce upfront payment requirement and, thus, enhance affordability; yet, these enterprises remain small, targeting consumers located in urban and peri-urban areas of large cities. Development partners, such as Sweden and the United Kingdom, have launched programs aimed to provide financial support through matching grants and credit lines for working capital for such off-grid solutions providers.

Substantial Challenges Remain in the Power Sector

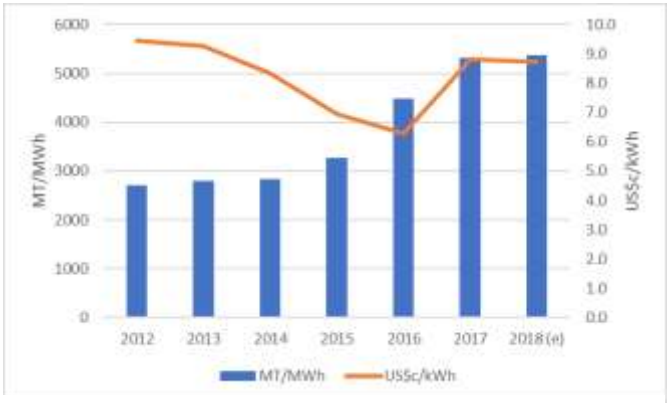
13. **First, the Mozambican electricity transmission system remains weak and is separated in three sub-systems.** The northern and the central systems are connected, albeit with a relatively weak link, there is no internal connection with the southern system, where most of demand is. Electricity from Cahora Bassa, Mozambique's main power plant, located in the northern system, is routed to the southern system through the South Africa's grid. Mozambique transmission network lacks resilience and is not sufficiently spread out to allow development of the lower voltage networks in all areas where access expansion is needed. Lack of national

[9] https://trackingsdg7.esmap.org/data/files/download-documents/chapter_2_electrification.pdf.

interconnectivity prevents the installed capacity to be efficiently dispatched and to meet the growing demand for electricity in the north.

14. **Second, EDM is experiencing a fragile financial situation.** This is due to a combination of: (a) a deteriorating macroeconomic situation; (b) retail tariffs not recovering the cost of power purchases and operations; (c) capital expenditures (CAPEX) for rehabilitation of the network and increasing energy access not being adequately funded; (d) adverse conditions in the regional power market (decrease in export prices); (e) limited supply from HCB due to hydrological constraints; and (f) high electricity losses estimated at 29.8 percent (in 2018). Despite several tariff adjustments, the last one introduced in December 2018, EDM has been accumulating operational losses on an accrual basis as well as significant payable arrears on cash basis. EDM's financial position also worsened due to the accumulation of receivables arrears, particularly from electricity exports to Zambia Electricity Supply Corporation (ZESCO).[10] Despite a partial debt restructuring process and a more regular electricity supply from HCB in 2018, EDM remains exposed to several exogenous factors and its financial position remains tight.

Figure 2. EDM Average Domestic Tariff Evolution

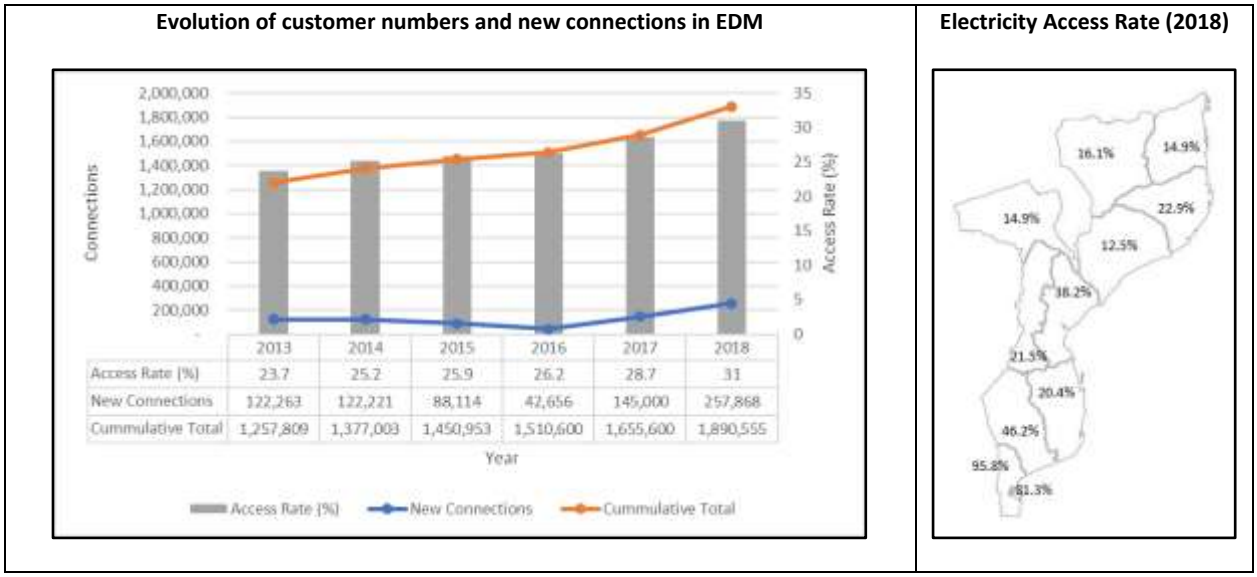


Note: (e) estimated figure. Source: World Bank based on EDM date.2018.

15. **Third, about two-thirds of Mozambicans do not have access to electricity, which is below the average for Sub-Saharan Africa.[11]** Provision of electricity services demonstrates disparities between urban and rural areas (54 percent of urban population have access compared with only 6 percent of rural population with electricity service). In rural areas, while FUNAE has been able to reach 260 villages (and 580 schools and 561 health centers), an overwhelming majority of rural population use alternative modes of lighting such as kerosene and candles to cope without electricity. The cost of electrification programs is not covered by electricity tariffs nor is EDM receiving subsidies from the Government for this purpose. So far, EDM and FUNAE has been implementing the electrification investments with limited available resources based on unclear priorities set at the political level and without proper planning following low-cost prioritization. Additionally, the sustainability of the service provided by FUNAE, that operates on a fee-for-service model, remains a challenge due to an unproven business model.

[10] Throughout the year 2016, ZESCO, accumulated arrears to EDM to the value of US$60 million. Repayment of these arrears is still under negotiation between the two utilities.
[11] The average rate of access to electricity service for countries in Sub-Saharan Africa is 38 percent.

Figure 3. Evolution of Electricity Connections and Access in Mozambique



	2013	2014	2015	2016	2017	2018
Access Rate (%)	23.7	25.2	25.9	26.2	28.7	31
New Connections	122,263	122,221	88,114	42,656	145,000	257,868
Cummulative Total	1,257,809	1,377,003	1,450,953	1,510,600	1,655,600	1,890,555

Source: EDM (2019).
Note: National Electrification Strategy (NES) represents a renewed momentum and paradigm shift towards Mozambique's quest to achieve universal access by 2030 – 70 percent from grid and 30 percent from off-grid.

16. **The GoM has recently launched the *"Programa Nacional de Energia para Todos" [Electricity for All National Program]*, representing a key milestone in reaching all Mozambicans with electricity access by 2030.** The Government, with the World Bank and other development partners' (DP) support, sponsored consultations and workshops since October 2016 to discuss the principles of an NES that would allow Mozambique to achieve universal access by 2030. The NES Roadmap proposes that during the initial stage EDM should take the lead in identifying and implementing on-grid projects following project prioritization criteria and electrification schemes, while FUNAE focuses on the implementation of off-grid solutions. FUNAE will then hand-over the operation and maintenance (O&M) of mini-grids to EDM for commercial and operational activities. NES constitutes the following key elements:

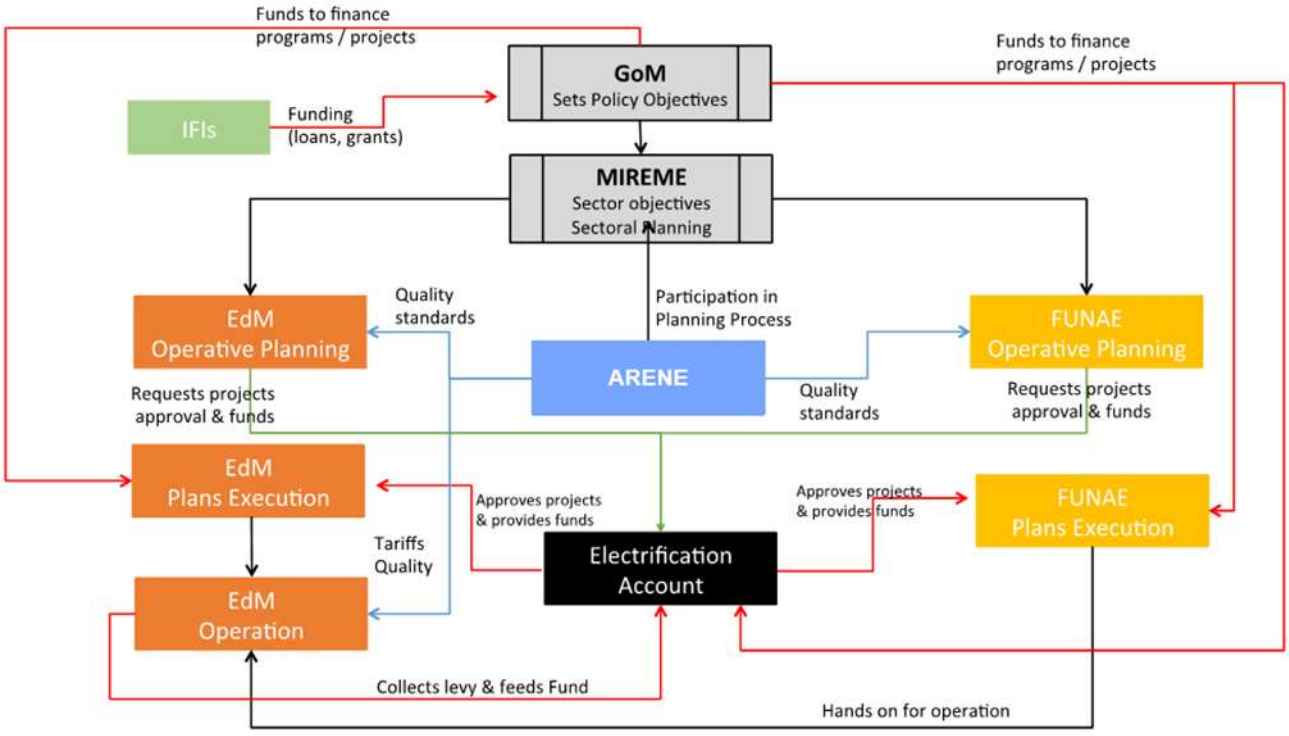
a. The GoM, through MIREME, determines the priority sites to be electrified – both on and off-grid and provides the financial means through government contribution from budget, taxes from generation concessioners and exports, concessional financing from DPs and contribution from existing users through an electrification levy;

b. EDM and FUNAE implement the electrification process with optimized technical standards and new procedures;

c. ARENE approves electricity tariffs that allows recouping the efficient cost of service provision; and

d. Electrification is pursued on a systematic manner following least cost principles that contemplates the development objectives of the GoM and optimization of technical design of the grid.

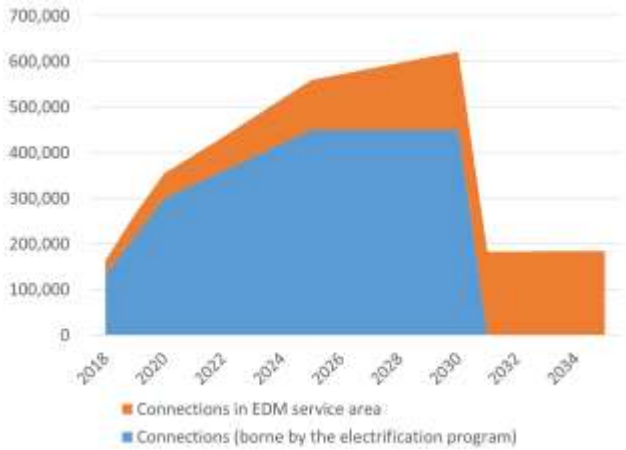
Figure 4. NES Schematic Representation of Institutional Relationship



Source: GoM (2018).

17. **NES funding requirements are US$540 million annually**. Electricity connections will need to ramp up from 165,000 a year in 2018 to 350,000 in 2020 and to 590,000 on average between 2025 and 2030 to achieve universal access by 2030, with an estimated investment of US$6.5 billion. It is expected that 70 percent of the population will be connected to the grid while 30 percent will be provided with off-grid energy solutions. Quintupling the number of consumers from about 1,550,000 in 2017 to about 7,800,000 by 2030 challenges not only distribution and commercial practices but also transmission and generation. It will require a complete internal restructuring of EDM's management, operations, logistics, technical staff, and systems to be able to incorporate around three times more the number of new clients and provide quality services to existing and new consumers.

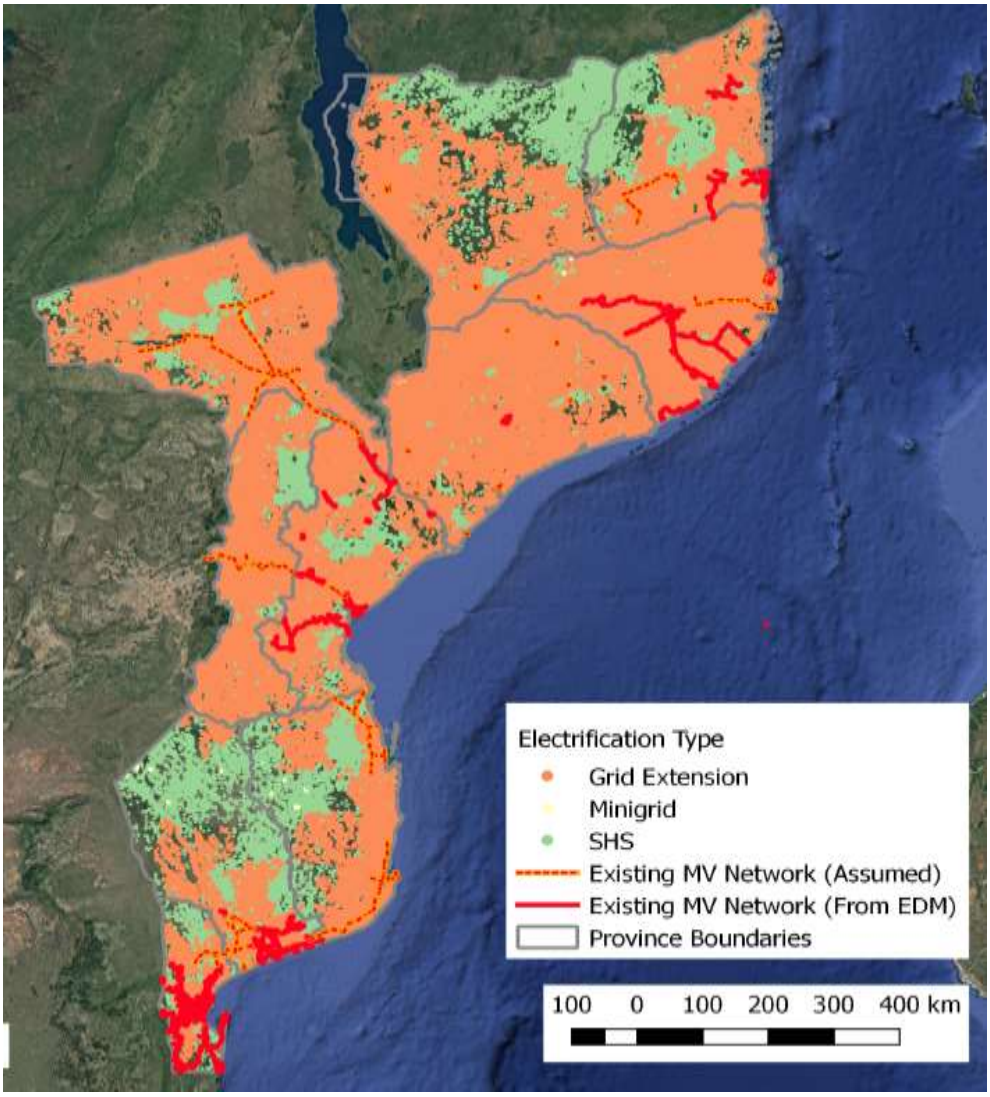
Figure 5. NES Projections on Electricity Connections



18. **The NES advocates a complementary approach encompassing both grid and off-grid solutions.** Considering the ambitions and challenges in achieving universal access in Mozambique, adoption of multiple modalities for electrification is required, including densification of already electrified areas to reach all existing households, businesses and public facilities, expansion of the national grid to all areas where this is

economically feasible. This will create the critical mass to contribute financially to reach remote and unserved areas of the country, where high development costs are combined with low affordability of the population. In parallel, off-grid electricity services through mini-grids and standalone solar home systems (SHS) can be provided as an intermediary solution. A preliminary analysis from the Mozambique Geospatial Options Analysis towards Universal Electrification (funded by the Energy Sector Management Assistance Program [ESMAP]) shows that around 14 percent of the population (4 million) are in the proximity of the national grid and could potentially be connected through grid-densification. Additionally, areas that are not currently served by EDM could be served either by extending the grid requiring investments in transmission and distribution, mini-grids or by SHSs. The number of potential beneficiaries varies depending on the priorities for expansion of the national network and the migration to urban settlements in the following 12 years.

Figure 6. Preliminary Results of Option Analysis for the Least-cost Electrification of Mozambique



Source: ESMAP - Mozambique Geospatial Options Analysis towards Universal Electrification.
Note: Both the public utility and private service providers will have to scale-up substantially to meet the NES targets.

19. **EDM is implementing multifaceted measures to improve its operational and financial performance.** The Integrated Management System, (*Sistema Integrado de Gestão*, SIGEM), financed by the World Bank through the Energy Development and Access Project (EDAP)(P108444) consisted of the incorporation by EDM of a set of management information systems (MIS) and other tools to improve efficiency, transparency, and accountability in operations in all business areas, as well as enhance corporate governance within the company and to external stakeholders. As a result, in 2018 EDM has been able, for the first time, to publish its financial statements of 2017 externally audited without any qualification. The ongoing Power Efficiency and Reliability Improvement Project (PERIP) (P158249) ensures effective application of functionalities of the incorporated MIS in processes and activities carried out in all business areas. Activities to be strengthened comprise, among others: (a) reinforcement of the company's financial management (FM) system, including the publication of audited financial statements; (b) optimization of revenue cycle for postpaid customers, management of prepayment customers and customer service; (c) revenue protection of sales to large customers, including implementation of a second phase targeting 10,000 users; and (d) modernization of the data network infrastructure, to ensure optimality and high availability of the commercial and financial data systems. Successful consolidation of these processes will create conditions to manage large electrification programs.

20. **Private solar companies are interested in expanding business.** The solar companies are already operating in Maputo, Gaza, Inhambane and Manica[12] and a strong interest has been indicated to operate in Nampula and Zambezia owing to their population size and density. However, the off-grid industry has to overcome two main challenges: First, on the supply side, the majority of solar product distributors are informal without business registration and tax payment to the Government. Few solar products are certified by international standards such as Lighting Africa, and therefore the quality of products in the market vary significantly. Furthermore, the distribution network for solar products and accessories is limited and mostly present in urban areas, with insufficient outreach to remote areas where these solar solutions are more useful. Second, on the demand side, considering the low saving rates of low-income population, there are affordability concerns even for pico-solar products. Optimizing existing grid-based capital assets, piloting a new business model for mini-grids, and piloting a financing facility for SHSs and their sustainability anchors, are fundamental aspects for creating space for both public utility and private sector to partner in electricity access expansion.

21. **Creating a platform for private-sector participation in energy service delivery will accelerate delivery of energy solutions to the population.** A key feature of the NES to scale up the deployment of off-grid solutions is to attract private sector participation to the off-grid market, particularly as partners in the generation component of mini-grids and as retailers of standalone SHSs. The project will pilot the creation of a results-based financing facility to support the expansion of the off-grid energy market in provinces where the poverty incidence is high.

22. **Balancing sector financial sustainability with consumer affordability is a precondition for the successful implementation of Mozambique's "*Programa Nacional de Energia para Todos*"**. To ensure that access expansion does not impose further financial burden on EDM, financing for the program will be repaid by the government and will not be reflected on EDM's balance sheet[13]. Most importantly, the program directly addresses the

[12] In Gaza, Inhambane and Manica, 35-45 percent of the population live below the poverty line according to World Bank estimate. In Nampula and Zambezia, 60-65 percent of people are estimated to live under the poverty line.

[13] The project will ensure complementarity with EDM's on-going modernization and operational recovery program under the ongoing PERIP focusing on the rehabilitation and upgrade of the network infrastructure, the enhancement of EDM commercial and operational efficiency and the provision of technical and capacity building. The project also aligns with sector financial recovery endeavors, which build on the results of the Cost of Service Study (financed by the World Bank under SE4ALL technical assistance) that provided a new tariff methodology to estimate the efficient cost of electricity service provision as well as the analytical foundations for the development of a comprehensive Financial Strengthening Plan (FSP), currently under preparation with support from the World Bank, through ESMAP (please refer to Annex 4 for details).

affordability barriers of consumers. At present, the minimum upfront connection charge paid by new electricity users in Mozambique is MZN 3,500 (approximately US$60) and represents approximately 1.5 times the monthly household expenditure for the lowest income quintile and 13 percent for the highest income quintile. The project will finance all electrification works EDM will recover operating expenditure (OPEX) to serve all its customers through Allowed Tariff Revenues set by the competent authority.

23. **This project is part of a coordinated effort by the donor community to implement the NES.** The project establishes a coordinated collaboration between DPs and private sector through the design of financial incentives to reduce cost, create a demonstration effect of off-grid solutions and develop a market for these products. Recognizing the need to harmonize and simplify procedures independently of the sources of financing, the Government of Norway and the World Bank have established a Mozambique Energy for All Multi-Donor Trust Fund (MDTF) administrated by the World Bank for investments for on-grid connections. The Government of Sweden and European Commission (EC) have also expressed interest to participate in this MDTF and are currently in the process of securing approval. This MDTF will facilitate the implementation of the program and will ensure that resources fully support the principles of the NES established by the GoM, particularly for on-grid with the highest potential to reach a larger number of new households in a sustainable manner. In the off-grid space, the United Kingdom's Department for International Development (DfID), the Governments of Sweden and Norway[14] and the World Bank are supporting the implementation of the NES through different initiatives and projects with the agreement to maximize collaboration (further details on donor's support for off-grid activities are presented in Annex 4).

Table 1. Pipeline of Donor's Support for Electrification in Mozambique

DP	Off-grid	On-grid	Project
DFID	US$30.0		BRILHO (Energy Africa). Objective: Encourage private sector innovation and investments in the solar Photovoltaic (PV), improved cookstoves and micro/mini-grid segments.
Belgium (Enabel)	US$13.8		Rural Energy for Rural Development (RERD). Objective: Support FUNAE to improve its capacity on planning and project management; and fund the construction of hydro mini-grids.
Embassy of Sweden	US$6.5		Embassy of Sweden, through the Africa Enterprise Challenge Fund (AECF) Objective: Provide a matching grant to RE solution providers, including mini-grid, SHSs and clean cooking solutions.
Embassy of Sweden	US$11.0		The Beyond the Grid Fund for Africa focus on providing financial incentive for private firms for energy solutions for off-grid.
Embassy of Norway[15]		US$20.0	ProEnergia (MDTF) (on-grid)
Embassy of Sweden[16]		US$20.0	ProEnergia (MDTF) (on-grid)
EC[17]	US$17.0	US$30.0	ProEnergia (MDTF) (on-grid). Program under preparation to support mini-grids and off-grid subsectors
German State-	US$3.5		Sustainable Economic Development Project. Objective: Support Commercial

[14] Government of Norway is providing financing (US$350,000) for pre-feasibility studies for off- energy solutions based on solar and mini-hydro in the following sites: Liziunga (Lago district), Matchedje (Sanga district), Nzizi (Muembe district), Mississi (Mandimba district), Mitomone, Chala (Chimbunila district) and Nairubi (Majune district) and Lupiliche (Lago district).
[15] Government of Norway finalized its contribution to MDTF with IDA on December 2018, administrative fees included.
[16] Government of Sweden is securing approval for its contribution to MDTF with IDA, administrative fees included.
[17] EC has indicated interest in contributing to MDTF and is in the process of securing approval, administrative fees included.

DP	Off-grid	On-grid	Project
owned Development Bank (KfW)			and Investments Bank *(Banco Comercial e de Investimentos,* BCI) to create a renewable energy and energy efficiency credit line.
Government of Italy	US$5.0		Program under preparation to support mini-grids and SHS.
World Bank	*US$16.0*	*US$66.0*	ProEnergia
Total	**US$102.8**	**US$136.0**	

24. **The project showcases a comprehensive approach to support the energy sector value chain in Mozambique**. The World Bank's energy portfolio in Mozambique, including recently closed and ongoing operations, spans all energy sub-sectors, from generation, to transmission and distribution, to regional power trade. The project is well aligned with this vast and diversified portfolio and complements well some of the ongoing operations, notably the PERIP approved in 2017 and regional projects under preparation.

C. Relevance to Higher Level Objectives

25. **The project is fully aligned with the World Bank Group (WBG) ongoing Country Partnership Framework (CPF) for Mozambique FY17–FY21**[18]. The proposed operation will directly support, under Focus Area 1 ("Promoting Diversified Growth and Enhanced Productivity"), the strategic objective of Expanding Access and Improved Reliability of Electricity by helping increase the delivery of electricity services through grid extension and provision of off-grid solutions throughout the country. In addition, the proposed project will support, under Focus Area 2 ("Investing in Human Capital"), the strategic objective of Enhancing the Skills Base and Improving Health Service Delivery by providing electricity service access to public institutions within the project target areas. Furthermore, the project will contribute to the CPF's cross-cutting issues, such as gender and climate change, by supporting equal access to low-emission, renewable energy mini-grids and SHSs, reducing women's exposure to indoor air pollution and providing them with access to better health services, particularly for maternal services.

26. The project would also help meet the WBG twin goals of poverty reduction and shared prosperity, and it is aligned with the Sustainable Development Goal 7 (SDG7), Sustainable Energy for All (SE4ALL), and World Bank's Energy Sector Directions Paper[19]. Providing electricity connections will increase access to electricity services for poor households in rural and urban areas enabling opportunities to study and work, contributing to raising the 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 but is also key to enabling the set-up of new private sector-led enterprises, which stimulates GDP growth. The project is also aligned with the Gender Equality and Development report[20] and with the WBG Gender Strategy "Gender Equality, Poverty Reduction and Inclusive Growth" (FY16 -FY23).

27. **The World Bank's portfolio is well aligned with the principles of 'Maximizing Finance for Development'**. The project is part of a larger comprehensive World Bank engagement in the energy sector providing support across the value chain. The WBG is leveraging synergies between the World Bank and IFC which aims to have a transformational impact in strengthening Mozambique's energy supply. Under the JIP, IDA financing focuses primarily on improving electricity services through grid rehabilitation and reinforcement as well as strengthening

[18] Report number: 104733. Discussed on April 27, 2017.
[19] Report number: 79597.
[20] World Development Report 2012 – Gender Equality and Development. World Bank (2011).

of the financial and operational functioning of the utility through the recently approved PERIP along with public sector investment in the transmission system. The project provides public sector financing for grid electrification where commercial financing is not considered viable, while also supporting increased private sector participation in O&M and off-grid service delivery. Risk mitigation and financing by the WBG has been instrumental in attracting some of the major IPPs and mobilizing private investment in the power sector.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

28. The Project Development Objective is to increase access to electricity service in Mozambique.

PDO Level Indicators

29. The PDO Level indicator is: People provided with new or improved electricity services (number).

B. Project Components

30. The proposed project contributes to the implementation of the "*Programa Nacional de Energia para Todos*" and will support the expansion of electricity access to peri-urban and rural areas by extending and densifying the existing grid network and by promoting the use of off-grid energy solutions in those areas where the grid extension is considered economically unfeasible. The national program is also financed by the GoM, DPs and other sources indicated as per the NES. Disbursement forecasts are indicative, and they will be accelerated in accordance with implementation progress, as required.

31. The underlying premise is to harness economies of scale in existing grid infrastructure. While the network reaches all 154 districts in the country with the existing distribution networks, a significant number of structures (households, businesses, etc.) are still not connected. This creates an opportunity to use available capacity of existing infrastructure to build additional distribution networks and service connections to incorporate and supply new users. In the settlements to be electrified, the project will "sweep" the areas by connecting all new potential customers as the distribution lines are extended. This approach will maximize the economies of scale in the connection process, minimize connection time and prevent discrimination against female headed households (FHH), fostering gender equality.

32. The project is complemented by three key technical assistance initiatives. First, a geospatial planning tool will determine how to optimally expand the electrical grid, while identifying economically-viable mini-grid sites, and suggesting priority focus areas for standalone solar solutions. Second, an off-grid market assessment will provide information on the status, players and barriers for off-grid solutions. Third, a low-cost grid design review will define the standards to maximize the use of resources and, thus, maximize access. This technique promotes the use of single-wire earth return (SWER) and shield wire schemes when the load and the geographic conditions are adequate. They are expected to significantly reduce the cost of connecting households compared to the traditional three-phase lines currently used in Mozambique for grid-based electricity access expansion. These activities are currently ongoing financed by the World Bank through ESMAP and PERIP.

Component A: Peri-urban and Rural Electrification – (estimated cost US$126 million equivalent: IDA Grant - US$60 million, Multi-Donor Trust Fund – US$66 million)

33. This component will finance the design, procurement of materials and construction works required to electrify all participating households and businesses in the project target areas with high population density, located close to existing electricity networks (in peri-urban and rural areas). EDM and GoM have identified over 500 settlements to be electrified in approximately 20 districts across the country. The site identification has been made based on the technical requirements and load profiles. The final selection of the sites will be confirmed by the geospatial electrification tool (currently under development) based on a least cost approach. About 74 percent of those settlements are in rural areas. The component is expected to connect around 250,000 households, of which 185,000 are in rural areas and 65,000 in peri-urban areas. It is expected that nearly 50 percent of new connections are made in the five poorest provinces of Mozambique – Niassa, Nampula, Zambezia, Cabo Delgado and Sofala. In particular, more than 85,000 connections are expected to be made in Nampula.

34. The component introduces new implementation arrangements (for example, clear responsibilities for each implementing agency and enhanced supervision arrangements) and new procurement arrangements (for example, procurement of main equipment in bulk and independent contracts for design, construction and installation) to maximize the resources available and efficiently implement the project with the expectation of reducing connection costs and, thus, maximize the number of connections per dollar invested. The average cost per connection is approximately US$505 based on the experience from last World Bank-funded projects in Mozambique.

35. In the settlements which are being electrified, EDM will also support the new users by providing ready boards for households that do not have the physical conditions or means to do in-house wiring. This will eliminate the piecemeal approach that connects each individual household/business/community facility once an individual application is submitted and the connection fee is paid, a process that is costly and time consuming, and resulting in the loss of economics of scale.

36. The project addresses the most important demand-side barrier on electrification projects. The minimum connection charge has been MZN 3,500 (approximately US$60) and increases with distance to the existing infrastructure. The connection charge has been unaffordable – for a large part of the Mozambican population, even to those living inside EDM's grid footprint. This is particularly relevant for the FHHs, which face financial constraints in paying connection fees. The GoM is committed to rationalizing the connection charge as part of the implementation of *Programa Nacional de Energia para Todos.* The policy and procedures include removal of the upfront connection charge. The amount will be publicly known in advance of connection. Resources collected by EDM through those charges will be allocated to the Electrification Account as per the NES. This arrangement should not adversely affect EDM's revenue requirements for covering the cost of operations and maintenance activities in the newly connected areas, since these costs will be recovered through the electricity bill.

Component B: Off-grid Electrification (US$13 million equivalent from IDA)

Sub-component B.1: Mini-grids (US$10 million equivalent from IDA).

37. This activity will support the electrification of areas where electricity supply through mini-grids represents the least-cost option from a country perspective. The locations of mini-grids will be informed by the results of the Mozambique Geospatial Options Analysis towards Universal Electrification (funded by ESMAP) which includes the initial site identification made by FUNAE. FUNAE has identified 13 potential mini-grid sites across several districts in the north of Mozambique to be supplied through combined solar PV and battery storage with a total estimated capacity of 2.6 MWp and with the potential to reach 7,000 consumers. The proposed project will finance the

construction of up to six of these mini-grids, adding approximately 4,000 new customers. In the settlements to be electrified by the mini-grid, the proposed project will connect all potential customers in selected sites, ensuring economies of scale.

38. Mini-grids will be developed under a PPP whereby IPPs will invest, operate, and maintain generation facilities of each mini-grid under PPAs with EDM to be tendered competitively; and the distribution network and service connections will be public investments financed by the project and operated by EDM. This arrangement will enhance private participation in rural electrification. FUNAE will contract the design and construction of distribution network components of the mini-grid and supervise implementation activities. The infrastructure built by FUNAE will be transferred to EDM for service delivery and O&M.[21] Therefore, the new beneficiaries of mini-grids will become EDM's consumers and face the national uniform tariff.

39. The mini-grids will be implemented in a phased approach. The first phase will consist of approximately six sites, selected using defined criteria established in the NES and in collaboration with private investors. In these sites the PPP concept will be tested. If the approach proves successful, the remaining sites will be implemented in a similar manner. In order to increase the attractiveness of small solar IPPs, the project could partner with International Finance Corporation (IFC) in supporting EDM in the competitive procurement and implementation under IPP arrangements of a portfolio of on-grid and mini-grid systems.

Sub-component B.2: Off-grid results-based financing (RBF) Facility (US$3 million equivalent from IDA).

40. This sub-component will support the expansion of off-grid energy market in Mozambique with a focus on selected provinces in the northern region**,** where the poverty incidence is high.[22] The Facility will primarily support quality-certified SHSs and potentially other energy technologies such as solar water pumps for agriculture and efficient cooking solutions. The RBF will disburse based on verified results (for example, market entry, sales) by an independent verification agent, through a Fund Manager, both contracted by FUNAE**.** Such a facility can offer financial remuneration for quality verified products creating credibility of such solar products, creating a space for new entrants, as well as supporting deeper penetration to bottom of the pyramid consumer segments. It is expected to reach around 18,000 households.

41. Harnessing the designs of such RBFs in other countries in Africa, this facility will encompass three main attributes. First, the companies will sell only Lighting Global or equivalent quality-verified products and provide adequate after-sales service. Currently, the majority of solar product distributors in Mozambique are informal without business registration and tax payment to the Government. Few solar products are certified by international standards such as Lighting Africa, and therefore the quality of products in the market vary significantly. In addition, as many of the product suppliers are not based in Mozambique, product warrantee or customer support is very scarce. Second, the companies will be provided incentives for the poorest districts in the selected regions. Such geographic targeting will also help direct the companies into areas where distribution channels are more difficult to establish, and affordability concerns are more pronounced. Third, the RBF payments will be structured to support up-front cost of market entry for new players. This will allow a more dynamic market condition – RBF could pay for initial set-up, consumer awareness, training of sales agents etc. FUNAE will retain consultancy services to manage the RBF since this is the first of such opportunity. The RBF will be managed by an

[21] In order to ensure that the quality of service meets applicable standards, EDM may outsource the O&M of network assets, and retail services to qualified private contractors through an O&M contract.

[22] The pilot provinces will be agreed in consultation with the GoM and FUNAE. Nampula and Zambezi are considered strong candidates for their large population and high population density. These two provinces are also identified as regional priority in CPF.

independent Fund Manager with high standards of transparency and integrity. After the project closing, the facility may continue to operate under FUNAE.

42. The facility will complement the ongoing efforts by DPs to incentivize the off-grid market with grant and working capital facilities to address barriers. Several DPs (for example, Sweden, United Kingdom and EnDev) are presently supporting the off-grid space in Mozambique, but the support is fragmented partly due to the lack of GoM's strategic vision and institutional capacity in this space. The project will contribute to strengthen the donor coordination and equip FUNAE with an instrument to strategically support off-grid electrification.

Component C: Technical Assistance and Implementation Support (US$9 million equivalent from IDA)

Sub-component C.1: Technical Assistance to EDM (US$6 million).

43. This subcomponent will mainly finance*: (a) Capacity building and implementation support for EDM,* for project management expenses such as the financing of external audit, oversight of implementation including the environmental and safeguards instruments for the investments, oversight of the health and safety aspects during construction, as well as enhancement of procurement procedures and material logistics; (b) *Community Engagement Program* this includes: connection campaign, which will be gender-sensitive, to inform people in target areas of the cost of electricity services, uniformed payment for electricity connection to be paid in installments without any up-front payment, procedures and safety practices of the electrification process and support the ongoing community reach out program of EDM which empowers a network of community agents in the beneficiary areas with the objective to reduce illegal connections; (c) *Young professional program at EDM,* to support EDM's efforts in building the new generation workforce in the company by competitively selecting technical specialists to support key business areas of the utility, while receiving hands-on training organized in conjunction with EDM's Academy; and (d) *Gender mainstreaming* in EDM to increase gender participation in the company through specific initiatives launch by EDM's human resources department (training, gender equality and justice policies, Gender Equality Seal, awareness campaign material).

Sub-component C.2: Technical Assistance to FUNAE (US$3 million)*.*

44. This activity will support project management-related expenses such as the financing of external audit, oversight of implementation of the environmental and safeguard instruments for the investment components, as well as the oversight of health and safety aspects during construction and operation. In addition, FUNAE, with support from contracted consultants, will develop a business strategy aligned with the roles it has been assigned under the NES. Also, this activity will support capacity building and consultancy services related to the development of Lighting Global quality standards for SHSs; and creation and implementation of a facility manager as well as the procurement of an independent verification agency for the RBF facility.

Project Cost and Financing

45. The project will be a regular Investment Project Financing (IPF) with a duration of five years. It will be funded through an IDA grant with joint co-financing for Component A in the form of a grant from a new MDTF that has been established. Table 2 below is indicative and all expenditures under Component A will be shared between the IDA grant and the MDTF grant.

46. It is expected that grant resources, in an indicative total amount of US$66 million for the Recipient-executed portion, will be secured and be available for joint co-financing. The grant agreement will be signed based on the contributions received into the MDTF.[23] Additional grant resources will then be passed on to the

[23] As of January 30, 2019, the MDTF has an available balance of US$2.725 million (equivalent).

Government as and when they are received without the need to process a restructuring or additional financing. In case the co-financing does not materialize or is less than expected, either additional resources will be sought potentially through an IDA additional financing mechanism or the project will be restructured to be proportionately scaled down.

Table 2. Project Cost and Financing

Project Components	IDA Financing (US$)	MDTF (US$)	Total (US$)
Component A: Peri-urban and rural electrification	60	66	126
Component B: Off-grid electrification	13		13
Component C: Technical assistance Implementation support	9		9
C.1: Technical Assistance to EDM	6		6
Operational support	3		
Community engagement program	0.5		
Young professional program	1		
Gender Mainstreaming	0.5		
Capacity building and Sector Studies	1		
C.2: Technical Assistance to FUNAE	3		3
Implementation support to FUNAE	1.0		
Independent verification agent and consultancy services for RBF facility	1.5		
Capacity Building	0.5		
	82	**66**	**148**

C. Project Beneficiaries

47. The project direct beneficiaries will be around 272,000 new customers provided with electricity services (through grid, mini-grids and stand-alone SHS) including households (close to 1.45 million people representing almost 5 percent of the population), enterprises and public facilities (800). The beneficiaries will replace consumption of kerosene and alternative fuels. Around half of the new connections will be made in the five poorest provinces of Mozambique – Niassa, Nampula, Zambezia, Cabo Delgado and Sofala. More than 85,000 connections are expected to be made in Nampula. Around 74 percent of the beneficiaries are in districts deemed rural by the 2017 census. Therefore, provision of electricity service could have a profound impact on these communities. The new procurement approach[24] is conducive to harness local capabilities for the supply and installation of the final connections to new clients where local and private participation are better placed given the national wide footprint of the project. Private participation can also take place in generation and operation and management of the isolated systems.

48. The project will also incentivize the commercialization of the SHS in selected areas of the country through an RBF approach. This pilot facility is expected to provide direct benefits to 4,000 households connected to mini-grids and 18,000 households and will benefit private companies by expanding the customer base for SHSs.

[24] Bulk supply versus turn key contract.

D. Role of Partners

49. The proposed project represents a coordinated effort of the DPs to implement the NES. Such an effort could harmonize procedures for faster implementation and establish a pipeline of projects to support on-grid and off-grid electrification efforts in Mozambique for about US$240 million across both grid and off-grid. Recognizing the need to harmonize and simplify procedures independently of the sources of financing, the Government of Norway the World Bank have established a Trust Fund at the scale of US$66 million (including the indicative contribution of the Government of Sweden and EC) administrated by the World Bank for on-grid electrification. This will facilitate the implementation of the electrification program and will ensure that resources fully support the implementation of the NES.

E. Lessons Learned and Reflected in the Project Design

50. **Fostering cost effective electrification**. The design of the project benefitted from lessons learned by similar utilities in the region which have embarked on successful electrification programs. EDM and FUNAE had the opportunity to exchange ideas with key stakeholders who implemented the largely successful electrification program in Kenya. Through this exchange, the following key successful features about an innovative approach for the procurement of activities related to electrification services has been extensively discussed and adopted for the project, which replaces the use of Engineering, Procurement, and Construction (EPC) contractors for the separate procurement of (a) materials in bulk and (b) engineering and construction services. This will require additional work for EDM, but it is expected to achieve a lower cost per connection due to the large economies of scale in the procurement of materials in bulk.

51. **Electrification is supported by least-cost plans using geospatial information**. Following recent Sub-Saharan African experience in Kenya, Nigeria, and Rwanda, Geographic Information System (GIS) least cost planning tools have become best practice in electrification planning. Geospatial least cost plans provide a powerful tool to the policy maker to balance the need to maximize the efficient use of limited public resources with the objective of providing equal opportunities to those living in areas far away from the existing grid. At the same time, geospatial plans allow for identifying communities that may require pre-electrification solutions in the short-to-mid-term while waiting for higher service standard connections.

52. **Addressing long term sustainability of peri-urban and rural on-grid services**. The lessons learned from the analytical work on geospatial electrification access planning shows that anchor loads in rural areas and prioritizing the grid-based electrification of the areas with medium to large scale productive uses of electricity is a critical success factor. Therefore, prioritizing the electrification of target areas based on potential demand from existing or planned anchor loads (for example, industrial applications, irrigation schemes, and commercial farming zones) could offset the grid-extension and O&M cost recovery through the uniform nationwide tariff structure, and could contribute to the sustainability of grid-based electrification in peri-urban and rural areas. EDM's prioritization and sequencing of grid extensions will be informed by the outputs from the options study on geospatial electricity access.

53. **Deploying mini-grids where the main grid will not reach in a timely manner and integrating productive uses in design are key success factors for decentralized electrification**. Grid-compatible mini grids under this project will be built where: (a) the main grid will not reach in the foreseeable future; and (b) stand-alone off- grid electrifications do not meet the energy needs of productive users of electricity in local communities in a cost-effective manner. The mini-grids under this project will be constructed with provisions for merging with the main grid if-and-when the national grid is extended to the same area, thus mitigating the risk of stranded assets. In

terms of site-selection for mini-grids, the project is coordinated with other development projects to ensure responsiveness to the demands from irrigation and agriculture projects among others, and to improve the financial sustainability of the mini-grid operations based on revenues from productive uses of mini-grid electricity.

54. **Gender-sensitive consumers awareness campaigns are important tools for the safe use of electricity.** Experience in several Sub-Saharan African countries show that gender-sensitive consumers awareness campaigns are important to educate – both males and females – in the benefits, correct use and payment of electricity (whether provided by on-grid or off-grid services). Given women under recognized role in the households as energy providers and managers, ensuring they have sufficient information on connection procedures, costs, consumer rights, safety etc. is key to enhancing their agency as customer. As part of these campaigns, additional consultative meetings are usually held with women only to provide an environment which invites women to openly raise questions, situation that may be unlikely to happen if the meeting is developed in a large, mixed group. Partnerships will be explored with relevant groups and stakeholders that have community knowledge and presence, including the energy committees and the community agents operating under the Community Engagement Program of EDM, to enhance the delivery of consumer information by EDM and FUNAE in local contexts.

55. **Strengthening implementation readiness.** The execution of large infrastructure works with World Bank-financing in Mozambique has often been delayed given the lack of implementation readiness at the time of project effectiveness. To mitigate the risk of implementation delays in the investment components, the World Bank is supporting EDM and FUNAE (through PERIP) with the advance preparation of (a) power distribution network standards and material specifications; (b) identification of potential project sites; and (c) environmental and social safeguards assessments.

56. **Enhancing contract processing and FM**. To mitigate the risk of delays in the processing of contracts and payment procedures, certain measures have been agreed between the World Bank and the GoM at portfolio level. Relevant to this project are: (a) to exempt contracts with a prior review from the World Bank from further Tax Authority approvals before execution and (b) to use Designated Accounts (DAs) instead of the Single Treasury Account. Further to this, the risk of exchange rate losses, which affected several projects in the past, will be mitigated by allowing the project implementation units (PIUs) to keep transferred funds in a U S dollar account.

III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

57. EDM will be responsible for the implementation of Component A and C.1. FUNAE will be responsible for the implementation of Components B and C.2.

58. EDM will define the areas to be electrified based on technical and policy development priorities provided by MIREME. EDM, the PIU will be under the Directorate of Social Energy (*Direcção de Energia Social*, DES)[25], a newly formed unit in EDM to lead electrification projects. The PIU is led by a Director and is supplemented with additional staff given the size of the project portfolio it manages, including the ongoing PERIP. Using this arrangement will allow EDM to capitalize on the long-standing experience and capacity to implement World Bank financed projects.

59. EDM is undergoing institutional reforms to address the challenges in the sector and better take advantage of the existing resources. The Environmental and Social Safeguards Unit will be a critical unit to ensure full

[25] This department was formerly known as *Direccao de Electrificacao e Projectos*.

compliance with World Bank safeguards requirements during the implementation of this project. The staff of this unit will be responsible for (a) carrying out social and environmental audits; (b) supervising social and environmental consultants; (c) guiding the Project Manager on major social and environmental issues; (d) preparing terms of reference for environmental consultants; (e) monitoring the implementation of the Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) and any Environmental and Social Management Plans (ESMPs), Resettlement Action Plans (RAPs) or abbreviated RAPs, (ARAP) as applicable; (f) liaising with EDM's Distribution Areas in the targeted provinces, in coordination with the Safety, Health and Environmental Directorate in EDM, to ensure fulfillment of social and environmental standards for utilities in the distribution areas; and (g) liaising with MIREME.

60. EDM is also undergoing a Supply Chain Reform, which intends to elevate the quality of procurement and inventory supply and management practices to international best practices. This reform will further strengthen PIU's compliance with World Bank procurement requirements during the implementation of this project. The reform is being driven by the newly structured Procurement and Logistics Directorate, and entails: (a) centralization and normalization of procurement practices, guided by new regulations and international standards; (b) refurbishment and optimization of warehousing capacity, to ensure optimal and safe storage of stocks; (c) optimization and possible upgrade of the Logistics module for Contract and Inventory management and controls; and (d) redesign of the transportation network for optimality of timing and costs in supplies. The capacity of the staff of the new directorate will be enhanced through tailored training.

61. FUNAE will be responsible for Component B and C.2. FUNAE has experience in implementing World Bank financed projects, with the recent work on "Investments on Rural and Renewable Energy Component" under the EDAP. Maintaining and strengthening the existing project management structure will enable FUNAE to capitalize on the experience accumulated and reduce implementation risks.

B. Results Monitoring and Evaluation Arrangements

62. The Monitoring and Evaluation (M&E) of the project will be carried out by the EDM PIU and FUNAE PIU for their respective components. Both PIUs will prepare semi-annual reports to be discussed at EDM's Senior Management level and periodically with the institutions' Board. The semi-annual progress reports will be submitted to the World Bank. These reports will include results indicators, as well as reporting on the implementation of the ESMP, RAP, Health and Safety Plans. Section VI presents the project's Results Framework, which defines specific outcomes and results to be monitored.

63. The proposed project contemplates the procurement of supervision consultants hired by EDM and FUNAE, for their respective components, who will support the implementing agencies in preparing progress reports and evaluating the progress of the works implemented by the contractors. An independent verification agent will be hired to monitor the connections made under the results-based financing facility (Component C.2).

64. Multi-tier Framework (MTF) Surveys at baseline and closing will contribute to estimate the quality of energy access. The MTF, developed by the Global Tracking Framework of Sustainable Energy for All,[26] moves beyond the traditional binary way of defining electrification to adopt a tiered definition (Tier 1 to Tier 5) based on the attributes of energy service such as affordability, reliability, legality, and so on. The survey will provide key insights into supply alternatives that households are using and will provide additional demand data on energy-related expenditure, as well as into user preferences and satisfaction with service.

26 http://trackingenergy4all.worldbank.org/

C. Sustainability

65. **Government ownership.** Global experience on successful electrification program points to Government ownership as a vital element. In Mozambique, the emerging consensus on the NES and geospatial mapping suggests the Government's determination to translate aspirations to action. The Government's target is to achieve universal access to electricity by 2030. To achieve this, EDM needs to implement on average 450,000 new connections per year. Such a scaled-up endeavor requires an increase in financial and human resources of the utility which is expected to grow at an exponential rate. The Government is clear about the economic, social and political benefits of sustaining development of the power sector and is fully committed to do so. The National Electrification Strategy was approved on October 2018 by the Council of Ministers, but the Government is going beyond the Strategy through the implementation of a comprehensive national electrification program, the "*Programa Nacional de Energia para Todos*".

66. **Financial sustainability.** Given the financial constraints of the country, the Government will contribute with limited resources in the first years of the program. However, they are expected to make financial contributions as the electrification program develops and according to the NES, which indicates an allocation from taxes collected from power concessioners. On the investment side, EDM and FUNAE will be provided with financing for executing projects for electrification. These investments will not be reflected in EDM's accounts contributing to the financial sustainability of the utility. Additionally, a new pilot program will be launched to attract private participation for individual energy solutions for off-grid. With considerable recognition of the large needs, the DPs co-financing the proposed project have made their financing available in the form of a grant to the Government which is expected to be passed on to EDM under the same grant terms. On the operational cost, the Government has contributed by supporting EDM in the increase of tariffs by 107 percent in the past three years, with the objective of reaching domestic tariffs that will cover cost of services. This will enable EDM to continue to operate commercially while serving low consuming customers.

67. **Commercial sustainability**. The project builds on the recent World Bank-financed PERIP that supports the improvement of operational performance of the company, with focus on quality of electricity supply, commercial operations (revenue cycle, prepayment), and customer service. Financing is also provided for network infrastructure rehabilitation and upgrade, consolidation of use of management information systems that support operations and key business areas of the utility. The commercial sustainability of electricity services depends on actual improvement of EDM's operational performance through implementation of actions in PERIP. This will provide the foundation for a successful development of an ambitious electrification program in the country that will incorporate around three times more new clients and provide quality services to existing and new consumers.

68. **Institutional sustainability**. Both EDM and FUNAE are undergoing institutional reforms which will better position them to implement and operate fast growing systems. These institutional reforms are equally important to ensure system sustainability during operations. For the off-grid systems, the proposed project envisages appointing O&M services to private companies who will be responsible for system operation, equipment replacements, billing and all other necessary actions that will ensure continuous operations. For the on-grid systems, the project will complement ongoing reforms and initiatives such as procurement reform, digitalization, organizational reform and staff management, gender promotion, etc, which are partly financed under PERIP, and by other DPs.

69. **Social sustainability.** The target beneficiary population, who will benefit from the increased access is expected to value their benefits and thus contribute to maintaining the investments and therefore to sustain the development outcomes overtime. This beneficiary engagement is being enhanced through a Customer Awareness Campaign and Satisfaction Survey. Consumer awareness campaigns provide useful information to new consumers

in unelectrified areas on the different uses of electricity, connection type and costs. This allows new customers to make better informed decisions which usually translates to increased electricity demand and sustainability of such connection. The Community Engagement Program launched by EDM in 2017, called "*EDM com a Comunidade*" will also be engaged as a platform for dialogue and awareness campaigns, focusing not only on new connections but also on loss reduction, the prevention of vandalism of infrastructure and energy theft, and an increased awareness of potential risks of accidents and injury in the electrical networks.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

Technical

70. The project includes works and equipment related to: (a) Electrification Program; and (b) Technical Assistance. The project presents no unusual construction and operational challenges as the concept of electrification is well known and proven in Mozambique. However, the project introduces modern power distribution technologies optimized technical designs to increase system efficiency. In previous years, EDM used Aerial Bundled Conductors to connect new low voltage customers, this is unusual in low income countries with a low electrification rate. The project is expected to improve this scenario by investing in new connections using bare conductors which are cost efficient and provide the same level of service to the customer. In areas where the conditions permit,[27] the project will implement the SWER. This technology is expected to be used instead of the long distribution lines which are subject to higher installation costs with higher technical losses.

71. The design also considers improved efficiencies in distribution system operation. The project will finance smaller distribution transformers, which have lower technical losses than the large transformers that EDM normally uses. Each new customer will have a pre-payment meter installed which is monitored in the Customer Management System to ensure that all new customers are monitor through a centralize system. At the household level, the project will fund the installation of ready boards in households without internal wiring to ensure safe and efficient use of electricity for the customer.

72. The mini-grid distribution networks will be designed and constructed following the same design principles as the on-grid distribution networks. This is to ensure that all mini-grids deliver reliable service and are capable to connect to the national grid at a later stage. The generation component of the mini-grid will be sized to allow a considerable amount of load growth, which will be stimulated by the foreseen economic activities that electricity will facilitate in these communities. The combination of solar PV and batteries is expected to provide pre-defined level of electricity services, which is equivalent to grid services.

Economic Analysis

73. The GoM's vision for universal electricity access in the country by 2030 calls for major investments in both on-grid and off-grid solutions. Grid electricity access in rural areas is generally considered to be financially unviable for utilities like EDM, due to the high costs of the grid extension to these areas as well as limited revenue prospects from low-income consumers. Therefore, public funding is needed to reduce the financial burden of EDM in expanding the grid network to rural customers.

74. Development of mini-grid solutions in Mozambique also faces the challenge of cost recovery, due to the limited prospect of revenue from low-income customers due to relatively low level of consumption and GoM's

[27] Densely populated communities, far away from the existing distribution network, with suitable ground conditions.

universal tariff policy. For this reason, the GoM's NES, identified the optimal approach for mini-grid development in Mozambique as to maximize the public funds to leverage private participation in the generation segment. In this regard, small generation plants are expected to be tendered competitively and with a PPA with EDM, while the network facility will be financed with public funding (by FUNAE). Once the mini-grid is in operation, new clients will be transferred to EDM, which may choose to outsource the operation of the mini-grids to private sector. Public funding is, therefore, needed to provide the necessary CAPEX for the mini-grids and to keep the electricity affordable for the mini-grid users.

75. The World Bank is well-positioned to support Mozambique in its endeavor to accelerate increased electricity access. The World Bank has supported off-grid solution development in other Sub-Saharan African countries including Zambia, Niger, Ethiopia and Kenya to name a few. Lessons and technical expertise from these existing operations can be used for the benefit of the project. In Mozambique, the World Bank has supported GoM's preparation of the NES and has provided financial support for the EDAP.

76. The results of the economic analysis are summarized in Table 3. The project demonstrated its economic viability with economic internal rate of return (EIRR) at 17.4 percent and net present value (NPV) of US$84.2 million (at 7 percent discount rate). The result is strengthened when global environmental benefits through greenhouse gas (GHG) abatement are included. The project is expected to result in net emission reduction of approximately 4.9 million tCO_2 over the project's economic life over 25 years.

Table 3. Results of the Economic Analysis

	EIRR (%)	NPV
Without GHG	17.4	US$84.2 million
With GHG	29.5	US$187.0 million

Financial Analysis

77. Since 2014, the expansion in Mozambique's generation capacity was developed through gas fired IPPs that signed PPAs with EDM, with prices set on hard currency. The entry into operation of these plants transformed EDM's energy balance, modifying significantly the unit cost of generation. This shift in the generation mix towards thermal generation had a profound impact on average generation costs, increasing from US$c3.2/kWh in 2014 to US$c6.2/kWh in 2017. This negative impact on costs was even further exacerbated during the rapid devaluation of the monthly household (MT) that followed the macroeconomic crisis of 2016.

78. Despite a tariff increase of over 100 percent during the same period, the sharp increase in energy purchases severely affected EDM's financial sustainability. Earnings before interest and tax, depreciation, and amortization (EBITDA) showed a sharp decrease during the period 2014 – 2017, mainly driven by tariff increases that were not sufficient to cover the increase in the energy purchase costs and fixed costs, affecting as a consequence EDM's margins for transmission and distribution activities. In 2017, EBITDA turned negative, highlighting EDM's difficulties in controlling its cost structure evolution.

79. EDM is currently over-leveraged, with most of its financial debt denominated in foreign currency. This situation limits its ability to deliver on the future expansion plan of the company and capex execution required to improve the quality of service and meet the forecasted energy demand.

80. **FSP.** Cognizant of this situation, EDM with support from the World Bank started, in 2017, the preparation of a Cost of Service Study that provided the analytical foundations for the development of a comprehensive FSP. Based on the recommendations from this study, GoM, MIREME and EDM are taking specific measures as part of

the FSP. The FSP includes: (a) performance contract of EDM through the implementation of PERIP's Component 2 to reduce system losses, from 29 percent in 2018 down to 19 percent in 2024; (b) a recapitalization process of EDM in line with the recommendations of the Cost of Service Study (50 percent recapitalization); (c) capex for electricity access projects financed according to the NES; and (d) electricity tariff adjusted in line with domestic inflation and full pass-through of generation costs.

81. The results show that EDM should be able to achieve operational breakeven in 2019 and return to profitability by 2020. In particular, EDM's return on capital invested (RoIC) is expected to rapidly recover to 4.3 percent in 2021 while Return on Equity (RoE) should reach 6.2 percent in 2022. Financial liquidity and leverage ratios are expected to improve as part of the debt recapitalization process. Debt Service Coverage Ratio (DSCR) is expected to achieve sustainable values by 2021. Current ratio, nonetheless, may take a bit longer to reach sustainable figures (it will be only >1 by 2023) but that is largely dependent on Mozambique's ability to collect receivables from Zambia's utility. Further details of the financial analysis are presented in Annex 3.

B. Fiduciary

(i) Financial Management

82. An FM assessment was conducted according to World Bank IPF Policy and Directive. Its objective was to determine whether EDM and FUNAE have acceptable and adequate FM arrangements to (a) ensure that funds are used only for their intended purposes in an efficient and economical way while implementing agreed activities; (b) enable the preparation of accurate and timely financial reports; (c) ensure that funds are properly managed and flow smoothly, rapidly, adequately, regularly, and predictably; (d) enable project management to monitor the efficient implementation of the project; and (e) safeguard the project's assets and resources.

83. The conclusion of the review of the proposed FM arrangements was that the overall residual FM risk rating of the project is Substantial. EDM will need to implement mitigating measures to the identified risks, including the updating of World Bank-related procedures of the already existing FM Procedures Manual (part of the Project Implementation Manual), and register the project and its components in the Enterprise Resource Planning (ERP). The external audit will be under the responsibility of the same private auditor in charge of auditing EDM entity financial statements, who will be recruited within three months of effectiveness. The proposed FM arrangements, as summarized in Annex 1, meet the requirements for FM under World Bank IPF Policy and Directive, and therefore, are able to provide, with reasonable assurance, accurate and timely information on the status of the project as required by the World Bank (IDA). Similar mitigation actions need to be implemented at FUNAE.

(ii) Procurement

84. **Procurement arrangements.** The proposed procurement activities for the project will be managed independently by the main beneficiaries: EDM through the DES and FUNAE through their UGEA (procurement unit). EDM has a generally long-standing experience with the World Bank in the implementation of several World Bank funded operations. Furthermore, EDM also has experience in the implementation and management of other DPs' projects. DES is also currently managing a World Bank funded project and the available expertise will be instrumental for synergies into the implementation of the proposed project. The undergoing procurement reform, driven by the newly created Procurement and Logistics Directorate, will aim at centralizing and normalizing procurement practices to an internationally recognized quality standard, and will support and sustain procurement activities under this project and the project team. FUNAE was involved into the implementation of the EDAP and, thus, possesses some experience with the World Bank procurement procedures.

85. **Project Procurement Strategy for Development (PPSD) Summary.** The two implementing agencies prepared their respective PPSDs. The PPSDs have informed the initial procurement plan and the procurement approaches to be used for the key procurement activities. While the project proposes an innovative approach for electrification (by replacing the use of EPC contractors for the separate procurement of materials in bulk and engineering and construction services), the envisaged contracts are not complex in nature and do not require the adoption of innovative or complex approaches beyond the capacity available in the two implementing Agencies.

86. **Procurement capacity.** The procurement capacity within EDM is satisfactory. The team that will be in charge of the implementation has been involved with the recently closed EDAP. In addition, they will have cross support from the team that is implementing another World Bank funded operation, the PERIP, and the Procurement Reform team, DAL. The risk associated with EDM for the implementation of the project is therefore, Moderate. FUNAE was also involved with the implementation of a component under the EDAP, although not through the current UGEA, and the envisaged activities under this project are of similar nature and also similar to other activities that FUNAE does implement with other sources of funding, hence the risk for the FUNAE component is rated as Substantial.

87. **Procurement for the proposed operation will be carried out in accordance with the 'World Bank's Procurement Regulations for Borrowers under IPF', dated July 1, 2016, revised August 2018, and the provisions stipulated in the Financing Agreement.** Furthermore, the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated October 15, 2006, and revised in January 2011 and July 2016, will apply.

88. **Current country practices for making payments abroad may also affect the performance of the procurement function of the project, as substantial delays are occurring throughout the portfolio.** In addition, the fulfillment of the requirements of the Attorney General's office and the Administrative Tribunal may lead to delays for contract signing, after the completion of the evaluation process and of the contract award. It is instrumental that the time required for the processing by the Administrative Court (*Tribunal Administrativo,* TA) is carefully taken into consideration in the activities planning process.

89. The overall procurement risk associated with the project in view of the risks indicated above and the experience of previous World Bank-financed projects is Substantial.

C. Safeguards

(i) Environmental Safeguards

90. The project will have positive environmental impacts. The electrification program will help to displace the use of kerosene for lighting by the connection of the household to electricity services. Access to electricity service will also displace small diesel generators used by businesses. There are no significant and/or irreversible adverse environmental issues anticipated from the investment for electrification under Component A to be financed under the project. Civil works will lead to relatively minor air and water pollution during the construction phases and, once the works are completed, limited loss of non-critical animal and plant habitats. Component B (off-grid electrification using renewable energy) will have low to moderate negative impacts on the environment, depending on their locations. The major environmental and public health risks might arise from improper disposal of SHSs batteries to be handled by private companies. An ESMF was prepared by the Borrower, to set forth mechanisms for screening, supervision and monitoring during implementation, including clear roles and responsibilities of client contractors and supervisors including a proposal of institutional strengthening program for EDM and FUNAE. The ESMF comprises a generic ESMP and subset of guidelines and code of conduct for

implementers. Both ESMF and ESMPs have been consulted upon[28] and publicly disclosed. The Client submited the ESMF on December, 1, 2018 for World Bank review and approval. The ESMF has been disclosed by the Client and the World Bank (in their respective websites) on January 25, 2019.

91. The following safeguard policies are triggered: (OP/BP 4.01) on Environmental Assessment, (OP/BP 4.04) on Natural Habitats, (OP/BP 4.11) on Physical Cultural Resources, and (OP/BP 4.12) on Involuntary Resettlement. OP/BP 4.04 on Natural Habitats was triggered, because the project may include civil works with potential negative impacts on natural habitats (coil, water, mainly), demanding specific provision on natural habitats, included in the proposed ESMF. Although the project will not be involved in major civil works of large movements of earth in areas containing sites deemed physical cultural resources, to ensure due diligence, chance find procedures are included in the ESMF to address OP/BP 4.11 basic requirements. The project will not support activities in areas with known physical cultural resources. No civil works within a river that is classified as an International Waterway (under OP7.50, International Waterways) or a tributary to such a river will be eligible for funding.

92. The Borrower's institutional capacity for safeguards management has increased during the past years. EDM has recently executed two World Bank financed projects (the EDAP – P108444 and the Power Efficiency and Reliability Improvement Project – P158249), gaining experience on the World Bank safeguards policies. The ESMF included the environmental and social management roles and responsibilities of the contractors and the supervision engineers, as well as a proposal of institutional strengthening program considering ongoing and proposed activities by EDM that could potentially stretch out its safeguards capacity and staffing.

(ii) Social Safeguards

93. The project will have positive social benefits. By connecting people to electricity in peri-urban and rural areas, the project will promote economic growth and equity through electrification of low-income households. All infrastructure investments in Component A will be at existing electricity network infrastructure (that is, at existing EDM' substations and lines). There will be no land acquisition and no involuntary resettlement for these components. The works under Component A are composed of construction of medium voltage (MV) and low voltage (LV) lines. The MV and LV lines do not require land acquisition and/or involuntary resettlement of households. The anticipated social impacts will be minimal and might involve compensation for crops and or/trees which could be damaged during way leave acquisition. In the case of Sub-component B.1, this component will require land acquisition for mini-grid in relation to the generation facilities. Once locations are known, a RAP will be prepared including the specifics of each location. After review by the Bank, EDM and FUNAE disclosed the ESMF on January 25, 2019. The RPF has been disclosed by the Client (in its websites) on January 23, 2019 and by the World Bank in its website on January 17, 2019.

(iii) **Gender**

94. In Mozambique, FHHs represents 36 percent of all households and are more likely to fall below the poverty line than male-headed households.[29] Furthermore, rural FHH are the most marginalized and excluded, with lack of secure rights to housing and other key resources. Thus, providing non-discriminatory access to electricity and gender-sensitive information on the benefits of electricity represents an important step forward in the creation of the necessary conditions required to curve the gender gap.

95. EDM conducted a general review about women participation in EDM's operations by the end of 2017. The results indicated that women represent 17 percent of the work force and 40 percent of them perform activities related to their training areas, 25 percent of women work on technical areas, 57 percent have a university degree,

[28] The ESMF and RPF were consulted on November 21, 2018 at Boane District Head Office.
[29] *Inquérito Demográfico e de Saúde* (2011).

34 percent have an undergraduate degree and 9 percent basic education. Around 50 percent of the women have at least 12 years of service at EDM. One out of four Executive Board Members is a woman. EDM is carrying out a gender audit to assess the challenges in terms of gender participation, diversity and equality and based on the results, will formulate a corporate gender strategy with the view to achieve at least 40 percent Gender Index by year 2030.

96. To advance women participation in the workforce, EDM has initiated the following programs: (a) increased awareness among the next generation workforce of potential economic activities or jobs through the "Bring your Daughter to Work" program; (b) conduct outreach to high-school level educational institutions that leads to long-term attraction of both male and female job candidates; (c) organize technical visits to generation or substation facilities for women in EDM's workforce, to increase their understanding of the business; (d) increase women participation among management positions, through the introduction of gender targets in the competitive selection processes; (e) preferential hiring for technical positions recently advertised (ex. *Central Terminal de Maputo*); and (f) creation of a young professionals program. The project will support part of the implementation of the gender strategy (Engendering EDM), driven by the Human Resources Directorate (POG) in coordination with other DPs. In addition, the project will ensure that at least 30 percent of the candidates hired in the young professional program are women, thereby closing a gender gap at the institutional level given the current baseline of only 25 percent of all EDM women working in technical areas.

(iv) Gender Based Violence (GBV)

97. The contextual risk for GBV in Mozambique is high similarly to other sub-Saharan countries. According to the 2015 Demographic and Health Survey (DHS), more than one in three women (37.2 percent) have experienced physical or sexual violence at some point in their lifetime, with higher rates (42.8 percent) found among young women aged 20-24 in Mozambique. Mozambique also has the 10th highest early marriage rate in the world with almost half (48 percent) of women aged 20-24 married before age 18 (55.7 percent in rural areas and 36.1 percent in urban areas), and the percent of young girls aged 20-24 that were married before turning 15 was as high as 14.3 percent. Taking into consideration the contextual issues, the GBV risk assessment tool was applied to the project to identify necessary mitigation measures that need to be included as per the World Bank's Good Practice Note (GPN). Also, GBV risks and identification measures have been included in the ESMF including the need for capacity building activities of the project implementation unit and code of conduct for contractors. Additional GBV activities as outlined in the GPN will be integrated during project implementation, such as code of conduct for contractors, training for PIU, etc.

(v) Citizen Engagement

98. As the project deals with providing electricity services to unelectrified consumers, it is key for the project beneficiaries —citizens— to properly understand the benefits, safety aspects and commercial aspects of the new service to be provided. The project supports interventions to inform citizens on the safe use of electricity to reduce misuse and ensure appropriate care of the products. Gender-sensitive awareness campaign and information dissemination will be made to inform the citizens on the diverse benefits they can get from the electricity service. These local community events will be organized under the umbrella of the Community Engagement Program, "*EDM com a Comunidade*", and coordinated with the PIU. As customers are connected to the services, they will be incorporated into the Customer Management System (CMS) of EDM as the formal platform for electricity's users to provide feedback on the services provided, which is recorded and correction measure is generated to improve the services.

(vi) Grievance Redress Mechanisms

99. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

100. As a general project policy, EDM and FUNAE will work proactively to avoid grievances by the community and workers during the implementation of the proposed ProEnergia project. However, there may be events that could give rise to complaints. Therefore, a GRM will be established, which will be applicable throughout the project cycle. The mechanism will be organized systematically using a fixed process in the following sequence: (i) EDM and FUNAE will disseminate GRM procedures at the project sites and surrounding communities, the locations to submit complaints will be established and communicated; (ii) The PIUs and contractors will receive and track complaints from the PAPs; (iii) The contractor will do a preliminary assessment of the complaint, to decide how and who will be responsible for resolving the complaint; (iv) the appointed responding agency will issue an initial response to the complainant within 15 days of receiving the complaint; (v) the responsible officials will investigate the complaint and develop solution options; (vi) the selected solution will be implemented and monitored, a confirmation of the solution will be agreed with the complainant in writing; (vii) the responsible officials will carry out additional actions if the complainant is not satisfied; (viii) lastly the implementation of the GRM is monitored, evaluated and reported on monthly by the relevant consultant.

V. KEY RISKS

101. The overall risk rating for the project is **Substantial**. Key risks and mitigation measures are discussed in the following paragraphs.

102. **Political and governance risk (Substantial).** Political and governance risk in the sector could raise concerns for the project. Lack of sectoral coordination from MIREME to drive electrification efforts, sectoral planning, tariff policy and funding of critical investments in the sector have prevented EDM and FUNAE from adequately addressing the electricity access problem in Mozambique in the past. This situation has been further exacerbated by a combination of rapid increase in the demand for electricity services and the deterioration of the existing transmission and distribution assets due to lack of funding for proper maintenance, putting additional pressure on the existing infrastructure.

- **Mitigation**. The development of the Nationally Electrification Strategy has brought clarity on the roles of each institution, including new implementation and financial model for electrification. Additionally, the GOM has committed to achieve a cost-reflective tariff with an increase of tariff as in the past two years.

103. **Macroeconomic risk (Substantial).** The increase in debt levels, the depreciation of the Mozambique metical, and external shocks (such as commodity price), have heightened Mozambique's macroeconomic vulnerability and exposure to fiscal risk. EDM, like many other state-owned enterprises in Mozambique, is cash constrained and is struggling to meet current payment obligations. This is putting undue stress on its current liabilities, with no new sources of working capital. There is limited capacity from the Government to financially bridge or remedy these short-term issues. This situation warrants a financial strengthening plan for EDM agreed with the Ministry of Economy and Finance.

- **Mitigation**. Macroeconomic risks are being mitigated through policy dialogue and technical assistance through the study of 'Cost of Electricity Services', which aims at (a) establishing the actual cost of electricity to be recognized through the tariff; (b) establishing a tariff methodology to carry out adjustments; and (c) analyzing the options for EDM's FSP.

104. **Sector strategies and policies (Substantial).** Lack of adequate tariff regulation, sectoral planning, and funding of critical investments in the sector has prevented EDM from expansion of access to customers to a level of earlier years. Adding a great number of clients in a short period of time will impact in system reliability sooner or later if the company is not well prepared. Even if new clients have low consumption at the beginning, their increasing number and growth of consumption per client once they have the service may impact in system reliability if upstream investments do not accompany this demand growth. Although more cost-effective technologies like SWER as well as technical standards are known and implemented by EDM, they are not extensively utilized to reduce electrification costs. Also, the GoM pursued investments in generation that do not follow a least-cost option from the country perspective, significantly affecting the sector efficiency.

- **Mitigation.** On the regulatory side, the formation of ARENE will allow for more transparent regulatory process in the country; the World Bank is currently supporting ARENE as part of the technical assistance provided on the PERIP. Planning will be improved in the medium-term through the geospatial least cost electrification roll-out currently underway. The planning will be informed by recommendations for standards of least-cost technologies, which is part of the ESMAP study.

105. **Institutional capacity for implementation and sustainability (Substantial).** While EDM is experienced in implementing large capital investments in transmission and distribution system expansion and upgrade financed by the World Bank and other DPs, the capacity of EDM's existing PIU, which is handling these projects, is stretched and the project will introduce new procurement arrangement that implies a higher level of management and supervision by EDM. On the off-grid side, the proposed component will require substantial coordination between FUNAE and EDM for the implementation of a new business model. From the policy / regulatory side, both MIREME and ARENE have limited capacity to develop, monitor and enforce the necessary regulation for sustainable power sector development in Mozambique. These capacity barriers and lack of experience might lead to delays in project implementation.

- **Mitigation.** The enhancements of commercial and operational activities in EDM are currently being supported by the World Bank through PERIP, near-team financial recovery plan looking concrete commercial, performance and financial measures to improve financial situation. The alignment with EDM's Procurement Reform (DAL), undergoing, will provide additional resources to the project and will support the project implementation. The same is true for other undergoing projects, such as digitalization and commercial revamping (PERIP), staff organization (Engendering EDM and Young professionals) and Community Engagement Program (EDM com a Comunidade). Additionally, the project will benefit from the technical assistance provided by IFC financed by Government of Norway, which focuses on increasing capacity in its treasury and risk management functions on a sustainable basis

106. **Fiduciary risks (Substantial).** A recent FM and procurement capacity assessment of EDM and FUNAE was conducted. The overall conclusion of the assessment was that FM and procurement arrangements are weak, and thus the fiduciary risk of the project is Substantial.

- **Mitigation.** To mitigate this risk EDM and FUNAE will need to implement the following measures: (a) updating of World Bank-related procedures of the existing FM Procedures Manual (part of the Project Implementation Manual); (b) customization and adjustment of the existing accounting software used by EDM to reflect the activities of the project; and (c) appointment of project external auditors. The FM capacity assessment of EDM will be updated and the FM action plan discussed and confirmed with EDM, and FUNAE. From the procurement perspective, the project will benefit from EDM's Procurement Reform under implementation and dedicated procurement specialist will be assigned to the project.

107. **Stakeholders (Moderate).** The project is composed of co-financing from three DPs to be channeled through a MDTF. To date, the Government of Norway has signed Trust Fund Agreements with IDA. The Government of Sweden and EC have s confirmed their support and intent to formalize their commitments by June 2019 following IDA Board approval, after obtaining their internal approvals. There is a low risk associated with shortfalls in DPs' co-financing. Under such circumstances, the overall project size may need to be reduced and this would limit the geographical coverage of the project by reducing the number of connections in peri-urban and rural areas as identified in the Component A of the project. The EU is one of the contributors to the project, and co-financing from the EU would need to comply with the Framework Agreement signed between the World Bank and the EC in 2014.

108. **Climate and Disaster Risks.** A climate and disaster risk screening has been carried out for the project. Mozambique is facing increased frequency of extreme weather events, including droughts, tropical cyclones and floods. 2015 - 2016 drought, which resulted in major impact in food production and people's livelihood in Mozambique, is one of such examples. Coastal areas are home to more than 60 percent of Mozambican

population and are exposed to sea level rise and intense tropical storms. The project activities, which provides access to on-grid, mini-grid and off-grid electricity services, may be affected by such natural disasters. To mitigate such risks, the project will employ higher design standards poles which are more resistant to storms in the prone areas. On the other hand, access to electricity is expected to strengthen the people's capacity to cope with natural disasters through enhanced access to information during such events.

VI. RESULTS FRAMEWORK AND MONITORING

Results Framework
COUNTRY: Mozambique
Mozambique Energy For All (ProEnergia)

Project Development Objectives(s)

The Project Development Objective is to increase access to electricity service in Mozambique.

Project Development Objective Indicators

Indicator Name	DLI	Baseline	End Target
Increased access to electricity services in target areas			
People provided with new or improved electricity service (CRI, Number)		0.00	1,360,000.00

Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	End Target
Component A: Peri-urban and Rural Electrification (on-grid)			
Households provided with access to electricity services with grid connections (Number)		0.00	250,000.00
Distribution lines constructed or rehabilitated under the project (Kilometers)		0.00	3,800.00
Enterprises provided with access to electricity services with grid		0.00	400.00

Indicator Name	DLI	Baseline	End Target
connections (Number)			
Public Facilities (Schools, Health Centers, Administrative Buildings) provided with access to electricity services with grid connections (Number)		0.00	400.00
Accounts created on the Commercial Management System (CMS) database for new customers (Number)		0.00	267,800.00
Creation of virtual warehouses to be used for the project (Number)		0.00	5.00
Component B: Off-grid electrification			
Households provided with access to electricity services with mini-grids (Number)		0.00	4,000.00
Number of off-grid energy companies mobilized by the project (Number)		0.00	2.00
Households provided with new electricity connections by stand-alone systems (Number)		0.00	18,000.00
Generation capacity of energy constructed or rehabilitated (CRI, Megawatt)		0.00	1.00
Renewable energy generation capacity (other than hydropower) constructed under the project (CRI, Megawatt)		0.00	1.00
Component C: Technical Assistance and Implementation Support			
Gender sensitive communications campaign developed (Yes/No)		No	Yes
Percentage of females hired under the Young Professionals Program at EDM (Percentage)		0.00	50.00
Develop and disclose a policy for gender equality and justice in EDM (Yes/No)		No	Yes
Lighting Global quality standards for solar home systems adopted and published (Yes/No)		No	Yes

Monitoring & Evaluation Plan: PDO Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
People provided with new or improved electricity service		Semi-annually	Semi-annual Report	Number of people provided with new or improved electricity service. It is estimated as the number of residential customers connected by EDM or FUNAE in the project areas as well as by the number of standalone solar home systems provided as a result of the project. To estimate the number of persons, a household is assumed to have 5 person per dweling. EDM's CMS and FUNAE's project monitoring	EDM and FUNAE

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Households provided with access to electricity services with grid connections	The number of households provided with access to electricity services with grid connections supported by the project	Semi-annually	Semi-annual Report	EDM's CMS	EDM
Distribution lines constructed or rehabilitated under the project	Length of medium-voltage and low-voltage lines constructed with the project support	Semi-annually	Semi-annual Report	EDM's project monitoring	EDM
Enterprises provided with access to electricity services with grid connections	Number of enterprises provided with a tariff different that the residential tariff	Semi-annually	Semi-annual Report	EDM's CMS	EDM
Public Facilities (Schools, Health Centers, Administrative Buildings) provided with access to electricity services with grid connections	Number of institutions with a tariff different that the residential tariff.	Semi-annually	Semi-annual report	EDM's CMS	EDM
Accounts created on the Commercial Management System (CMS) database for new customers	Number of customers incorporated to the Commercial Management System (CMS) database for recording and management of all future commercial transactions	Semi-annually	Semi-annual report	EDM's CMS	EDM
Creation of virtual warehouses to be used for the project	Number of warehouses prepared with physical separation for storage of main equipment and	Semi-annually	Semi-annual report	EDM's Procurement and Logistics Directorate (DAL) and project monitoring	EDM

	materials to be used for the project within the premises of existing EDM warehouses. Each physical warehouse will be linked to a virtual warehouse created through GIAF-ERP.				
Households provided with access to electricity services with mini-grids	Number of households provided with access to electricity services with mini-grids supported by the project	Semi-annually	Semi-annual Report	FUNAE's project monitoring	FUNAE
Number of off-grid energy companies mobilized by the project	Number of private companies providing off-grid energy products (such as SHS, solar water pumps, efficient cooking solutions, etc.) mobilized by the project.	Annually	Annual Report	FUNAE's project monitoring	FUNAE
Households provided with new electricity connections by stand-alone systems	The indicator measures the number of households that have received new or improved electricity service via stand-alone solar systems as a result of the project	Semi-annually	Semi-annual report	Facility Manager	FUNAE
Generation capacity of energy constructed or rehabilitated		Annual	EDM and FUNAE	Project monitoring report	FUNAE
Renewable energy generation capacity (other than hydropower) constructed under the project					

Gender sensitive communications campaign developed	EDM's gender sensitive connection campaign is developed.	Semi-annually	Semi-annual Report	EDM's Community Engagement Program (EDM com a Comunidade) and project monitoring	EDM
Percentage of females hired under the Young Professionals Program at EDM	Percentage of female staff hired by EDM under the Young Professional Program	Annually	Annual report	EDM's Human Resource Directorate (POG) and project monitoring	EDM
Develop and disclose a policy for gender equality and justice in EDM	Policy for gender equality and justice in EDM is developed and disclosed in EDM's webpage and an awareness campaign is disclosed on EDM's intranet.	Annually	Annual report	EDM's Human Resource Directorate (POG) and project monitoring	EDM
Lighting Global quality standards for solar home systems adopted and published	Measures whether Lighting Global quality standards for solar home systems have been adopted and published	Annual	FUNAE	FUNAE monitoring report	FUNAE

ANNEX 1: Implementation Arrangements and Support Plan

COUNTRY: Mozambique
Mozambique Energy for All (ProEnergia) Project

Project Institutional and Implementation Arrangements

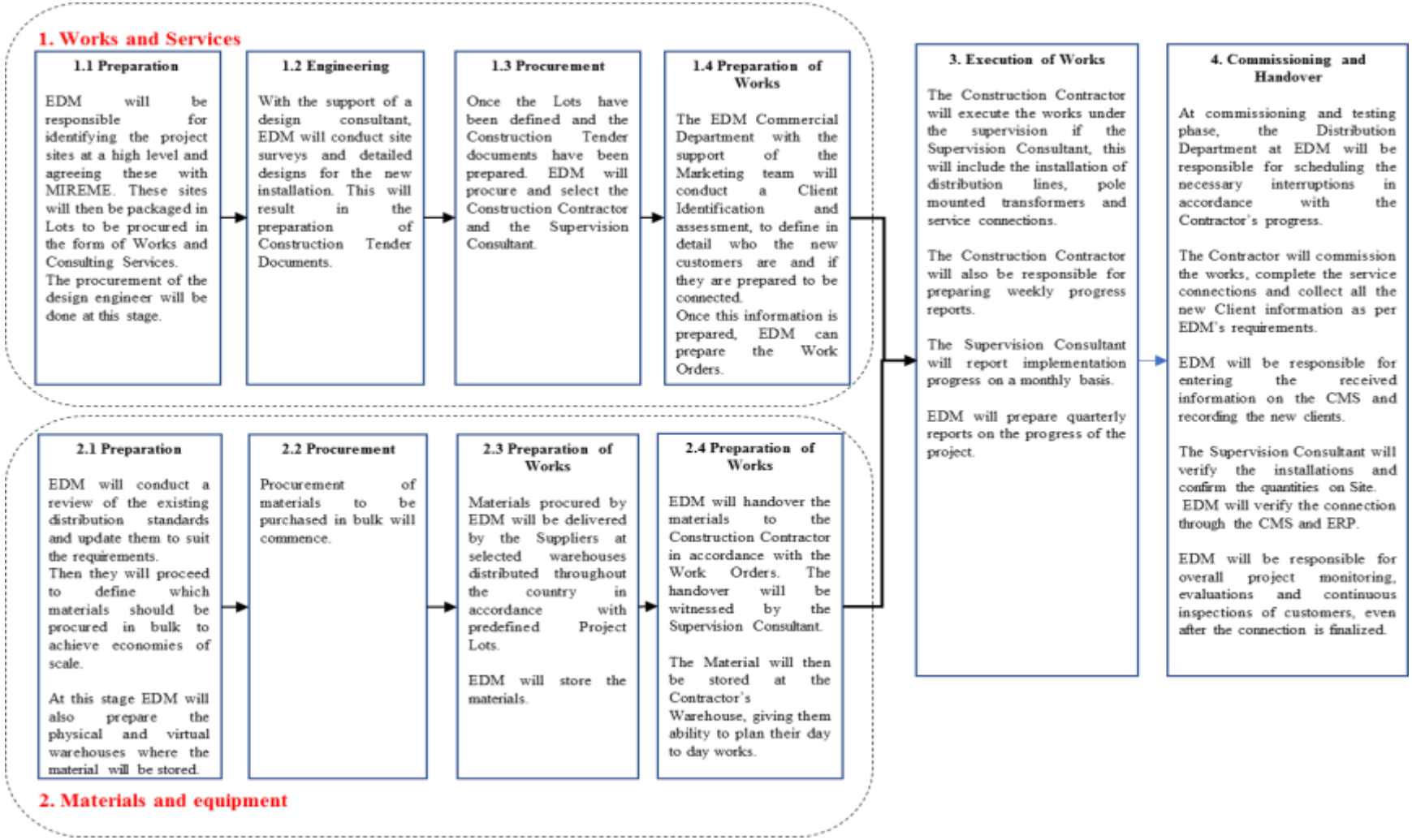
1. EDM will implement Components A and C.1; and FUNAE will implement Components B and C.2.

2. EDM will implement Component A and C.1 under the DES[30] in charge of electrification. Areas to be electrified based on technical and policy development priorities will be defined by MIREME. EDM management has assigned dedicated staff from the DES led by a Director and is supplemented with additional staff given the size of the project portfolio it manages, including the ongoing PERIP, Procurement Reform Program, Engendering EDM Program, EDM's Community Engagement Program, EDM's e-learning initiative, and EDM's Young Professionals Program. Using this arrangement will allow EDM to capitalize on the long-standing experience and capacity to implement World Bank financed projects. The implementation process will follow the activities presented in the diagram in Figure 1.1.

3. Warehousing capacity is needed to store and manage the materials and equipment to be used by the project. EDM's warehousing and transportation network will be the basis for the constitution of separate storage capacity and its management, in the logistics module of the ERP (GIAF).

[30] This department was formerly known as *Direccao de Electrificacao e Projectos*.

Figure 1.1. Component A – Implementation Process



4. EDM is undergoing institutional reforms to enable the utility to address the challenges in the sector and better take advantage of the existing resources. The Environmental and Social Safeguards Unit will be a critical unit to ensure full compliance with World Bank safeguards requirements during the implementation of this project. The staff of this unit will be responsible for (a) carrying out social and environmental audits; (b) supervising social and environmental consultants; (c) guiding the Project Manager on major social and environmental issues; (d) preparing terms of reference for environmental consultants; (e) monitoring the implementation of the ESMF, RPF and any ESMPs, RAPs or AAPs, as applicable; (f) liaising with EDM's Distribution Areas in the targeted provinces to ensure fulfillment of social and environmental standards for utilities in the distribution areas; and (g) liaising with MIREME.

5. The project also benefits from the review of EDM corporate procurement practices financed by Government of Sweden carried out by Crown Agents. EDM has adopted a new EDM Procurement Regulation to enhance internal approvals and process with the aim to improve transparency. The project will also follow the World Bank's Procurement Guidelines, and will be complemented by the undergoing Procurement Reform, driven by the Supply and Logistics Directorate.

6. FUNAE will be responsible for the implementation of the off-grid component (Component B) and Sub-component C.2. FUNAE has experience in implementing World Bank financed projects, with the recent work on "*Investments on Rural and Renewable Energy Component*" under the EDAP. Maintaining and strengthening the existing project management structure will enable FUNAE to capitalize on the experience accumulated and to smoothly transition into the implementation of the proposed project.

Financial Management and Disbursement

7. The World Bank's FM assessment of EDM and FUNAE concluded that the project's FM arrangements meets the World Bank's minimum requirements under World Bank IPF Policy and Directive. The overall residual risk rating for the project is Substantial.

8. The objective of the FM assessment was to determine whether the FM arrangements will; (a) ensure that funds are used only for their intended purposes in an efficient and economical way while implementing agreed activities; (b) enable the preparation of accurate and timely financial reports; (c) ensure that funds are properly managed and flow smoothly, rapidly, adequately, regularly, and predictably; (d) enable project management to monitor the efficient implementation of the project; and (e) safeguard the project's assets and resources. The assessment complied with the FM Manual for World Bank-Financed Investment Operations that became effective on March 1, 2010 and was revised on February 4, 2015.

Project Financial Management Arrangements

9. **Budgeting arrangements.** The budgeting process will need to consider all relevant aspects of the project and be prepared at least two months before the fiscal year to which it pertains. The DES, in close coordination with other relevant units of EDM, will prepare budget activities which will be captured in annual work plans, which will need to be submitted to IDA for approval. The budget will be monitored through the unaudited quarterly financial reports, which will measure the actual performance against the targets for each period, through the integrated management tool for FM, GIAF accounting software, which is already functional and has been used to prepare the latest annual accounts of EDM. Significant differences between the planned and actual expenditures will also need to be documented in the quarterly reports, which will be submitted to IDA within 45 days after the end of each calendar quarter. The principles and procedures for preparation of the consultative budget are already included in the existing Implementation Manual, including its respective formats.

10. **Accounting arrangements**. The accounting transactions will be recorded and summarized in the GIAF accounting software for EDM, which will also be used to generate quarterly and annual reports. In addition to the accounting system to be installed and the books needed to maintain an accurate and complete record of transactions. EDM will need technical assistance to ensure just-in-time country-based support for GIAF to ensure continuity in the case of interruption.

11. EDM's finance department is headed by an experienced Director and accountants. EDM has been implementing several World Bank-financed operations over the last decade. EDM has also appointed an accountant who will be solely responsible for the activities of the project but will still work under the overall responsibility of the Director. The Director's experience will play a key role in the transfer of know-how and providing training to all accountants. FUNAE also has extensive experience in handling World Bank-financed operations, including the ongoing PERIP and the recently closed EDAP.

12. The project will make use of International Public Sector Accounting Standards and Cash Basis of accounting, which recognizes transactions and events only when cash (including cash equivalents) are received or paid by both the implementing agencies.

Internal Control Arrangements

13. **Internal control systems**. The assessment was favorably affected by the fact that EDM and FUNAE have been implementing World Bank-financed operations continuously for at least the past decade and they have generally performed well. However, the review of the payment process indicates that there are significant delays which could impact the timely implementation of activities. EDM and FUNAE will need to strengthen its payment cycle to ensure that the process is clear and transparent. These procedures will be documented in the Implementation Manual, which will be approved by the World Bank. A review of project audit reports and internal systems and procedures did not reveal significant reportable issues. However, EDM continues to face challenges, particularly with regard to pension provisions and differences between commercial and financial systems, which are expected to be solved with the full implementation of the GIAF.

14. **Internal auditing**. EDM and FUNAE have each internal audit department performing post-audit activities on all the financial transactions of the entity, including an assessment of whether the budget utilization is in line with the intended purposes. At least annually, the internal audit department would be involved in conducting audits pertaining to this project and such reports will need to be shared with IDA. The internal audit function reports directly to the Chairman and Board of Directors for independence in the case of EDM.

Funds Flow and Disbursement Arrangements

15. **Funds flow arrangements.** EDM and FUNAE will open separate DAs for the project at the *Banco de Moçambique*, in U.S. dollar. Details of the DA and the Authorized Signatories Letter, in the format defined in the Disbursement Letter, should be submitted to the World Bank, soon after the Financing Agreement is signed, to ensure that there are no delays in the first disbursement.

16. The implementing entities will submit an initial withdrawal application to the World Bank based on a six-month forecast, as stated in the Disbursement Letter, but also based on agreed project work plans and budget. The arrangement is relatively simple with centralized payments at DES allowing for more effective control of the project funds for EDM.

17. **Disbursement arrangements**. The implementing agencies will use report-based disbursement procedures mainly through the Advance disbursement method. It may also use other methods of disbursement such as Direct

Payments, Special Commitments, and Reimbursements. Details concerning disbursements are spelt out in the project's Disbursement and Financial Information Letter.

Table 1.1. Eligible Expenditures under IDA Grant

Category	Amount of the Grant Allocated (expressed in SDR)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consulting services, training and Incremental operating costs for Part A of the project.	42,840,000	46%
(2) Goods, non-consulting services, consulting services, training and Incremental operating costs for C.1. of the project.	4,310,000	100%
(3) Goods, non-consulting services, consulting services, training and incremental operating costs for C.2. of the project.	2,168,000	100%
(4) Results-based financing payments under Part B.2. of the project.	2,142,000	100%
(5) Goods, works, non-consulting services, consulting services, training and Incremental operating costs for Part B.1. of the project.	7,140,000	100%
TOTAL AMOUNT	**58,600,000**	

Table 1.2. Eligible Expenditures under Mozambique Energy for All MDTF Grant

Category	Amount of the Grant Allocated (expressed in USD)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consulting services, training and Incremental operating costs under Part A of the project.	2,725,000	54%
TOTAL AMOUNT	2,725,000	

18. **Financial reporting arrangements**. EDM and FUNAE will prepare quarterly unaudited financial reports in form and content satisfactory to the World Bank, which will be submitted to the World Bank within 45 days after the end each calendar quarter to which they relate. To simplify arrangements, the format of the reports will be similar to those used under the recently closed project. Details of the reporting requirements, including content, format, as well as frequency will be defined in the Implementation Manual. These reports will include (a) DA activity statement; (b) summary payments subject to the World Bank's prior review; (c) summary payments not

subject to prior review; (d) detailed use of funds by project components/activity; and (e) explanation of variances and short-term forecasts of expenditures.

19. **Auditing arrangements**. Annual audited financial statements with the respective Management Letter will be submitted by EDM and FUNAE to the World Bank within six months of the end of the year being audited. The audit reports will be publicly disclosed on the World Bank's external website and the audits will be conducted in accordance with International Standards on Auditing. EDM's audits will include appropriate disclosure of the project activities as follows:

- A statement of sources and uses of funds showing funds;
- A summary of expenditures analyzed by both component and category;
- The supporting notes in respect of significant accounting policies and accounting standards adopted by management; and
- Summary listing of withdrawal applications by reference number, date, and amount.

Procurement

20. **Applicable procedures.** Procurement for the proposed operation will be carried out in accordance with the 'World Bank Procurement Regulations for Borrowers under IPF', dated July 1, 2016, revised August 2018, and the provisions stipulated in the Financing Agreement. Further, the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated October 15, 2006, and revised in January 2011 and July 2016, will apply.

21. **Procurement strategy.** A PPSD was developed during preparation to inform the applicable procurement arrangements during implementation of the Project. Both implementing agencies prepared their respective PPSD. The PPSD highlighted that the envisaged contracts are not complex and do not require the adoption of innovative or complex approaches beyond the capacity available in the two implementing Agencies.

22. **Procurement arrangements**. Activities to be procured under the project are generally not complex, despite the existence of some activity of considerable high value, but within the available capacity management of EDM and FUNAE, who will be supported by the World Bank office in Mozambique, as required. The proposed procurement activities for the project will be managed independently by the main beneficiaries: EDM through the DES and supported by the Supply and Logistics Directorate (DAL), and FUNAE through their UGEA (procurement unit). EDM has generally a long-standing experience with the World Bank in the implementation of several World Bank funded operations. Furthermore, EDM also has experience in the implementation and management of other donor's projects. DES is also currently managing a World Bank funded project and the available expertise will be instrumental for synergies into the implementation of the proposed project. FUNAE was involved in the implementation of the EDAP and, thus, possess some experience with the World Bank procurement procedures.

23. **Procedures for selection of consultants.** Quality and Cost-Based Selection will be the main method for the selection of firms for Updating Technical Standards for Design and Construction of Electricity Distribution Infrastructure; Design and Supervision of Works in northern provinces; Design and Supervision of Works in central and southern provinces. Occasionally, consulting services may be procured through Selection based on Consultants' Qualifications and Least-Cost Selection procedures, whenever its complexity justify the adoption of such methods in accordance with the PPSD.

24. **Procedures for procurement of works.** Works contracts will be procured generally through Open Competitive Procedure, the Request for Bids (RFB), consistent with the Mozambique Procurement Regulation (Decree 5/2016 of March 8, 2016) and limited to the local market, particularly for the Installation Services for rehabilitation and expansion of networks and the installation of PV mini-grids. There are no envisaged contracts requiring Open International competition as per the PPSD.

25. **Procedures for goods.** Goods, including Supply of transformers; Supply of meters; Supply of cables and Conductors; Supply of Poles, will be procured through Open International procedures, to ensure adequate competition and value for money. IT Equipment, Office furniture, vehicles, software, among others, will be procured generally through Request for Quotations. When the estimated amount exceeds US$100,000, procurement may be done through an Open Competitive Procedure, the RFB, consistent with the Mozambique Procurement Regulation (Decree 5/2016 of March 8, 2016) and limited to the local market.

26. **The Procurement Plan** will be individualized by each of the two beneficiaries, EDM and FUNAE. Each agency will manage its own activities, separately, according to project design and will manage them through the World Bank's tracking system, Systematic Tracking of Exchanges in Procurement (STEP).

27. **Review by the World Bank of procurement decisions.** Table 1.3 indicates the initial values for prior Review by the World Bank. All activities estimated to cost below these amounts shall be treated as post review and will be reviewed by the World Bank during the Implementation Support Mission under a post procurement review exercise. Direct Contracting/Single Source Selection will be subject to prior review only for contracts estimated to cost more than the amounts indicated in Table 1.3. The World Bank may, from time to time, review the amounts, based on the performance of the implementing agencies.

Table 1.3. Prior Review Thresholds per Implementing Agency

Procurement Type	Prior Review (US$) EDM	Prior Review (US$) FUNAE
Works and Supply and Installation	5,000,000	5,000,000
Goods and non-consulting services	1,500,000	1,500,000
Consultants (Firms)	500,000	500,000
Individual consultants	200,000	200,000

28. **Assessment of National Procedures.** The Mozambique Procurement Regulation, the Decree 5/2016 of March 8, has been assessed as required under the World Bank's Procurement Framework. The assessment indicated that the Country's Regulations are generally consistent with international best practice for the following reasons: (a) there is adequate advertising in national media; (b) the procurement is generally open to eligible firms from any country; (c) contracts documents have an appropriate allocation of responsibilities, risks, and liabilities; (d) there is publication of contract award information in local newspapers of wide circulation; (e) the national regulations do not preclude the World Bank from its rights to review procurement documentation and activities under the financing; (f) there is an acceptable complaints mechanism; and (g) maintenance of records of the procurement process.

29. However, the RFBs/request for proposals document shall require that bidders/proposers submitting bids/proposals present a signed acceptance at the time of bidding, to be incorporated in any resulting contracts,

confirming application of, and compliance with, the World Bank's Anti-Corruption Guidelines, including without limitation the World Bank's right to sanction and the World Bank's inspection and audit rights.

30. With the incorporation of the above provision, the Mozambique Procurement Regulation will be acceptable to be used under those procurements not subject to the World Bank's Prior Review, as the thresholds indicated in Table 1.3, or any updates indicated by the World Bank in the Procurement Plan.

Environmental and Social (including safeguards)

31. The project is classified as Category B, as the potential environmental impacts are limited in scope and localized. The investment program is composed of a large number of small-scale and dispersed interventions, that comprise urban, peri-urban and rural areas of Mozambique. Given the nature, scale and scope of the infrastructure investments planned, no significant environmental or social impacts are foreseen and no protected areas for nature conservation, species or natural habitats of particular interest will be directly or indirectly affected. The project will have positive environmental impacts. The electrification program will help displace the use of kerosene for lighting by the connection of the household to electricity services. Access to electricity service will also displace small diesel generators used by businesses. There are no significant and/or irreversible adverse environmental issues anticipated from the investment for electrification under Component A to be financed under the project. Civil works will lead to relatively minor air and water pollution during the construction phases and, once the works are completed, limited loss of non-critical animal and plant habitats. Component B (off-grid electrification using renewable energy) will have low to moderate negative impacts on the environment, depending on their locations. The major environmental and public health risks might arise from improper disposal of SHS batteries to be handled by private companies. Component C will finance technical assistance and capacity building activities to better support the project implementation.

32. The objective of most investments considered under the project is to increase access to electricity in Mozambique. The scope or work consist of installation or construction of short LV extensions, limited MV extensions, and some additional networks. This scope of work may require site and land clearance for right-of-way that could lead to loss of vegetation and associated fauna, soil disturbance and erosion, increased runoff and sedimentation of water bodies, people's temporary or permanent physical displacement (Sub-component B will require land acquisition for mini-grid in relation to the generation facilities), including issues of community and worker's health and safety. Potential adverse environmental and social impacts of the project are expected to be moderate, reversible and temporary.

33. The following safeguard policies are triggered: (OP/BP 4.01) on Environmental Assessment, (OP/BP 4.04) on Natural Habitats, (OP/BP 4.11) on Physical Cultural Resources, and (OP/BP 4.12) on Involuntary Resettlement. OP/BP 4.04 on Natural Habitats was triggered, because the project may include civil works with potential negative impacts on natural habitats (coil, water, mainly), demanding specific provision on natural habitats, included in the proposed ESMF. Although the project will not be involved in major civil works of large movements of earth in areas containing sites deemed physical cultural resources, to ensure due diligence, chance find procedures are included in the ESMF to address OP/BP 4.11 basic requirements. The project will not support activities in areas with known physical cultural resources. No civil works within a river that is classified as an International Waterway (under OP7.50, International Waterways) or a tributary to such a river will be eligible for funding.

34. An ESMF and RFP have been prepared by the implementing agencies to guide the process in addressing any negative social impact from the project. The documents set forth mechanisms for screening, supervision and monitoring during implementation, including clear roles and responsibilities of client contractors and supervisors including a proposal of institutional strengthening program for EDM and FUNAE. The ESMF comprises a generic

ESMP and subset of guidelines and code of conduct for implementers. RPF will guide how project impacts will be mitigated and will guide the preparation of site-specific RAPs or Abbreviated RAPs, in case the project identifies project affected people that need to be resettled or compensated. Given the nature of works related to activities under PERIP, some of the RPF provisions will follow the provisions approved by the PERIP RPF. Under Component C the project will also consider capacity building for EDM/FUNAE personnel for better monitoring of safeguards aspects of the project.

35. The Borrower's institutional capacity for safeguards management has increased during past years. EDM has recently executed two World Bank financed projects (EDAP and PERIP), gaining experience on World Bank safeguards policies. The ESMF and RFP included the environmental and social management roles and responsibilities of the contractors and the supervision engineers, as well as a proposal of institutional strengthening program considering ongoing and proposed activities by EDM and FUNAE that could potentially stretch out its safeguards capacity and staffing.

36. The ESMF has been consulted upon, approved by the World Bank, and disclosed in the World Bank website and in-country on January 25, 2019. The RPF has been consulted upon, approved by the World Bank, and disclosed in the World Bank website on January 17, 2019 and in-country on January 23, 2019.

Monitoring and Evaluation

37. The M&E of the project will be carried out by the EDM and FUNAE implementing units for their respective components. Both PIUs will prepare quarterly reports to be discussed at Senior Management level and periodically with the institutions' Board. The quarterly progress reports will be submitted to MIREME and the World Bank. These reports will include results indicators, as well as reporting on the implementation of the ESMP, RAP, Health and Safety Plans.

38. The World Bank team will then prepare periodic progress reports, mid-term report and completion report which will be shared with the DPs co-financing the project through the MDTF.

39. The proposed project contemplates the procurement of supervision consultants who will support the implementing agencies in preparing progress reports and evaluating the progress of the works implemented by the Contractors.

Role of Partners

40. The project will be co-financed by the Governments of Norway and Sweden and EC and resources will be channeled through the MDTF to be administrated by the World Bank. This will facilitate the implementation of the electrification program with single procedures in terms of fiduciary, reporting and monitoring arrangements and will ensure that resources fully support the principles of the NES established by the GoM. The World Bank will report annually to the contributing members of the MDTF and hold an annual meeting with contributing and recipient members to ensure timely feedback and correction measures, as required. Regular feedback will be provided to contributing countries as part of the regular World Bank supervision. The World Bank will notify contributing members about formal supervision announcements and meetings that will take place at least every six months and aide-memoires will be circulated. As per invitation of EDM, contributing members will also carry out joint meetings and site visits minimum once per year.

Strategy and Approach for Implementation Support

41. The strategy for implementation support was developed based on the nature of the project and its risk profile. Its aim is to make implementation support to the client more flexible, efficient, and focused on the risk mitigation measures defined in the project risk summary.

42. The World Bank will provide implementation support to the client office through Headquarter and Maputo-based staff to ensure timely, efficient and effective implementation support. Formal implementation support mission will be carried out twice a year.

43. **Technical Inputs**. For both on-grid and off-grid components, the client will engage contractors to execute physical works. Effective preparation of bidding documents and work supervision requires sound technical knowledge. Therefore, the PIU will engage supervision consultants to strengthen their implementation capacity through Component C. The World Bank will also support capacity building for the client to carry out geospatial analysis.

44. **Fiduciary requirements**. Maputo-based World Bank staff will support the PIU to ensure that fiduciary requirements, including FM, procurement and environmental/social safeguard requirements are met.

Table 1.4. Implementation Support Plan and Resource Requirements

Time	Focus	Skills Needed	Resource Estimate	Partner Role
First twelve months	(a) Strengthen PIU through hiring of technical consultants. (b) Site identification informed by geospatial planning. (c) Strengthening off-grid regulatory environment. (d) Implementation of environmental and social safeguards and FM/Procurement system.	• Procurement expertise. • Technical specialist for on-grid and off-grid. • Safeguards specialist. • FM specialist. • Procurement specialist. • Gender and communication.	US$150,000	EDM and FUNAE needs to coordinate closely.
12-48 months	Technical supervision Safeguards supervision M&E supervision Procurement and FM supervision	Off-grid specialist. Safeguard specialists. Procurement specialist. FM specialist.	US$600,000	EDM and FUNAE needs to coordinate closely.

Skills Mix Required			
Skills Needed	**Number of Staff Weeks**	**Number of Trips**	**Comments**
- Project Management (Task leader) - Power Engineer - Off-grid/solar specialist - Social and environmental safeguard - Procurement - FM - Energy Specialist - Gender and communication - Administrative Support	7 - 10 weeks per year across the team	In Maputo In Maputo 2 per year In Maputo In Maputo In Maputo 2 per year In Maputo	To be adjusted annually depending on available budget

Partners		
Name	**Institution/Country**	**Role**
EDM	Mozambique	Implementing Agency
FUNAE	Mozambique	Implementing Agency
Government of Sweden	Donor	Co-financer
Government of Norway	Donor	Co-financer
European Union	Donor	Co-financer

ANNEX 2: Detailed Project Description

COUNTRY: Mozambique
Mozambique Energy for All (ProEnergia) Project

1. The GoM has prepared the NES defining the institutional, technical and financial arrangements aimed at achieving universal access by accelerating the connection of new users and the sustainable provision of good quality electricity service. Implementation of the NES implies adoption of multiple modalities for electrification, including densification of already electrified areas to reach all existing households, businesses and public facilities, expansion of the national grid to all areas where this is economically feasible, and provision of off-grid electricity services through mini-grids and standalone SHS in all other zones. The project will support the implementation of the first phase of the NES, by financing the construction of on-grid and off-grid infrastructure needed to provide electricity services to new users, and technical assistance needed for that purpose and to ensure sustainable provision of electricity service.

Component A: Peri-urban and Rural Electrification (estimated cost US$126 million equivalent: IDA Grant-US$60 million, Multi-Donor Trust Fund – US$66 million)

2. **Rationale.** The national transmission system of Mozambique is composed of two separate (not interconnected) networks built in the southern and northern regions of the country. The network reaches all 154 districts in the country with the existing distribution networks. However, a significant number of structures (households, businesses, etc.) are still not connected. This creates an opportunity to use available capacity of existing infrastructure to build additional distribution networks and service connections to incorporate and supply new users. Available capacity and good condition of existing infrastructure is ensured through execution of rehabilitation and upgrade investments in the scope of the ongoing Short-Investment Program financed by bilateral DPs and the World Bank under the PERIP.

3. **Scope.** Through the geospatial plan, GoM and EDM have identified over 500 settlements in 20 predominantly rural and peri-urban districts across the country located relatively close to existing electricity networks, which can be fully electrified through a combination of densification and short-range grid extension. This component will finance the design, supply of equipment and materials and construction works required to connect all households and businesses in those settlements through densification and short-range grid extension. The settlements have been grouped in geographic areas/zones to facilitate procurement, logistics and other project implementation arrangements. Of the 20 target districts, six are located in the North Region, five in the Central Region, and three zones in each of South Region, Maputo City and Maputo Province. The project will finance all activities (design, supply and construction) needed to connect around 250,000 households, of which about 185,000 (74 percent) are in rural areas and 65,000 are in peri-urban areas. The overall number of electrified households in rural areas will almost double from the current estimate of 240,000 to 437,600 (82 percent increase). All public facilities and businesses located in the settlements will also be connected.

4. **Estimated amounts of physical works**. EDM has estimated that the following works will be needed to connect about 250,000 new customers in project target areas: construction of about 1,500 km of MV lines, installation of 1,200 distribution transformers, extension of 3,500 km of low voltage distribution lines and installation of about 11,000 km in service drops (users' connections). Ready boards will be installed in low-income households unable to pay for the internal wiring.

5. **Implementation arrangements**. Based on the lessons learned during the implementation of similar projects financed by the World Bank, specific procurement and supervision arrangements aimed at optimizing unit construction costs (US$/new user connected) are included in the design of the component. Regarding the procurement aspects, EDM will conduct separate processes for procurement of design, supply of main equipment and materials, and installation works, rather than through a turnkey (EPC) approach. This is the typical arrangement adopted by capable distribution companies for the construction of medium and low voltage networks and connection of low voltage customers. The proposed approach can result in intense competition for supply in bulk of the main equipment and materials (poles, conductors, transformers and meters), resulting in lower prices. The arrangement creates favorable conditions for the participation of local companies in execution of construction works. EDM is in the final stages of selecting consultants to prepare detailed design of the electrification projects. EDM will also be supported by external consultants in the supervision of construction works. Preliminary estimates made by EDM show that expected average cost per connection is approximately US$505 for urban and peri-urban areas.

6. **Design and construction of distribution networks for urban, peri-urban and rural areas will be standardized to help cost optimization**. With support from specialized consultants, EDM will define optimized standards for design and construction of medium (operating voltage of between 1 kV and 33 kV) and for low voltage distribution infrastructure to be built in the future in urban, peri-urban and rural areas, including the incorporation of low-cost technologies successfully adopted for massive rural electrification in the United States, Australia, New Zealand, Brazil, Peru and Tunisia (among other countries). Establishment of optimized standards will make it possible to minimize unit investment costs for connecting new users and supplying them in full compliance with applicable standards on service quality. The design of distribution networks will follow the same technical standards for on-grid and off-grid assets to ensure proper interconnection capability between the two systems by the time the national grid reaches the off-grid areas.

7. **Project design eliminates barriers for connection of new users**. At present the minimum upfront connection charge paid by new electricity users in Mozambique is MZN 3,500 (approximately US$60). This charge varies depending on distance of household to the existing grid and customer category (social, domestic, industrial, etc.). Evidence shows that existing connection charges are unaffordable to a substantial part of the Mozambican population, even to those living inside EDM's existing grid footprint. This includes most FHHs. As the scope of the component includes all activities needed to connect at the same time all households in each selected settlement, there is no need for EDM to collect any upfront connection charge from new users. Therefore, the design of the component removes the main demand-side barrier to electrification and shows the commitment of GoM to implement the electrification program and move towards gender equality. EDM will recover OPEX to serve all its customers through Allowed Tariff Revenues set by the competent authority.

8. **Logistics arrangements for equipment and materials and construction works**. EDM has defined the logistics for supply of material and equipment and implementation of construction works on the PPSD, which included: (a) testing at manufacturers' facilities; (b) reception in special-purpose warehouses (within the premises of existing warehouses but physically separated from others) whose location is defined according to the areas/zones where electrification projects will be executed; (c) separate management of the new virtual warehouses through the GIAF-ERP system; and (d) delivery to construction contractors as needed according to the respective construction schedules.

9. **Registration of new users as EDM's customers**. With the rapid increase in number of EDM's customers, the utility must review and optimize procedures to register new consumers connected through the electrification projects as regular customers and manage them regularly with the support of the CMS and its GIS-based

customers' database. This activity is supported by PERIP but will be further monitored through this project. EDM will also strengthen its customer profiling, for example by tagging male and FHHs.

10. **Connection of public facilities**. The project will connect public facilities in the project area based on the information provided by the national departments of health and education.

Component B: Off-grid Electrification (estimated cost US$13 million equivalent from IDA)

Sub-component B.1 – Mini-grid electrification estimated cost US$10 million equivalent from IDA)

11. This activity will support the electrification of areas where electricity supply through mini-grids represents the least-cost option from a country's perspective. The locations of mini-grids will be informed by the results of the Mozambique Geospatial Options Analysis towards Universal Electrification (funded by ESMAP) which includes the initial site identification made by FUNAE. FUNAE has identified 13 potential mini-grid sites across several districts in the north of Mozambique to be supplied through combined solar PV and battery storage with a total estimated capacity of 2.6 MWp and with the potential to reach 7,000 consumers. The proposed project will finance the construction of approximately six of this mini-grids, adding approximately 4,000 new customers. In the settlements to be electrified by the mini-grid, the proposed project will connect all potential customers in selected sites, ensuring economies of scale.

12. Mini-grids will be developed under a PPP whereby IPPs will invest, operate, and maintain solar generation facilities of each mini-grid under PPAs with EDM; and the distribution network and service connections will be public investments financed by the project and operated by EDM. This arrangement will enhance private participation in rural electrification. FUNAE will contract the design and construction of distribution network components of the mini-grid and supervise implementation activities. The infrastructure built by FUNAE will be transferred to EDM for service delivery and O&M.[31] Therefore, the new beneficiaries of mini-grids will become EDM's consumers and face the national uniform tariff.

13. The mini-grids will be implemented in a phased approach. The first phase will consist of approximately 6 sites, selected using defined criteria established in the NES and in collaboration with private investors. In these sites the PPP concept will be tested. If the approach proves successful, the remaining sites will be implemented in a similar manner. In order to increase the attractiveness of small solar IPPs, the project could partner with IFC in supporting EDM in the competitive procurement and implementation under IPP arrangements of a portfolio of on-grid and mini-grid systems.

14. **Affordability.** As the potential beneficiaries will be EDM customers, mini-grid customers will pay the same tariff for each category charged to users connected to the national grid, ensuring effective implementation of a national uniform tariff policy. Recurrent charges to be paid by EDM to the IPPs and O&M contractor in every mini-grid under the PPA and distribution O&M contract will be passed-through to allowed tariff revenues of EDM set by the competent authority. This will allow the socialization of the operating costs incurred by the utility to serve consumers connected to mini-grids among all customers countrywide.

15. **Sustainability**. Construction and O&M contracts, both for generation and network assets of the mini-grids, will be procured on a competitive basis to ensure long-term service provision of electricity services by EDM to consumers, in full compliance with applicable standards.

16. **Site identification**. Locations will be confirmed by GoM, based on the results of the Mozambique Geospatial Options Analysis, which incorporates all the sites identified by FUNAE in the Renewable Energy Projects

[31] In order to ensure that the quality of service meets applicable standards, EDM may outsource the O&M of network assets, and retail services to qualified private contractors through an O&M contract.

Portfolio[32] and the pre-feasibility studies that have been carried out. There will be a mix of more densely populated sites and less densely populated sites in each lot, where possible, to enhance their overall commercial attractiveness.

17. **Enhance private participation in generation to accelerate rural electrification**. The project will also explore the possibility to partner with IFC in supporting EDM in the competitive procurement and implementation under IPP arrangements of a portfolio of medium- and small-scale grid connected solar PV plants. IFC is currently supporting EDM in the identification of 3-5 sites in the more remote areas of the radial grid (Central / Northern region), with easy connection to the grid, where 10 - 25MW (up to 50MW in aggregate) solar PV plants included in least-cost planning could be built and run by IPPs. Battery storage might be added to mitigate the intermittent nature of solar PV generation and/or to allow for load-shifting and dispatch of the plants after sunset. IFC and World Bank agreed on packaging the sites for medium scale grid-connected solar PV projects with a set of sites where small-scale solar PV plants for supply to mini-grids will be built also under the IPP scheme. This would allow EDM to get the benefits of economies of scale deriving from procurement and implementation of a portfolio of projects involving larger installed capacity. In case IPP arrangements for solar PV plants for mini-grids do not materialize—due to the security risks in some of the target provinces or other reasons—a fully public model for electrification will be considered, with both generation facilities and distribution network (including service drops) are fully financed by the project.

18. **Feasibility and packaging**. This component will be complemented by preparatory studies to (a) confirm the sites through further feasibility studies and techno-economic analysis; (b) promote productive and efficient use of energy by users; and (c) provide technical, legal, and procurement support to effectively design the bidding documents and supervise the construction of the mini-grid assets.

19. The following activities will be carried out by the different stakeholders:

FUNAE

a. Select sites in coordination with MIREME and EDM.
b. Carry out the detailed engineering design of the mini-grid (demand assessment, sizing of solar power plan and storage, design of the distribution network, etc.).
c. Ensure availability of land required for the generation module of the mini-grid system and facilitate the environmental permits.
d. Package a set of mini-grids to increase the size of contracts and attract experienced contractors.
e. In coordination with EDM, prepare bidding documents to award contracts for construction, O&M of mini-grid facilities (PPAs and network O&M).

EDM

a. Sign the PPAs and network O&M service contract

ARENE / MIREME

a. Allow pass-through to allowed revenue requirement of costs incurred by EDM under PPAs and network O&M.
b. Issue licenses for mini-grid IPPs and (if necessary) the operations and maintenance services contractors.

Subcomponent B.2: Off-grid results-based-financing facility (RBF) estimated cost US$3 million equivalent from

[32] FUNAE (2017) – Renewable Energy Projects Portfolio for Hydro and Solar Resources.

IDA)

20. This sub-component will support the expansion of off-grid energy market in Mozambique through a RBF Facility. The RBF will offer clear and predictable financial incentives to distributors for the sale of high-quality (that is, Lighting Global quality-verified) products on a first-come, first-served basis. The RBF is helping cover expansion costs, including finding and training new agents, improving supply chains, and acquiring new customers (for example, through marketing and consumer engagement campaigns). Existing RBF schemes have typically taken a one-size-fits-all approach to off-grid solar sales, simply using a formula to calculate incentive payments based on the access provided by each system sold. The RBF will disburse based on verified results (for example, market entry, sales) by an independent verification agent, through a Fund Manager, both contracted by FUNAE. Such a facility can offer financial remuneration for quality verified products creating credibility of such solar products, creating a space for new entrants, as well as supporting deeper penetration to bottom of the pyramid consumer segments. The facility will complement the ongoing efforts by DPs to scale-up the off-grid market with working capital and grant facilities and addressing other barriers and equip FUNAE with an instrument to support off-grid electrification under the framework of the GoM “Programa Nacional de Energia para todos”. This facility will encompass three main attributes.

21. **Quality**. The Facility will primarily support quality-certified SHSs and potentially other energy technologies such as solar water pumps for agriculture and efficient cooking solutions. Given the market spoilage by low-quality solar products in Mozambique, the Facility will support Lighting Global quality-verified products. For water pumps and clean cooking solutions, appropriate third-party certification of product quality will be included in the eligibility criteria to receive the project support. In addition, provision of adequate after-sales service, such as warrantee or customer support, will be required.

22. **Geographical targeting**. These RBF payments will help these companies to expand faster and serve more remote and poorer clients that otherwise could not be served. The RBF scheme will therefore have a strong pro-poor impact. Such geographical targeting will help direct the companies into areas where distribution channels are more difficult to establish, and affordability concerns are more pronounced.

23. **Increasing market players.** The RBF payments will be structured to support not only the existing players, but also entry for new domestic and international players. This will allow a more dynamic market condition and healthy competition. For this purpose, RBF could pay for initial set-up, consumer awareness, training of sales agents etc.

24. FUNAE will retain consultancy services to manage the RBF since this is the first such opportunity. The RBF will be managed by an Independent Fund Manager with high standards of transparency and integrity. After the project closing, the Facility may continue to operate under FUNAE.

25. **Collaboration with existing programs.** The facility will complement the ongoing efforts by DPs to incentivize the off-grid market with working capital facilities and addressing other barriers and equip FUNAE with an instrument to support off-grid electrification, particularly with the program from KfW Sustainable Economic Development Project. The KfW Sustainable Economic Development Project provides credit lines at interest rates lower than market rates to enterprises and individuals providing renewable energy or energy efficiency solutions.

Component C: Technical Assistance and Implementation Support (estimated cost US$9 million equivalent from IDA)

Sub-component 1: Technical Assistance to EDM (US$6 million).

26. ***Capacity building and implementation support for EDM***, for project management expenses such as the financing of external audit, oversight of implementation of the environmental and safeguards instruments for the investments, oversight of the health and safety aspects during construction, enhancement of procurement procedures and material logistics, related studies for electrification, short term consultants and training. (estimate US$3 million).

27. ***Community Engagement Program***. EDM has an ongoing community outreach program, with components of awareness campaigns, community education and customer communication, using various communication platforms such as radio in various national languages, video, theater, house-to-house, etc. EDM's Community Engagement Program ("be connected, be safe, be efficient") mainstreams gender-sensitive information as well as supports the empowerment of vulnerable groups in the communities (women, young, children, etc.). The project will support the community outreach program of EDM, (a) through a new connection campaign *("be connected")*, to inform people in target areas (on-grid and off-grid) the cost of electricity services, uniformed payment for electricity connection to be paid in installments without any up-front payment, procedures and safety practices of the electrification process lead by the commercial department who are responsible for marketing with the dual objective to reduce illegal connections, and (b) to provide information to the communities about safety aspects of electricity *("be safe")*, raise awareness on the negative impacts of energy theft and vandalism of the infrastructure, and the benefits of adopting energy efficiency and conservation practices *("be efficient")*. (estimate US$0.5 million).

28. ***Young Professionals Program at EDM*** aims to build a new generation workforce, with professional experience and enhanced leadership skills. The project will support EDM's efforts to bring future talent to be trained through the project and after a time frame of three-five years to be transferred to EDM core business areas. The project will support the new young professional program and the overall program coordination. Half of the selected professionals will support directly the implementation of the electrification program. They will receive hands-on training, specialized short-term training, exposure to all the elements of the process leading to new connections from the planning, procurement, safeguards, commercial aspects, incorporation of new customers to the management information system and customer service. The selection process will be done by EDM's HR directorate in coordination with the relevant departments hosting the professionals, and performance evaluation will be regular. At least 30 percent of the selected professionals will be women, which contributes towards closing gender gaps at the institutional level given that only 25 percent of women at EDM work in technical roles. The professionals will report directly to the hosting departments. (estimate US$1 million).

29. ***Gender mainstreaming in EDM*** to support the following set of activities: (a) establishing a program to train young women in technical areas, to later be hired by EDM (scholarship program); (b) develop a policy for gender equality and justice in EDM (regulations to complement the Code of Ethics); (c) implementation of a Gender Equality Seal, as a ranking and incentive system to promote the adoption of gender principles and regulations, and link it to the performance evaluation of organizational units; (d) developing audio-visual material for awareness and basic training on gender equality and gender justice for EDM staff. The project will support part of the implementation of the strategy in coordination with other DPs. (estimate US$0.5 million).

Sub-component 2: Technical Assistance to FUNAE (US$3 million). This activity will support:

30. ***Implementation support for FUNAE.*** Project management-related expenses such as the financing of external audit, oversight of implementation of the environmental and safeguards instruments for the investments, as well as the oversight of health and safety aspects during construction and operation. In addition, FUNAE, with support from contracted consultants, will develop a business strategy aligned with the roles it has been assigned under the recently approved NES and the development of Global Lighting quality standards for SHSs. (estimate US$1.0 million)

31. ***Independent verification agent and consultant for RBF facility.*** This activity will support consultancy services related to the creation and implementation of a facility manager as well as the procurement of an independent verification agency for the RBF facility. (estimated US$1.0 million)

32. ***Capacity building.*** This activity will support training for FUNAE staff to acquire adequate technical, planning, and operational capacity to implement the off-grid electrification activities and effectively undertake activities under Component B. (estimated US$1.0 million).

Project Cost and Financing

33. The project will be a regular IPF with a duration of five years. It will be funded through an IDA grant with joint co-financing for Component A in the form of a grant from a new MDTF that has been established. Table 2.1 is indicative and all payments for Component A will be shared between the IDA grant and the MDTF.

34. It is expected that grant resources, in an indicative total amount of US$66 million for the recipient-executed portion, will be secured and be available for joint co-financing. The grant agreement will be signed based on the contribution received into the MDTF. Additional grant resources will then be passed on to the Government as and when they are received without the need to process a restructuring or additional financing. In case the co-financing does not materialize or is less than expected, either additional resources will be sought potentially through an IDA additional financing mechanism or the project will be restructured to be proportionately scaled down.

Table 2.1. Project Cost and Financing

Project Components	IDA Financing (US$)	MDTF (US$)	Total (US$)
Component A: Peri-urban and Rural Electrification	60	66	126
Component B: Off-grid Electrification	13		13
Component C: Technical Assistance and Implementation Support	9		9
C.1: Technical Assistance to EDM	6		6
Operational support	3		
Community engagement program	0.5		
Young professional program	1		
Gender Mainstreaming	0.5		
Capacity building and Sector Studies	1		
C.2: Technical Assistance to FUNAE	3		3
Implementation support to FUNAE	1		
Independent Verification agent and consultant for RBF facility	1.5		
Capacity Building	0.5		
	82	**66**	**148**

ANNEX 3: Economic and Financial Analysis

COUNTRY: Mozambique
Mozambique Energy for All (ProEnergia) Project

Background

1. The ProEnergia project aims to increase access to electricity services for about 272,000 new customers in targeted areas of Mozambique (250,000 through grid densification, 4,000 through mini-grids and 18,000 by incentivizing the SHS market). Economic analysis has been undertaken to assess the economic viability of the project. The analysis is based on standard cost-benefit analysis for investment components, namely grid extension (Component A) and off-grid solution (Component B). The technical assistance component (Component C) is not included in the analysis due to the methodological challenges in quantifying the cost and benefit. In addition, affordability analysis has been carried out to determine whether the electricity service is affordable to the poor segment of Mozambican population.

2. **Project Costs**. The on-grid component will finance grid extension investments as well as a connection subsidy scheme to remove the barrier of connection fees. The investment will include construction and/or extension of medium- and low-voltage lines (including line drops) and installation of ready-boards for households which cannot afford internal wiring of the premises. EDM estimated the average connection cost in selected townships will be US$505 per customer, assuming that EDM will prioritize the sites to achieve lowest cost per connection within the project budget. The cost items considered also include O&M cost as well as the cost of electricity services (see Table 3.2). Taxes and duties are excluded from the analysis.

3. For mini-grid investment (Component B1), based on the figures provided by the FUNAE, an average cost of a mini-grid system is estimated to be US$0.88 million and is expected to connect approximately 431 households and 117 commercial and institutional users. The project will pilot a public-private partnership in which the generation component is financed by the private sector, while the GoM (through FUNAE) provides the finance to support CAPEX expenditures in network and other activities[33]. For SHS investment through RBF (component B2), an average cost of US$110 per basic Tier 2 system (capable or powering three lamps, phone charger and radio) has been assumed.

4. **Project benefits**. The project benefit arises from the economic utility of electricity usage by newly connected users. Therefore, the Willingness to Pay (WTP) for electricity services has been estimated based on their energy expenditure. According to the SE4ALL framework, energy is affordable if it falls into 5 percent of their household expenditure. Therefore, 5 percent of current household expenditure is used as a conservative estimate of a WTP.

5. The users are disaggregated into low-income, middle-income and high-income users, using the classification in the NES. They represent poorest quantile, third poorest quantile and richest quantile of population respectively. Since a large share of the connections / SHS sold are expected to be in the five poorest provinces, 64 percent of the total new customers (including grid, mini-grids and SHS) were assumed to be in low-income; 13

[33] For the purposes of the economic analysis, the total CAPEX (excluding taxes and import duties) for mini-grid is considered, irrespective of which entity (public or private) provides the financial resources.

percent will be either high-income or commercial/institutional users; and the rest is assumed to be middle-income. The summary of the customer disaggregation is provided in Table 3.1.

Table 3.1. Summary of Customer Disaggregation and WTP

	Proportion (%)	WTP	Consumption
Low- income	64	US$2.0/month	180 kWh/year
Middle-Income	23	US$4.7/month	540 kWh/year
High -Income, commercial and institutional users	13	US$0.3/kWh	2400 kWh/year

Note: It is assumed that WTP for low- and middle- income population increases by 2.6 percent and 4.8 percent per year, respectively. It is assumed that WTP and consumption level of commercial and institutional customers are equivalent to high-income residential customer that are already using diesel genset that will be replaced by access to grid/mini-grid services. The consumption figures are extracted from the preparatory studies for the NES.

Other Assumptions

6. The discount rate has been determined based on the World Bank's internal guidance which recommends using twice of the prospect real per capita GDP growth as a proxy of the discount rate. Mozambique's Growth forecast between 2018 and 2020 averages about 3.45 percent according to the latest macroeconomic projection[34]. On this basis, the discount rate of 7 percent is employed. The assumptions employed in the analysis are summarized below.

7. The emission reduction of the project has been estimated using emission factors based on World Bank's GHG guidance and other reputable sources. The shadow price of carbon use for the valuation of GHG abatement is US$39/78 in 2019 ascending to US$64/128 in 2043, as per the World Bank's guidance on the shadow price of carbon.

Table 2.2. Summary of Cost Items Included in Economic Analysis

	On-Grid	Off-grid	SHS
Description	Grid connection to 250,000 customers	six mini-grids, each connecting 431 households and 117 commercial/institutional users	18,000 SHS distributed
Capital Investment	US$505 per connection	US$880,000 per system	US$110 per unit (with an expected lifespan of five years)
O&M	2 percent (Yearly)	1 percent (Yearly) followed by 2 percent increase per year Battery Replacement: every 8 years at US$ 100,000 Inverter Replacement: every 10 years at US$40,000	3 percent (Yearly)
Cost of Service	US$0.13/kWh	0 (powered by solar)	0 (powered by solar)

Results of Economic Analysis

8. The results of the economic analysis are summarized in Table 3.3. The project demonstrated its economic viability with EIRR at 17.4 percent and NPV of US$84.2 million. The result is strengthened when global

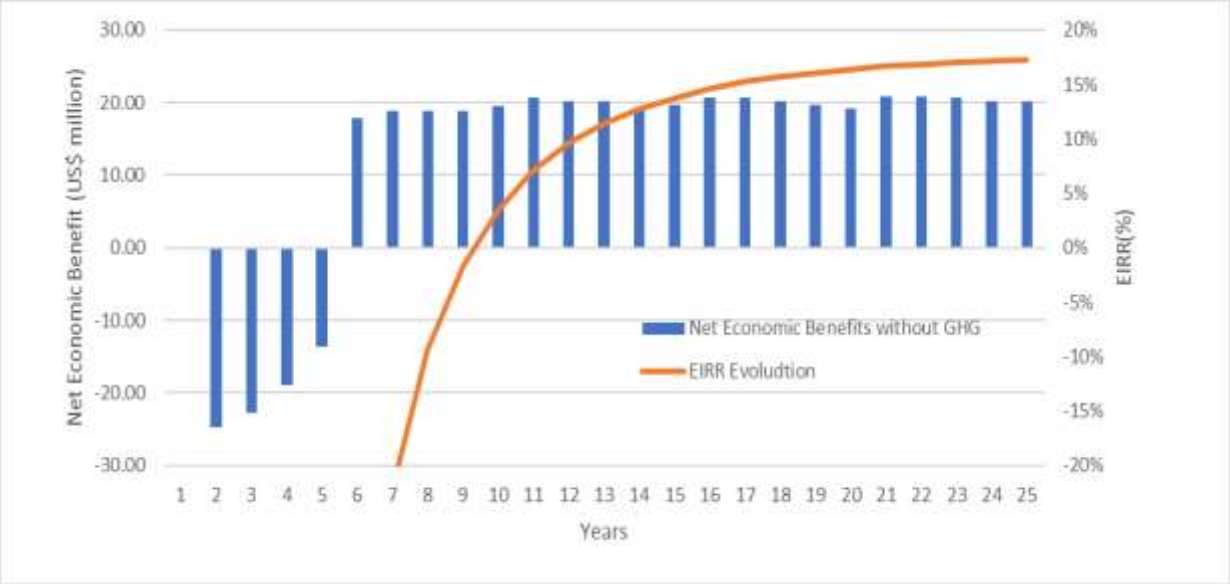
[34] World Bank (2018) Mozambique Macro and Poverty Outlook.

environmental benefits through GHG abatement are included. The project is expected to result in net emission reduction of approximately 4.9 million tCO_2 over the project's economic life over 25 years.

Table 3.3. Key Results from the Economic Analysis

Composition of NPV	Net value at discount Rate of 7% (US$ millions)
Total Cost	331.3
OPEX	237.5
CAPEX	93.8
Total Benefit	518.3
Electricity Services	415.6
GHG Abatement Benefit	102.8
Net Benefit without GHG	84.2
Net benefit with GHG	187.0
EIRR without GHG	17.4%
EIRR with GHG	29.5%

Figure 3.1. Project Net Economic Benefits and EIRR Evolution (excluding GHG)



Sensitivity Analysis

9. Sensitivity analysis has been carried out to test the robustness of the economic viability of the project. The analysis found that the project will be economically viable as long as the CAPEX (both for grid and mini-grid investments) increase does not exceed 187 percent of the initial estimation. Similarly, the project will remain economically as long as the overall WTP of all beneficiaries does not decrease more than 20 percent across the entire lifetime of the project.

Affordability Analysis of Electricity Service

10. Given the importance of the project's benefits channeled to the poor segment of Mozambican population, affordability of electricity services has been assessed. A common definition of affordability is a household's monthly expenditure on electricity not exceeding 5 percent of total household expenditures in order to purchase 30kWh per month, which is a subsistence level electricity consumption.[35]. This definition of affordability is employed in this analysis.

11. In Mozambique, HH at the lowest income quantile (20 percent) has monthly expenditure of MT 2,344.[36] Therefore, with the above definition of affordability, Mt 117.2 is the approximate threshold for electricity to be affordable. With the latest 2018 retail tariff of electricity by EDM, 30kWh falls under the social tariff category which is Mt 1.07/kWh. Therefore, 30kWh of electricity will cost MT 32.1 per month. This constitutes 1.3 percent of a household's energy expenditure, well below the 5 percent threshold. This tariff is the same for both grid connection and mini-grid connection under the GoM's universal tariff policy. Therefore, the electricity service is considered affordable to the poor segments of Mozambican population.

12. To take into account geographical disparities, the affordability analysis has been repeated at the provincial levels. Table 3.4 illustrates affordability ceilings for subsistence energy expenditure in each province of Mozambique, in comparison with the estimated electricity expenditure. It validates that, in all provinces in Mozambique, expected electricity expenditure is well below their affordability threshold of 5 percent.

Table 3.4. Estimated Relative Cost of Subsistence Electricity for Households in Mozambique (disaggregated by province)

	Monthly Household Expenditure	Cost of Subsistence Electricity as % of Household Expenditure
Cabo Delgado	4413.4	0.7
Gaza	3926.4	0.8
Inhambane	4078.6	0.8
Manica	4185.2	0.8
Maputo Cidade	11611.9	0.3
Maputo Province	9877.0	0.3
Nampula	2708.9	1.2
Niassa	3622.1	0.9
Sofala	3332.9	1.0
Tete	4428.7	0.7
Zambezia	2541.5	1.3
Urban	**5935.3**	**0.5**
Rural	**3180.7**	**1.0**
National	**3652.5**	**0.9**

Based on World Bank (2018) Mozambique Poverty Assessment.

[35] World Bank et al (2017) Tracking SDG7: The Energy Progress Report: a joint report of custodian agencies.
[36] 2014 - 2015 Household survey and inflation adjustments.

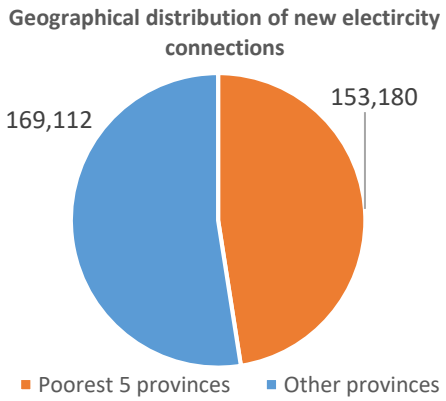
Poverty analysis

13. Poverty analysis has been carried out to analyze the extent to which the project reaches out to the poor beneficiaries in Mozambique, ensuring the project's contribution to the WBG's twin goals of poverty reduction and shared prosperity. Although the poverty level in the country is in decline, in 2015, nearly half - 48.4 percent - of the Mozambican people lived under poverty.[37] There is also a significant variation in poverty level across the country. In general, the poverty level is higher in northern regions, such as Niassa, Nampula and Zambezia. The poverty level is significantly lower in southern parts of the country, notably in the capital of Maputo city and the surrounding Maputo Provinces. The geographical variation is presented in Table 3.5 as well as the map at the end of the document.

14. It is expected that nearly 50 percent of new connections are made in the five poorest provinces of Mozambique – Niassa, Nampula, Zambezia, Cabo Delgado and Sofala. More than 85,000 connections are expected to be made in Nampula.

Table 3.5. Poverty Rate in Mozambique (disaggregated by province)

Province	Poverty Rate (%)
Niassa	66.70
Nampula	64.84
Zambezia	61.76
Cabo Delgado	50.03
Sofala	49.56
Gaza	43.62
Tete	41.93
Manica	37.15
Inhambane	34.52
Maputo Province	11.80
Maputo City	3.83



Source: World Bank (2018) Mozambique Poverty Assessment.

15. On-grid and mini-grid technologies will play different roles in these poorest provinces. Mini-grid will likely reach small number (approximately 4,000 households) of rural and poorest segments of the population, whereas the on-grid connection will reach large number (approximately 250,000 households) of beneficiaries in rural towns and their surroundings.

[37] World Bank (2018) Mozambique Poverty Assessment.

Table 3.6. Economic Flows of the Project

Aggregated Econoimic Analyisis																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Economic Benefits																										
On-grid access	US$ million	0.00	9.31	19.06	29.16	39.94	40.89	41.87	42.87	43.91	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97	44.97
Mini-grid access	US$ million	0.00	0.00	0.00	0.00	0.59	0.60	0.61	0.63	0.64	0.65	0.66	0.68	0.69	0.70	0.71	0.72	0.74	0.75	0.76	0.78	0.79	0.80	0.82	0.83	0.85
SHS access	US$ million	0.00	0.00	0.12	0.38	0.65	0.67	0.68	0.70	0.72	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.59	0.30	0.00
Total Benefits	US$ million	0.00	9.31	19.18	29.64	41.18	42.16	43.17	44.20	45.27	46.36	46.37	46.38	46.39	46.40	46.42	46.43	46.44	46.45	46.47	46.48	46.49	46.51	46.37	46.09	45.81
Economic Cost																										
CAPEX																										
On- grid CAPEX	US$ million	0.00	27.98	27.98	27.98	27.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mini-grid CAPEX	US$ million	0.00	0.00	1.38	1.38	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SHS CAPEX	US$ million	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.00	0.00	0.00
CAPEX Total	US$ million	0.00	27.98	29.91	30.46	30.46	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.55	1.10	1.10	0.00	0.00	0.00	0.00	0.00
OPEX																										
On-grid O&M	US$ million	0.00	0.56	1.12	1.68	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.24
On-grid Cost of Service	US$ million	0.00	5.47	10.95	16.43	21.91	21.95	21.98	22.42	22.87	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32	23.32
Mini-grid O&M	US$ million	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.46	0.04	0.22	0.04	0.04	0.04	0.04	0.04	0.46	0.04	0.04	0.04	0.22	0.04
SHS O&M	US$ million	0.00	0.00	0.02	0.05	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.03	0.00
OPEX Total	US$ million	0.00	6.03	12.08	18.16	24.28	24.31	24.34	24.78	25.23	25.68	25.68	26.10	25.68	25.86	25.68	25.68	25.68	25.68	25.68	26.10	25.68	25.68	25.67	25.82	25.60
Total Cost	US$ million	0.00	34.01	42.00	48.62	54.75	24.31	24.34	25.33	26.33	26.78	25.68	26.10	26.23	26.96	26.78	25.68	25.68	26.23	26.78	27.20	25.68	25.68	25.67	25.82	25.60
Net Economic Benefits without GHG		0.00	-24.70	-22.82	-18.98	-13.57	17.85	18.83	18.87	18.94	19.57	20.68	20.28	20.16	19.44	19.63	20.74	20.76	20.22	19.68	19.28	20.81	20.82	20.71	20.28	20.21
GHG abatement	tCO2	-	51,073	105,283	162,690	220,979	221,222	221,535	225,652	229,852	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447	218,447
Shadow Carbon Price (low)	US$/tCO2	39	40	41	42	43	44	45	46	47	48	49	50	51	51	53	55	56	57	58	59	60	61	62	63	64
GHG Abatement Benefit	US$ million	0.0	2.0	4.3	6.8	9.5	9.7	10.0	10.4	10.8	10.5	10.7	10.9	11.1	11.1	11.6	12.0	12.2	12.5	12.7	12.9	13.1	13.3	13.5	13.8	14.0
Net Economic Benefits with GHG	US$ million	0.0	-22.7	-18.5	-12.1	-4.1	27.6	28.8	29.3	29.7	30.1	31.4	31.2	31.3	30.6	31.2	32.8	33.0	32.7	32.4	32.2	33.9	34.1	34.2	34.0	34.2

Financial Analysis

Historical analysis

16. A historical financial analysis was carried out for EDM's financial statements and key performance indicators for the period 2012 - 2017, in a difficult macroeconomic environment where the Mozambican Metical (MT) versus the US$ dropped by nearly 50 percent to 0.17 between December 2012 and December 2017 while the accumulated inflation was over 45 percent in the same period.

17. Some key productivity indicators are presented in Table 3.7.

Table 3.7. Key Productivity Indicators

KPI Group	KPIs	Units	2012	2013	2014	2015	2016	2017
Regulatory KPI´S	Average Tariff (calculated excluding Exports)	MT/kWh	2.44	2.49	2.54	2.72	3.70	5.44
	Average Tariff (calculated excluding Exports)	US$c/kWh	8.73	8.30	8.04	6.78	6.25	8.20
	Average Export Tariff	MT/kWh	1.72	2.24	2.78	4.23	7.47	3.78
	Average Export Tariff	US$c/kWh	6.17	7.48	8.81	10.54	12.63	5.70
	Average Tariff (calculated including Exports)	MT/kWh	2.37	2.47	2.55	2.99	4.76	5.10
	Average Tariff (calculated including Exports)	US$c/kWh	8.47	8.24	8.08	7.46	8.05	7.68
	Average Energy Fuel & Purchase Cost per Energy Sale	MT/kWh	0.86	0.99	1.00	2.06	3.99	4.22
	Average Energy Fuel & Purchase Cost per Energy Sale	US$c/kWh	3.08	3.30	3.17	5.15	6.74	6.36
	Variable Margin per Unit	MT/kWh	1.51	1.48	1.55	0.93	0.78	0.88
	Variable Margin per Unit	US$c/kWh	5.39	4.94	4.91	2.31	1.31	1.32
	Opex/kWh	MT/kWh	1.21	1.12	1.18	1.07	1.14	1.29
	Opex/kWh	US$c/kWh	4.31	3.74	3.75	2.66	1.93	1.95
Operation KPI´S	Total Losses	%	24.1%	21.0%	23.2%	25.2%	26.1%	25.9%
	Collection Rate	%	98.0%	97.9%	98.6%	98.0%	98.0%	81.9%
	Opex/Customer	MT/Customer	3.43	3.20	3.26	3.50	4.24	4.19
	Opex/Customer	US$/Customer	122.8	106.6	103.3	87.2	71.6	63.2
	Fixed Assets/kW	MT´000/kW	45.7	50.7	57.7	61.7	70.7	88.8
	Fixed Assets/kW	US$/kW	1,636	1,692	1,827	1,538	1,194	1,338
	Fixed Assets/kWh	MT/kWh	11.86	12.17	12.99	12.78	15.91	19.09
	Fixed Assets/kWh	US$c/kWh	42.4	40.6	41.2	31.9	26.9	28.8

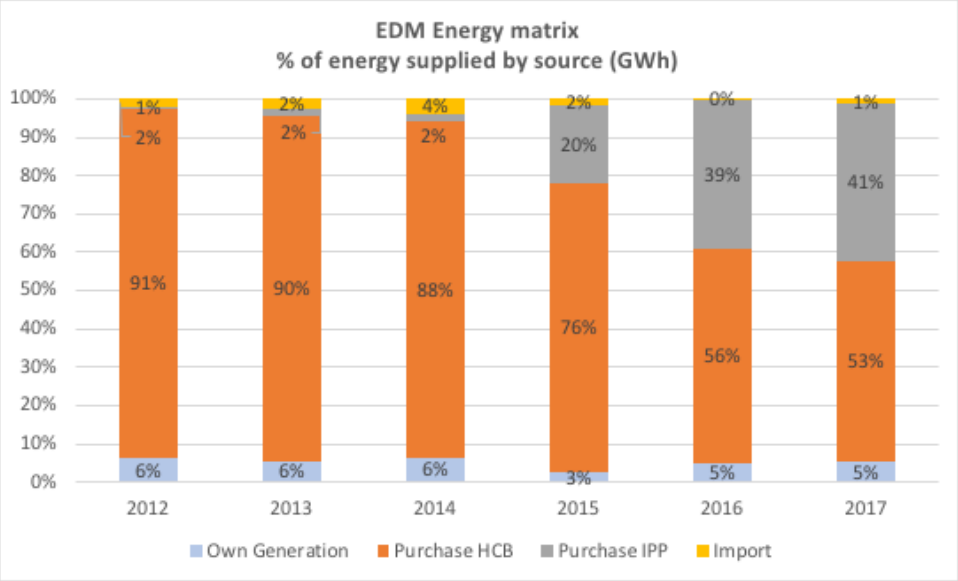
18. Since 2014, Mozambique's generation capacity has expanded to 2,724 MW to serve local and regional demand, with significant participation from the private sector through PPP. In February 2015, a 175 MW gas fired IPP was commissioned at CTRG, a joint-venture between EDM (51 percent) and Sasol (49 percent). In December 2015, a 120 MW Gigawatt IPP was also commissioned at Ressano Garcia. In October 2017, a 40 MW gas fired IPP (Kuvaninga) was commissioned in Chokwe. All three IPPs have signed PPAs with EDM. The entry into operation of these plants transformed EDM's energy balance, modifying significantly the unit cost of generation.

19. In 2017, EDM produced a total of 6,505.6GWh, declining by 8 percent compared to 2016 output: this is primarily due to a drop in HCB hydroelectric purchase, as during the previous year the Cahora dam was not able to operate at full capacity due to low levels of water in the reservoir. In December 2016, the elevation of the reservoir had fallen to 312 meters above sea level, the lowest recorded since the construction of the dam. There was a significant recovery in 2017 and by the end of the year the elevation had reached almost 318 meters: however, this level is still way below the elevation of 326 meters regarded as necessary for normal operations.

Table 3.8. EDM Energy Balance Trend

EDM Energy Balance		2012	2013	2014	2015	2016	2017
Own Generation	GWh	263.0	251.0	318.0	158.0	340.0	339.3
Purchase HCB	GWh	3,874.0	4,084.0	4,351.0	4,599.0	3,942.0	3,423.0
Purchase IPP	GWh	30.0	95.0	102.0	1,229.0	2,742.0	2,656.3
Import	GWh	84.0	109.0	190.0	98.8	11.0	87.0
Total Supply	**GWh**	**4,251.0**	**4,539.0**	**4,961.0**	**6,084.8**	**7,035.0**	**6,505.6**

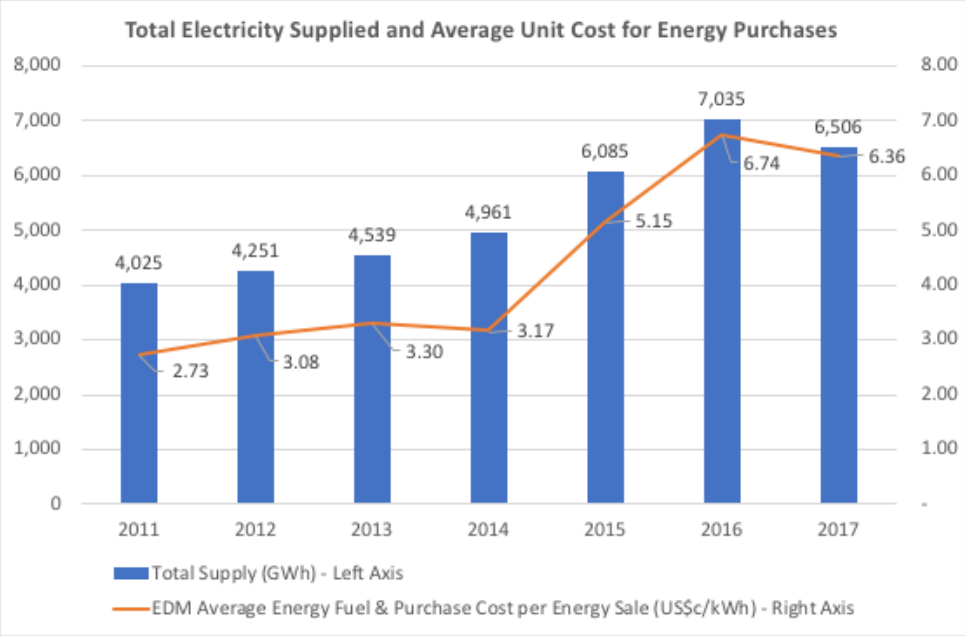
Figure 3.2. EDM Energy Matrix



Source: World Bank (2018).

20. The shift in the generation mix towards thermal generation and the fact that the energy acquisition prices are determined on hard currency, as per the PPA, exacerbated the negative impact on EDM's cost structure during the rapid devaluation of the MT versus the U S dollar across the period analyzed. In 2016, the average unit energy fuel and purchase cost reached US$c6.36/kWh, with a slight decline compared to 2016, but still standing on high levels, due to a lower contribution from hydropower output than in the past years (53 percent on total energy supplied in 2017 compared to around 90 percent during 2012 - 2014).

Figure 3.3. Total Electricity Supplied and Average Unit Cost for Energy Purchases

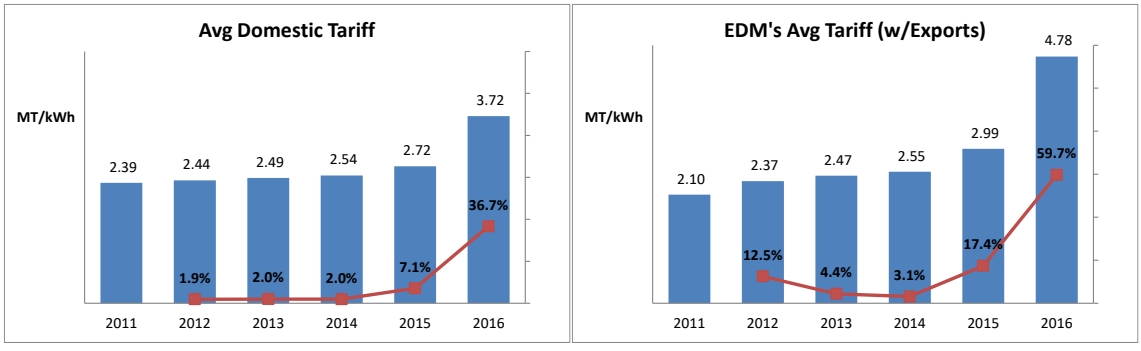


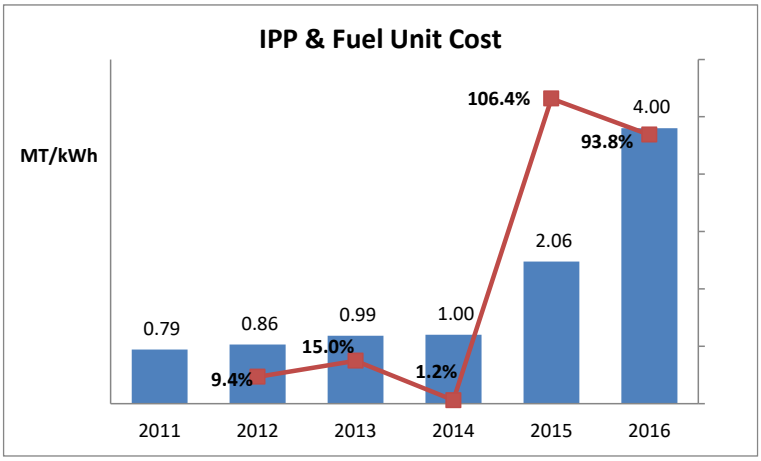
Source: World Bank (2018)

21. The still high levels in energy purchase costs in 2017 – although 7 percent lower than 2016 levels – were only partially offset by an increase of over 100 percent in the Average Tariff (including Exports) that occurred in the same period. However, since 2012 the tariff increase observed during the period (+17 percent as average yearly compound growth) has not been not enough to compensate the increase of fuel and energy purchase cost (+37 percent on an average yearly basis) and the impact of inflation and MT depreciation.

22. The following graphs illustrate the evolution during 2012 - 2017 of the average tariff, without export, [in MT/kWh], of the average domestic tariff [in MT/kWh] and fuel and IPP unit cost.

Figure 3.4. Evolution of Electricity Tariffs versus Generation Costs





23. As a consequence of the sharper increase across the period analyzed in fuel and energy purchase average costs as compared to the pace of tariff growth, EDM financial sustainability was significantly impacted. EBITDA showed a sharp decrease during the period 2011 – 2016, mainly driven by tariff increases (no tariff increases occurred during 2011-2014) that were not sufficient to cover the increase in the energy purchase costs and fixed costs, highlighting that in 2015 and 2016 the tariff increase was not even enough to fully pass-through the increase in the energy purchasing costs. In 2017, EBITDA turned negative, highlighting EDM's difficulties in controlling its cost structure evolution. Since 2012, electricity revenues [in MT] almost tripled to over MT27 million whilst the variable supply costs grew nearly seven times, which reflects a disproportional trend to expected revenue/variable cost ratio. This trend is also reflected in a lower 2016 and 2017 Gross Profit than 2014 and, consequently, in highly negative earnings before interest and tax (EBIT), on the back of the growing fixed cost structure.

Table 3.9. EDM Income Statement (2012-2017)

FINANCIAL INCOME STATEMENT (IFRS)							
	Units	2012	2013	2014	2015	2016	2017
LV, MT (Tariff-Based Customers) & HV (Transmission Customers)	MT Million	7,119	8,275	9,214	10,577	14,841	21,989
Exports	MT Million	567	583	445	3,643	11,764	3,985
Electricity Sales	MT Million	7,686	8,858	9,659	14,220	26,605	25,973
Other revenyes	MT Million	809	1,056	1,081	2,129	2,517	1,100
Total Revenues	**MT Million**	**8,496**	**9,913**	**10,740**	**16,349**	**29,122**	**27,073**
Growth	MT Million		*17%*	*8%*	*52%*	*78%*	*-7%*
Total Variable Cost (Fuel and IPPs)	MT Million	-2,792	-3,543	-3,792	-9,810	-22,270	-21,510
Growth	MT Million		*27%*	*7%*	*159%*	*127%*	*-3%*
Gross Profit	**MT Million**	**5,704**	**6,371**	**6,948**	**6,538**	**6,853**	**5,563**
Growth	*MT Million*		*12%*	*9%*	*-6%*	*5%*	*-19%*
Total Fixed Costs	MT Million	-3,915	-4,021	-4,486	-5,075	-6,381	-6,590
Growth	*MT Million*		*3%*	*12%*	*13%*	*26%*	*3%*
EBITDA	**MT Million**	**1,789**	**2,350**	**2,461**	**1,463**	**472**	**-1,027**
Growth	*MT Million*		*31%*	*5%*	*-41%*	*-68%*	*-318%*
Total non-operating items	MT Million	1,422	1,981	2,360	3,047	2,901	2,810
EBIT	**MT Million**	**367**	**369**	**101**	**-1,583**	**-2,429**	**-3,837**
Total Interest - Gain (Loss)	MT Million	-68	-317	-173	-1,132	1,417	406
Income Tax - Revenue (Expense)	MT Million	-195	-120	11	770	28	598
Net Profit After Tax	**MT Million**	**105**	**-68**	**-61**	**-1,945**	**-983**	**-2,833**

24. This has put at risk the company's financial sustainability, whose free cash flow production has worsened across the period examined. The operating cash flow (Net Cash provided by Operating Activities) remained

positive during the period 2012 – 2017: until 2016, this evolution was better explained by the growth in accounts payable, which was greater than the increase in expenses (energy purchase and contractor costs), a clear sign of financial stress. On the other hand, negative account payables and positive receivables for 2017 fiscal year helped maintaining EDM's OCF on the positive side.

Table 3.10. EDM Cash Flow Statement (2012-2017)

CASH FLOW STATEMENT (IFRS)							
	Units	2012	2013	2014	2015	2016	2017
(+) EBIT	MT Million	299	52	-72	-2,715	-1,012	-3,431
(+) Depreciation and Amortisation	MT Million	1,573	2,144	2,582	4,423	3,162	3,415
(+) Others	MT Million	0.00	-0.44	0.00	0.00	529.29	119.39
EBITDA Adjusted	**MT Million**	**1,872**	**2,196**	**2,510**	**1,708**	**2,680**	**104**
(-) Accounts receivables	MT Million	-63.8	118.1	-441.1	-3,493.9	-6,891.1	2,675.8
(-) Other Current Assets	MT Million	200.3	300.8	850.9	-422.7	-4,556.3	2,670.6
(-) Accounts Payables	MT Million	160.4	699.5	3,432.0	13,095.5	13,934.7	-3,429.3
(=) Working Capital Adjustments	**MT Million**	**297**	**1,118**	**3,842**	**9,179**	**2,487**	**1,917**
(-) Taxes paid	MT Million	-236.8	-92.0	0.0	0.0	28.2	0.0
(-) Interest Expenses	MT Million	-160.3	-199.9	0.0	0.0	0.0	0.0
(=) Net Cash provided by operating activities	**MT Million**	**1,772**	**3,023**	**6,352**	**10,887**	**5,195**	**2,021**
Investments in fixed assets	MT Million	-6,213	-9,236	-13,503	-20,720	-23,392	-17,000
(=) Net Cash provided by investing activites	**MT Million**	**-4,441**	**-6,213**	**-7,151**	**-9,833**	**-18,197**	**-14,979**
Free Cash Flow	**MT Million**	**-2,669**	**-3,190**	**-800**	**1,054**	**-13,001**	**-12,958**
Load Disbursement	MT Million	0	0	308	-552	13,596	5,412
Loan Repayment	MT Million	-97	-363	0	0	0	0
Donations	MT Million	1,389	0	0	0	0	2,542
Loan for Rural Electrificatioin	MT Million	1,094	2,927	0	0	0	0
Other (e.g. Equity injection, Dividends, etc.)	MT Million	-3	-2	327	101	330	7,029
(=) Net Cash provided by financing activites	**MT Million**	**2,967**	**3,951**	**635**	**-451**	**13,926**	**12,441**
(=) Net Increase in Cash and Cash equivalent	**MT Million**	**298**	**760**	**-164**	**603**	**925**	**-517**
(+) Cash and Cash equivalent at beginning of the year	MT Million	1,792	2,090	2,851	2,844	3,447	4,372
(+) Cash and Cash equivalent at end of the year	MT Million	2,090	2,851	2,686	3,447	4,372	3,855

25. During the full period under analysis, the OCF was highly insufficient to cover the CAPEX, showing a gap between financial needs for the company due to higher investments and internal self-financing capabilities, that has been growing every year. Despite an increasingly negative EBITDA during the past four years, the CAPEX increased significantly. This is reflected in a growing negative free cash flow during the period, which was financed by an increase in loans and donations. In particular, in 2017 the EDM financial situation, which was deeply under distress, required a MT7 billion equity injection. As a consequence, the balance sheet shows an important increase in fixed assets – that in 2017 more than doubled compared to 2012 levels – and accounts receivables (MT7 billion in 2017 compared to MT0.4 billion in 2012), which have been financed by Loans from Multilateral Development Banks, Donation and Grants and accounts payable.

Table 3.11. EDM Balance Sheet (2012-2017)

BALANCE SHEET - IFRS							
	Units	2012	2013	2014	2015	2016	2017
Accounts receivable - net	MT Million	428	309	996	3,170	9,753	6,960
Inventory	MT Million	906	1,103	1,393	1,366	1,307	1,617
Income tax receivable	MT Million	0	0	0	209	0	0
Other financial current assets	MT Million	368	333	386	1,194	2,157	2,107
Other current assets	MT Million	1,073	1,041	838	1,273	4,954	5,648
Cash (unrestricted)	MT Million	2,090	2,851	2,844	3,447	4,372	3,855
Total Current Assets	**MT Million**	**4,865**	**5,638**	**6,456**	**10,659**	**22,543**	**20,188**
Land	MT Million	21,518	25,687	27,688	25,416	24,508	24,103
PPE	MT Million	11,928	10,825	13,568	22,600	38,682	50,666
Others	MT Million	206	1,481	1,528	2,066	3,159	2,288
Total Fixed Assets	**MT Million**	**33,652**	**37,993**	**42,784**	**50,082**	**66,348**	**77,057**
Total Assets	**MT Million**	**38,517**	**43,631**	**49,241**	**60,741**	**88,891**	**97,245**
Accounts payable	MT Million	2,887	3,660	4,760	10,018	23,952	20,523
Accrued liabilities, interco and other	MT Million	323	279	320	399	567	569
Donations & Grants	MT Million	167	344	395	338	414	187
Other Financial Liabilities	MT Million	512	774	1,466	2,636	324	1,527
Loan - current portion	MT Million	452	450	415	1,046	7,331	7,033
Total Current Liabilities	**MT Million**	**4,341**	**5,507**	**7,356**	**14,437**	**32,588**	**29,840**
Donations & Grants	MT Million	4,532	5,877	6,852	7,685	8,697	9,912
Other Financial Liabilities	MT Million	5,409	6,471	8,211	14,982	509	483
Loan - LT portion	MT Million	1,138	2,341	2,684	1,501	25,758	31,468
Accounts payable	MT Million	196	123	102	0	0	0
Deferred tax	MT Million	3,316	3,336	3,248	2,666	2,429	1,831
Provisions	MT Million	1,191	1,444	6,168	6,696	6,789	6,993
Total Long-Term Liabilities	**MT Million**	**15,781**	**19,592**	**27,265**	**33,529**	**44,182**	**50,687**
Total Capital and Reserves	**MT Million**	**18,395**	**18,532**	**14,619**	**12,775**	**12,121**	**16,718**
Total Liabilities and Equity	**MT Million**	**38,517**	**43,631**	**49,241**	**60,741**	**88,891**	**97,245**

26. The financial ratios showing the evolution and current situation of the profitability, cash and leverage of EDM are presented in Table 3.12.

Table 3.12. EDM Main Financial Ratios (2012-2017)

MAIN FINANCIAL RATIOS								
	Units	2012	2013	2014	2015	2016	2017	Acceptable Limits
Profitability and Cash Generation Ratios								
Gross Profit/Revenue	%	67.1%	64.3%	64.7%	40.0%	23.5%	20.5%	
Opex/Gross Profit	%	68.6%	63.1%	64.6%	77.6%	93.1%	118.5%	
Capex/Gross Profit	%	79.9%	79.2%	102.3%	150.0%	263.8%	258.6%	
EBITDA/Fixed Asset	%	5.3%	6.2%	5.8%	2.9%	0.7%	-1.3%	
EBITDA/Depreciation & Amortisation	%	125.8%	118.6%	104.3%	48.0%	16.3%	-36.6%	
EBITDA/Capex	%	39.2%	46.6%	34.6%	14.9%	2.6%	-7.1%	
OCF/Capex	%	38.9%	59.9%	89.4%	111.0%	28.7%	14.0%	
Liquidity Ratios								
Current Ratio		1.12	1.02	0.88	0.74	0.69	0.68	Min = 1.2
Acid Test		0.91	0.82	0.69	0.64	0.65	0.62	Min = 1
DSO		18.37	11.40	33.84	70.77	122.24	93.84	
Leverage Ratios								
Debt to Equity		0.84	1.02	1.87	3.13	5.58	4.21	Max [3.5 - 4]
Gearing (Net Financial Position / Equity)	%	-3%	0%	2%	-7%	237%	207%	Max [60% - 70%]
Debt to Asset	%	40%	43%	56%	66%	76%	72%	
Covenants								
Debt Service Coverage Ratio (DSCR)		0.40	0.35	0.10	-0.41	-0.37	-0.61	Min = 1.5
EBITDA/Interest Expenses		3.66	3.88	4.11	0.42	0.08	-0.16	Min = 3
Net Financial Debt/EBITDA		3.03	3.06	4.04	11.42	62.59	-35.69	Max = 3

27. Debt, fueled by the need to keep up with the investment plan for generation, transmission and distribution activities, grew significantly during the period, finishing by the end of 2017 with a Debt/Equity ratio of 4.21x, compared with a maximum typically accepted range in the industry of between 3.5 and 4. The Debt/Asset ratio at the end of 2017 was 72 percent, slightly above the maximum typically accepted range between 60 percent and 70 percent. All covenants at the end of 2017 stand at a critical level and in negative region.

28. EDM is currently over-leveraged, with most of its financial debt denominated in foreign currency, this situation would limit its ability to deliver on the future expansion plan of the company and capex execution required to improve the quality of service.

FSP

29. Cognizant of this situation, EDM with support from the World Bank started, in 2017, the preparation of a Cost of Service Study that provided the analytical foundations for the development of a comprehensive FSP. Based on the recommendations from this study, GoM, MIREME and EDM are taking specific measures as part of the FSP. The FSP includes: (a) performance contract of EDM through the implementation of PERIP Component 2 to reduce system losses from 29 percent in 2018 down to 19 percent in 2024; (b) a recapitalization process of EDM in line with the recommendations of the Cost of Service Study (50 percent recapitalization); (c) CAPEX for electricity access projects financed according to the NES; and (d) electricity tariff adjusted in line with domestic inflation and full pass-through of generation costs.

30. Financial analysis projections have been made assuming key provisions of the FSP are implemented. These assumptions include: (a) implementation of PERIP's Component 2 to reduce system losses, from 29 percent in 2018 down to 19 percent in 2024; (b) a recapitalization process of EDM in line with the recommendations of the Cost of Service Study (50 percent recapitalization); (c) CAPEX for electricity access projects financed according to the NES; and (d) electricity tariff adjusted in line with domestic inflation and full pass-through of generation costs.

Profitability

31. The tables below show the main figures from EDM's financial statement projections together with the main profitability ratios for the company. Under the assumption of FSP implementation, EDM's profitability is expected to return to positive numbers by 2020, with almost a breakeven in 2019.

32. In particular, EDM's RoIC is expected to rapidly recover to 4.3 percent in 2021. Similarly, EDM's RoE should rapidly deteriorate from a 6.2 percent expected peak in 2022.

Table 3.13. EDM Income Statement: Main Projected Figures

(US$ millions)	2018	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
Net Revenues	29,922	*40,035*	*44,492*	*49,259*	*55,624*	*65,673*	*78,507*
EBITDA	660	*5,002*	*7,468*	*10,430*	*11,849*	*13,229*	*11,063*
EBIT	-1,957	*2,318*	*4,531*	*7,022*	*7,791*	*8,668*	*5,802*
Net Profit	-5,056	*-383*	*1,082*	*2,844*	*3,461*	*4,187*	*2,372*

Table 3.14. EDM Profitability Ratios

	2018 %	*2019 %*	*202 %0*	*2021 %*	*2022 %*	*2023 %*	*2024 %*
EBITDA Margin (%)	2.2	*12.5*	*16.8*	*21.2*	*21.3*	*20.1*	*14.1*
Operating margin (%)	-6.5	*5.8*	*10.2*	*14.3*	*14.0*	*13.2*	*7.4*
Net margin (%)	-16.9	*-1.0*	*2.4*	*5.8*	*6.2*	*6.4*	*3.0*
ROE (%)	-16.6	*-1.1*	*2.7*	*6.0*	*6.2*	*5.8*	*2.8*
Return on Assets (%)	-5.3	*-0.4*	*0.9*	*2.0*	*2.2*	*2.4*	*1.2*
ROIC (%)	-1.9	*2.0*	*3.3*	*4.3*	*4.2*	*4.0*	*2.4*

Liquidity and Leverage

33. The table below provides a summary of the main metrics and their trends on EDM's liquidity and leverage conditions. EDM's liquidity position remains weak as long as the receivables from ZESCO remain unsettled. The quick ratio, although increasing from the poor level at 0.15x in 2018 to 0.65x in 2024, still remain under 1:1: this shows that EDM would still have difficulties to meet its current financial obligations with the available quick funds on hand. However, the improvement at current ratio level, from 0.66x in 2018 to a level above 1x, indicates a better working capital management from EDM.

Table 3.15. Short-term Liquidity and Solvability Ratios

	2018	2019	2020	2021	2022	2023	2024
Quick ratio ((Cash+Current Receivables)/Current Liabilities)	0.15	0.20	0.23	0.28	0.36	0.48	0.65
Current ratio (Current Assets/Current Liabilities)	0.66	0.67	0.74	0.82	0.94	1.15	1.43
Leverage (Long-Term Debt/Equity) %	66	69	85	99	101	90	89
Indebtedness (Net Financial Position / Equity) %	73	82	98	110	109	94	93
Total Liabilities/Total Assets	0.68	0.67	0.67	0.66	0.64	0.59	0.57
Covenants							
Interest coverage ratio (EBITDA/Interest Expenses)	0.2	1.9	2.5	3.7	4.4	5.3	4.8
Debt Service Coverage Ratio (DSCR) (excl. CAPEX)	0.15	0.75	1.05	1.38	1.61	1.82	1.41
Net Financial Debt/EBITDA	61.0	8.9	7.1	6.1	5.9	5.6	7.1
CFO/Debt *	-0.08	0.02	0.05	0.07	0.08	0.09	0.04

*Note:*CFO = Cash Flow from Operations, Debt = Short-Term Borrowings + Long-Term Borrowings + Current portion of Long-Term Borrowings*

34. Interest coverage ratio being highly inadequate in 2018 (0.2x), will improve within the next four years. Similar situation takes place with the DSCR, which improves from very depressed values to exceed adequate levels (above 1.25) by 2021.

ANNEX 4: Status of Standalone Off-grid Solar Market in Mozambique

COUNTRY: Mozambique
Mozambique Energy for All (ProEnergia) Project

Standalone Off-grid Solar Systems

1. **There is a growing market on standalone off-grid energy solution in Sub-Saharan Africa**. The market was born starting with solar lanterns, which typically provides a lighting and phone-charging function. Recently, there is an increasing focus on SHS that is capable of providing greater level of service including multiple lights, phone charging and radio capability. Although these solutions do not provide the same level of service as the grid electricity connection, the technology can meet the basic service needs of off-grid population as well as the need of backup power for grid-connected population.

2. **In Mozambique, the consumer confidence with regards to off-grid solar products is negatively affected by significant variance in the product quality**. The majority of solar product distributors are informal without business registration and tax payment to the Government. Few solar products are certified by international standards such as Lighting Africa, and therefore the quality of products in the market vary significantly. In addition, as many of the product suppliers are not based in Mozambique, product warrantee or customer support is very scarce. Consequently, the prevalence of inferior quality products has deteriorated the consumer perception of standalone off-grid solutions and resulted in general skepticism in the reliability of solar products. In addition, these products in informal market is often priced significantly lower (up to 50 percent) than those in formal market due to the different level of product standard but also due to lack of enforcement on value-added tax (VAT) and import duties which could add 30-40 percent to the retail price of the products. Therefore, formal enterprises with higher quality products face unequal playing field with informal players.

3. **Nonetheless, Mozambican off-grid energy market is starting to thrive**. In the past two years, emerging new players have started providing high-quality certified solar products with more flexible payment schemes such as PAYGO model. The PAYGO providers in Mozambique are currently serving about 15,500 customers.

Figure 4.1. Products from SHS Companies (from left: Logos; Solarworks; Green Watts)

4. **There is also a growing interest among solar companies to launch their business outside Maputo in less developed regions.** The solar companies are already operating in Gaza, Inhambane and Manica[38] and a strong interest has been observed to operate in Nampula and Zambezia owing to their population size and density. There

[38] In Gaza, Inhambane and Manica, 35-45 percent of the population live below the poverty line according to World Bank estimate. In Nampula and Zambezia, 60-65 percent of people are estimated to live under the poverty line.

is an interest to invest in LPG distribution chains. However, this expansion of both off-grid solar and clean cooking solutions requires sizable investment as well as public support for demand activation and awareness raising.

5. **Affordability of standalone off-grid solutions is a concern for low income consumers**. According to the NES, average household monthly expenses for the 1st quintile of the population was estimated in MT 2,344 (US$38.6) in January 2018. Off-grid solution can replace households' existing energy expenditure, including kerosene, batteries and candles as long as the price is affordable to the population. Assuming that no more than 10 percent[39] of the monthly expenses is devoted to lighting needs, an average household in the 1st quintile of the will spend up to MT 234.4 (US$3.8) per month on energy. Assuming that standalone off-grid solution can replace these expenses (except for grid-connected electricity which households will keep using), the cost of a pico-solar solution would be paid back in 4.3 months, and the cost of basic SHS would be recovered in 2.1 years. Considering the low saving rates of low income population, there are affordability concerns even for pico-solar products.

Figure 4.2. Payback Period of Typical Standalone Off-grid Solutions

	Functions	Typical price of direct purchase	Payback Period
Pico-Solar		MT 1,000	4.3 months
Basic SHS		MT 6,000	2.1 years

6. **The use of SHS could be fostered by PAYGO models but hindered by limited usage of mobile money.** Typical price of a basic SHS is approximately MT 6,000 (US$99), which largely exceeds the monthly income of many Mozambicans. Experience in East Africa suggests that the PAYGO model, which allows users to pay in installments over 12 - 24 months, can effectively remove the customers' cash constraint for purchase. PAYGO typically requires availability of mobile money that significantly reduces the transaction cost of monthly payment. While Mozambique enjoys relatively high mobile network coverage of 82 percent,[40] the use of mobile money is not as common. It is estimated that mobile money is used by roughly 30 percent of mobile phone users, which tends to be urban and economically well-off. The uptake of mobile money is constrained by access to commercial banking facilities, which is required by mobile money vendors. So far, only two businesses[41] in Mozambique offer PAYGO as payment option to their off-grid customers; however, lack of clarity in leasing regulation is also observed as a barrier to scaling of the PAYGO model.

7. **Significant working capital will be required for such rapid growth of off-grid market.** This is particularly the case for PAYGO providers that collect revenues from their customers over a period of 1 to 2 years. Since their revenue stream is in local currency, they require affordable local currency loans to avoid currency fluctuation risks. Current commercial interest rate in Mozambique is 25-30 percent, which is unaffordable for most local businesses. Appetite for affordable loans has been demonstrated by credit line by BCI, supported by KfW. The demand for such affordable local currency loan may grow further in the near future.

[39] Normally 5 percent of monthly expenditure is used as the affordability threshold of energy expense. However, it has been observed that many households in Mozambique consume more than 5 percent for energy expense. Hence 10 percent has been assumed.
[40] USAID (2016) Mozambique Mobile Access and Usage Study. Coverage with 2G network.
[41] As of August 2018, only Solar works! and Epsilon offered PAYG options to the team's knowledge.

Clean Cooking Solutions

8. **Energy for cooking in Mozambique is currently dominated by traditional stoves and fuels as in most other Sub-Saharan African countries.** It is estimated that 80 percent of urban and peri-urban households use charcoal in urban market and most rural households use firewood with traditional three-stone stoves. Charcoal price increased significantly in the past year in urban/peri-urban areas, hurting the poor. Nonetheless, reputable and aspirational clean stoves with proven efficiency gain (for example, Envirofit, Burn) in East Africa has limited presence in Mozambique. The market faces similar barriers to the standalone off-grid solar solutions, including custom duty and VAT barriers as well as affordability. Alternative energy for cooking, such as LPG, ethanol and electricity are also emerging, but so far served primarily urban middle to high income users due to their affordability and distribution constraint. However, there is a renewed interest in clean cooking solutions from both public and private players. SHS distributors in Mozambique are exploring the inclusion of energy efficient stoves as a part of their product portfolio beyond SHSs. As shown in Table 4.1, many DPs support clean cooking in conjunction with off-grid solar solutions.

Mini-grid

9. **Mini-grids in Mozambique are publicly owned and operated through FUNAE.** FUNAE tendered out the construction of mini-grids and maintained the ownership of these grids and bear the O&M responsibility. The bill is also collected by FUNAE, in some cases at a rate different from EDM's. Using this business model, FUNAE has been operating three mini-grids in Mozambique. However, owning and operating the mini-grids are costly and stretching scarce human and financial resources of FUNAE.

10. **Therefore, FUNAE is exploring private sector participation into the mini-grid business models.** There has been strong interest from private sector and DPs for private sector led development of mini-grids in Mozambique. GoM is currently developing a regulatory framework for mini-grid including the modality of private sector participation. The mini-grid subcomponent of the project will pilot a public-private partnership in which FUNAE will fund and construct distribution infrastructure of the mini-grids and private sector will be contracted to supply power to them.

Development Partners

11. **Coordination among DPs and the GoM in off-grid space needs to be strengthened.** Following the initial success of PAYGO model in Mozambique, several DPs (for example, Sweden, United Kingdom, EnDev) have launched or are preparing programs to support renewable energy enterprises that offer solar and/or clean cooking energy solutions through grant provision and technical assistance. This support is likely to attract new market entrants operating in East African countries (for example, Tanzania, Uganda, Kenya) and thus scale off-grid market further. However, the donor support is currently fragmented partly due to the shortage of GoM's strategic vision and capacity in this space. Existing donor programs are summarized in Table 4.1.

Table 4.1. Ongoing Support Activities for Off-grid Solutions

Name of Initiative	Objective / Areas
Energizing Development (EnDev). US$4.5 million	EnDev's US$4.5 million program, coordinated by GiZ, entails both a solar and an Improved Cook Stove (ICS) market development component aimed to support accelerated distribution of energy technologies in the country. The current phase of EnDev program ends in 2019, and an upscaling program beyond 2019 is currently being negotiated. The principal instrument of support is RBF mechanism.

Name of Initiative	Objective / Areas
DfID - Energy Africa (BRILHO) US$30 million	BRILHO is a Part of 'Energy Africa' program which aims to improve access to energy for rural households and businesses. it will encourage private sector innovation and investments in the solar PV, improved cookstoves and micro/mini-grid segments of the energy sector in Mozambique. BRILHO has 4 complementary components: Market Development Fund and Technical Assistance to enterprises; Demand Activation; Research and Dissemination; Policy Reform and Institutional Strengthening. BRILHO has a budget of US$30 million and is expected to begin implementation in 2019 for a project period of 5 years.
Enabel (former Belgian Technical Cooperation) - RERD, Phase 2 US$13.7 million	US$13.7 million over a 5-year period (2018-2022) and will support FUNAE to improve its capacity on planning and project management, on supplying reliable and adequate energy services and on improving the technical and financial sustainability of existing systems. Half of the budget is expected to fund the construction of hydro mini-grids, and the remaining half to provide technical assistance for FUNAE.
Embassy of Sweden - US$6.5 million	Embassy of Sweden, through the AECF is investing US$6.5 million into Mozambique for private sector companies to access capital and technical assistance with the aim of accelerating access to low cost, affordable, high quality products and services by rural poor households and communities across Mozambique. AECF provides a matching grant to RE solution providers, including mini-grid, SHSs and clean cooking solutions.
Embassy of Sweden US$11 million	The Beyond the Grid Fund for Africa focus on providing financial incentive for private firms for energy solutions for off-grid.
KfW Sustainable Economic Development project (US$3.5 million)	KfW supported BCI to create a renewable energy and energy efficiency credit line. The credit line was initiated in 2014 but was launched only in July 2018 due to high Central Bank rates. The credit line provides a low interest rate at 15 percent to enterprises and individuals providing renewable energy or energy efficiency solutions.
Government of Norway (US$300,000)	Prefeasibility studies for off- energy solutions based on solar and mini-hydro in the following sites: Liziunga (Lago district), Matchedje (Sanga district), Nzizi (Muembe district), Mississi (Mandimba district), Mitomone, Chala (Chimbunila district) and Nairubi (Majune district) and Lupiliche (Lago district).
European Union (Euro 50 million)	Program under preparation to support mini-grids and off-grid subsectors
Government of Italy (US$5 million)	Support program for mini-grid and SHS.

ANNEX 5: Selected sites for intervention

COUNTRY: Mozambique
Mozambique Energy for All (ProEnergia) Project

Table 5.1. Summary of Locations:

Item	Location	Potential Clients	Medium Voltage Line (km)	Low Voltage Line (km)	Transformer posts	Service Drops (KM)
1	Regiao Sul	23,604	247.29	555.28	151	944.16
2	Regiao Centro	72,561	599.055	1800.82	621	2902.44
3	Regiao Norte	112,420	515.8	1082.95	591	4496.8
4	Cidade de Maputo	68,835	112.3	434.5	181	2753.4
5	Provincia de Maputo	29,062	116.5	297	142	1162.48
TOTAL		277,420	1474.445	3873.55	1544	11096.8

Table 5.2. Transformers closer to the project areas

	Item	Substation	Nominal voltage [kV]	Location	
				District	Province
NORTH	1	Auasse	110/33	Mocimboa da Praia	Cabo Delgado
	2	Cuamba	110/33	Cuamba	Niassa
	3	Lichinga	110/33	Cidade de Lichinga	Niassa
	4	Macomia	110/33	Macomia	Cabo Delgado
	7	Metoro	110/33	Ancuabe	Cabo Delgado
	8	Pemba	110/33	Cidade de Pemba	Cabo Delgado
	9	Monapo	110/33	Monapo	Nampula
	10	Moma	110/33/11	Moma	Nampula
	11	Nacala	110/33	Nacala	Nampula
	14	Nampula 220	220/110/33	Cidade de Nampula	Nampula
	17	Nampula Central	110/33	Cidade de Nampula	Nampula
CENTRAL	18	Alto Molócuè	220/110/33	Alto Molócuè	Zambézia
	21	Cerâmica	220/33/33	Nicoadala	Zambézia
	23	Chimuara	110/33	Chimuara	Zambézia
	24	Gurué	110/33	Gurué	Zambézia
	25	Mocuba	220/110/33	Mocuba	Zambézia
	29	Uapé	110/36	Gilé	Zambézia
	30	Beira	110/22/6.6	Beira	Sofala
	34	Catandica	220/33/33	Barue	Manica
	35	Chibata	220/110/18.6	Gondola	Manica
	36	Chicamba	117/22.4/6.6	Messica	Manica
	38	Chimoio 1	66/6.6	Cidade de Chimoio	Manica

	43	Dondo	110/22	Dondo	Sofala
	44	Gondola	110/22	Gondola	Manica
	46	Guaraguara	66/33	Buzi	Sofala
	47	Inchope	110/33/22	Gondola	Manica
	48	Lamego	110/66/22	Nhamatanda	Sofala
	49	Mafambisse	110/22	Dondo	Sofala
	50	Munhava	110/22/6.6	Cidade da Beira	Sofala
	51	Manica	116.5/34	Cidade de Manica	Manica
	52	Marromeu	110/33	Marromeu	Sofala
	53	Tete	66/33	Cidade de Tete	Tete
	54	Movel de Tete	66/33	Cidade de Tete	Tete
	55	Manje	66/33	Chiuta	Tete
	56	Mavita	110/22/6.6		Tete
	58	Matambo	220/66/33	Changara	Tete
	60	Benga		Moatize	Tete
	64	Mavuzi	123.2/6.6	Sussundenga	Manica
	67	Chibata		Gondola	Manica
	69	Messica	110/22	Manica	Manica
SOUTH	70	Beluluane	66/11	Beluluane	Maputo
	71	Boane	32	Boane	Maputo
	74	Chicumbane	110/33	Xai - Xai	Gaza
	75	Corumana	110/11	Moamba	Maputo
	77	CTM	2	Distrito Urb. KaMubukwana	Cidade de Maputo
	79	Infulene	275/110/66	Matola	Maputo
	85	Lindela	110/33	Jangamo	Inhambane
	87	Lionde	110/33	Chokwé	Gaza
	88	Mapai	110/33	Chicualacuala	Gaza
	89	Marracuene	66/33	Marracuene	Maputo
	90	Machava	66/33	Matola	Maputo
	92	Macia	110/33	Bilene	Gaza
	93	Manhiça	60/30	Manhiça	Maputo
	97	Matola 275	275/66/33	Matola	Maputo
	99	Matola Rio	66/33	Boane	Maputo
	100	Matola Gare	66/33	Matola	Maputo
	103	Riopele	60/30	Marracuene	Maputo
	104	Salamanga	66/33	Matutuine	Maputo
	106	SE1	66/11	Kamfumo	Cidade de Maputo
	107	SE2	66/11	Kamfumo	Cidade de Maputo
	108	SE3	Jan-09	Kamfumo	Cidade de Maputo
	111	SE4	66/11	Kamaxaquene	Cidade de Maputo

	112	SE5	66/11	Kamaxaquene	Cidade de Maputo
	114	SE6	66/33/11	Kamubukwane	Cidade de Maputo
	115	SE7	66/11	Kamfumo	Cidade de Maputo
	116	SE8	66/11	Kamavota	Cidade de Maputo
	117	SE9	66/11	Kamavota	Cidade de Maputo
	119	SE10	66/33	Kamubukwane	Cidade de Maputo
	120	SE11	66/33	Kamaxaquene	Cidade de Maputo
	134	Muhalaze		Matola	Maputo

ANNEX 6: Map

COUNTRY: Mozambique
Mozambique Energy for All (ProEnergia) Project