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Report No: PAD5105

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 296.7 MILLION
(US$400 MILLION EQUIVALENT)

TO THE

REPUBLIC OF MADAGASCAR

FOR A

DIGITAL AND ENERGY CONNECTIVITY FOR INCLUSION IN MADAGASCAR PROJECT

March 9, 2023

Energy and Extractives Global Practice
Digital Development Global Practice
Eastern and Southern Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective January 31, 2023)

Currency	Malagasy Ariary (MGA)
US$1 =	MGA 4,285.04
US$1 =	SDR 0.74

FISCAL YEAR
January 1 – December 31

Regional Vice President:	Victoria Kwakwa
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ABBREVIATIONS AND ACRONYMS

ADER	*Agence de Développement d l'Electrification Rurale* / Rural Electrification Agency
ARELEC	*Autorité de Regulation de l'Electricité* / Electricity Regulatory Authority
ARTEC	The Regulatory Authority for Communication Technologies / *Autorité de Régulation des Technologies de Communication*
ASA	Advisory Services and Analytics
BESS	Battery Energy Storage System
CAPEX	Capital Expenditure
CAT DDO	Catastrophe Deferred Drawdown Option
CERC	Contingent Emergency Response Component
CIP3	Communications Infrastructure Project
CPF	Country Partnership Framework
CPSD	Country Private Sector Diagnostic
CSO	Civil Society Organization
CEM	Country Economic Memorandum
CTM	Commercial Transactions Manual
DARES	Distributed Access through Renewable Energy Scale-up
DE4A	Digital Economy for Africa
DECIM	Digital and Energy Connectivity for Inclusion in Madagascar Project / *Connectivité numérique et énergétique pour l'inclusion à Madagascar*
DGU	Digital Government Unit
DPO	Development Policy Operation
EPC	Engineering, procurement, and construction
ESOGIP	Electricity Sector Operations and Governance Improvement Project
EU	European Union
FDTIC	ICT Development Fund / *Fonds pour le développement des technologies de l'information et de la communication*
FI	Financial Intermediary
FNED	*Fonds National de l'Energie Durable* / National Energy Fund
FY	Fiscal Year
GB	Gigabyte (measure of data)
GDP	Gross Domestic Product
GHG	GreenHouse Gases
GO	Gas Oil
GNI	Gross National Income
GoM	Government of Madagascar
GRID	Green, Resilient and Inclusive Development
GSMA	Global System for Mobile Communications Association
HFO	Heavy Fuel Oil
HHI	Herfindahl-Hirschman Index; a measure of market concentration
HLO	High-Level Objective
ICT	Information and Communication Technologies
IDA	International Development Association
IEG	Independent Evaluation Group

IFC	International Finance Corporation
IMF	International Monetary Fund
IPF	Investment Project Financing
IPP	Independent Power Producer
iRENALA	Research and Education Network for Academic and Learning Activities
IRG DPO	Inclusive and Resilient Growth Development Policy Operation
IRU	Indefeasible Rights of Use
JIRAMA	Jirosy Rano Malagasy (national electricity and water company)
kV	kiloVolts
LCDP	Least Cost Development Plan
LEAD	Least-Cost Electricity Access Development Project
LEO	Low Earth Orbit satellite
LIC DSF	Low-Income Country Debt Sustainability Framework
MEH	*Ministère de l'Energie et des Hydrocarbures* / Ministry of Energy and Hydrocarbons
MFD	Mobilizing Finance for Development
MFI	Micro Finance Institutions
MGA	Malagasy Ariary
MIGA	Multilateral Investment Guarantee Agency
MNDPT	Ministry of Digital Development, Digital Transformation, Posts and Telecommunications / *Ministère du développement Numérique, de la transformation Digitale, des Postes et des Télécommunications*
MSME	Micro, Small and Medium Enterprises
MPA	Multiphase Programmatic Approach
MTF	Multi-Tier Framework
MW	Mega Watts
NDP	National Development Plan
OBI	Open Budget Index
OGS	Off-grid solar
O&M	Operations and Maintenance
OMDF	Off-grid Market Development Fund
OMH	*Office Malgache des Hydrocarbures*/ Malagasy Hydrocarbons Office
OPEX	Operational Expenditure
PADAP	*Projet Agriculture Durable par une Approche Paysage* / Sustainable Landscape Management Project
PAEB	*Projet d'Appui à l'Education de Base* / Basic Education Project
PAYGO	Pay as you go
PBA	Performance Based Allocations
PBC	Performance Based Conditions
PCM	Private Capital Mobilization
PEM	*Plan Emergence Madagascar* / Madagascar Emergency Plan
PFM	Public Financial Management
PIC	*Pôle Integré de Croissance* / Integrated Growth Pole
PICOM	*Projet d'Infrastructures de Communication* / Communication Infrastructure Project)
POM	Project Operations Manual
PPA	Performance and Policy Actions

PPP	Public Private Partnership
PPSD	Project Procurement Strategy for Development
PRODIGY	Digital Governance and Identification Management System Project
PSC	Project Steering Committee
PV	Photovoltaic
PWD	Persons with Disabilities
RBF	Results Based Financing
SCADA	Supervisory control and data acquisition
SCI	Statistical Capacity Index
SDR	Special Drawing Right
SME	Small and Medium-Sized Enterprise
SMG	Scaling Mini-Grid
SML	Short-term Maturity Loan
SMP	Significant Market Power
SOE	State-Owned Enterprise
SSN	Social Safety Net
SUW	Scale Up Window
TA	Technical Assistance
WBG	World Bank Group
WiFi	Wireless Fidelity (networking standard)

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DATASHEET

BASIC INFORMATION

Country(ies)	Project Name	
Madagascar	Digital and Energy Connectivity for Inclusion in Madagascar Project	
Project ID	**Financing Instrument**	**Environmental and Social Risk Classification**
P178701	Investment Project Financing	Substantial

Financing & Implementation Modalities

[ ] Multiphase Programmatic Approach (MPA)	[✓] Contingent Emergency Response Component (CERC)
[ ] Series of Projects (SOP)	[ ] Fragile State(s)
[ ] Performance-Based Conditions (PBCs)	[ ] 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)	[✓] Hands-on Enhanced Implementation Support (HEIS)

Expected Approval Date	Expected Closing Date
30-Mar-2023	31-Mar-2028
Bank/IFC Collaboration	**Joint Level**
Yes	Complementary or Interdependent project requiring active coordination

Proposed Development Objective(s)

The Project Development Objective is to expand access to renewable energy and digital services in Madagascar.

Components

Component Name	Cost (US$, millions)
1. Expanding Energy and Digital Infrastructure	155.00
2. Enhancing Energy and Digital Inclusion	205.00
3. Supporting the Enabling Environment for Green Energy and Digital Infrastructure	20.00
4. Project Management and Implementation Support	20.00
5. Contingent Emergency Response Component	0.00

Organizations

Borrower:	Republic of Madagascar
Implementing Agency:	Ministry of Digital Development, Digital Transformation, Posts and Telecommunications (MDDDTPT) Ministry of Energy and Hydrocarbons (MEH)

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	400.00
Total Financing	400.00
of which IBRD/IDA	400.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	400.00
IDA Shorter Maturity Loan (SML)	400.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	SML Amount	Guarantee Amount	Total Amount
Madagascar	0.00	0.00	400.00	0.00	400.00

Scale-Up Window (SUW)	0.00	0.00	400.00	0.00	400.00
Total	**0.00**	**0.00**	**400.00**	**0.00**	**400.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2023	2024	2025	2026	2027	2028	2029
Annual	0.50	54.50	75.00	85.00	95.00	88.75	1.25
Cumulative	0.50	55.00	130.00	215.00	310.00	398.75	400.00

INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Digital Development

Climate Change and Disaster Screening

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

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	Substantial
2. Macroeconomic	Substantial
3. Sector Strategies and Policies	High
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	High
6. Fiduciary	Substantial
7. Environment and Social	Substantial
8. Stakeholders	Substantial
9. Other	Substantial
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

Environmental and Social Standards Relevance Given its Context at the Time of Appraisal

E & S Standards	Relevance
Assessment and Management of Environmental and Social Risks and Impacts	Relevant
Stakeholder Engagement and Information Disclosure	Relevant
Labor and Working Conditions	Relevant
Resource Efficiency and Pollution Prevention and Management	Relevant
Community Health and Safety	Relevant
Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Relevant
Biodiversity Conservation and Sustainable Management of Living Natural Resources	Relevant
Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	Not Currently Relevant
Cultural Heritage	Relevant
Financial Intermediaries	Relevant

NOTE: For further information regarding the World Bank's due diligence assessment of the Project's potential environmental and social risks and impacts, please refer to the Project's Appraisal Environmental and Social Review Summary (ESRS).

Legal Covenants

Sections and Description

Schedule 2. Section I.A. 8 of the FA : Prior to the carrying out of any activity under Part 1.2(a) of the Project, the

Recipient shall, no later than six (6) months after the Effective Date, or any later date agreed upon in writing with the Association, cause the FDTIC to have published an annual report and its accounts on its financing activities.

Sections and Description

Schedule 2. Section I.A. 8 of the FA : Prior to the carrying out of any activity under Part 1.2(a) of the Project, the Recipient shall, no later than six (6) months after the Effective Date, or any later date agreed upon in writing with the Association, cause ARTEC to have issued a draft directive on national roaming and concluded stakeholder consultations; both in a manner, form and substance satisfactory to the Association.

Sections and Description

Schedule 2. Section I.A.2 of the FA : The Recipient shall establish no later than three (3) months after the Effective Date, and thereafter maintain throughout Project implementation, a Project Steering Committee, with mandate, composition and resources acceptable to the Association and further set out in the Operations Manual, to be responsible for the strategic direction and general oversight of the Project and support for sectoral coordination.

Sections and Description

Schedule 2. Section I.A.3 of the FA: The Recipient shall establish no later than three (3) months after the Effective Date, and thereafter maintain throughout Project implementation, a Technical Committee for the Project, with mandate, composition and resources acceptable to the Association and further set out in the Operations Manual, to be responsible for providing technical support to the Project, including the review of audited financial statements and clearance of the Annual Work Plans and Budgets.

Sections and Description

Schedule 2. Section I.A. 4 of the FA. The Recipient shall establish no later than three (3) months after the Effective Date, and thereafter maintain throughout Project implementation, PCU under the oversight of both the Ministry of Energy and the Ministry of Digital and Telecoms and formally hosted within the Ministry of Energy, with terms of reference, resources, staffing satisfactory to the Association, as the PCU shall be staffed at all times during Project implementation with at least the following key staff: (a) a Project coordinator; (b) a deputy coordinator for energy; (c) a deputy coordinator for digital; (d) environmental and social specialists as listed in the ESCP; (e) a monitoring and evaluation specialist; (f) an off-grid specialist; (g) a procurement officer; all with terms of reference, qualifications and experience satisfactory to the Association.

Sections and Description

Schedule 2. Section I.A. 5 of the FA. Notwithstanding and without limitation to para. 4 immediately above and the ESCP, the Recipient shall: (a) recruit for the Project, (i) no later than three (3) months after the Effective Date, (A) a financial management specialist; (B)an accountant; and (C) an internal auditor; and (ii) no later than six (6) months after the Effective Date, an external auditor; all with terms of references, qualifications and experience satisfactory to the Association; and (b) acquire, customize and install, no later than three (3) months after the Effective Date, an accounting software, under modalities and specifications satisfactory to the Association.

Sections and Description

Schedule 2. Section I.A. 7 of the FA. For purposes of and prior to implementing results-based activities under Part 1.3 and 2.1 of the Project, the Recipient shall not later than six (6) months from the Effective Date, or any other date the Association may agree,appoint an independent verification agent, with qualifications, experience and under terms of reference acceptable to the Association, and in accordance with the Procurement Regulations.

Conditions

Type	Financing source	Description
Disbursement	IBRD/IDA	Schedule 2, Section III, B 1(b) of the FA: No withdrawal shall be made under Category (1), unless and until the Recipient have prepared the Operations Manual for the Project, in form and substance acceptable to the Association and in accordance with Section I.B. of Schedule 2 to this Agreement
Type	Financing source	Description
Disbursement	IBRD/IDA	Schedule 2, Section III, B 1(c) of the FA: No withdrawal shall be made under Category (3)(a) and (b), until and unless the Recipient has adopted the Commercial Transactions Manual in form and substance satisfactory to the Association
Type	Financing source	Description
Disbursement	IBRD/IDA	Schedule 2, Section III, B 1(d) of the FA: No withdrawal shall be made under Category (4)(a) and (b), until and unless the Recipient has: (i) adopted the Fund Manager Manual in form and substance satisfactory to the Association; (ii) recruited a Fund Manager in accordance with the Procurement Regulations, and based on terms of reference, experience and qualifications satisfactory to the Association; (iii) caused said Fund Manager to establish and operationalize an ESMS satisfactory to the Association, in accordance with the ESCP; and (iv) demonstrated to the satisfaction of the Association that said Fund Manager has arrangements in place in form and substance satisfactory to the Association, including acceptable governance, institutional and fiduciary capacity, operational guidelines and commercial and financial practices

I. STRATEGIC CONTEXT

A. Country Context

1. **Following a prolonged period of political instability and economic stagnation, Madagascar was on a modest growth trajectory prior to the COVID-19 pandemic.** The Gross Domestic Product (GDP) growth rate was estimated at 4.4 percent in 2019[1], the largest growth level in over a decade. The presidential elections in 2018 also marked the first democratic transfer of political power in Madagascar since the return to constitutional order in 2013. The peaceful political transition supported this modest economic revival as it restored investor confidence, reopened access to key export markets, reinstated flow of concessional financing, and encouraged structural reforms. Labor market conditions improved, and poverty declined, although about 79.4[2] percent of the population lived below the international poverty line of US$2.15 per day in 2019, significantly higher than the Sub-Saharan regional average of 41 percent.

2. **Madagascar has struggled to scale up economic opportunities even during periods of relative stability and remains exposed to frequent, deep, and persistent crises.** Low investment in physical and human capital, lack of structural transformation and entrenched low productivity combined with stalled structural reforms due to pervasive governance challenges are the most salient constraints to development. In addition, Madagascar is highly prone to frequent climatic shocks due to extreme climate change: river, urban, and coastal floods, along with landslides, cyclones, and wildfires[3]. The country suffered five cyclones in 2021. Together, these hazards have cost the country over US$1 billion in damages in the last 20 years and undermined the country's water supply, sanitary systems, health systems, food security, and infrastructure. Madagascar ranks 167 out of 182 in the Notre Dame Global Adaptation Index, indicating high vulnerability and low readiness to combat the effects of climate change.[4] These increasing weather-related hazards create significant adaptation needs in Madagascar, including on climate resilient infrastructures.

3. **A COVID-19-induced recession was the latest in a series of shocks to the country, which reversed previous economic growth gains**. A collapse in export revenues and private investment resulted in a contraction of GDP by 7.1 percent and of income per capita by 9.6 percent. An estimated 2.4 million people fell below the international poverty line in 2020. As a result, poverty rate reached an estimated record high of 81 percent in 2020.[5] This has been exacerbated by the impact of Russia's invasion of Ukraine which raised international oil prices, exerting fiscal and inflationary pressures on countries. This has stifled human capital accumulation, aggravated already fragile food systems and worsened the plight of the estimated 7-8 million people faced with chronic food insecurity in the country.

4. **Reduced economic activity among key trading partners of Madagascar is likely to continue.** This includes the deteriorated outlook of the European Union (EU), which absorbs 32 percent of the country's exports. The higher international oil prices are projected to contribute to a widening trade deficit as imports of refined petroleum products account for about 5.1 percent of GDP, even as the impact is expected to be mitigated by rising revenues from higher prices of nickel (whose exports account for an estimated 4.5 percent of GDP), cobalt, and gold.[6]

[1] Instat, World Bank, (2020).
[2] Macro Poverty Outlook, World Bank, 2022
[3] World Bank Climate Change Knowledge Portal, at: *https://climateknowledgeportal.worldbank.org/country/madagascar* and *https://thinkhazard.org/en/report/150-madagascar/FL*
[4] Notre Dame Global Adaptation Index, at : *https://gain.nd.edu/our-work/country-index/*
[5] World Bank (2022). *Madagascar Economic Update: Navigating Through the Storm.*
[6] World Bank (2022). *Madagascar Economic Update: Navigating Through the Storm.*.

5. **In 2021, the IMF approved a 40-month Extended Credit Facility arrangement with total access of SDR 219.96 million (about US$312.4 million equivalent), with SDR 122.2 million disbursed as of December 2022.** The financing package was designed to support Madagascar's economic recovery from the pandemic and reinvigorate the authorities' reform efforts to stimulate and sustain growth and reduce poverty. The second review of the program was completed by the IMF's Board in September 2022. Fiscal adjustment measures considered include inter alia increasing the fight against tax fraud and improving tax arrears collection, unwinding recent fiscal measures to offset the impact of rising inflation, strengthening social safety nets for most vulnerable households, reducing contingent liability risk through the financial recovery of *Jiro sy Rano Malagasy* (JIRAMA), the electric utility, reforming spending commitment authorization process and public investment management.

6. **Madagascar must increase its growth potential substantially and attract new investments in sectors that will help drive structural transformation to improve living standards and reduce poverty**. Reversing current trends and accelerating the pace of economic transition will require economy-wide and sector-specific reforms. This includes boosting "bright spots" in the economy, particularly in the ICT/digital sector, which has a large untapped potential to support structural transformation, including the technology-intensive Business Process Outsourcing (BPO) sector.[7] According to the 2020 Madagascar Country Economic Memorandum,[8] the BPO sector is contributing to job creation at the fastest pace, resilient to shocks and has significant linkages with other sectors of the economy. In addition, better access to infrastructure, including energy, will be key to the post-crisis recovery. It will accelerate structural transformation, improve the delivery and access to the basic services necessary for social and economic progress, while reducing popular grievances that fuel risks of instability. Emphasis needs to be placed on expanding opportunities for all groups of society, especially populations that are most at risk of exclusion, including women and youth. Empowering women and girls will be particularly important in supporting the demographic transition that is needed in rural settings where fertility rates remain high. Likewise, it will be essential to build human capital to foster sustainable economic development.

B. Sectoral and Institutional Context

7. **Access to infrastructure in Madagascar including electricity and digital are among the lowest in Sub-Saharan Africa and in the world**. Madagascar has a vast land area and population living in isolation along thin coastal plains and on rugged high plateaus. This has made it challenging to expand access to digital and energy services viably and evenly across the island. Decades of under-investment, poorly managed public infrastructures, underperforming State-Owned Enterprises (SOEs) and an inability to attract private investments due to lingering exclusivities and an unfinished reform/liberalization agenda, have led to insufficient and deteriorating infrastructure, which severely impairs the ability of the country to generate economic opportunities, especially in rural areas. Poor prioritization of projects and the impact of frequent natural disasters have further dilapidated infrastructure quality.

8. **Energy is an enabler of digital development and *vice versa***. Access to energy is necessary for mobile network providers to deploy and maintain their infrastructure and for individuals to charge their communication devices and thus fundamental to connecting individuals and businesses to the digital economy. Conversely, access to good-quality communications and broadband internet can enable electric utilities and private energy service providers to carry out their core activities more efficiently, e.g., by leveraging digital financial services and Pay-As-You-Go (PAYGO) solutions to

[7] Empower Africa. 2022. Top seven countries for Outsourcing in Sub-Saharan Africa, *https://empowerafrica.com/top-seven-countries-for-outsourcing-in-sub-saharan-africa/*.

[8] World Bank. 2020. *Madagascar Country Economic Memorandum: Scaling Success – Building a Resilient Economy*. *https://documents1.worldbank.org/curated/en/699781575279412305/pdf/Madagascar-Country-Economic-Memorandum-Scaling-Success-Building-a-Resilient-Economy.pdf*.

facilitate financial access to energy solutions such as Solar Home Systems. Furthermore, infrastructure sharing across the two sectors can enable lower cost of infrastructure deployment. Energy and digital together can improve access to basic services (health, education) and improve agriculture productivity in remote areas. A coordinated approach through the mutual deployment of energy and digital technologies can improve access to both services, while driving broader development outcomes.

Energy sector

9. **An estimated 33.7 percent of the population has access to electricity, compared to an average of 48.4 percent for Sub-Saharan Africa in 2020.**[9] Over 18 million people currently lack electricity access, placing Madagascar 13th in the list of countries with the largest unelectrified population worldwide. At the current pace of electrification, over 18 million people will still lack access by 2030, as electrification has not been able to outpace population growth. Some areas of the country are even experiencing a decline in the level of electrification. For those connected to the grid in larger urban centers, electricity service quality is poor, severely impairing key export-oriented industries. Frequent power outages and voltage fluctuations means that an average company outside the capital city loses almost a seventh of sales per year. There are also significant gender gaps in Madagascar for electricity access, among female-headed households, which represent 28.5 percent of all households in the country. Gaps were found to vary also depending on the region (urban or rural areas), wealth, and composition of the household. Specifically, the analysis identified that female-headed households have a disproportionally lower access to electricity in rural areas at 14.1 percent as compared to male-headed households at 18.5 percent. The gap persists but shrinks in urban areas with 66.4 percent of female-headed households versus 67.9 percent for male-headed households. However, the gap is even higher in certain geographical areas, with three of Madagascar's geographical departments presenting a gap above 10 percent.

10. **Electricity in Madagascar is provided by both public and private entities through grid, mini grid and off-grid solar technologies.** Public electricity service is provided by JIRAMA, the vertically integrated state-owned utility that services major population centers, as well as operating 95 isolated grids. In areas not served by JIRAMA, population are being served by private sector mini grids (including about 157 private sector mini grids, of which, 119 are fully operational) and multiple companies offering off-grid solar (OGS) systems. According to the latest energy access survey[10], which was carried out before the COVID-19 pandemic, only 14 percent households had access to the grid, while 22 percent households used off-grid solutions, such as solar kits and lanterns, as their primary source of electricity.

11. **The Government of Madagascar (GoM) is committed to expanding electricity access.** The commitment to expanding energy access is laid out in the New Energy Policy (NEP 2015-2030) and reinforced by the Plan Emergence Madagascar (PEM 2019 – 2023). The goal of the GoM's electrification policy is to increase electrification rates to at least 50 percent by 2025 through both grid and off-grid solutions. Electrification efforts are also closely linked to GoM's plans to reduce its greenhouse gas (GHG) emissions. According to its Nationally Determined Contributions (NDCs) submitted in 2016, Madagascar aims to reduce approximately 30 $MtCO_2$ of GHG emissions, representing 14 percent of national emissions compared to the Business-as-usual scenario.[11] It intends to achieve this by facilitating access to energy, strengthening existing systems and promoting renewable and alternative energies, in particular increasing share of hydro and solar in the generation mix from 35 to 79 percent by 2030.

[9] World Bank Development Indicators, Access to Electricity as a percentage of the populations, at: https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2020&most_recent_value_desc=false&start=1996&view=chart
[10] World Bank Energy Access Survey, Multi-Tier Survey, carried out in 2020
[11] With projections based on GHG inventory from year 2000 to 2010. Madagascar's GHG emissions are about 0.2 percent of global emissions.

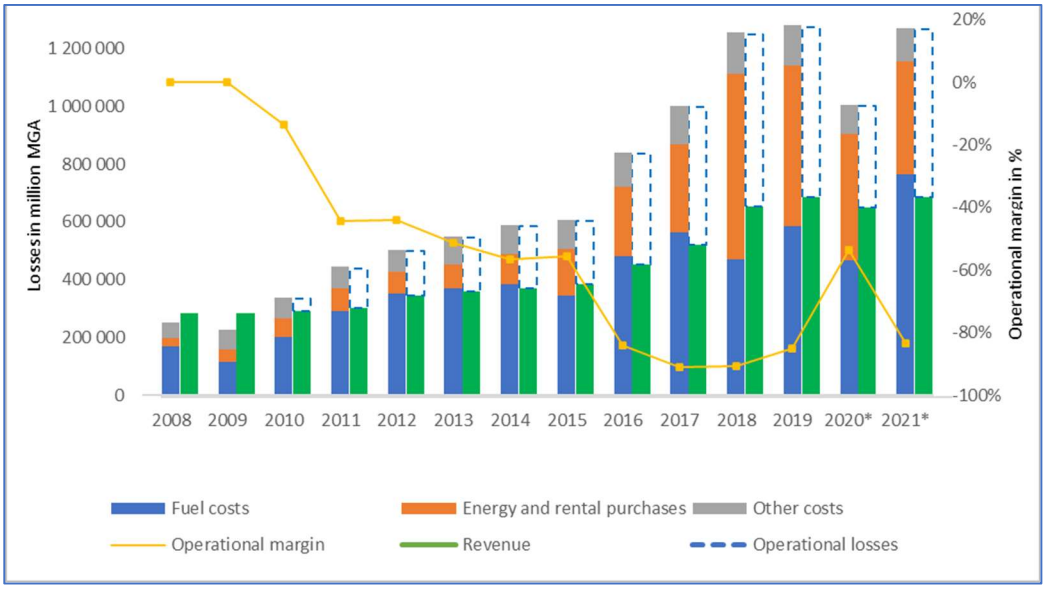
12. **Institutional structure for energy sector development is in place, but multiple policy, legal, governance and capacity challenges are constraining progress.** The Ministry of Energy and Hydrocarbons (*Ministère de l'Energie et des Hydrocarbures*, MEH) sets government policy, provides strategic coordination of the energy sector and oversees JIRAMA's electricity sector activities. The regulatory function is performed by the Electricity Sector Regulator (*Autorité de Regulation de l'Electricité*, ARELEC). ARELEC was established by the Electricity Code as a legal entity with financial autonomy that specializes in technical, consultative, and executive matters of the electricity sector. In practice, however, ARELEC has struggled to assert its independence. According to the law, ARELEC has the mandate to: (i) establish technical regulations; (ii) set and publish regulated electricity prices and tariffs and monitor their application; (iii) monitor compliance with quality-of-service standards as well as the Grid Code; (iv) carry out or commission specific audits, surveys and investigations on the electricity sector; and (v) promote transparency and competition in the electricity sector. ARELEC, however, faces obstacles in fulfilling its mandate as the decree outlining the specific procedures of the Electricity Code with regards to ARELEC's mandate has not been adopted for more than four years. Also, the existing regulation related to tariffs is outdated.

13. **JIRAMA is facing a precarious financial situation as well as governance and operational challenges**. JIRAMA owns and operates most of the country's grid infrastructure, responsible for distribution, transmission, and roughly half of the generation. JIRAMA provides grid-based electricity in three larger networks covering the major urban centers of Antananarivo, Toamasina, and Fianarantsoa. Private sector companies supply power to JIRAMA through power purchase agreements and rental agreements. The installed generation capacity of JIRAMA in 2021 was estimated at 672 MW, of which 210.6 MW is owned by JIRAMA and 461.4 MW is managed by the private sector. The 2022 energy mix in terms of generation capacity installed is composed of 60 percent of thermal assets.[12] JIRAMA also owns and operates 95 isolated grids spread over the whole Madagascar territory. They are made up of distribution networks with voltage levels of up to 20 kV and are generally powered by diesel fuel.

14. **JIRAMA's financial health has significantly worsened over the past decade**. Between 2008 and 2021, electricity tariffs fell from US$0.20 per kilowatt hour (kWh) to US$0.13 per kWh in nominal terms while the financial cost of service increased from US$0.17 per kWh to US$0.24 per kWh as the share of thermal power production increased from 15 percent to over 45 percent. The impact of Russia's invasion of Ukraine and related fuel price increases have worsened the situation with an average cost increase for JIRAMA of 45 percent between 2021 and 2022. This resulted in JIRAMA's cost recovery rate falling from 118 percent in 2008 to 60 percent in 2021, with its operating margin declining from 14 percent in 2008 to minus 39 percent in 2021 (Figure 1). Significant Government transfers, amounting to US$600 million between 2016 and 2021,[13] did not manage to close the cash flow gap and JIRAMA has accumulated arrears to suppliers over the years amounting to US$486 million as at the end of 2021. JIRAMA's financial situation is affecting its ability to increase connections and expand grids. In its current situation, JIRAMA struggles to maintain its existing infrastructure, with system losses reaching 27 percent, and has little ability and incentives to invest in new connections. Consequently, grid electrification has stalled.

[12] JIRAMA Financial model version dated 24.04.2022
[13] JIRAMA and MEF data aggregated by World Bank Task Team

Figure 1: Evolution of JIRAMA's Operational Losses and Margin



15. **GoM has initiated several targeted energy sector reforms to improve the financial situation of JIRAMA and reduce fiscal risks, including with support from the IMF program.** In July 2022, JIRAMA adopted a new tariff schedule for its industrial customers (Optima Business) after the first reform in 2021, which revised tariffs for low voltage customers and increased the company's revenues by 20 percent. The industrial tariff reform has already reduced the sector's budget deficit by approximately US$13 million as of end of 2022. As part of the program, JIRAMA must also finalize a realistic business plan for the next five years, taking into account revenue protection actions such as replacement of current meters with prepaid meters, hybridization of isolated centers, and decentralization of some regional agencies.

16. **Hybridization of JIRAMA's isolated grids is ongoing but progress has been slow.** JIRAMA manages the operation of 95 isolated grids spread throughout the island, representing a total capacity generation of about 116MW and consisting mainly of costly diesel power plants. Out of the 95 isolated grids, 38 with a total capacity of 6.3MW are owned and operated by JIRAMA, 42 (with a capacity of 48.2MW) are owned by JIRAMA but operated by the private sector and the generation assets of the remaining 15 isolated grids (62.1MW) are jointly managed by JIRAMA and private sector. Consumption in isolated grids currently accounts for around 20 percent of the country's total electricity consumption. To reduce its production costs and its dependence on hydrocarbons, JIRAMA started hybridizing these isolated grids with renewable energy (mainly solar photovoltaic-PV) in 2018. A total of 45 sites have been prioritized, but to-date only 9 of these projects have been completed and 10 are in progress. The delays are due to the difficulties in signing purchase contracts due to the lack of capacity and experience on the JIRAMA side. Indeed, no feasibility studies had been carried out at the time of the launch of tenders and there is a lack of transparency in selection procedures. In 2022, with its own internal resources, the Ministry has launched a call for tenders for the hybridization of 36 JIRAMA isolated centers. Evaluations are underway and work is scheduled to begin in December 2023.

17. **In addition to the supply-side electrification barriers, high connection costs, which range between US$240 to US$420 per connection in urban and peri-urban areas, are also constraining access**. The government and JIRAMA have initiated steps to address the issue. For example, a new connection policy was adopted that foresees that the poorest customer segment would pay US$7-US$10 for a connection including wiring kit, and a monthly bill of between US$2-US$3, including the meter rental costs. However, this only covers the service drops and does not include poles for which customers are still charged the full price. Further, JIRAMA has little financial incentive to add large numbers of mostly low

consuming customers in low-tariff categories nor to regularize households with informal, shared connections provided by so-called “meter lords” as consumption of none-regularized households tends to place them in a higher residential tariff category due to the shared connection.

18. **The Rural Electrification Agency *(Agence de Développement de l'Electrification Rurale, ADER)* is responsible for rural electrification, but faces financing, institutional and capacity constraints.** ADER’s mandate covers grid, mini grid and off-grid solar electrification, but ADER has so far focused only on mini grids, being severely underfunded. Its anticipated source of funding through a sector levy for the *Fonds National de l’Electricité* (National Electricity Fund) has not materialized, resulting in ADER’s over-reliance on donor funding, which can be sporadic and unpredictable. As a result, ADER is understaffed, with only 28 staff to carry out planning, promotion, feasibility studies, tendering, financing, providing TA and monitoring of mini grids, which are geographically spread out in remote rural locations. Many technical skills needed for these tasks are lacking. As a result, there has been a lack of consistency in the support to mini grids, with small and fragmented donor projects, inconsistent subsidy amounts, varied capacities of mini grid operators, and resulting varied sustainability outcomes.

19. **Despite these challenges, since its creation in 2004, ADER has managed to finance about 157 private sector mini grids in 400 localities, in addition to a number of privately funded mini grids in existence, making Madagascar as one of the most active mini grid markets in Sub Saharan Africa.** ADER has gradually shifted its support from diesel to renewable energy mini grids, with 57 percent of mini grids now being powered by renewable energy. Some of the mini grids are top class, providing 24/7 electricity service and additional support to their customers such as to develop productive uses. Many of these mini grids, however, face operational challenges due to faulty planning, access to finance issues and inadequate capacity of operators. Revenues are typically constrained due to low affordability levels of target populations. About one third of mini grids financed by ADER are no longer operational (or just barely operational) due to : (i) the ability to pay of the customers; (ii) difficulty of providing maintenance due to remoteness of villages; (iii) financial capacity of companies and their ability to raise debt and grant financing to sustain operation; (iv) intermittency of the resource (climate-related hydro variability or biomass availability); (v) high cost of fuel and operating costs; and (vi) none payment of customers due to their dissatisfaction with the service.

20. **Madagascar has a promising emerging off-grid solar market, but the market is constrained by low affordability.** Over the last decade, off-grid solar systems have started to fill in the gap in electricity access, becoming a primary source of electricity for 22 percent of unelectrified population. Tillrecently, however, there has not been any systematic support from the Government for off-grid solar systems, resulting in a market dominated by small solar kits and lanterns (below Tier 1) of primarily low quality. In 2020, the GoM, with the support of the Least-Cost Electricity Access Development Project (LEAD, P163870) launched the Off-grid Market Development Fund (OMDF) as a principal entity to drive off-grid market development. OMDF, managed by a fund manager, offers two packages for distributors: (i) a grant in the form of results-based financing; and (ii) a working capital loan. An Independent Verification Agent ensures the actual verification of sales made by distributors. A total of 11 companies are currently benefiting from results-based grants. Three companies and one microfinance institution have received a loan from OMDF. Overall sales of quality-verified off-grid solar systems have nearly tripled between 2020 and 2022, having reached over 50 thousand in the first half of 2022, and continue rising, primarily for entry level solar home systems (Tier 1) sold through pay-as-you-go (PAYGO) business model. Sales have however, concentrated primarily on more affluent urban and peri-urban households. Affordability has been identified as the major obstacle for OMDF expansion into rural areas. A SE4ALL study has found that only 60 percent of people in Madagascar can pay more than US$3 for electricity, and only 20 percent can pay more than US$7.50[14]. Considering the high level of poverty of the population, about 79.4 percent of the population lived below the poverty line, 33 percent access to electricity, and the low average per capita consumption of electricity (61 kWh), which is 1.9 percent of the world

[14] Taking the pulse of energy access in Madagascar. 2019

average (3,265 kWh) and 11 percent of that of Africa (560 kWh) per capita, this means that it is important to support end-users in order to allow for the scaling up of electrification in Madagascar. Consequently, OMDF is designing a pilot for end-user subsidies, which will be implemented in the next 18 months.

21. **The World Bank has been supporting GoM in its efforts to expand energy access and improve energy sector sustainability through two investment operations, as well as policy dialogue, in close coordination with the IMF.** The policy dialogue has been concentrating on improving financial performance of JIRAMA, strengthening energy sector governance structures and unlocking policy and regulatory bottlenecks to support least-cost and low-carbon generation expansion. On the investment side, the World Bank-funded Electricity Sector Operations and Governance Improvement Project (ESOGIP, P151785) and Least-Cost Electricity Access Development Project (LEAD, P163870) have built foundations for the energy access scale up efforts to be supported by the Digital and Energy Connectivity for Inclusion in Madagascar (DECIM) project and generated valuable lessons that are being integrated in the project design.

22. **The LEAD project (P163870), approved in 2019, is the main vehicle for the first phase of the NEP,** supporting: (i) cost-effective, priority investments in grid extension and densification; (ii) development of an off-grid market based on the sale of solar kits, providing working capital and Results-Based Financing (RBF) to eligible off-grid solar providers and financial institutions; (iii) off-grid electrification of health facilities; as well as (iv) technical assistance. LEAD does not include investments in mini grids, which has up to now been supported by other development partners, including *Gesellschaft für Internationale Zusammenarbeit* (German Society for International Co-operation, GIZ), *Agence Francaise de Developpement* (French Development Agency, AFD), *Kreditanstalt für Wiederaufbau* (Credit Institute for Reconstruction, KfW), European Investment Bank (EIB) and African Development Bank (AFDB). ESOGIP and LEAD projects have also financed data analytics and studies underpinning the NEP, informing the design and strategy of national electrification, including: (a) the Least Cost Development Plan (LCDP) to guide decision making in power generation and distribution; (ii) geospatial planning tools, which have enabled the identification of least-cost technology solutions for electrification; and (iii) an off-grid market assessment that mapped out areas that could be served by off-grid solutions as well as delivery mechanisms based on market size, risk assessment and regulatory framework. Furthermore, the World Bank, with support from the Energy Sector Management Assistance Program (ESMAP), has launched the Global Survey on Energy Access, using the Multi-Tier Framework (MTF)[15] approach. The survey's objective is to provide more nuanced data on energy access, including access to electricity and cooking solutions. This survey has established a baseline for electrification situation in Madagascar and provided detailed demand-side data, including grid and off-grid access, alternatives used by unelectrified population, expenditures, key barriers, and willingness to pay.

23. **Universal electricity access in Madagascar can only be achieved if grid, mini grid and off-grid solar electrification are all significantly accelerated.** Grid electricity continues to be the least cost technology in urban and peri-urban areas, with a significant densification potential in particular in the central and northern parts of the country, where grid is currently serving major population centers in the Antananarivo, Fianarantsoa, and Toamasina areas, and undergoing expansion in Mahajanga, Antsiranana, Nosy Be, and Sambava. Given Madagascar's population patterns, the majority of unelectrified population is likely to require off-grid solutions. Based on the geospatial analysis, about 50 percent of new connections identified in the NEP would be best served by off-grid solar technologies. The potential for mini grids also

[15] The multi-tier framework (MTF) approach redefines energy access to fill the gaps in the Global Tracking Framework binary access measurement. It acknowledges that access is a spectrum of service levels experienced by households. The Framework was developed by the World Bank acting in the role of the SE4ALL Knowledge Hub, with the support of the Energy Sector Management Assistance Program, in partnership and thorough consultations with multiple SE4ALL stakeholders. The MTF survey provides detailed energy data at the household level for governments, development partners, the private sector, nongovernmental organizations, investors, and service providers. The survey started on 2019 and its final report published in 2022. Madagascar - Beyond connections: Energy Access Diagnostic Report Based on the Multi-Tier Framework, World Bank Group, ESMAP, SE4All, 2022

remains significant. In addition to 95 isolated grids served by JIRAMA and 400 localities already served by more than 150 private sector mini grids, the geospatial analysis has identified potential for 146 hydro and 3,819 solar PV mini grids.

24. **Accelerated energy access expansion is only possible if the current institutional, sustainability and affordability constraints are overcome. Based on the lessons from ESOGIP, LEAD and ADER's mini grid development, this will require:**

- Improving JIRAMA's financial situation. Major expansion in energy access is not possible without first addressing JIRAMA's financial viability. In the current conditions, JIRAMA lacks both capacity and incentives to increase connections and expand grids.
- Professionalizing mini grid development, building a national platform that would move away from the current piecemeal effort and drive scale through adequate planning, feasibility studies, transaction advice, mobilization of adequate public and private financing, and attracting capable mini grid developers.
- Addressing affordability and social inclusion in grid, mini grid and off-grid electrification, including : (i) ensuring affordable connection fees for JIRAMA's low-income users and incentives for JIRAMA to connect low-income households, (ii) building sustainable financial packages for mini grids that would match financial viability for mini grid developers with affordability for end-users; and (iii) deploying end user subsidies to make off-grid solar systems more affordable for low-income/rural population.
- The nascent off-grid solar and mini grid market in Madagascar requires both grant and debt financing. Grant financing is needed to test innovative approaches, help companies to expand to new regions and to fill the affordability gap. Debt financing incentivizes business mentality, efficiency, and contributes better to building sustainable markets. Experience from LEAD has demonstrated that there is demand for both grants and loans from qualified companies. Their combined use has led to the off-grid market acceleration.
- Addressing sustainability in electrification of public institutions by: (i) collecting better data on beneficiary institutions; (ii) adopting a robust quality assurance framework; and (iii) developing sustainable operations and maintenance (O&M) arrangements.

25. **Based on these considerations, the DECIM project will focus on scaling up decentralized renewable energy solutions**, such as mini grids and off-grid solar systems, with the aim to mobilize private sector, while addressing affordability barriers of target populations and sustainability challenges of past interventions, particularly in mini grids, off-grid solar systems and electrification of health care centers and schools. It will not support grid expansion but focus on deepening the current support for improving JIRAMA's financial performance through Technical Assistance (TA) and mini grid hybridization, building foundations for more significant grid scale up in the future. By accelerating off-grid solar markets, demonstrating mini grids at scale, and addressing barriers constraining grid electrification, the DECIM project will set foundations for an accelerated pathway for achieving universal electricity access in Madagascar.

26. **Considering the project's potential to scale up distributed renewable energy through private sector engagement, Madagascar was included among the priority countries for the World Bank Group Distributed Access with Renewable Energy Scale-up (DARES) platform,** which was launched at COP27 and aims to leverage private sector investment through joint World Bank Group and other development agencies collaboration and innovation to deliver energy access with distributed renewable energy technologies, such as mini grids and off-grid solar systems, to 100 million people, as well as farmers, businesses, schools, and health clinics. Discussions are under way with the International Finance Corporation (IFC) and the Multilateral Investment Guarantee Agency (MIGA) to explore collaboration on scaling mini grids and piloting a model for sustainable electrification of public institutions in Madagascar.

Digital sector

27. **Despite progress in recent years, Madagascar ranks relatively low in terms of connectivity and accessibility of broadband services**. Internet usage is increasing, reaching some 22 percent of the population in 2021, up from just 5.1 percent in 2016.[16] However, this penetration rate remains one of the lowest in the world and is notably well below the 33 percent regional average for Sub-Saharan Africa. Fixed broadband penetration, which is particularly important for businesses and government, stands at just 0.6 percent in the country.

28. **Madagascar is marked by significant digital divides, along socio-economic, gender and urban-rural lines, which can further widen inequalities**. Digital exclusion is primarily an issue of poverty and socioeconomic factors. Women, the elderly, those who live in rural areas, those who have lower levels of income or education and other vulnerable groups, including persons with disabilities, are less likely to use the internet. Access to broadband internet is mainly from urban areas, and there is a very large digital divide between Antananarivo, the capital, and the rest of the country. For example, some 27.1 percent of the population in urban areas report using internet services regularly (i.e., at least once a week), compared to only 5.4 percent in rural areas.[17] Gender gaps are also reflected in mobile ownership and internet access: 50 percent of men report owning a mobile phone, compared to 43.6 percent of women,[18] and men are 12 percent more likely to access the internet than women.[19]

29. **The GoM has put ICT at the heart of its 2018 development strategy, "*Madagascar's Emergence Initiative*"**. The 2018 strategy identifies the development of Information Communications Technology (ICT) as one of its six priority sectors for economic growth. The promotion of the digital economy is also one of the flagship projects of the *Plan Emergence Madagascar* (PEM 2019 – 2023) in line with the second ''*Velirano*'' (commitment) around the modernization of Madagascar, with the expected impacts of accelerated growth through the emergence of a dynamic ICT sector, the creation of more than 20,000 private sector jobs and the development of human capital through digital technologies. Dedicated priority projects include: (i) completing the legal framework and strengthening the regulation of the telecommunications sector to establish an environment conducive to the development of infrastructure, the introduction of new technologies, improved access, lower tariffs, and the emergence of innovative services, (ii) improving public access through free Wi-Fi hotspots, and (iii) strengthening digital training programs. The GoM is also committed to strengthen government capacity to deliver public services through digitization, which requires improving connectivity of public institutions.

30. **The main agencies in charge of promoting the expansion of digital infrastructure and digital adoption are longstanding, but the institutional environment remains marked by weak governance and capacity challenges.**

- The Ministry of Digital Development, Digital Transformation, Posts and Telecommunications (*Ministère du développement Numérique, de la transformation Digitale, des Postes et des Télécommunications*, MNDPT), has a mandate to guide, coordinate and implement the Government's policy on the telecommunications and ICT sub-sectors, and to guarantee access to ICT for all by developing the telecommunication infrastructure networks and fostering adoption of ICTs.
- The Regulatory Authority for Communication Technologies (*Autorité de Régulation des Technologies de Communication*, ARTEC), under the aegis of MNDPT, has responsibilities, amongst others, for licensing, proposing policies, managing scarce resources, consumer protection and ensuring fair competition. While admittedly, the

[16] "Unique" mobile-broadband subscriptions per 100 inhabitants as reported in GSMA Mobile Broadband Capable Connections / GSMA SIMs Per Unique Subscriber (Feb 2021) / United Nations Population (2020).
[17] Afro barometer Surveys, 2018.
[18] *Ibid*.
[19] Digital Gender Gaps monthly report for July 2022, accessed on January 20, 2023. See *https://www.digitalgendergaps.org/monthly*

legal framework provides guarantees for the independence of the regulator, in practice the ARTEC lacks independence. Its powers are also relatively weak as it cannot effectively control the activity of operators and use sanctions when they fail to respect their obligations, or in the case of anti-competitive practices.

- The ICT Development Fund (*Fonds pour le Développement des Technologies de l'Information et de la Communication*, FDTIC) has the mandate to improve both digital connectivity and adoption. Despite having been created in 1996, the body in charge of managing the Fund has never been established. In the absence of an appropriate structure, ARTEC plays the role of cashier, responsible for collecting the operators' contributions to the Fund and paying the expenses financed by the Fund, while the Minister in charge of ICT authorizes the commitments. The poor governance and performance of the FDTIC to date have limited its impact in rural areas[20].
- The Digital Government Unit (DGU, under the joint supervision of the Presidency and the MNDPT) is mandated to (i) design and implement digital public services; (ii) simplify and dematerialize administrative procedures; (iii) strengthen the state's digital skills; and (iv) promote digital tools and the development of their use by citizens. Although a nascent institution, the DGU is growing in terms of its capacity to support the implementation of the government's strategic digitization reforms and programs.

31. **While large investments have been made in submarine cables, gaps remain in middle and last mile connectivity**. While three operators (Telma, Orange, Airtel) compete on mobile services, the level of competition in some segments remains limited,[21] with a *de jure* monopoly for fixed services, a *de facto* monopoly for the backbone infrastructure, and a duopoly for international infrastructure. The country is relatively well served in terms of international connectivity, with three international submarine cables in use, three geographically dispersed landing stations, and a fourth planned.[22] For the middle mile, the incumbent operator, Telma, is responsible for most of Madagascar's core network but has only around 10,000km of fiber cables. The country's backbone network remains expensive, in part because of Telma's exclusivity in this segment for many years and its current dominant position. For the last mile, mobile broadband coverage is incomplete, with 4G mobile signal covering only 67 percent of the population in 2022. Remote and rural areas suffer from persistent market failures from an economic point of view, i.e., private operators do not consider investing in these areas for fear of not being profitable enough, due to high costs for infrastructure deployment and maintenance, and lower levels of income and weak consumer demand. Therefore, significant investments would be required to expand last-mile connectivity in rural, and remote areas.

32. **While a coverage gap still persists, the bigger problem is the very large usage gap, which prevents widespread access to broadband, due to a combination of supply-side and demand-side constraints.** Around 72 percent of those covered by broadband networks, or around 15.5 million people,[23] do not appear to be using broadband services. This usage gap is higher than in comparable low-income economies in Africa.[24] It highlights the existence of underlying factors, in addition to the unavailability of the network, that are hindering people from using the internet, for instance the gender gap in smartphone ownership and digital skills. On the demand side, the key constraint is the unaffordability of services and devices for most of the population, exacerbated by low purchasing power. While the price of mobile cellular and

[20] Not only has FDTIC's lack of performance limited its ability to disburse funds for rural connectivity projects, but the Fund has had a negative impact on market competition. Indeed, the Fund does not benefit all operators in the telecommunications market, although they all contribute to it. In practice, only one operator, Telma, has benefited from the Fund to date.

[21] The standard measure of market dominance, the Herfindahl-Hirschmann Index, has risen in Madagascar over the last decade, from 3,410 in 2012 to 3,517 in 2021, which indicates that the market liberalization measures have been ineffective in promoting more competition in the telecoms market.

[22] For two of the cables, EASSy and METISS, Telma, the former incumbent, is a landing party, while Orange is a landing party for LION. Additional upgrades to the international connectivity are expected from at least one additional cable, 2Africa, in 2023. But the lack of open access cables, and the effective duopoly of Telma and Orange, reduces scope for price competition.

[23] Author calculations, based on GSMA data, 2021.

[24] World Bank. 2021 *World Development Report: Data for better lives*

mobile broadband baskets has fallen significantly since 2016, these services remain too expensive for a large portion of the population. Madagascar stands at 110th out of 233 countries and territories for mobile broadband prices with an average monthly price of US$1.52 for 1 GB of data in 2022[25], equivalent to 3.5 percent of GNI per capita. This compares unfavorably with the generally accepted threshold target of below 2 percent, adopted by the UN Broadband Commission. Mobile devices are similarly unaffordable for a large part of the population. The cheapest smartphone costs 87 percent of the average monthly income and even the cheapest feature phone costs 28 percent.[26] As a consequence, only about a third of households possess a mobile phone, and fewer than two fifths of these are smartphones. The unaffordable price of devices is also partly due to high taxes and duties on ICT equipment. Overall, while low income, demographics and coverage limitations partly explain the underperformance in absolute terms, lack of affordability explains much of Madagascar's failings relative to regional peers with similar characteristics.[27] These issues are reinforced by low levels of literacy and digital skills, as well as the low perceived value of services in part due to the lack of relevant, local language content.

33. **On the supply side, the main bottlenecks to further telecom sector growth include a lack of sectoral competition, important legal and regulatory gaps and a relatively weak regulatory authority, which results in distorted competition while the level of competition has not significantly increased**. A Telecom Law adopted in 2005, in parallel with Telma's privatization, allowed for opening the market after a short exclusivity period. Yet, 17 years later, only slow progress has been made towards full liberalization. Analysis of the current regulations show that they are slowing down the opening up to competition and that they are not adapted to recent technological changes. For instance, the class licensing regime does not allow all operators to carry out the same activities on an equal footing.[28] These issues impact the entire broadband value chain and sector development. In particular, the lack of regulation of high wholesale tariffs by the regulator, despite Telma's effective control over the optical fiber backbone, has restricted access to the backbone and international bandwidth by other providers and deterred investment in network expansion. Likewise, the lack of regulation of interconnection tariffs results in significant differences between on-net and off-net tariffs further contributing to club effects and the dominance of Telma. One manifestation of these weaknesses is the high prices and limited affordability, noted above.

34. **Following the closure of the Madagascar Communications Infrastructure Project (CIP3, P094103)[29] in 2015, the World Bank has been supporting the GoM in its efforts to develop the telecommunications sector through policy dialogue and technical assistance**. In particular, an in-depth review of the legal and regulatory framework has been commissioned with financing from the Digital Governance and Identification Management System Project (PRODIGY, P169413), with a view towards modernizing the current regulations in the service of greater competition in the sector so that all operators can compete on a level playing field. Funding from the Digital Development Partnership Trust Fund will also be leveraged to strengthen the technical capacity of ARTEC for it to become a stronger and more credible regulatory body. The GoM has recently indicated its willingness to initiate critical reforms in the sector, which should improve the operational environment for this project. These include passing a ministerial order fixing backbone price caps and two decrees relating to licensing, and access to and use of networks.[30] The President of the Republic has also called for a revision to the Telecommunications Law.

35. **Based on past efforts, the DECIM project will propose a flexible approach to expand digital access and interventions adapted to the enabling regulatory environment in place.** Initially, CIP3 was supposed to support the

[25] Data collected by Cable.co.uk; data for April 2022.
[26] Alliance for Affordable Internet, 2021.
[27] Salience Consulting for IFC. 2021 *Digital Infrastructure Deep Dive in Madagascar*.
[28] Other issues include the regime for scarce resources is incomplete and their management lacks transparency and is not very equitable and dynamic; and the regulation is inadequate with regard to interconnection tariffs, as well as tariffs for access to international and national bandwidth.
[29] CIP3 was part of the First Phase for the Regional Communications Infrastructure Program, approved by the World Bank board in March 2007.
[30] The ministerial order setting price caps for the use of the backbone network, was adopted on February 8, 2023.

development of a national and regional backhaul and backbone infrastructure. However, due to the difficulty of passing policy reforms (notably the liberalization of capacity resale, which was an essential preliminary condition for the success of the backbone), the project had to be restructured to focus on the rollout of a "passive" infrastructure to extend mobile services to underserved areas. Years later, while a dynamic trajectory has been initiated towards reforms, the market structure of the backbone is still not conducive to donor support in the absence of the required reforms. Therefore, DECIM proposes to focus on the last-mile segment, while providing support for accelerating the reform agenda. This will build foundations for support across the entire value chain in the future, including through additional financing for backbone extension if corresponding reforms are enacted. Recognizing the need to also address the usage gap, the project will support digital inclusion initiatives around digital device affordability and digital literacy to spur demand for digital services.

C. Relevance to Higher Level Objectives

36. **The Digital and Energy Connectivity for Inclusion in Madagascar (DECIM) project is aligned with the World Bank Group goals of boosting shared prosperity and reducing poverty, and the new Madagascar Country Partnership Framework (CPF) FY23-FY27**, currently under preparation, which focuses on the role of infrastructure (both physical and digital) in boosting productivity, connecting people to markets, and improving living conditions and access to services. The first High-Level Outcome (HLO) ''*Improved economic opportunities'',* will focus on growing the pie in an inclusive and green manner and taking a chance on a few sectors to push for structural transformation, including energy and telecom/digital. The CPF envisions concentrated interventions targeting these sectors supported by selected reforms with potential for creating jobs and driving growth but doing so in a manner that limits elite capture. The project is aligned with the Africa Region strategy (2019-2023), through creating jobs and transforming economies, building up the digital economy and making institutions more efficient and accountable. The project will support AFE's regional priority of reaching universal access to electricity in the region by 2030, and also its immediate target: double the pace of access expansion through a scale-up of successful country based access programs and by leveraging distributed renewable energy between now and 2026, while supporting climate, food security and human capital goals.

37. **The project will support both the World Bank's Green, Resilient and Inclusive Development (GRID) approach and the Global Crisis Response Framework (GCRF).**

- **First, the project will accelerate economic growth that goes hand in hand with social inclusion.** Electricity connections will create new opportunities for study and work, particularly in rural areas, contributing to raising the quality of life, improving safety at night, improving agricultural productivity and stimulating off-farm activity. They will also enable setting up new enterprises, resulting in job creation, including in rural areas. Increased adoption of broadband internet will increase productivity, lower transaction costs, support the optimization of supply chains, and enable innovation and entrepreneurship, with businesses and individuals using the internet to create new applications and services in areas such as ecommerce, digital trade and financial services.[31]
- **Second, it will support climate change adaptation and mitigation, in line with the World Bank Group Climate Change Action Plan 2021-2025 and the Paris Agreement.** The energy sector and to a lesser extent the digital sector are major generators of GHG, but equally they can both be part of the solution for climate change mitigation. Transitioning towards economy-wide digital transformation, supported by accelerated energy access, will drive greater resilience and adaptation with enhanced and uninterrupted access to basic services and public assistance in times of emergency, continuity of critical communications and commerce and supporting a transition away from natural resource intensive and climatically vulnerable sources of growth and job creation. Renewable energy sources can significantly help to reduce GHG emissions and achieve climate change mitigation. Likewise,

[31] World Bank. 2016. *World Development Report: Digital Dividends*

greater use of digital technologies can substitute for the physical movement of people and goods, hence reducing GHG emissions. Technologies to be adopted in the project will be climate-resilient and energy efficient.

- **Third, it will positively impact Madagascar's resilience and crisis response capacity in the context of important risks on global supply chains (including energy and food).** Providing energy access to communities can mitigate adverse climate impacts, such as by powering cooling appliances and improving food security through solar irrigation and cold chain. On the digital side, DECIM will contribute to building back better by increasing the reliability of connectivity, which is critical for mitigating economic slowdowns, sustaining wellbeing, and speeding up recovery in times of crisis as evidenced during the COVID-19 pandemic. The project focuses mainly on Pillar 3 "*Strengthening Resilience*" and Pillar 4 "*Strengthening Policies, Institutions and Investments for Rebuilding Better*" of the GCRF.

38. **The project is aligned with the World Bank's Gender Strategy (2016-2023) through its focus on improving women's economic empowerment thanks to better access to energy and digital services.** Proposed interventions address key barriers of access, affordability as well as skills attainment and support the strategic objectives of: (i) improving human capital endowments (e.g., by building digital skills among women); (ii) removing constraints to more and better jobs (e.g., by contributing to the reduction of gender gaps in energy and digital access, by engaging in outreach activities that increase women's access to digital services, technologies, and markets, etc.), and (iii) removing barriers to women's ownership and control of assets (by increasing women's access to solar kits and digital devices). Global studies indicate that access to digital technology and internet, in particular, may enhance women's ability to find employment and access markets, communicate more efficiently with their clients / contractors and find an additional income source[32].

39. **The project is also aligned with the recommendations of the Madagascar Country Private Sector Diagnostic (CPSD),[33] with the view to Mobilizing Finance for Development (MFD) and Private Capital Mobilization (PCM) where applicable.** The project will leverage public funding to directly catalyze private sector investment to expand energy and digital access in rural areas, through provision of grants and smart subsidies to the private sector or in response to government stimulated demand for services, effectively delivering PCM. The project will leverage pragmatic collaboration with IFC and MIGA where appropriate, for example by deploying the World Bank Group Scaling Mini Grids (SMG)[34] initiative. In parallel, by addressing barriers such as access to digital devices and skills, the project is expected to drive demand and create a growing user-base that can increase and sustain commercial investments. Lastly, it will address key market bottlenecks through support to improve policy and regulatory reforms that will help create markets and encourage private sector investment in infrastructure and services. The amount of private investment expected to be leveraged as a result of the project is difficult to estimate upfront, as it will be determined by competitive processes during implementation and the technical designs and additional infrastructure needs identified by the private partners, but it is likely to be substantial and will be tracked in the results framework.

[32] See for instance Intel (2012). Women and the Web: Bridging the Internet gap and creating new global opportunities in low and middle-income countries. Intel Corporation

[33] IFC. 2021. *Creating Markets in Madagascar*, at ://www.ifc.org/wps/wcm/connect/4c301d92-5b22-4165-ba1d-696813aa9e24/CPSD-Madagascar.pdf?MOD=AJPERES&CVID=nVJGtas

[34] Scaling Mini-Grid (SMG), a World Bank Group innovation, aims to help emerging markets attract investments for large-scale mini-grid programs. SMG offers financing, advisory support and risk mitigation for governments and private investors. From early-stage site screening and assessment to a rapid tendering process, as well as a competitive financing and insurance process, the SMG program offers numerous advantages for clients. SMG aims to help clients to efficiently manage risks, with the twin goals of achieving competitive tariffs for mini-grid end users and shortening the time from project development to financial closure.

II. PROJECT DESCRIPTION

A. Project Development Objective

PDO Statement

40. The Project Development Objective is to expand access to renewable energy and digital services[35] in Madagascar.

41. **PDO Level Indicators.** The PDO indicators are the following:

Outcome 1: Expand access to renewable energy services

- People provided with new or improved electricity service (number) (corporate results indicator)

Outcome 2: Expand access to digital services

- People provided with new or enhanced broadband internet access (number) (corporate results indicator) (disaggregated by gender and urban/rural)

B. Project Components

42. **The project proposes a set of interventions to increase access to reliable and affordable energy and digital services, with a focus placed on including underserved communities.** This will be achieved by targeted investments exploring synergies between the two sectors, enabled by critical reforms. The project is expected to benefit at least 10 million people, with a positive impact on the poor, thereby supporting more equitable growth. The project will also boost resilience to future crises, thanks to enhanced energy and digital connectivity, with spillover benefits to mitigating climate change. It is built around four mutually reinforcing components and a contingent emergency response component as shown in Table 1.

Table 1: Proposed budget allocation by Component and Subcomponent

Project Component/Subcomponent	Indicative Budget (US$ millions)
Component 1: Expanding Energy and Digital Infrastructure	**155**
Subcomponent 1.1: Hybridization and digitization of isolated grids	35
Subcomponent 1.2: Deployment of digital infrastructure in rural areas	60
Subcomponent 1.3: Private sector renewable energy mini grids	60
Component 2: Enhancing Energy and Digital Inclusion	**205**
Subcomponent 2.1: Affordable off-grid solar and digital devices for underserved communities and marginalized groups	135
Subcomponent 2.2: Digital literacy and renewable energy awareness	10
Subcomponent 2.3: Off-grid solar and broadband connectivity for public institutions to increase service delivery and access for underserved communities	60
Component 3: Supporting Enabling Environment for Green Energy and Digital Infrastructure	**20**

[35] "Digital services" is defined here to cover both carrier services (such as voice, SMS and data) and also the services and applications that run over the top of them, such as e-Government, e-Commerce, mobile money, etc.

Project Component/Subcomponent	Indicative Budget (US$ millions)
Subcomponent 3.1: Support for digital sector reforms	8
Subcomponent 3.2: Support for energy sector reforms	8
Subcomponent 3.3: Enabling environment for enhanced climate change adaptation and mitigation	4
Component 4: Project Management and Implementation Support	**20**
Component 5: Contingent Emergency Response Component	**0**
TOTAL	**400**

43. **The project will accelerate deployment of digital and energy services in Madagascar for underserved populations, promoting socio-economic inclusion**. With the exception of JIRAMA, energy and digital services in Madagascar are provided by the private sector. Low population densities and high poverty levels in most of the underserved areas make it impossible for the private sector to deliver these services on purely commercial basis. Public sector funding in the form of viability gap financing and performance-based grants will be provided to close the gap between costs of service provision and affordability levels of target population. Special incentives and end-user subsidies will be available for the inclusion of the poorest and vulnerable groups, as well as for the provision of transformative digital devices and productive appliances to deliver economic opportunities. The project will, therefore, play a critical role in driving socio-economic inclusion, while also mobilizing private sector investments, and leveraging the private sector capacity and innovation in service provision. The project will address barriers to service provision on both the supply side (subsidizing provision of infrastructure in areas that are not commercially viable) and the demand side (closing affordability gap and promoting awareness and digital literacy), and in parallel support critical sector reforms in both sectors to drive transparency, efficiency and sustainability. By jointly delivering energy and digital services to schools and health clinics, the project is expected to have transformational impact on availability and quality of education and health services (e.g., enabling on-line education and remote medical care) in rural areas, delivering on human capital goals.

44. **In addition, the project can close gender gaps by lowering the upfront cost of electricity provision and electric appliances, and digital devices, to make them affordable to female-headed households and women-led businesses**, which are less likely to have access to finance. In particular, the project undertakes to close identified gender gaps by providing access to female-headed households, with a target of 28.5 percent of connections provided to female-headed households, reflecting the share of female-headed households in Madagascar as a whole. The project will also bridge the gender digital divide through interventions on digital literacy, awareness and inclusion at community public access points so that more women can benefit from the dividends associated with increased use of digital technologies.

Component 1: Expanding Energy and Digital Infrastructure (US$155 million IDA equivalent)

45. **This component will focus on the deployment of infrastructure and mobilizing private capital to improve and expand access to energy and ICT in underserved areas, leveraging synergies in joint planning and roll out to reduce deployment costs.**

Subcomponent 1.1: Hybridization and digitization of isolated grids (US$35 million IDA equivalent)

46. **This subcomponent will support the hybridization of up to 32 isolated grids owned and operated by JIRAMA.** The project will finance investments in: (i) hybridizing thermal power plants supplying these isolated grids with solar PV technology, battery storage, and associated equipment, (ii) deployment of smart-grid and smart-metering technologies, (iii) strengthening, densifying and extending climate-resilient distribution grids and connecting additional customers, and (iv) feasibility, affordability and other relevant studies.

47. **An initial short-list of 32 isolated grids, which have not yet been or are not scheduled to be hybridized, have been pre-selected by JIRAMA**. These systems have installed thermal capacity of 20 MW and an available capacity of 9 MW of diesel generation. Final selection will be based on their technical, economic levelized cost of electricity, social (new households connected), and environmental feasibility. In the perimeter of these isolated centers, the average access rate remains below 15 percent. Studies will be done to estimate new connection potential, define supply- and demand-side barriers to connection, and resulting approaches to their densification, including connection subsidies. Connections for public institutions and street lighting will also be included where appropriate. All relevant studies, including technical feasibility studies, will be launched under LEAD and be ready in the early stages of project implementation, i.e., by the end of 2023.

48. **In parallel, the project will also invest in the automation and digitization, deploying "smart grid" and "smart metering",** climate smart technologies to support better energy management at the production, network and consumer levels, which will reduce losses and peak demand and lead to additional lowering of GHG emissions. These investments will transform the existing distribution network into a modern platform using state-of-the-art, connected and integrated technologies, allowing the reduction and management of outages, network balancing, automatic load management, and real-time readjustment of load balancing in line with consumers' needs.

49. **These investments will improve and expand electricity access, contribute to improving JIRAMA's financial situation, increase sustainability of the systems and reduce GHG emissions.** Actual generation costs for these isolated grids are extremely high, putting an additional burden on JIRAMA's financial situation. The systems could be hybridized with up to 12 MW of solar capacity (PV installed capacity ranging from 40kW to 2.7MW per site) and 38 MWh of battery energy storage system, which would lighten the burden of fuel charges. During project implementation, opportunities for hybridizing privately operated generation assets and seeking private sector management of hybridized isolated grids (which could include both generation and distribution) will be explored.

Subcomponent 1.2: Deployment of digital infrastructure in rural areas (US$60 million IDA equivalent)

50. **The project will expand the coverage of broadband connectivity networks to selected rural areas characterized by market failure, under an MFD approach, by leveraging public financing to encourage further investment from the private sector.** The design of the subcomponent will be informed by a mapping and feasibility study. Specifically, the project will finance: (i) incentives ("smart subsidies") to encourage mobile operators or infrastructure service providers to extend data-enabled (4G or higher) network coverage to areas that are unserved by any mobile cellular signal ("greenfield" sites) and to upgrade existing 2G cellular sites to 4G+ ("brownfield" sites). A Commercial Transactions Manual (CTM) will be developed to guide the allocation of the gap-financing subsidies; (ii) the recruitment of an independent monitoring firm to ensure compliance in technical, environment and social and service level requirements during both construction and operations phases, including application of relevant standards for climate-resilience; and (iii) related studies and consultancy, including for a feasibility study for mapping prioritizing underserved areas and exploring how best to leverage public financing to crowd in the private sector to expand last-mile coverage, as well as technology options for extending coverage.

51. **The project will seek to promote the most cost-effective connectivity options.** While the exact model will be refined based on the findings of the feasibility study, based on experience with similar initiatives in the region, it is likely that a 'reverse-auction' model or similar arrangement will be identified for competitive award of one-time smart subsidies to bridge the financing gap for deployment of infrastructure and services. Under such a mechanism, one or more private sector partners will be selected through a competitive process for the construction, operation, and maintenance of the infrastructure, in return for a subsidy. Ownership of the infrastructure would be retained by the network operators. In principle, the public subsidy would apply only to the initial capital expenditure (CAPEX) investment required for the capital

investment. Digital infrastructure would typically comprise relatively small cell towers, close to villages or serving dispersed population centers. The cell towers would house mobile broadband base stations providing fourth generation (4G) or, later, 5G services. Ideally, the towers would be connected to the backbone network by fiber optic cable. However, this is unlikely to be viable in rural areas, instead, a mix of microwave or low earth orbit (LEO) satellite would be used for backhaul. Technological neutrality will be maintained in tenders to allow the selected bidder(s) to identify and deploy the most cost-effective solutions, possibly utilizing emerging technologies, provided that they meet or exceed identified service level specifications. Solar power and batteries would be used for cell towers and base stations, and these would be ''over-dimensioned'' to allow for co-deployment of mini grids to power both towers and local communities simultaneously whenever possible (see subcomponent 1.3), and at least to install charging points for the community. Site selection will be based on objective criteria including lack of existing or planned broadband connectivity and energy infrastructure, expected demand (considering population size covered by the new cell tower), the impact on vulnerable and climate-affected populations, and value-added for economic activity, growth and service provision.

52. **This subcomponent is expected to mobilize significant private capital alongside public funds from the project.** Based on similar projects elsewhere, it is estimated that IDA funds could leverage private sector funds in the ratio of around 1:2 (i.e., US$65 million of IDA funds could leverage up to US$130 million in PCM funding), though this is likely to be reduced due to the focus of this project on the poor and rural areas. In so doing, the project will ensure compliance with the following principles: (i) targeting areas of market failure (i.e. where operators do not currently provide services, and do not intend to do so in the medium term, even with an enhanced legal and regulatory framework); (ii) aligning interventions with the principle of general interest as set out by the World Bank twin goals of eliminating extreme poverty and boosting shared prosperity and the project focus on inclusion (striking a balance between targeting areas with the maximum economic impact and investor interest, and the areas with the poorest and most vulnerable populations); and (iii) limiting public funding to the minimum necessary (ensuring the best 'value for money' through use of a competitive tender process to select the 'most economically advantageous offer' and piloting different procurement approaches to determine how best to incentivize private sector investment. This may potentially include, for instance, the use of an interactive electronic auction platform to optimize the best value in competitive, multi-round bidding processes. Competitive award processes will also be run in phases to ensure that learnings from one phase can be passed on to the next.

53. **Mechanisms will be established to ensure that access to infrastructure built with public funds is provided to all market players on the basis of open access, non-discriminatory conditions of service provision, and with fair pricing** (with adjustments over time), including national roaming agreements. The use of geographical lots will be used to ensure that not all contracts go to the same actors and reinforce issues of dominance in the market. The project will also seek to utilize additional funds from the FDTIC to enlarge the overall project impact (see discussion on dated covenants below) and at the same time support the reforms of the FDTIC so that the Fund is progressively able to play its role in the expansion of broadband connectivity (see subcomponent 3.1).

54. **In addition, the infrastructure financed through the project will improve the energy-efficiency and climate-resilience of digital infrastructure**. Wherever possible, green energy solutions (e.g., solar power and battery storage) will be used to power cell towers and networks. Tenders for digital connectivity infrastructure will follow energy-efficiency guidelines taking local conditions into account (see subcomponent 3.3 for the development of such guidelines), including encouraging a shift away from high-energy-consuming legacy technologies toward more energy-efficient alternative network technologies such as fiber optics. Moreover, the feasibility study will analyze location-specific climate change risks and exposure to natural disasters and identify adequate mitigation measures. For instance, technical and design specifications for the tenders will be developed factoring in climate-induced risks and resilience measures, e.g., related to site selection. Bidders will be required to comply with specific infrastructure robustness requirements to increase resilience to climate shocks (e.g., investments in flood barriers, more resilient ducts and towers, etc.).

Subcomponent 1.3: Private sector renewable energy mini grids (US$60 million IDA equivalent)

55. **This subcomponent will support deployment of private sector-operated renewable energy hydro and solar mini grids for communities that are not served by JIRAMA.** This will include (i) investments in rehabilitation of mini grids that have stopped operating or are operating at suboptimal level; (ii) investments in hybridization of diesel mini grids with renewable electricity, battery storage and associated equipment; (iii) viability gap funding and performance-based grants and sub-loans to the private sector to build and operate new mini grids, and to expand the existing mini grids (e.g. densifying connections, extending service to additional communities etc.); (iv) performance-based grants and sub-loans for appliances and productive uses; and (iv) comprehensive technical assistance related to development, implementation and monitoring of mini grids (geospatial planning, feasibility studies, technical and transaction advisors, capacity building, productive use development, digital platforms). All renewable energy technologies, including solar and micro-hydro will be considered. This sub-component will essentially finance two types of investments and associated TA.

56. ***First*, it will rehabilitate and/or hybridize existing private sector mini grids that have been financed by ADER but are no longer in operation or are operating in suboptimal/unsustainable conditions**. The long list includes primarily 57 diesel mini grids, which were developed in early years of ADER, of which 45 are no longer operational, but also about 30 renewable energy mini grids, which have stopped operating due to factors such as financing gap, technical/O&M complications, or affordability gap. Where appropriate, the project can also finance new connections. The project is expected to rehabilitate and/or hybridize about 50 mini grids. The project will carry out a detailed assessment of the potential beneficiary mini grids and select those that will be financed by the project. The key selection criteria will include (i) existence of a capable operator; (ii) ability to operate sustainably once rehabilitated; (iii) costs; and (iv) impact (electrified population, public institutions, productive uses, climate, gender etc.).

57. ***Second*, the subcomponent will also provide viability gap funding and performance-based grants and sub-loans for new, private sector-built and operated greenfield mini grids**, channeled through the Fund Manager. In line with the goals and ambitions of the Government, the subcomponent will support scale up of private sector-led approaches, mobilizing significantly larger private capital for the mini grid scale-up. The project will provide viability gap funding grants, covering difference between the developer's cost of system installation and O&M (including appropriate margins) and the tariffs that can be charged based on consumers' affordability. The eligible beneficiaries will include mini grid developers that comply with technical competency, experience in mini grid development, financial strength and other eligibility criteria defined in the Project Operations Manual (POM). The actual mini grid sites will be selected based on geospatial analysis complemented by on-site assessments of the most promising sites and feasibility studies, including demand and affordability estimates. The prioritization will be primarily based on cost-benefit criteria, favoring sites with a strong economic and financial viability. Geographic location will also be considered to create optimal packages for each lot. While some of the analysis has already started, the site selection will be finalized in the early stages of implementation.

58. **The sub-component will build on ADER's experience with tendering mini grids, but it will also address its shortcomings.** In particular, the sub-component with help GoM to move away from piecemeal efforts to building a national program/platform that will allow achieving economies of scale, attract larger mini grid developers (as well as supporting the existing competent developers already operating in the market), standardize and rationalize subsidies, mobilize private sector financing at affordable terms, and achieve overall professionalization of the mini grid development in Madagascar. The Government and the World Bank are in close coordination with the existing development partners supporting mini grids, who will be invited to co-develop and co-fund the proposed national platform. This ambition is well-aligned with the World Bank Group Scaling Mini Grid approach,[36] and the project will explore with IFC and MIGA whether

[36] Scaling Mini-Grid (SMG), a new World Bank Group initiative, seeks to increase private investment in mini-grid services by working with governments, private sector investors and donors to find solutions to the remaining challenges in the sector

Scaling Mini Grids could be implemented jointly in Madagascar. In that case, the identified mini grids will be tendered at the same time, allocated into multiple (e.g., three) lots. The World Bank would finance viability gap funding via grants, while IFC would provide debt financing and MIGA de-risking instruments. Additional de-risking, such as for demand risk (e.g., Minimum Revenue Guarantee in place in a similar Scaling Mini Grid transaction in the Democratic Republic of Congo) may be sought from other stakeholders (e.g. the Rockefeller Foundation, the Global Alliance for People and Planet, and the Sustainable Renewables Risk Mitigation Initiative).

59. **While Scaling Mini Grid or a similar large-scale tender approach is anticipated to be the main implementation modality, viability gap funding and performance-based grants would also be provided through bottom-up approaches** based on proposals from mini grid developers to accelerate market before the tender is launched, support smaller, local companies, and test innovative ideas. Performance-based grants will also be available to support access to appliances, including digital devices and for productive use of energy and to leverage solar auto-producers, telecom towers etc., e.g. for projects that could leverage them as anchor loads to electrify surrounding communities. Comprehensive technical assistance will be available for all key stakeholders for all implementation modalities. Performance-based grants can also be provided for the expansion of existing mini grids, such as to densify their network, extend infrastructure to surrounding communities, to introduce streetlight and connect public institutions, such as schools and health clinics. Mini grid companies, complying with qualification criteria, would also be eligible for loans for their working capital from a line of credit set up under subcomponent 2.1 (and benefit from future risk-sharing instruments that would be activated during the lifetime of the project – see subcomponent 2.1).

60. **The Fund Manager Manual will include detailed provisions for grant-making,** including eligibility, evaluation and award criteria, procedures for setting a grant value and loan terms, verification procedures and monitoring and evaluation. Loans will be provided on market terms. The Fund Manager Manual will be a disbursement condition for the disbursement category related to this sub-component.

Component 2: Enhancing Energy and Digital Inclusion (US$205 million IDA equivalent)

61. **This component aims to accelerate uptake by addressing barriers that hamper digital and energy access.** To ensure access and meaningful usage, supply-side interventions and network infrastructure alone are not sufficient. For energy services, it is not enough that energy infrastructure and services are available in the area, if these services are not affordable. Awareness campaigns are also sometimes needed to educate users about benefits of renewable energy and how to recognize quality off-grid products. For digital services, interventions are needed to facilitate access to physical devices, build digital awareness and skills and create demand for services and products, and local content, to encourage usage and expand socio-economic benefits. This approach is at the core of this component, aiming at creating a consumer market for energy and digital services.

62. **The proposed interventions will seek to close spatial- and gender-related gaps to actively support greater inclusion, including for poor and remote communities/households, as well as persons with disabilities and other marginalized groups.** For digital access, the target areas for this component would be those rural areas where infrastructure has been deployed under Component 1, as well as those areas already covered by energy and telecommunication services but where adoption of services is low (e.g., poor secondary cities and peri-urban areas along growth corridors, where there is a large usage gap and a large concentration of poor people who could benefit from new economic opportunities through digital technologies, i.e., areas that have a high potential to stimulate growth). For energy, the target areas are all localities that are not adequately served by grid or mini grids and are therefore a potential market for OGS.

Subcomponent 2.1: Affordable off-grid solar and digital devices for underserved communities and marginalized groups (US$135 million IDA equivalent)

63. **This subcomponent will promote access to off-grid solar (OGS) solutions (e.g., solar kits/solar home systems) and affordable digital devices (e.g., feature phones, basic smartphones and tablets).** The component will address affordability, access to finance and other constraints preventing the accelerated growth of the off-grid solar and digital device markets in Madagascar. Ultimately, this subcomponent will facilitate wider ownership of OGS products and digital devices among lower-income groups, resulting in nearly doubling Madagascar's electrification rate from the current 34 percent to 60 percent, and an increase of more than three million internet users during the course of project implementation. Out of the sub-component's US$135 million allocation, about US$105 million is expected to be used for supporting off-grid solar services, and about US$30 million would be used for supporting digital devices (which will largely be bundled with the off-grid solar systems).

64. **This sub-component will specifically finance: (i) performance-based grants and catalytic grants for the distribution of OGS products, digital devices and productive use equipment and appliances among target populations; (ii) sub-loans provided via a line of credit for working capital for decentralized renewable energy companies; and (iii) related technical assistance.** The eligible beneficiaries of performance-based grants will be the qualified distributors of off-grid solar products, digital devices and productive equipment and appliances. The eligible beneficiaries of sub-loans will be qualified decentralized renewable energy (DRE) companies and financial institutions (including micro-finance institutions) providing financing to decentralized renewable energy companies or directly to the users for the acquisition of off-grid solar products. Decentralized renewable energy companies are companies that provide electricity services to their customers using renewable energy. These will be primarily off-grid solar companies, but the line of credit may also open eligibility to other DRE companies, such as mini grid developers.

65. **Both catalytic grants and sub-loans are needed to achieve the Project's ambitious targets**. Catalytic grants will be primarily used to close the affordability gap for end users, drive expansion of the market to less economically attractive areas and pilot innovations. Grants will also remain important for smaller companies that do not qualify for loans. Loans are required to provide working capital to the growing OGS companies to finance their expansion. The OGS companies use "pay-as-you-go" model through which they pre-finance off-grid solar systems and collect payments from users over time, typically in one to three years. The companies are in a growth stage and cannot provide user financing and invest in expansion at the same time without access to working capital. The sub-component will follow the approach for the provision of grants and loans established with OMDF under the existing LEAD Project with a few modifications reflecting lessons learned, as described below. A study will be conducted to determine the amounts to be allocated to each financial instrument managed by the fund manager, with the objective to have more sub-loans than grants if possible.

Performance-based grants

66. ***First,* RBF supply-side subsidy, which has been rolled out by OMDF under the LEAD Project will be complemented by an end-user (demand-side) subsidy**, which will aim at reducing the price of the OGS/digital devices to the users, tackling the affordability barrier, which has been identified as the main constraint for scaling up OGS under the LEAD Project. End-user subsidy will be channeled via RBF, integrating lessons from the LEAD end-user subsidy pilot, which is expected to be implemented in the coming months. Like supply-side RBF, the payments for demand-side RBF will be linked to results, but they will be staged, including a larger upfront payment to alleviate OGS companies' cash constraints. Unlike a supply-side subsidy, the OGS company will be required to pass on the end-user subsidy to their customers in terms of a reduced price. Through a combination of three mechanisms, the subsidy will be targeted towards lower income households: (a) the subsidy will only be made available for Tier 1 off-grid solar systems, targeting only households with low electricity consumption; (b) socio-economic data will be used to identify regions and districts with higher poverty

incidents to benefit from the subsidy; and (c) the beneficiary database of the social safety net will be leveraged to identify households that need relatively more support to bridge the affordability gap. The exact combination of the targeting mechanisms and design of the combined supply and demand side subsidies will be informed by the OMDF pilot and an affordability study.

67. ***Second*, the scope of RBF will be expanded to include the provision of digital devices and productive use equipment (PUE).** Companies will be encouraged to bundle solar kit offerings with a feature phone or basic smartphone. In addition, to further maximize synergies between electricity access and digital inclusion, the grant eligibility criteria will be reviewed to understand how non-OGS companies, e.g., telecommunication operators interested in offering financing schemes for OGS (e.g., Orange, Telma) can be included. Result-based grants will be added for digital devices, such as laptops and devices for specific groups, such as women entrepreneurs who want to start a business or teachers. This will stimulate economic activity amongst more vulnerable communities. A phased approach will be followed, starting with a digital device affordability feasibility study, followed by pilot projects before scaling up. The targeting, eligibility and subsidy levels and modalities will be determined by the feasibility study.

68. ***Third*, performance-based catalytic grants will be applied alongside RBF to allow DECIM Project to support promising innovative business models and approaches that are not yet ready for a scale up under the RBF, and growth of smaller, local companies that are not yet ready to access loans under the line of credit.** The innovations to be supported include OGS PUE, including larger digital devices, such as tablets and laptops, as well as agriculture uses, such as solar irrigation, cold storage, milling etc., and private sector-based models for electrification of public institutions. This approach will allow companies to test business models through the catalytic grants, and scale successful pilots through results-based grants and loans. The targeted PUE subsidies will geographically focus on areas with high agricultural productivity to further boost economic development in areas with promising prospects.

Line of credit

69. **DECIM Project will expand on and enhance the line of credit that was established by the LEAD Project, with the view of providing financing for working capital for OGS distributors to support the anticipated OGS market growth over the life of the DECIM Project**. The OMDF line of credit has up to date provided sub-loans to three OGS distributors and one Microfinance Institution (MFI) for a total value of about US$5 million. This working capital injection has fueled the acceleration of the market, and the companies' working capital needs continues to increase. The sub-loans have been provided by OMDF on market terms, benchmarked against typical Financial Intermediary (FI) lending to companies of similar size. The OMDF line of credit is open to both OGS companies and FIs. The FIs, however, have not yet shown interest in lending to the OGS distributors, perceiving the market too small and risky (due to their unfamiliarity with the technologies and business models and the lack of longer-term track record of the OGS companies in Madagascar). As the OGS market matures, however, and as the track record of the OGS companies is built (including their repayment of loans to OMDF), it is expected that local FIs could be incentivized to lend.

70. **The DECIM project, therefore, will follow a two-pronged approach.** It will continue the line of credit established under OMDF, through which it will provide sub-loans for eligible beneficiaries to continue providing the working capital needed to support the OGS market growth in line with the ability of OGS companies to expand. To expand the market size, the line of credit may also be opened to other DRE companies in need of working capital, including companies selling larger systems for productive uses and/or public institutions and mini grid companies. In parallel, the project will explore an introduction of other measures to incentivize local FI lending to OGS companies, including risk-sharing instruments, such as a partial-credit guarantee. The Fund Manager will also provide TA to local FIs to make them more familiar with the OGS/pay-as-you-go business model, credit risk assessment etc. Fund Manager's terms will include incentives for mobilizing co-financing from FIs along with the loans extended from the line of credit. The line of credit under DECIM will be designed

in compliance with the FI policies. An FI assessment has been conducted during the project preparation, establishing key principles for the line of credit. Detailed provisions will be included in the Fund Manager Manual.

71. **The Fund Manager manual will include detailed provisions** for grant-making and the provision of sub-loans under the line of credit, including eligibility criteria, evaluation and award criteria, procedures for setting a grant value and loan terms, targeting mechanism for end-user subsidy, verification procedures and monitoring and evaluation. The sub-loans will be provided on market terms, building on the process already in place for sub-loan provision under the LEAD Project. The Fund Manager Manual, and contracting the Fund Manager, will be disbursement conditions for the disbursement category related to this sub-component.

72. **The administration of grants will leverage a digital platform, linking up with OGS companies' PAYGO platforms to facilitate monitoring and verification**. The project will seek to create synergies with the Madagascar Safety Nets Resilience Project (P179466). The project seeks to build a digitized social registry and further expand the number of beneficiaries included under the current cash transfer system. The project also seeks to increase the number of transfers made through digital payment platforms. Unlocking synergies include leveraging the database of cash transfer beneficiaries for targeted support to low-income households and cooperating on the uptake of mobile money and digital inclusion, as well as for agriculture productive uses. These synergies can also therefore increase adaptability of the agricultural irrigation and supply chain against climate and other natural disasters. Synergies will be explored also with other initiatives, such as cash transfer programs, ID registration campaigns, facilitation to open mobile money accounts, Interactive Voice Response health and education campaigns beneficiaries can access on their phones, link with fab labs for the rehabilitation of the phones, etc., to ensure that critical complements (ability to use devices, recognition of the intrinsic value in the device) maximize the impact and sustainability.

Subcomponent 2.2: Digital literacy and renewable energy awareness (US$10 million IDA equivalent)

73. ***On the digital side*, this subcomponent will aim to facilitate the adoption of digital services by improving digital awareness, literacy and skills**. The type of digital literacy training will be selected during project implementation, upon completion of a feasibility study. More specifically, the project will finance: (i) a feasibility and sustainability study that will assess and compare several models of digital literacy training in terms of effectiveness and sustainability; and (ii) digital literacy courses, provided for the general population in selected communities. These courses will be designed to enhance basic digital literacy capabilities to allow beneficiaries to "get connected" confidently and gain entry-level user skills allowing them to access digitally enabled services, including services available online in the event of a crisis such as a natural disaster or a pandemic.

74. **The following design features will be explored in the feasibility study and considered for inclusion in project design**: (i) a focus on task-based learning and the use of applications relevant to end-users; (ii) training for potential "digital ambassadors" who can impart digital skills and raise awareness at the community level – who could be selected among IT graduates, mobile money agent networks, or community agents; and (iii) linking trainings to use cases such as trade or entrepreneurship and connecting training graduates to employment/self-employment opportunities for digital-savvy young people. The curriculum will include specific modules on financial inclusion and PAYGO models for energy services and workplace or commerce use cases, as well as training on leveraging digital tools and services as an adaptation mechanism in case of climate shocks or to alleviate the gradual impacts of climate change. The trainings will first be tested as pilots in selected communities, adopting an iterative approach before expanding operations, and will build on existing initiatives, such as the ICT Bus project implemented by MNDPT.

75. **The courses will place a special emphasis on young people and vulnerable groups (such as women and girls, the elderly, people with disabilities [PWDs]).** Curricula and approaches will be tailored to distinct user groups and regional

specificities and delivered in local languages. In particular, tailored digital literacy trainings will target women in order to bridge the digital skill gap between men and women. These trainings will feature : (i) relevant content/curricula for women, notably specific modules to tackle online forms of gender-based violence; (ii) women-only training cohorts led by female trainers, to ensure women feel safe and comfortable actively participating in sessions; (iii) female peer learning and mentorship, as well as inclusion of NGOs, 'women in technology' associations to ensure trust by women, and to eliminate social and cultural barriers; (iv) opening hours suitable for women; and (v) trainings held in locations that women feel safe traveling to. Likewise, considerations will also be made to support learning needs for PWDs.

76. **In parallel, a national awareness-raising campaign will be deployed to enhance awareness about digital services and the opportunities they enable and build trust in digital services**. Attractive, language-specific content tailored to rural communities will be developed as well as an awareness program tailored to women to increase access to information and combat social norms and cultural barriers that prevent them from using digital tools.

77. **In addition, *on the energy side*, this sub-component will finance targeted consumer education campaign to inform consumers about renewable energies and the opportunities that modern off-grid solar products present and assist them in making informed purchasing decisions.** It is envisaged that the campaign will reach both urban and rural consumers through a broad range of marketing and public awareness activities customized to meet local market needs. Some of these activities designed to reach consumers and create behavioral change, through mass communication activities, could include training, roadshows, concerts and local radio programs. It is also anticipated that the campaigns will involve close collaboration with the media, private sector companies, and civil society. The desired outcome is to increase the demand and build a sizeable and sustainable market for sales of low-carbon and least-cost, off grid energy products amongst Malagasy consumers.

Subcomponent 2.3: Off-grid solar and broadband connectivity for public institutions to increase service delivery and access for underserved communities (US$60 million IDA equivalent)

78. **This subcomponent will support electrification and connectivity for up to 3,000 schools and health clinics.** Specifically, the component will finance contracts with private sector to deliver: (i) electricity service through installing and maintaining solar PV systems for about 2,000 schools and 1,000 health centers; (ii) broadband connectivity services for a subset of these institutions; (iii) a pilot for long-term service contract; and (iv) related studies and technical assistance. Those public institutions that serve the largest number of inhabitants, and thus have the highest suppressed energy and broadband demand will be prioritized, as well as those with the lowest likelihood of receiving grid or mini-grid connections in the medium to long term. The selection of public institutions will be finalized during project implementation after preparation of a longlist of sites based on technical feasibility and demand assessments and after consultation with Ministry of Health and Ministry of Education. Out of the sub-component's US$60 million allocation, about US$30 million is expected to be used for supporting electrification of public institutions, and about US$30 million will be used for enhancing their broadband connectivity.

79. **Building on a pilot initiated under LEAD (P163870), implementation of this subcomponent will allow GoM to complete electrification of all country's health centers and tertiary schools, and 66 percent of secondary schools, while ensuring that most of them also have broadband connectivity**. Provision of OGS and broadband connectivity services (as a bundled service) will help transform public service delivery for underserved communities, which is also expected to lead to critical improvements in crisis response capacity and climate change adaptation by facilitating online delivery of public services. A study and pilot on broadband connectivity for municipalities will be carried out as part of PRODIGY and will help inform this subcomponent.

80. **The design of the subcomponent builds on experience and lessons learned with solar electrification of health care centers under LEAD**. This experience has demonstrated a tremendous impact of such an intervention on the ability of healthcare workers to provide quality services and increase their own wellbeing. Key lessons integrated to this subcomponent design include: (i) a need for a more thorough assessment of beneficiary institutions (quality of buildings, accessibility etc.) to estimate correctly the costs of service provision; (ii) greater focus on quality assurance, including more demanding technical specifications; (iii) the need to bundle electricity with digital connectivity to ensure that remote monitoring devices on solar PV systems works properly; and (iv) a need to integrate long-term O&M arrangements from the onset into the design of the intervention and into the contractual arrangements.

81. **The subcomponent design has internalized all these findings.** More comprehensive assessments are already carried out under LEAD. The bidding documents will integrate recommendations from the recently published Lighting Africa-funded quality assurance framework[37] for solar PV electrification of public institutions, while co-investment with the digital sector under this subcomponent will strengthen connectivity, expected to result in improved functioning of remote monitoring devices.

82. **The subcomponent will also pilot use of long-term contracts.** The initial pilot design is pointing to the following key elements: (i) Government and private sector providers will sign long-term service contracts; (ii) The service providers will receive a performance-based grant, covering fully or partially the CAPEX costs), and disbursed gradually based on performance criteria, to ensure service providers incentives for long-term service provision; (iii) Additional periodic (e.g. quarterly) payments will be executed by the Government, which will cover the remaining portion of CAPEX and O&M; and (iv) The Government will establish an escrow account which will be capitalized during implementation by Government and/or through donor contributions. Project funds will not be used to fund this account. The escrow account will be used for O&M/service payments post World Bank project closure. Under the DARES platform[38], the project is exploring a collaboration with MIGA to participate in the pilot with additional de-risking. The pilot will be designed based on consultation with all Government and private sector stakeholders.

83. **Likewise, for the broadband connectivity, the allocation of smart subsidies will be conducted through a competitive, market-based approach, whereby funds from the projects are used to deploy infrastructure and purchase digital connectivity for the Government, under long-term supply agreements**. Where it may be necessary to construct additional infrastructure to reach a particular location (e.g., last-mile fiber), it is expected that the vendor supplying the infrastructure would continue to own and operate the infrastructure after the close of the contract. A certain number of dark fiber strands would be handed over for the Government's own requirements for the lifetime of the infrastructure (for the schools and health centers that will be connected), by those operators that benefit from subsidies. The project will also include support for upgrading local area networks (e.g., campus WiFi networks) to reliably connect end-users, and will provide network maintenance training to technical personnel at connected institutions. Wherever possible, green energy solutions (e.g., solar power) will be used to power networks.

84. **For the higher education community, the sub-component will support iRENALA, the national research and education network, by paying its membership fees for the EU AfricaConnect 3 program,**[39] so that it benefits from the boost in international bandwidth and access to open educational resources that the program offers.

[37] Quality Assurance Framework Overview for Component-based Off-grid Solar Energy Systems. June 2022
[38] https://www.worldbank.org/en/news/press-release/2022/11/09/world-bank-group-announces-major-initiative-to-electrify-sub-saharan-africa-with-distributed-renewable-energy
[39] European Union AfricaConnect 3 program, at: https://africaconnect3.net/

85. **To further help connect the unconnected, the project will also support public access through the expansion of last-mile connectivity for free community public Wi-Fi access points.** This will include, for example, schools, public post offices, marketplaces, and other community facilities, so that citizens will benefit from free publicly funded WiFi hotspots and charging points at connected locations to stimulate internet usage. The activity will be informed by a feasibility study which will look at how to scale up the existing WiFi Hotspots project of the MNDPT and will finance the advanced bulk purchase of connectivity services that will be outsourced to the private sector. This scheme will be coordinated with the financing of affordable digital devices, in the same target areas under sub-component 2.1. Emphasis will be placed on simplicity of implementation, low costs, sustainability, and locally driven design, with the development of a business model that ensures facilities and equipment can be maintained, and operational costs covered. This might be done, for instance, by working with community champions or "digital ambassadors" (see sub-component 2.2), by charging for specific services at the access points, such as phone charging or delivery of specialized technical training courses, by partnering with mobile money service providers who may be interested in placing an agent at the access point, local private sector, or community actors, etc. Public access points will be selected to reach women, particularly in rural communities by ensuring safe places for women, picking spaces where women congregate and the availability of female intermediaries/staff in case they have any questions.

Component 3: Supporting the Enabling Environment for Green Energy and Digital Infrastructure (US$20 million IDA equivalent)

86. **This component aims to strengthen the policy, legal and regulatory environment in both the digital and energy sectors to maximize the success, effectiveness, and sustainability of other project activities.** It specifically targets a series of priority reforms, as well as supporting climate change mitigation and adaptation capacity. All activities related to the enabling environment will ensure the inclusion of gender in relevant policies and ensure the collection of gender-disaggregated industry data.

Subcomponent 3.1: Support for digital sector reforms (US$8 million IDA equivalent)

87. **This subcomponent will support the adoption and implementation of fast-tracked reforms in the digital sector.** Liberalization of digital infrastructure combined with independent and effective sector regulation is the starting point for inclusive telecommunications and internet access and the growth of Madagascar' digital economy. They are needed to allow private sector players to compete on a level playing field to provide high quality access at the best price, and to encourage investment in digital infrastructure. This involves both improving the legal and regulatory framework and strengthening the capacity and independence of the regulator to implement effective regulation. In addition, the FDTIC can become an effective tool to improve digital access and adoption, but only if its governance and performance are improved. Overall, this subcomponent will seek to establish an enabling environment conducive to the development of a more competitive and dynamic telecom/broadband market, offering both extensive network coverage and the provision of affordable, high-quality commercial services, in support of universal digital access goals. This would be the continuation of the support currently provided under the PRODIGY project. Interventions could include technical assistance and capacity building to MNDPT and ARTEC on the following aspects:

a) **Revising the legal and regulatory framework** with a focus on: (i) removing constraints and exclusivities on the construction and commercialization of digital infrastructure, most notably the fiber optic backbone, to ensure that all operators have equal rights across the value chain and the fiber optic meets climate resilient standards; (ii) addressing issues of competition in the legal and regulatory framework, including Significant Market Power (SMP) and open access to guarantee open and competitive access to infrastructure and fair wholesale tariffs; (iii) revising

the licensing framework and removing barriers to entry for additional players in specialized market segments, such as facilities-based internet service providers; (iv) promoting national roaming agreements to stimulate more efficient investment in underserved areas; (v) defining a clear strategy and operational plan for universal access ; and (vi) strengthening customer protection and promotion of user interests.

b) **Building the technical capacity of ARTEC through technical assistance**, so that the regulator is better resourced and is armed with effective enforcement powers – with an emphasis on: (i) designation of SMP in specific market segments; (ii) the regulation of wholesale rates and conditions, where justified, including an assessment of upstream wholesale markets and wholesale prices, ensuring non-discriminatory access to network infrastructure and interconnection services; (iii) enhanced and modernized spectrum allocation and management; (iv) monitoring of operator obligations (coverage, quality of service, accessibility); and (iv) enhanced market analysis capabilities, including gender- and spatially-disaggregated data collection,[40] and information dissemination through the strengthening of the ICT Observatory.[41]

c) **Strengthening the FDTIC**, so that the Fund can truly play its role in expanding access to ICT, with a focus on digital inclusion, by: (i) ensuring the transparency of financial statements and developing appropriate accountability procedures for allocating, managing, and reporting on the use of universal access funds[42] and how it contributed to reducing digital gender gaps; (ii) developing more substantive incentives for efficient deployment and/or innovation, for example through a Pay-or-Play mechanism, whereby operators can decide to provide either financial contributions to the fund or in-kind contributions by implementing projects in commercially unattractive areas, thus reducing the risk that funds levied through the FDTIC will not be disbursed; (iii) revising the FDTIC's mandate to focus on increasing digital inclusion; and (iv) strengthening its governance structure.

d) **Improving digital device affordability**. The TA will look into policy and regulatory strategies to improve digital device affordability, including sector taxation and customs duties, but also at other options, such as development of a secondhand market and local assembly of mobile phone kits that could be exempted from excise taxes.
Promoting the pooling and sharing of infrastructure across the energy and digital sectors to reduce deployment costs across the technical value chain, to optimize investment, especially in rural areas, and to enable access to the telecom infrastructure of other utilities to others. For instance, this could involve running fiber over energy distribution networks, that are generally more resilient to extreme weather conditions, rather than using telegraph poles to carry aerial fiber.

Subcomponent 3.2: Support for energy sector reform (US$8 million IDA equivalent)

88. **This activity will finance targeted reform preparation support, including technical assistance to JIRAMA to assist the utility's path towards financial and operational performance improvement and strengthening the other sectoral institutions.** The reforms in the energy sector relate essentially to the revision of the texts in force which should give more comfort to private sector investments, in particular in activities which affect both the energy sector and that of telecommunications. As such, actions are planned at the level of each institution.

a) TA to support the Ministry of Energy:

- **Sector studies and assessments:** Sector studies and technical assessments, like regularly up-date of the LCDP, affordability studies and geospatial analysis. The Ministry agents including the attached agencies will be trained to be capable and autonomous for the updating of these strategic tools.
- **Technical assistance for institutional reform:** Studies in support of institutional reforms in the sector, including restructuring options of JIRAMA, assessments of the role of the regulator, institutional structure for

[40] This could include the financing of a household survey on the usage of digital services.
[41] The ICT Observatory within the telecom regulator, ARTEC, publishes ICT indicators: see *www.artec.mg*.
[42] This will build on the preparation of a Commercial Transaction Manual to guide the award of smart subsidies under Sub-component 1.2.

rural electrification, roles and responsibilities of sector institutions and capacity building plan for sector institutions (including Ministry, JIRAMA, ARELEC, ADER).

- **Technical assistance for strengthening regulatory framework:** Review of laws, decrees and regulations governing the energy sector, including review of the tariff regime and approval processes, tariff structure and methodology, tariff adjustments, tariff regulations for mini-grids, development of tariff approval tools, framework for self-producers of renewable energy and review of regulations governing the structure of rural electrification including the nano grid.

b) TA to support JIRAMA

- **Revision of JIRAMA's connection policy:** The new connection policy adopted in 2020 considers only low-income households living close to the JIRAMA network (subscribed power <1.1kW, less than 30m from the network). The technical assistance consists of defining provisions to be considered for other categories of households, especially in the JIRAMA networks to ensure that the current long waiting period for new connections can be shortened and connections can be delivered at reasonable costs.
- **Options assessment and TA to enable JIRAMA to better manage and commercialize its fiber network on a wholesale**, open-access basis to support the lower-cost deployment of broadband services and last-mile infrastructure throughout the country, to create incentives and to generate additional revenue for JIRAMA, including considerations for changes to the legal and regulatory framework needed to allow this.
- **Technical support to improve bidding and auction policies for renewable energy IPPs to ensure a transparent and competitive process:** (i) preparation of standardized bidding documents and power purchase agreements; (ii) grid integration studies; (iii) transaction advisory services; (iv) studies to identify risk mitigating instruments; (v) TA for a complete asset inventory and valuation of JIRAMA's production and real estate assets to ensure that JIRAMA's financial statements correctly reflect the assets owned and their latest conditions; (vi) TA for JIRAMA's financial and accounting systems to ensure financial statements are reliable, elaborated in a timely manner and can be properly audited; and(vii) TA for proper asset maintenance planning and related needs.

Subcomponent 3.3. Enabling environment for enhanced climate change adaptation and mitigation (US$4 million IDA equivalent)

89. **This subcomponent will support the transition towards investments in climate-smart energy and digital infrastructure and capacity building that helps increase response capacity and reduce Madagascar's climate footprint.** Interventions may include:

a) **TA to streamline the inclusion of resilience in the planning and deployment of digital and energy infrastructure and increase GoM's responsiveness capacities**. TA will be provided to ARTEC and ARELEC, in close collaboration with the National Risk and Disaster Management Office (*Bureau National de Gestion des Risques et des Catastrophes*, BNGRC). This will be done through : (i) assessment of the resilience and vulnerability of critical infrastructure; (ii) capacity-building for emergency response planning and preparedness, including better integration of climate data and risk analysis into digital and energy infrastructure planning and deployment; and (iii) development of standards for climate-resilient energy and digital infrastructure, including detailed network construction guidelines and technical and design specifications for energy and digital infrastructure to ensure robustness and redundancy[43].

b) **TA to develop climate informed policy and regulation in the ICT sector and leveraging digital technologies for climate adaptation and mitigation**, including the development of a Green ICT strategy to :(i) leverage digital technologies to 'green' the economy and enhance resilience to climate related shocks and gradual impacts of

[43] These specifications will be included in the tenders financed by the project.

climate change; and (ii) minimize the climate and environmental impact of ICT infrastructure, devices and services (including an e-waste management plan, best practice for green data centers and telecoms sector). The e-waste management plan will include guidance on how to address additional electronic waste from solar and digital devices.

Component 4: Project Management and Implementation Support (US$20 million IDA equivalent)

90. **This component will support project management and implementation functions and strengthen the GoM's coordination and management capacity.** This includes operating and staff costs of the project coordination unit (PCU) and the recruitment of expert consultants in key areas, such as project management, procurement, and financial management (FM), environmental and social (E&S) management, as well as technical specialists relevant to the various project components. The component will also finance the costs of the Fund Manager and the Independent Verification Agent (IVA). It will also include support for inter-ministerial and stakeholder coordination efforts, to be conducted through a project steering committee (PSC) as well as citizen engagement and communications. This component will also include a number of trainings and TAs targeted at filling knowledge gaps (surveys, market and impact assessments, options analyses) in support of implementation of investment components, e.g., a demand-side survey on the barriers to digital adoption.

Component 5: Contingent Emergency Response Component (US$0 million)

91. **The objective of this component is to support the GoM's response to an eligible crisis or emergency, as needed.** A CERC with zero allocation may be used to contribute to an emergency response through the timely implementation of activities in response to an eligible national emergency. The CERC could also be used to channel additional funds should they become available as a result of the said emergency. The CERC mechanism will be further defined in a CERC Operations Manual and relevant CERC Environmental and Social Management Framework (CERC ESMF) as set up in the Environmental and Social Commitment Plan (ESCP) which include triggers and conditions for the use of funds. This manual will clearly outline (a) any structures or institutional arrangements for coordinating and implementing the CERC; specific activities which may be included; eligible expenditures and any procedures for such inclusion, financial management arrangements; procurement methods and procedures; documentation required for withdrawals; a description of the environmental and social assessment and management arrangements; and a template Emergency Action Plan. Should the CERC be triggered, all expenditures will be made in accordance with paragraph 11 of the IPF Policy and ESF requirements and reviewed and accepted by the World Bank before any disbursement is made. In accordance with paragraphs 11 and 12 of the IPF Policy, this component would provide immediate, rapidly disbursing support to finance goods (positive list agreed with the Government), works, and services needed for response, mitigation, and recovery and reconstruction. Operating costs that are eligible for financing would include the incremental expenses incurred for early recovery efforts arising from the impact of a major crisis.

C. Project Beneficiaries

92. **The project's main beneficiaries are 2,000,000 households that would have access to electricity, 3,400,000 people that would have access to digital connectivity, 1,000 health centers and 2,000 schools that currently have extremely limited access to affordable and reliable energy and 2,000 health centers and schools that would have access to digital connectivity.** The expected project outcomes include a significant scaling up of the number of people provided with new or improved energy service by 10 million and with new or enhanced access to broadband internet by 3.4 million. Beneficiaries will benefit directly from electricity access in their premises and indirectly through improved access to economic opportunities and public services that come with electrification. Likewise, the population residing in historically

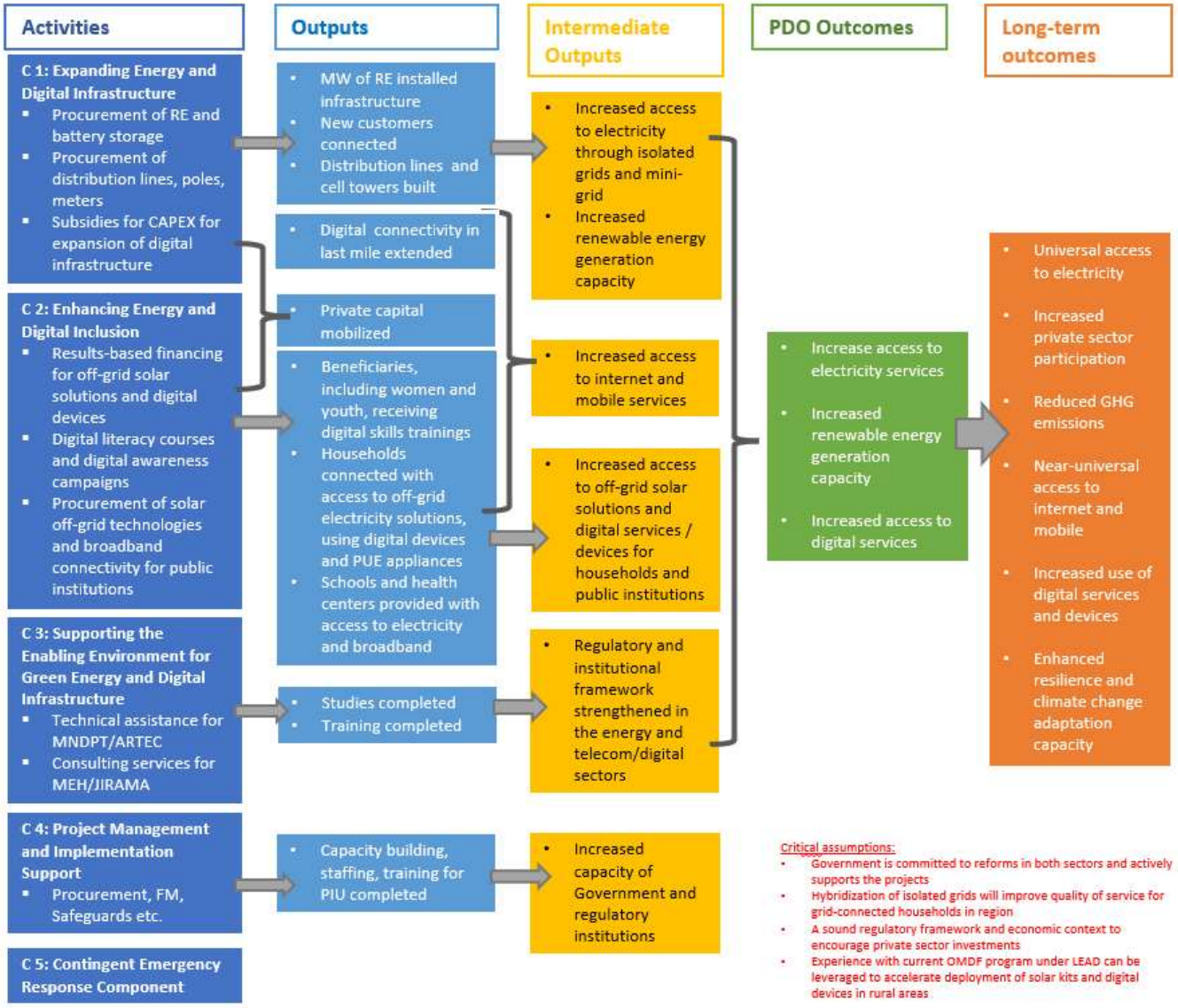
underserved areas, including lagging regions in the southern parts of the country, will have increased access to broadband networks and services through which to access digital communications and other digitally enabled services and livelihoods opportunities. Targeted individuals will also benefit from wider opportunities to access digital services through activities that promote digital access and inclusion. These include individuals accessing digital literacy training and receiving support to acquire a digital device, and those residing near connectivity access points. Youth, women and girls, persons with disabilities and other marginalized and vulnerable groups are specifically targeted, with gender and location disaggregated data used to track progress.

93. **The private sector will benefit significantly, both directly and indirectly, from the project.** On the energy side, the Project will support private sector mini grid developers and off-grid solar providers, allowing them to grow their business and build sustainable supply chains, delivering new employment opportunities in clean energy segment, including in lagging regions and rural areas. Other contractors will also benefit from the Project activities. SMEs will benefit from improved access to energy, and from the provision of productive use equipment and appliances. On the telecom side, targeted businesses will directly benefit, including telecommunication companies, IT services and equipment providers and digital skills providers contracted under various project activities. The telecommunications sector more broadly, including smaller local internet service providers (ISPs), will benefit because the project will enable a reduction in the costs of network deployment, the development of larger, more competitive markets, and boosted consumer demand for broadband and other digital services.

94. **While the project will have a national approach, some interventions will be more geographically focused, prioritizing underserved areas, which are facing both supply side (availability of infrastructure) and demand-side (affordability, digital literacy) barriers.** The project will follow both geographic and user-specific targeting in order to reach underserved population, including the poor and vulnerable households. On the energy side, the Project will target JIRAMA isolated grids, where electricity service is severely restricted (only 15 percent of population are connected). By hybridizing the mini grids, the Project will improve reliability of supply and allow connections of currently unserved households. For new mini grids, the project will follow the geospatial analysis, which will prioritize sites based on their economic viability and impact (e.g. maximize the number of households, leverage synergies with digital services, while ensuring that lagging regions are included). On the digital side, rural connectivity programs will target areas where there are gaps in coverage, while digital inclusion programs (devices, digital literacy) will also include poor secondary cities and peri-urban areas along growth corridors, where there is a large usage gap and a large concentration of poor people who could benefit from new economic opportunities through digital technologies, i.e., areas that have a high potential to stimulate growth. The spatial targeting methodology will be based on geo-spatial analysis to identify key priority locations based on need/demand and impact potential to maximize the catalytic impact of investments and building synergies across subcomponents. Access to off-grid solar solutions and digital devices will be promoted throughout the whole country, but results-based grants (including end user subsidy) will be geographically targeted to incentivize service provision in underserved and poorer regions. Geographic targeting is expected to be complemented with poverty targeting (targeting of specific households based on their poverty status), leveraging Madagascar Safety Nets Resilience Project (P179466), which is setting up a registry of poor and vulnerable households. Other Projects, such as PROGIDY (P169413) will also be leveraged to facilitate more productive use of internet-connected devices among beneficiaries and enable them to access new supported services or mobile money transfers.

D. Results Chain

Figure 2: Theory of Change for the DECIM Project



95. **The theory of change underpinning the proposed project is presented in Figure 2.** The project aims to increase access to renewable energy and broadband services for households, public facilities, and enterprises in Madagascar through financing of investments in renewable energy capacity, network densification and expansion in rural areas, activities to support the development of a market-enabling environment to crowd in private sector participation, schemes to improve solar kits and digital device affordability and training to enhance digital skills and knowledge. Furthermore, the proposed operation will provide capacity building and implementation support to agencies for sustainable planning, rollout, and management of programs beyond the life of the project. Achievement of project objectives posits the realization of the following critical assumptions:

a. A sound policy framework to support the expansion of access to electricity services, particularly in the rural

areas. This includes GoM's continued support to the NEP agenda and an adequate regulatory framework for the mini-grid sector.

b. A sound policy, legal and regulatory framework to encourage competition and private sector investment in the telecom/digital sector. This includes GoM's willingness to pursue key reforms and follow a competitive, private sector driven approach to meet its connectivity needs.
c. GoM's commitment to ensuring that electricity and broadband connectivity consumed by public agencies are budgeted and paid for.
d. The private sector is able and willing to expand broadband and energy access infrastructure and services in response to incentives.
e. Results-based financing and viability gap funding grants can close the affordability gap.

E. Rationale for Bank Involvement and Role of Partners

96. **The principal rationale for World Bank involvement in this project is to support socio-economic inclusion by extending digital and energy services to underserved regions and targeting the poor and vulnerable households.** The project is financing expansion of energy and digital services to underserved regions and for poor and vulnerable households which cannot be served on purely commercial terms. The project will leverage private sector delivery of energy and digital services, but it will provide viability gap and performance-grant financing to close the gap between costs of service provision and affordability levels of target population. Public sector funding will thus on one hand ensure that the services are affordable for the target population, including for the poor and vulnerable households, and on the other hand that sustainable provision of these services by the private sector is not compromised. By supporting not only the access to infrastructure but also the access to digital devices and productive appliances, and by supporting joint service provision in schools and health clinics, the project is expected to help generate transformative opportunities for improved livelihoods and human capital development This will promote a "levelling up" of rural and peri-urban areas to match the benefits experienced in urban areas. This should promote a convergence of opportunity and a reduction in the digital divide. In doing so, the project will bring valuable economic and social benefits to a portion of the Malagasy population that would otherwise remain excluded.

97. **With an existing portfolio of US$255 million for the energy sector, the World Bank is committed to supporting the Malagasy government**. The World Bank Group strategy is two-fold: (i) working on decentralized renewable energy solutions to push access; while (ii) continuing to work on efforts to stem the financial losses of JIRAMA. Increasing access is a core agenda of the World Bank Africa Region and Madagascar is one of the countries of focus for this agenda. The project will support private sector investments and operating models in distributed renewable energy systems building on the World Bank Group-wide Distributed Access through Renewable Energy Scale-up (DARES) platform in partnership with IFC, MIGA and other sectors, as well as other development partners and philanthropies. According to geospatial modeling, distributed renewable energy technologies (mini grid and off-grid solar systems) can reach 70 percent of unelectrified population. The project will aim to increase the rate of access to electricity in Madagascar from 33 percent to 60 percent, which can only be achieved through a large-scale intervention leveraging both public and private funding.

98. **Many financial partners are involved in the energy sector in Madagascar (Figure 3)**. The World Bank is the largest partner in the energy sector, followed by the AfDB, which is mainly involved in large hydroelectric projects and interconnected networks. The other financial partners (EU, GIZ, AFD, Kuwait Fund, BADEA...) intervene already on rural electrification, notably the mini grids. The DECIM Project provides an opportunity to build on these initiatives and help the Government channel them into larger-scale efforts under a platform developed by subcomponent 1.3.

Figure 3: Involvement of partners in the energy sector in Madagascar

Sector policy options				Enhance electricity access & connectivity	Accelerate clean energy transition	Create financially viable utility (JIRAMA)	Governance, support policy & regulatory reforms
Donors[44]	WB	ESOGIP	105	X	X	X	X
		LEAD	150	X	X	X	X
		DECIM	400	X	X	X	X
		GIF	1.5		X		
	AfDB	PRIRTEM	220	X	X	X	X
	EU	PHEDER	2.35	X	X		X
		RHYVIERE II	7.25	X	X		X
	USAID	SAEP			X		X
	ONUDI	PCH	17.19	X	X		X
	GIZ	PERER	25.21	X	X		X
	BADEA	Andekaleka	7.1		X		
	Kuwait	Andekaleka	6.77		X		
	France/IR	CIRAD	8.38				X
	OPEP	PIC 2	8.03	X	X		X
	UE/BEI	Andekaleka	12		X		
	AFD	ENVOL	1.2	X	X		X
		PAMELA	0.78	X	X		X
	FEM/GEF	Hydro	1.17		X		
	KFW	Hydro			X		X

99. **The World Bank is also well-positioned to support the digital sector in Madagascar, given its technical knowledge as well as prior track-record of investing in the main areas covered by the project.** For example, the World Bank Group is home to dedicated Communities of Practice on "Digital Infrastructure 2.0", and Digital and Climate Change, which can draw on experts in the field, cutting edge research and mobilize support from partners in industry and academia. Moreover, the World Bank has a track-record of supporting digital development in Madagascar, including CIP-3, and similar operations regionally. The ecosystem approach proposed and the focus on the enabling foundations of the digital economy have been developed and tested through World Bank Group programs in other countries. This contrasts with the more siloed or smaller-scale approaches supported by other institutions in this space that may not be able to bring

[44] Global Infrastructure Facility (GIF), African Development Bank (AfDB), *Projet de renforcement et d'interconnexion des réseaux de transport d'énergie électrique à Madagascar* (PRIRTEM), European Union (EU), *Pico Hydro Electricité au service du Développement Rural* (PHEDER), *Réseau hydroélectrique villageois et protection de l'environnement* (RHYVIERE II), United States Agency for International Development (USAID), Southern Africa Energy Program (SAEP) , *Organisation des Nations Unies pour le Développement Industriel* (ONUDI), *Petite Centrale Hydroélectrique* (PCH), *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ), *Promotion de l'Electrification par les Energies Renouvelables* (PERER), *Banque Arabe pour le Développement Economique en Afrique* (BADEA), *Centre de coopération Internationale en Recherche Agronomique pour le Développement* (CIRAD) , OPEC Fund for International Development (OPEP), *Projet Pôles Intégrés de Croissance et Corridors* (PIC2) , *Banque Européenne d'Investissement* (BEI) , *Agence Francaise de Développement* (AFD) , *Energies Nouvelles et Valorisation des Localités du Sud-Ouest de Madagascar (ENVOL), PArtenariat Multi-acteurs pour un accès durable à l'ÉLectricité des Activités économiques* (PAMELA), Global Environment Facility (GEF), *Kreditanstalt für Wiederaufbau* (KFW)

together all sectors and arms of Government, the cross-cutting expertise and financial resources necessary to achieve comprehensive digital transformation.

F. Lessons Learned and Reflected in the Project Design

100. **On the energy access side, the project is built on lessons from implementing the past and current energy projects in Madagascar, as well as the latest lessons from the energy access operations worldwide, and in Sub-Saharan Africa in particular.** Lessons from countries that have successfully accelerated electrification efforts point to the need of long-term electrification efforts that build nation-wide/sector-wide electrification platforms, leveraging both grid and off-grid electrification and mobilizing both public and private sector resources in a coordinated manner. Their experience shows that significant progress can be achieved even in relatively short time with political commitment, enabling environment, long-term strategy, least-cost planning, and putting in place adaptive approaches that finetune implementation based on lessons learned. They also show that this requires financially strong utilities for grid electrification and leveraging private sector financing and innovation in off-grid electrification. The project builds on these lessons by: (i) focusing resources into scaling up mini grid and off-grid solar solutions, which based on geospatial modelling are the least-cost technologies for the majority of Malagasy population (70 percent);[45] while (ii) taking actions to improve financial performance of the utility JIRAMA, through targeted TA support and investments in hybridizing JIRAMA's diesel grids, to prepare foundations for a more rapid grid electrification in the future. DECIM builds on existing experiences but provides an opportunity for further improvements and innovations. The project builds on the experiences of ADER and OMDF in providing financing to mini-grid and off-grid solar companies but further refines them to: (i) drive scale and faster progress, and (ii) address consumer affordability constraints.

101. **In Madagascar, the mini-grid sector faces challenges regarding high cost of connections, expensive distribution networks for small numbers of customers with very low affordability capacity living in sparsely populated regions, limited access to finance and sporadic access to grants and subsidies.** To build both scale and sustainability it is necessary to (i) select sites based on a careful analysis and based on prioritization criteria optimizing costs and benefits underpinned by least-cost geospatial electrification planning; (ii) leverage economies of scale to drive down costs; (iii) support productive uses to increase day-time loads to optimize the use of mini grid renewable generation; (iv) involve communities early on and throughout the process; (v) ensure transparent and stable regulatory framework and contractual arrangements to de-risk private sector participation; and (vi) provide viability gap funding. Results- (or performance-) based financing has been found an effective mechanism for leveraging private sector investment, innovation and efficiencies, and (vii) pool resources across Government and development partners to drive scale.

102. **The OMDF experience has succeeded in building a market for quality-verified OGS systems in Madagascar, but the market is shallow, focusing on urban and peri-urban customers.** OMDF experience has demonstrated that a combination of loans and grants is an effective mechanism for building and expanding off-grid solar market, but also that there is a limit to the impact of these instruments. Experience from other countries, as well as the market analysis in Madagascar, point to the need to introduce end-user subsidies to close the affordability gap, complementing the current supply-side RBF (such subsidies have proven to increase uptake of off-grid solar systems in Rwanda, Togo, and Nigeria, and are also being introduced in other countries, such as Uganda, Malawi, the Democratic Republic of Congo, and Niger). Experience from Madagascar and other countries also point to the need to complement RBF with catalytic grants, which can support smaller/local companies to build their distribution channels or to introduce innovations in the market.

103. **Electrification of public institutions tends to produce high economic and societal benefits, but sustainability of**

[45] Analysis of least-cost geospatial electrification options for on- and off-grid deployment in Madagascar, 2021, Innovation Energie et Developpement (IED) & Geosystems

investments is often a challenge. Experience from other countries shows that a pure public procurement model usually results in suboptimal and under-funded maintenance of assets, which result in systems failure many years before their lifespan. Several pilots are currently underway (e.g., in Uganda and under the Regional Off-Grid Electricity Access Project – ROGEAP) to introduce log-term service contracts. The DECIM project will feature a pilot for long-term service arrangements, which will be developed in consultation with all key Government and private sector stakeholders, integrating lessons from Uganda and ROGEAP.

104. **On the digital side, the project also builds on relevant lessons accumulated through several projects under implementation that use similar mechanisms to those proposed in the project design:**

a) **Overall approach**: Global lessons point to the need for layered interventions that tackle all key access barriers, including reliable infrastructure, accessible broadband access points, affordable digital devices, digital literacy, etc. The project also builds on learning lessons from the Digital Economy Diagnostic study completed in June 2019.[46]

b) **Digital infrastructure and connectivity:** Connectivity elements of the proposed project leverage lessons learnt from a comparative analysis study of 70+ last-mile connectivity deployments,[47] and the implementation of IDA financed projects which have successfully leveraged similar models such as the use of targeted smart subsidies intended to increase cellular coverage in rural areas (as planned in sub-component 1.2), under the *Digital Tanzania Project (*P160766) and *Smart Villages Niger Project* (P167543). These projects point to the importance of engaging the private sector at an early stage of transaction design and creating appropriate incentives for PCM. Similarly, the extension of fiber to schools and health centers, and the use of pre-purchase of internet capacity using long-term supply agreements (as planned in sub-component 2.3) has been used to good effect, for example in projects in Malawi (Digital Malawi Foundations Project, Phase I; P160633) and Ethiopia (Digital Ethiopia Foundations Project; P170134). Competitive bidding documents from these projects can help inform the design of similar transactions for this project. The most recent experience of IDA investment in the digital sector in Madagascar was the third phase of the *Regional Communications Infrastructure Project* (RCIP3, P094103), which ran from 2005 to 2015. An important lesson from this project is to have good models for sustainability after IDA funds run out. While the Ministry of Telecom was supposed to be responsible for monitoring the "passive" infrastructure after project closure to ensure that the PPP convention was enforced and validate any changes in the pricing structure, this was not done and created issues, with some operators complaining that prices were not updated to remain cost-oriented over time and became too high. Under DECIM, technical assistance will be provided to ARTEC and MNDPT to be able to play this monitoring role more effectively.

c) **Device affordability:** Project design regarding device affordability will leverage lessons learned on targeting, instrument mix and implementation modalities from related schemes in-country and elsewhere, including a global study underway on Affordable Devices (P173751) and the Rwanda Renewable Energy Fund Project P160699). It will also draw on research conducted with partners such as Global System for Mobile Communications Association (GSMA), Facebook Connectivity, and from experience of smartphone subsidy schemes,[48] including related interventions in social protection projects.[49]

[46] World Bank. 2019. Digital Economy Country Assessment: Madagascar. (unpublished).

[47] World Bank (2020), Innovative Business Models for Expanding Fiber-Optic Networks and Closing the Access Gaps study.

[48] Examples include: Full price of a device called Ascend Y21 was reverse subsidized by MTN Ghana, in the form of voice and data services over a 12-month period; Columbia allocated US$90 million for data and smartphones subsidies for low-income households; Malaysia launched a national program to encourage youth to purchase 3G-enabled smartphones with a rebate on certain phones reducing the cost by 40 percent.

[49] Examples include: "Plan Mobile Internet Access," offering a 12-month instalment plan to incentivize 8 million citizens to switch from 2G feature phones to 4G smartphones in Pakistan - a partnership between Tameer Bank, Telenor, and the Government of Punjab; Microfinance institutions in India offering 9-12-month loans at 18-22 percent interest to low-income women micro entrepreneurs to purchase smartphones.

d) **Digital skills and capacity-building**: The project will benefit from lessons learned from programs supporting digital skills across the World Bank Group portfolio including e-Burkina (Burkina Faso e-Governance Project; P155645) and e-Gabon (P132824) as well as a digital skills program in Nigeria (Innovation Development and Effectiveness in the Acquisition of Skills; P166239) that provides a successful case study for training of youth and vulnerable women in partnership with a local non-profit organization and connecting participants with local employment opportunities. Key lessons that will be incorporated in DECIM's activities include: (i) the benefits of carrying out multiple smaller trainings over time rather than a massive one-off training, to incorporate feedback and make improvements and offer opportunities for knowledge refresh; (ii) enhancing public promotion and community outreach; (iii) providing adequate internet infrastructure, relevant devices and digital tools for digital skills programs; (iv) encouraging linkages between the program and other ecosystem support services; (v) reinforcing local technology ecosystem to prepare/adapt and deliver training content; (vi) incorporating local language and content/knowledge into programs; (vii) employing differentiated instruction and personalization of delivery; and (viii) ensuring sensitivity to socio-cultural and religious norms that create barriers to participation.

e) **Telecom sector reform: PICOM also points to the importance of tackling sectoral reform, particularly for wholesale** prices, and this is handled in this project under sub-component 3.1

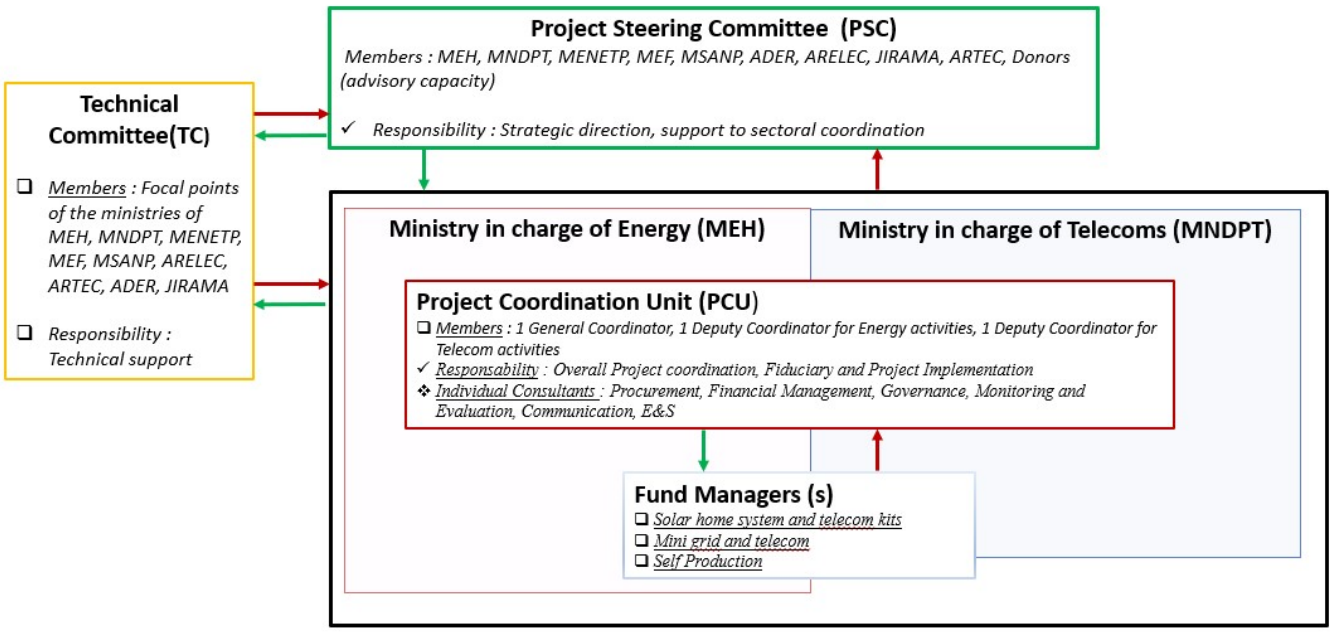
III. IMPLEMENTATION ARRANGEMENTS

A. Institutional and Implementation Arrangements

105. **The Ministry of Energy (MEH) and the Ministry of Digital and Telecoms (MNDPT) will be the implementing agencies with technical oversight of project activities expected to be implemented over five years**. Project activities will be carried out by a Project Coordination Unit (PCU) under the oversight of both MEH and MNDPT. MEH will retain fiduciary responsibility for the project. The PCU will be staffed with (a) a Project coordinator; (b) a deputy coordinator for energy; (c) a deputy coordinator for digital; (d) environmental and social specialists as listed in the ESCP; (e) a monitoring and evaluation specialist; (f) an off-grid specialist; (g) a procurement officer; among others. The deputy coordinator for digital activities will split their time between the PCU and the MNDPT to ensure coordination with the MNDPT team and ownership by the line ministry. Each deputy coordinator will be given a clear list of activities for which he/she will be responsible according to the energy/digital/joint sub-components to ensure clear accountability mechanisms. Additional consultants for procurement, FM, governance, Monitoring and Evaluation (M&E), communications, and environment and social, among others, will further strengthen the capacity of the PCU.

106. **To improve sectoral coordination, an inter-Ministerial Project Steering Committee (PSC), chaired by MEH and MNDPT and comprising members from relevant agencies (including MEH, MNDPT, MENETP, MEF, MSANP, ADER, ARELEC, JIRAMA, ARTEC and others) will be established** to provide strategic direction and general oversight of the project and support for sectoral coordination. The Project Steering Committee shall also approve Annual Work Plans and Budgets. A technical committee with focal points from MEH and MNDPT and other relevant institutions will provide additional technical support, including for the review of audited financial statements and clearance of the Annual Work Plans and Budgets.

Figure 4: Institutional and Implementation Arrangements of DECIM

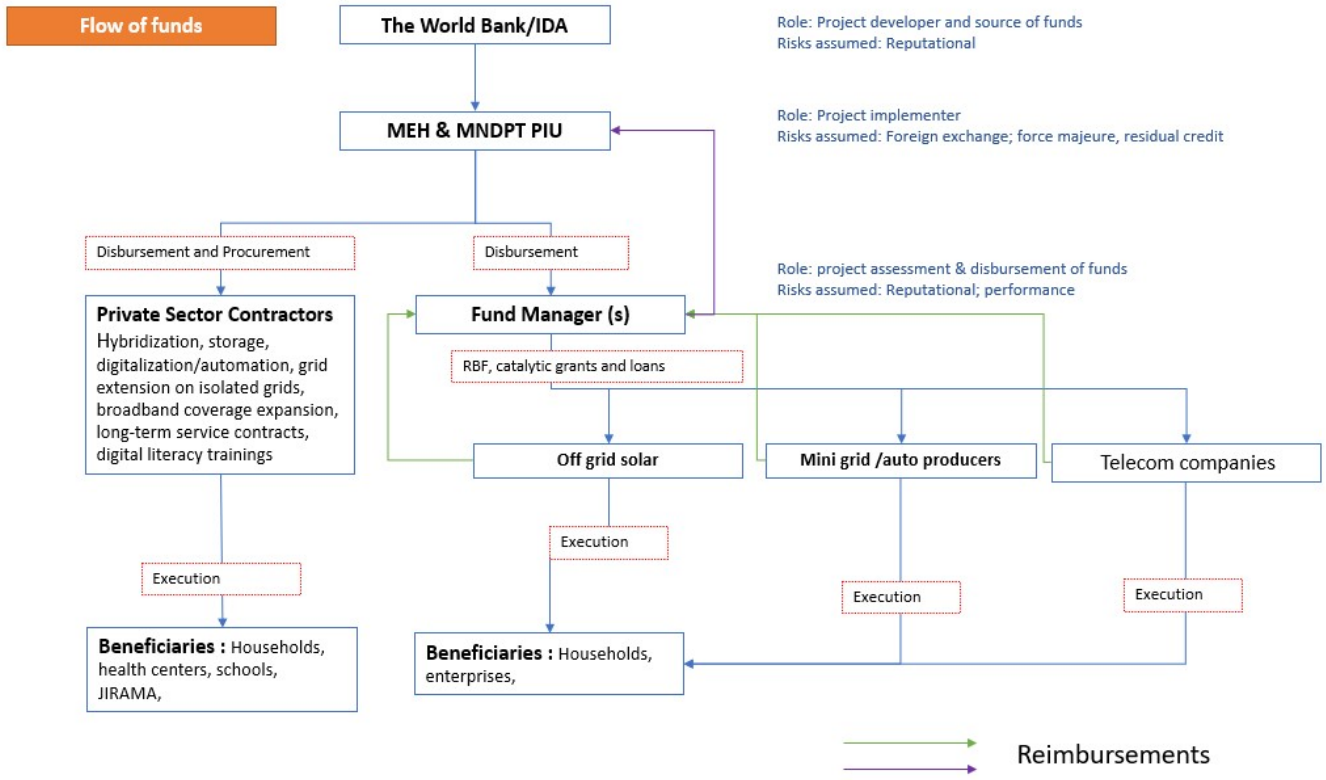


107. **The Fund Manager shall, unless otherwise agreed with the World Bank:** (a) recover the refinanced Sub-loans from eligible Recipients no later than the Project Closing Date; (b) reimburse the Recipient for such recovered funds, in accordance with the POM; (c) reimburse the Association for any amount not used by the Closing Date; (d) ensure, through Subgrant Agreements, that any eligible financial institution, including microfinance institutions, use the proceeds of the Sub-loans, and ensure that final beneficiaries of new loans using the proceeds of the Financing do the same through appropriate contractual arrangements; and (e) take all steps to ensure that any Sub-loan is subject to meaningful ex post review by the World Bank.

108. **The PCU will be tasked with the procurement activities under components 1.1, 1.2, 2.2, 2.3, 3 and 4.** For implementation of subcomponents 1.3 and 2.1, the PCU will recruit competitively, a Fund Manager based on terms of references approved by the World Bank to operationalize and oversee financial instruments to be financed by these components. Component 2.1 will be implemented by the Fund Manager with a close collaboration with ADER, with ADER's active participation and in the design of mini grid transactions, evaluation of proposals and grant award decisions. A verification agent will be recruited to verify the connections made by the private sector benefitting from the results-based financing provided under subcomponents 1.3 and 2.1. Terms and selection criteria of the grant and loan schemes will be spelled out in a Fund Manager Manual for subcomponents 1.3 and 2.1, to be prepared jointly by the PCU and the Fund Manager. The Fund Manager Manual for subcomponents 1.3 and 2.1 implemented by the Fund Manager, will be a disbursement condition for those subcomponents, as it can only be completed when Fund Manager is contracted. Recruitment of a Fund Manager in accordance with the Procurement Regulations, and based on terms of reference, experience, and qualifications satisfactory to the World Bank will also be a disbursement condition for the same subcomponents, implemented through the Fund Manager. For sub-component 1.2, a Commercial Transactions Manual will be developed to guide the allocation of smart subsidies, and the preparation of this Manual will be a disbursement condition. In addition, other dated covenants have been added related to progress on policy and regulatory issues, to ensure that the government has made progress in implementing certain of the reforms presented under subcomponent

3.1, namely '*FDTIC to publish annual report and accounts on the activities financed by the Fund'* and '*ARTEC to publish a Draft Directive on National Roaming and conduct stakeholder consultations*.

Figure 5: Flow of funds



B. Results Monitoring and Evaluation Arrangements

109. The **Monitoring and Evaluation** of the project will be carried out by the PCU who will prepare quarterly reports and semi-annual progress reports to be discussed with the technical committee and shared with the World Bank and the PSC. These reports will include status of results indicators, as well as reporting on the implementation of environment and social instruments including the ESCP, ESMP, RAP, Health and Safety Plans. Section VII presents the project's Results Framework, which defines specific outcomes and results to be monitored. The proposed project will procure M&E consultants hired by the PCU, who will support the implementing agencies in preparing progress reports and evaluating the progress of the components.

110. **The project will apply an agile implementation mechanism** whereby procurements identified as strategic in the PPSD analysis are conducted in phases, with each successive phase – for instance of rural broadband expansion (Sub-component 1.2) or roll out of solar power and internet connectivity to schools and health centers (2.3) -- learning from the experience of the previous phase. This will require a robust results framework in which real-time reporting of indicators, backed up by frequent beneficiary surveys, delivers just-in-time improvements in bidding documents and contract management. The project team proposes to use the Project 360 tool, which has been piloted at the level of the Country Management Unit (CMU), for co-management between the World Bank and PIU of project investments. PDO indicators will help to monitor progress in narrowing the access gap and will be backed up by intermediate indicators that

measure the price of digital services (a surrogate for the level of effective competition), and the number of people benefitting from specific services delivered under the project (e.g., digital skills training, affordable OGS and devices). In-built systems for tracking results and satisfaction surveys will be leveraged to support citizen engagement and solicit beneficiary feedback. Related tools will be embedded directly into project delivery to ensure feedback in real time, using digital tools and systems to register beneficiaries and report their feedback (e.g., using tablet-based or rapid mobile/short message service survey tools). Beneficiary focus groups will also be leveraged to inform design and track progress over time.

C. Sustainability

111. **On the energy side, sustainability will be ensured through** (i) providing incentives to the private sector to enter more nascent markets, which eventually can lead to a more market-based model for off-grid electrification; (ii) addressing affordability constraints in the project design by including demand-side subsidies; (iii) optimizing costs and benefits underpinned by least-cost geospatial electrification planning and selecting sites based on a careful analysis and based on prioritization criteria; (iv) leverage economies of scale to drive down costs; (v) supporting productive uses to increase day-time loads to optimize the use of mini grid renewable generation and increase income generating opportunities for off-grid solar beneficiaries; and (vi) collecting better data on beneficiary institutions, adopting a robust quality assurance framework and developing sustainable O&M arrangements for public institutions.

112. **On the digital side, the long-term sustainability of the initiatives launched under the project are a key feature of its technical design**. Longer-term sustainability is supported, inter alia, by (i) the use of private sector-led and market-based mechanisms for resource allocation and investments in digital infrastructure, including favoring ownership and operation of network infrastructure by the private sector, even when receiving public subsidies from project funds, which will shift financial risk and operational responsibility associated with operation/maintenance of infrastructure to private providers (under subcomponents 1.2,1.3 and 2.1); (ii) the use of long-term supply agreements (up to ten years) for pre-purchase of internet capacity (under sub-component 2.3); (iii) a series of providing of measures under sub-component 3.1 for reform and strengthening of the FDTIC, including TA to introduce the use of Pay-or-Play mechanisms to provide a solution for payment of ongoing operational expenditure (OPEX) expenses for network infrastructure in rural areas or other zones of marginal profitability and strengthening the FDTIC so that it can continue to support network development in rural areas after the end of the project; and (iv) digital access initiatives, including public connectivity access points, schemes for affordable smart devices and digital skills programs, which will help form a critical mass of digitally enabled citizens that can improve the financial viability of the investments made by operators in ‘white’ and ‘gray’ areas and make continued investment in network upgrades, expansion, and maintenance commercially viable. Moreover, while many international firms/contractors will be hired to support the various technical activities envisioned, emphasis will be placed on knowledge-transfer to ensure that local teams are able to maintain systems and solutions introduced. Lastly, key decision makers will be sensitized to opportunities for sustaining O&M after project closure and the need for adequate planning for recurring public financial and operational support, particularly around public access points, the government network and investments in connectivity and technologies in schools.

IV. PROJECT APPRAISAL SUMMARY

A. Technical, Economic and Financial Analysis

(i) Technical Analysis

113. **The project design is technically viable.** The investment under Components 1 and 2 generally use well-proven technologies and presents no unusual installation, commissioning, or operational challenges.[50] The equipment and the technologies to be used in the construction and operation of PV, lines and transformers, on the energy side, and cell sites and fiber deployment on the digital side, will follow relevant international standards. For solar kits, only Verasol quality-verified solar kits will be supported. Cost estimates will be derived from benchmarking against other similar countries under projects financed by the World Bank or by other donors and aligned with current market prices. Regarding project implementation, technical experts will be hired to support the design of activities under Components 1 and 2 in line with best practices and supervision of the implementation of key contracts.

114. **Both solar PV and battery technologies are in a phase of improvement and cost reduction aligned with the national strategies.** It is suggested, therefore, that the project considers a procurement approach that requires tenderers to meet minimum performance requirements for the plant rather than deliver to a narrowly defined technical specification. The tenderer (engineering, procurement, and construction) would contribute toward the design to meet or exceed these performance requirements as well as provide construction and training of the utility staff to operate and maintain the plant. On the digital side, smart subsidies and technology-neutral tendering will be used in competitive procurement process to ensure the best value for money and optimal technical solutions.

115. **Considering the commercial situation of JIRAMA, the project is designed to reduce the unit cost of production for electricity by developing renewable energy and improve reliability of supply.** The hybridization and digitization of the grid will allow to increase system reliability and, hence, quality of service and will reduce fuel consumption, electric technical losses, and maintenance needs, thus reducing O&M costs. Further, the project will improve sector planning and financial sustainability through well-developed and best global practices-informed approaches, including an LCDP, and geospatial analysis.

116. **Climate resilience measures to protect the infrastructure from geophysical and climate risks, will be included, as needed, in the project activities.** Examples of such resilience measures include, but are not limited, to: (a) anchorage support for infrastructures; (b) deep foundation and larger-size footings to withstand extreme wind and flooding, for instance on cell towers; (c) elevated control room and critical equipment to reduce potential flood hazard; (d) use of steel, concrete, or composite towers; and (e) the creation of vegetation buffers.

(ii) Economic Analysis

117. **The economic analysis follows a standard cost-benefit framework, which compares the present value of incurred costs to the stream of attributable benefits**. The Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) of the project inform the project's viability over its economic lifetime with a positive NPV and an EIRR above the discount rate indicative of an economically viable project. The net benefits of the Project were calculated by comparing

50 There is a possibility that the use of low-earth orbit (LEO) satellites may be licensed in Madagascar during project implementation, but the use of existing satellite technology is already well understood, and LEO satellites do not present any major new technological challenges.

the economic costs and benefits of the "with project" and "without project" scenarios. The economic benefits of the project are assessed using the avoided-cost approach, and the Willingness To Pay (WTP)[51] approach for the access component. For this assessment, the economic benefits are confined to the activities that generate benefits for which an economic value can be clearly identified and measured, i.e., investments under Components 1 and 2. The benefits of the TA and reforms components are excluded from the assessment of the project's economic benefits because of the difficulty in valuing the outcomes of such activities.

118. **Economic Benefits**. The identified economic benefits of the project include (a) reduced generation cost due to the hybridization of isolated grids (substituting diesel generation with solar with battery storage); (b) increased number of people with access to broadband internet services (corresponding to a 6 percent mobile broadband internet penetration); (c) increased number of households provided with new electricity connections through densification and intensification, greenfield mini grids and SHS (10,000,000 people or 2,000,000 households); (d) increased access of public institutions to broadband internet services (2,000); (e) increased number of public facilities including schools and health centers with access to reliable electricity services (3,000); and (d) reduced greenhouse gasses.

119. **The project also presents some indirect benefits**. On the energy side, these include increased economic activity, increased household incomes, enhanced financial viability of sector utility, reduced technical and commercial losses, and reduced frequency and duration of outages. On the digital side, these include increased government revenues through license issuance, taxes, and fees from telecom companies, increased Foreign Direct Investment, improved educational outcomes due to improved research and increased efficiency of the public sector. These indirect benefits are, however, not included in the evaluation of project benefits due to limitations in available data. As such, the results of the economic analysis are conservative estimates of the economic benefits of the project.

120. **Economic Costs**. The economic costs were estimated based on the preparatory studies by the project and adjusted to remove duties and taxes. The capital cost of the investment component is estimated at US$360 million and assumed to be disbursed over a five-year period across the different project components. Capex is assumed to be drawn down over 2024 to 2028 at rates of 10, 20, 30, 30 and 10 percent. The main capital expenditures are costs associated with the installation of the solar PV plants with battery storage, system upgrades to facilitate hybridization, cost of works associated with the construction of new distribution lines, wiring costs, connection costs, costs of SHS kits, and cost of mobile devices to access internet services. There are also recurrent operating and maintenance costs including repairs, battery replacements, costs associated with hub, salaries, and utilities, and maintenance of towers and other ICT infrastructures.

121. **Summary of Key Assumptions**. The project is expected to have a 5-year implementation period with the benefits of the project expected to set in from 2024 (for off-grid SHS component) and from 2029 for all other project components. We utilize an economic discount rate of 6 percent in the absence of a reliable economic growth projections for Madagascar in accordance with World Bank economic analysis guidelines. The Economic life of the project is assumed to be 20 years for the solar PV with Battery storage component assuming that there are provisions within the project for a battery change every seven years, and to cover O&M costs. The digital infrastructures are also assumed to have a 20-year asset life. An annual O&M costs 2 percent of CAPEX is assumed.

122. **The analysis finds that the project is economically viable with a Net Present Value (NPV) of US$173 million and an Economic Internal Rate of Return (EIRR) of 12 percent at a 6 percent discount rate**. The project also has a financial net present value of US$441 million and a financial internal rate of return of 20 percent with using a discount rate of 6

[51] Willingness to pay (WTP) is the maximum amount of money a customer is willing to pay for a product or service. It is a common metric measured in pricing research studies, which helps businesses to set optimum prices for their products and services to attract customers while maximizing their profits.

percent.

B. Fiduciary

(i) Financial Management

123. **The FM arrangements that are within the Project Coordination Unit under the Ministry of Energy (MoE) are compliant with the FM Manual for the World Bank-financed Investment Operations dated as of September 7, 2021 and are deemed adequate for the implementation of the project.** The ESOGIP Project (P151785)[52] and the LEAD Project (P163870[53]) currently implemented by the PCU within the MoE and the JIRAMA (National Electricity and Water Facility) are broadly in compliance with FM requirements and the FM performance is moderately satisfactory. This performance rating is mainly linked to the important weaknesses of the assets and stocks management system within the JIRAMA as well as the low capacity in planning and treasury management. On the MoE side, low adherence with procedures is noted resulting to poor quality of reporting and insufficient documentation of expenditures. Corrective actions are being taken under the ongoing projects to address these issues. The overall residual risk rating is *Substantial* due mainly to the complexity of activities to be financed involving multiple technical stakeholders and the level of decentralization that may impede the coordination, the funds flow involving financial intermediary financing and several schemes of grants, the low capacity at the MoE. Given the workload implied by the ongoing projects as well as the complexity of the DECIM project, the PCU will be reinforced for the implementation of the DECIM project. The MoE will appoint an independent Fund Manager to implement the subcomponents 1.3 and 2.1. This Fund Manager will provide micro-credits/grants to retailers and consumers to enable energy and digital access. The agreed arrangements considered the applicable guidance on Financial Intermediary Financing under an IPF.

124. **To further improve the project FM arrangements, the PCU will consider the following mitigation measures**:

i. Recruit a qualified Finance management specialist and an Accountant with TOR agreed with the World Bank no later than three months following the effectiveness date.

ii. Recruit an Internal auditor to continuously review the governance, risk management, and control over the project's activities no later than three months following the effectiveness date.

iii. Develop the POM considering the existing procedures applied to the ESOGIP and the LEAD, as well as the specifics of this new project. The POM will particularly consider clear collaboration arrangements between the PCU and the Technical Committee (Digital and Energy departments/entities involved); the contract management aspects; the assets and stock management. The POM will be adopted by the effectiveness date.

iv. Develop procedures (Fund Manager Manual) that will support the management of performance-based grants and loans under the sub-components 1.3 and 2.1 that will be managed by the Fund manager. The Fund Manager Manual will clearly define the eligibility criteria for the Participating Financial institutions (PFIs), the flow of funds applicable to the sub-components 1.3 and 2.1 (grants, loans, line of credit), the eligible expenditures linked to these sub-components, the applicable grievance redress mechanism, the monitoring and evaluation procedures, the reporting requirements. This manual will be submitted to the World Bank for approval.

[52] ESOGIP Project P151785 - IDA Credit 57730 and 6280, US$105 million, effective in August 2016 and will close in June 2023; US$100 million is implemented by JIRAMA and the remaining part of the project is managed by the MEH.
[53] LEAD Project, P163870 - IDA Credit 63730, US$150 million, effective in July 2019 and will close in June 2024; US$120 million is implemented by JIRAMA and the remaining part of the project is managed by the MEH.

v. Define robust arrangements with the Fund manager (financial intermediate) that will implement the sub-components 1.3 and 2.1 of the project. The ToR for the Fund Manager will ensure compliance of on-lending terms with the World Bank Directive on IPF (Financial Intermediate - FI). The PCU will be supported by a Transaction advisor in the recruitment process. The intervention scope of the verification agency for these RBF activities

vi. Appoint an External audit firm to undertake a review guided by agreed-upon procedures (AUP) that will confirm the adequacy of the procedures applied in managing the sub-components 1.3 and 2.1. This AUP will cover the period of 12 months following the first disbursement under the components concerned. The report will be transmitted no later than four months following the review. An Independent Verification Agency (IVA) will be recruited to ensure the monitoring of the Fund Manager's performance and will report biannually to the PCU.

vii. Develop procedures (Commercial Transactions Manual) for the management of the financial incentives under the sub-component 1.2 and smart subsidies under the sub-component 2.3.

viii. These mitigation measures will strengthen the internal control environment, maintain the timeliness and the reliability of information produced by the PCU.

125. **FM arrangements.** The PCU will rely on qualified FM staff throughout the lifecycle of the project. The PCU will open 2 Designated Accounts (DA) to better manage the funds flow related to the different components: the first DA will receive funds related to components 3 and 4 as well as sub-components 1.1, 1.2, 2.2 and 2.3. the second DA will receive funds related to the sub-components 1.3, 2.1, and smart subsidies under 2.3. The IDA funds will be disbursed on transaction-basis using the following methods: reimbursement; advances; direct payments; and special commitments.

126. **The PCU will purchase an accounting software to record the project's transactions and to report upon. The PCU will prepare quarterly unaudited interim financial reports (IFRs) and provide such reports to the World Bank within 45 days of the end of each calendar quarter**. The project financial statements will be audited annually by private auditor recruited with agreed TOR. The audit report will be submitted to the World Bank no later than six months after the end of each fiscal year. The project will be supervised at least twice a year, in addition to routine desk-based reviews and FM regular meeting.

127. **The Fund Manager will maintain FM arrangements that are acceptable to the World Bank and that, as part of the overall arrangements for implementing the operation and will provide reasonable assurance that the proceeds of the loan are used for the intended purposes**. Audit reports and interim financial reports will be submitted to the World Bank by the Fund Manager acting as the implementing entity covering funds received and funds on-lent, capturing loans by Participating Financial Institutions.

(ii) Procurement

128. **The LEAD PIU has previous experience with the World Bank's New Procurement Framework.** However, based on its current evaluation and experience, we noticed that moderate shortcomings in Borrower procurement processes and contract administration have jeopardized the timely achievement of one or more major outputs and/or limited achievement of value for money, economy, efficiency, effectiveness, integrity, fairness, transparency, and accountability, but resolution(s) is/are likely. The project will address any procurement capacity gaps by training the PCU's procurement officers, who have already been involved in the implementation of the preceding similar Project. The World Bank

procurement team will continue to provide coaching and continuous hands-on support to the PCU. Based on all of this, the residual project procurement risk is considered ***Substantial***.

129. **Procurement under the project will be guided** (i) by the Procurement Regulations for Investment Project Financing (IPF) Borrowers' dated November 2020, (Procurement Regulations) and its later updates; and (ii) by the World Bank's Anti-Corruption Guidelines: 'Guidelines on Preventing and Combatting Fraud and Corruption' revised as of July 1, 2016, as well as provisions stipulated in the Financing Agreement.

130. **All works, goods and non-consulting services will be procured in accordance with the requirements set forth or referred to in Section VI.** Approved Selection Methods: Goods, Works and Non-Consulting Services of the Procurement Regulations mentioned above. All consulting services will be procured in accordance with the requirements set forth or referred to in Section VII. Approved Selection Methods: Consulting Services of the Procurement Regulations, as well as according to the Project Procurement Strategy for Development (PPSD) and the Procurement Plan approved by the World Bank.

131. **The PPSD and Procurement Plan covering the first 12-18 months of project implementation were approved by the World Bank before negotiations.** A brief summary of the PPSD is provided in Annex 1. The Procurement Plan specifies for each contract (a) a brief description of the activities/contract; (b) the selection methods and the market approach option to be applied; (c) the estimated cost; (d) time schedules; (e) the World Bank's review requirements; and (f) any other relevant procurement information. Any updates of the Procurement Plan shall be submitted for the World Bank's approval with the corresponding update in the PPSD. The project will be using the World Bank's online procurement planning and tracking tools, Systematic Tracking of Exchanges in Procurement (STEP), to prepare, clear, and update its Procurement Plan and to carry out all procurement transactions.

132. **Regarding the risk of forced labor, under Environmental and Social Standard (ESS2),** where the is a significant risk of forced labor related to primary supply workers, the Government will require the primary suppliers to identify those risks and if forced labor cases are identified, the Government will require the primary suppliers to take appropriate steps to remedy them. Ultimately, where remedy is not possible, the Government will, within a reasonable period not exceeding 15 days after finding, shift the project's primary suppliers that cannot demonstrated that they are meeting the relevant requirements of ESS2. Prior to beginning the procurement process, the Government will undertake market analyses to identify the possible suppliers of solar panels to the project. The bidding documents will emphasize forced labor risks in solar panels and components and will require that sellers of solar panels to the project will not engage or employ any forced labor among their work force. Bidders will be required to provide two declarations: i) a Forced Labor Performance Declaration, which covers past performance, and (ii) a Forced Labor Declaration, which covers future commitments to prevent, monitor and report on any forced labor, cascading the requirements to their own sub-contractors and suppliers. In addition, enhanced language on forced labor will be included in the procurement contracts. The World Bank will carry out the prior review of the procurement of solar panels and solar panel components to ensure that the required provisions to the contracts are used by the Government.

(iii) Gender

133. **Although the Government is undertaking efforts to achieve greater gender equality, women's economic empowerment is still limited in Madagascar**. As Madagascar continues to invest in and reform the power and digital sectors, it is essential to develop and implement measures and policies that create more gender-inclusiveness across issues such as access, entrepreneurship, employment, and customer relations. In particular, the project can be leveraged to close identified gender gaps in Madagascar by: (a) reducing disparity of access of poorer urban households and in

particular of female-headed households to access electricity through targeted measures such as adapted costs for connections as well as targeted communication efforts; (b) offering targeted outreach to promote electricity connections as well as accompanying business development programs for women-led businesses which are disadvantaged in their access to finance and information; and (c) reducing the gender digital divide so that more women can benefit from the dividends associated with enhanced usage of digital technologies. The project plans to do this by accompanying female-headed households and female-led businesses to obtain electricity connections and access digital services through targeted assistance that will enable women to combat time-poverty, enhance their livelihoods and boost their business opportunities.

134. **Reaching an increasing number of women customers, in particular female-headed households and women-led enterprises, which are often disproportionately affected by energy poverty, is key to closing gender gaps.** In particular, the proposed project can promote gender equality and close gender gaps by lowering the upfront cost of electricity provision and electric appliances to make them affordable to women and women-led businesses, who are less likely to have access to finance. In particular, the project undertakes to close identified gender gaps by providing access to female-headed households, with a target of 28.5 percent of connections provided to female-headed households, reflecting the share of female-headed households in Madagascar as a whole. In addition, gender disparities can be ameliorated with approaches enabling women to have the same opportunity as men to benefit from improved income-generating activities linked to electricity access. For this project, this will be achieved by targeting women-led MSMEs to provide access as well as an accompanying business development program, which will ensure that the newly gained electricity access will be leading to increased income-generating activities efficiently.

135. **On the digital side, the project addresses specific gender gaps in broadband access, device ownership, and digital literacy**. These gaps prevent women from reaping digital dividends, hindering their empowerment. A gender analysis in the context of digital will be carried out to understand barriers and facilitators to access in Madagascar and to ensure existing gaps and their underlying causes are identified and will be tackled. Specific interventions include: (i) promoting women's access to broadband services by providing public access in safe spaces that women and girls access disproportionately, promoting the affordability of internet use and developing outreach and communication activities targeted at women; (ii) promoting access to digital devices by supporting policy and regulatory strategies to improve their affordability and developing financing schemes specifically for women to facilitate purchase of internet connected devices; and (iii) promoting digital literacy by conducting women-friendly digital literacy trainings that specifically address women's concerns and needs and by working with female mentors and advisors to help women overcome social and cultural norms and gender-related barriers.

C. Legal Operational Policies

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

D. Environmental and Social

136. **The environment and social risk classification (ESRC) is *substantial*.** The relevant Environment and Social Standards (ESS) that have been identified via the environmental and social risk screening at concept stage of the project are: ESS1: Assessment and Management of Environmental and Social Risks and Impacts; ESS2:Labor and Working Conditions; ESS3: Resource Efficiency and Pollution Prevention and Management; ESS4: Community Health and Safety;

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement; ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources ESS8 Cultural Heritage; ESS 9: Financial Intermediaries, ESS10: Stakeholder Engagement and Information Disclosure.

137. **Environment risks and impacts.** The environment risk rating has been determined as "Substantial" mainly due to key environmental risks and impacts stemming from Component 1, that are associated with community health and safety risks, the transmission of communicable diseases such as COVID-19, environmental pollution risks are associated with transportation, installation, storage, operation, and disposal of solar panels. The civil works construction of local small-medium-infrastructure are associated with community health and safety concerns and other OHS related issues with the use of vehicles, construction equipment, and machinery to direct and indirect contracted workers. However, substantial impacts are expected such as: activities associated with ESS2 related to OHS for different types of workers and also to potential forced labor linked to the production of solar panels, ESS3 related environmental pollution, ESS4 related community health and safety, as well as ESS6 related biodiversity loss, clearing of habitats, and potential damage to ecologically sensitive areas, natural and/or critical habitats, and ESS8 related potential damage to cultural heritage, not yet reported. In addition, it is noted a low institutional capacity of the Ministries stemming from the unfamiliarity with the new Environmental and Social Framework and the key environmental risks and impacts related to: (i) solid waste from the construction phase, (ii) management of waste of electrical and electronic equipment (WEEE) and hazardous waste including end-of-life batteries, (iii) community health and safety risk, (iv) noise and vibration caused by generators, and (v) downstream impacts likely to be generated by TA activities. However, preliminary screening of the project shows that it does not include activities associated with potentially significant and irreversible negative environmental risks and impacts through the implementation of established mitigation measures. The utilization of financial services, the Risk-Sharing Facility, under Component 2.1 has ESS9 related risks that will require the Financial Intermediary to put in place and maintain an Environmental and Social Management System for environmental risk management.

138. **Social risks and impacts.** The social risk rating for this project is ***substantial***. The project activities will largely benefit the population as it aims to provide new and/or improved electricity and broadband services. Project interventions may include (i) several technical assistances to establish an enabling environment for improved digital access and maximizing synergies between energy and digital; (ii) public subsidy funds for private sector to co-deploy digital infrastructure and green energy solutions; (iii) purchasing digital connectivity and energy services; and (iv) various capacity building activities. Anticipated social risks and impacts of the project are expected to be temporary and reversible. Potential social risk identified at this stage relates to potential economic and physical displacement resulting from the component 1 which includes the construction/upgrading of digital infrastructure and installation of IT equipment to expand broadband connectivity to rural areas and e-waste management with associated potential civil works leading to safety and health hazards for workers and communities. Other main risks that may induce by the project activities are (i) possible increase of the gaps between people digitally included and some groups such as poor or low-income household members, people with disabilities, elderly, people with lower education or no digital literacy, and herders living in remote areas; (ii) workers health and safety and community health and safety risk; (iii) labor influx risks including sexual exploitation and abuse/sexual harassment (SEA/SH) and exposure to COVID-19 induced by the civil works but also due to the hiring of enumerators for the ICT household survey under component 1. Moreover, based on the available information at this stage, it is not certain that the PIU, under the LEAD project, will have social risk management capacity especially on the ESF.

139. **Mitigation and risk management.** To limit these risks, stakeholder consultations took place between December 14 and 19, 2022. In addition, the project has developed (i) an Environmental and Social commitment plan (ESCP) which could be adjusted during the project life keeping with the evolution of environmental and social risk and impact; (ii) an inclusive stakeholder engagement plan (SEP) that list the training sessions to be included in the capacity-building

programs; (iii) Environment and Social Management Framework (ESMF) given that the exact locations of the activities are not yet well identified. The ESMF includes inter alia Resource Efficiency & Pollution Prevention and Management Plan, water pollution, air pollution and others; Chance Finds Procedures; Environmental and Social Impact Assessment; Occupational Health and Safety Plan (including for COVID-19); Community Health Plan (including for COVID-19) and an Electrical and Electronic Waste Management Plan (EEWMP); (iv) a Labor Management Procedures (LMP) which will be used to manage labor related risks.; (v) Resettlement Framework (RF) to capture the scope of mitigation measure retaliated to involuntary resettlement; and (vi) an accessible grievance mechanism (GM). Final version of the ESMF and RF acceptable to the Association with the ESCP, GBV action plan and LMP have been disclosed on February 21, 2023 in the country and to World Bank's external website on February 22, 2023. The selection of hydropower system location is not available yet; a standalone ESIA with its ESMP is required for any hydropower and transmission lines for each selected site to be submitted to World Bank's review and approval prior launching bidding document. It will be developed, adopted and implemented the small dam manual in accordance with ESS4 to manage the environmental and social risks of hydropower infrastructures up to 30 MW: micro, mini and small hydro, i.e. less than 30MW with run-of-river and diversion dams (up to 4m) without reservoir but equipped of pressure line, as part of relevant subproject instruments (ESIA/ESMP). The Project as the sub-component 2.1 will enable OGS companies and MFIs, as Financial Intermediaries, to extend credit and sell OGS products to households and micro, small, and medium enterprises through the OMDF. The entity to be the Risk-Sharing Facility has not been identified, however, the identified Financial Intermediary will be required to put in place and maintain an Environmental and Social Management System to manage E&S risks. The PCU will ensure the requirement for FI to have, or if not, to develop and adopt, an Environmental and Social Management System (ESMS), covering policy, procedures, organizational capacity monitoring and reporting and stakeholder engagement as well as compliance the legal agreement. These ESMS should be consistent with policy, procedures, organizational capacity monitoring and reporting and stakeholder engagement as well as compliance with the legal agreement and in compliance the exclusion list.

140. **Environment and social monitoring.** The M&E systems of the project will include monitoring of ESS impacts and measures. The PCU as the implementing agency for the project, with the guidance of its environmental and social specialists and with the support of World Bank E&S team, will be responsible for the preparation of the relevant Environmental and Social Assessment documents, or other appropriate E&S tools. Monitoring checklists will be prepared based on mitigation plans.

141. **Social inclusion and citizen engagement. The project will emphasize approaches that maximize outreach and participation of communities and broader public awareness of project activities.** The project will emphasize approaches that maximize outreach and participation of communities and broader public awareness of project activities. In addition to including at least one indicator monitoring progress on CE in the RF, on responsiveness to grievances, the project will also develop specific activities to solicit beneficiaries' feedback and maximize stakeholder engagement. To this end, specific activities have been outlined in the SEP. In accordance with the ESS10 and the guidelines for citizen involvement in projects throughout the preparation and implementation processes, the project will further promote citizen participation and the establishment of a process for processing community feedback. These aspects have been included in the SEP, which will also include the establishment and operationalization of a project.

V. GRIEVANCE REDRESS SERVICES

142. ***Grievance Redress.*** Communities and individuals who believe that they are adversely affected by a project supported by the World Bank may submit complaints to existing project-level grievance mechanisms or the Bank'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 Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted to the AM at any time after concerns have been brought directly to the attention of Bank Management and after Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit https://accountability.worldbank.org.

VI. KEY RISKS

143. **DECIM is an innovative project in that it brings together two sectors, energy and digital, that have hitherto implemented separate projects.** While it is fully justified to develop a joint project, it is an approach that is untested and therefore the overall risk rating is classified as Substantial.

144. **The Political and Governance risk is rated as *Substantial.*** Although the country is currently undergoing a period of relative political stability after the turbulence of the 2010s, this project was prepared under the shadow of an impending general election to be held in 2023. Sectoral Governance is also relatively weak, with both regulatory authorities, ORE and ARTEC, struggling to establish credibility. The political and governance risk may be mitigated by providing PCU with an operational autonomy (authority to take certain decisions), even as it remains under the oversight of the respective Ministries.

145. **The Macroeconomic risk is rated as *Substantial*.** The multiple overlapping crises of the COVID-19 pandemic, the rise in fuel and food prices, and increasing climate risks place Madagascar in a delicate situation, and it has experienced a recession that is up to three times deeper that elsewhere in Sub-Saharan Africa, in a country that lacks the resilience to recover quickly. The macroeconomic situation could reduce the private sector's ability and willingness to make significant investments in network expansion, operations and maintenance and energy investments linked with components 1.2, 2.1 and 2.3. However, this risk is partially mitigated by the flexibility in the design, which will determine the level of grants and smart subsidies based on the market situation to account for both (i) need to ensure affordability of service, and (ii) need to ensure commercial viability for private sector service providers.

146. **The Sector Strategies and Policies Risk is rated as *High***. On the Digital Side, the basic law governing the sector dates from 2005 and has several problems that need to be addressed, including lifting certain exclusivities which are blocking network investment, the lack of open access on the backbone network and the fact that the FDTIC has never properly been operationalized. The project team is working with the government to tackle these problems through policy dialogue. A technical assistance program is being supported by the PRODIGY project to assist the Government with new draft laws. However, the impact on the project if the reforms do not pass is relatively limited, as the project focuses on the last mile segment, which is already liberalized. The rural connectivity program would benefit from FDTIC and national roaming reforms to maximize its impact, and therefore legal covenants have been added. On the energy side, since its adoption in 2018, the new Electricity Code has not been able to be implemented due to the lack of progress in adoption of the application decree. The World Bank and the IFC have mobilized significant resources to support the government in finalizing the decree. Once adopted, the decree will, (i) clarify contract award procedures including unsolicited bidding

and ambiguities regarding the scope of application of the PPP Law, (ii) establish the legal basis for JIRAMA to sign power purchase agreements (including for large ongoing projects such as Sahofika, Volobe, Scaling Solar), (iii) resolve inconsistencies and impractical conditions for bidders to participate in tenders organized by the GoM tThe Government has committed itself in December 2022 to an action plan of reforms to be put in place for the next three years. These actions also being discussed with the IMF in the context of its program in Madagascar, would be carefully monitored. The Bank is engaged in the policy dialogue.

147. **The Technical Design risk of the project is rated as *Substantial*.** Bringing together the two sectors for combined investment projects is relatively risky, due to the danger of competing priorities, but it promises higher rewards thanks to the potential synergies generated from a coordinated approach. On the Digital side, the two main intervention mechanisms to be used – smart subsidies and long-term pre-purchase of capacity – have been widely used in Bank-funded projects elsewhere, which should mitigate the technical risk. Satellites and emerging technologies may potentially be used to reach remote areas, which may increase the technical risk, but lessons from other operations leveraging such technologies will inform the design of the relevant activities. On the energy side, the project builds on lessons from the LEAD project, filling in the gaps that were identified during LEAD implementation. The use of pilots, phased rollout, technical assistance, and quality assurance provided by the World Bank will help refine the activities' design and mitigate these risks.

148. **The Institutional Capacity risk for Implementation and Sustainability is rated as *High*.** The use of subsidy mechanisms is, by definition, timebound and there is a danger that initiatives will fall apart once Bank funding ends. On the digital side, one mitigation measure is the use of long-term internet supply contracts to ensure that benefits and longer-term, and another measure is to introduce a *Pay or Play* mechanism for operator contributions to the FDTIC to cover OPEX expenses for rural cell sites. On the energy side, the subsidy for mini grids will be limited to funding just the viability gap, which would then allow sustainable operation of mini grids throughout the concession period. For solar kits, the focus is on developing larger off-grid solar market, which over time would result in lower costs and rising ability to pay of targeted population, allowing gradual phase out of subsidies. For electrification of public institutions, a use of long-term service contracts/arrangements will be piloted.

149. **The Fiduciary risk for the Project is rated *Substantial*.** The overall FM residual risk rating is *Substantial* due mainly to the complexity of activities to be financed involving multiple technical stakeholders and the level of decentralization that may impede the coordination, the funds flow involving financial intermediary financing, the low capacity at the MoE level. The mitigation strategy to be followed is to work with an existing PIU (e.g., from the LEAD project) which has previous World Bank experience, and to apply Hands-on Expanded Implementation Support (HEIS).

150. **The Environment and Social Risk is rated as *Substantial***. The project will support civil works in rural areas, in particular for: (i) the construction of small to medium infrastructure (such as solar power plant, small hydropower plants), solid waste from the construction phase, (ii) management of WEEE and hazardous waste including end-of-life batteries, (iii) community safety and health hazards for workers and communities, (iv) economic and physical displacement resulting from the component 1 (the installation of renewable off grids) and (v) labor influx risks including sexual exploitation and abuse/sexual harassment (SEA/SH). To mitigate these risks, the detailed assessment of the actual needs and existing gaps in implementing the ESF has been conducted in the ESMF to ensure the borrower's capacity to manage environmental and social risks adequately. Any capacity gaps/strengthening measures for the implementation of the Environmental and Social Standards (ESSs) at both ministries have been provided in Environmental and Social Management Framework (ESMF) and reflected in the Environmental and Social Commitment Plan (ESCP). A proposal for an institutional capacity

building program is part of the ESMF, with the hiring of a full-time environmental specialist, social specialist, GBV specialist and Electrical and Electronic Equipment Waste Management Specialist within the PCU.

151. **The Stakeholders risk is rated as *Substantial***. Working with two different sectors brings an extra level of complication. Weak inter-ministerial coordination could pose a risk to effective project implementation, though this will be mitigated through a cross-cutting, high-level PSC and dedicated project coordinators representing the two key stakeholder groups affiliated with MEH and MNDPT. During project preparation every effort has been made to bring the two together, both in private sector workshops and in formal meetings between the two sets of ministries and regulators.

152. **Other risks are rated as *Substantial*.** Although COVID-19 restrictions have largely been lifted on the island, there is a risk of recurrence, as has happened elsewhere in the world. Equally, while security risks are currently low, there is a risk that the situation could deteriorate in certain project intervention zones in the rural areas. All advised protocols to mitigate these risks have been followed at every stage during project preparation and these risks will continue to be monitored and mitigated during implementation.

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY: Madagascar

Digital and Energy Connectivity for Inclusion in Madagascar Project

Project Development Objectives(s)

The Project Development Objective is to expand access to renewable energy and digital services in Madagascar.

Project Development Objective Indicators

Indicator Name	PBC	Baseline	End Target
Expand access to renewable energy services			
People provided with new or improved electricity service (CRI, Number)		0.00	10,000,000.00
Expand access to digital services			
People provided with new or enhanced access to broadband internet (CRI, Number)		0.00	3,400,000.00
People provided with new or enhanced access to broadband internet – Female (CRI, Number)		0.00	1,800,000.00
People provided with new or enhanced broadband internet access in rural areas (Number)		0.00	1,500,000.00

Intermediate Results Indicators by Components

Indicator Name	PBC	Baseline	End Target
1. Expanding Energy and Digital Infrastructure			
Generation capacity of energy constructed or rehabilitated (CRI, Megawatt)		0.00	27.00
Renewable energy generation capacity (other than hydropower) constructed under the project (CRI, Megawatt)		0.00	27.00
New or improved electricity connection for female-headed households (Percentage of households connected.) (Percentage)		0.00	28.50
Percentage of the population that is covered by a broadband cellular signal (3G+) (Percentage)		67.00	80.00
Mobile broadband penetration rate (unique subscribers) (Number)		26.00	32.00
Households provided with new or improved isolated grid & mini-grid electricity access (Number)		0.00	100,000.00
Households and businesses provided with new off-grid electricity access (Number)		0.00	1,900,000.00
2. Enhancing Energy and Digital Inclusion			
Affordable digital devices distributed under the project (Number)		0.00	830,000.00
Affordable digital devices distributed under the project to women and girls (Number)		0.00	500,000.00
Number of schools, healthcare centers and Government ministries departments and agencies provided with new or enhanced broadband internet access, under the project (Number)		0.00	2,000.00
Health centers and schools provided with new electricity service under the project (Number) (Number)		0.00	3,000.00

Indicator Name	PBC	Baseline	End Target
Number of beneficiaries who received digital literacy trainings (Number)		0.00	20,000.00
Number of women and girls beneficiaries who received digital literacy trainings (Number)		0.00	12,000.00
Number of enterprises and FIs that have received loans/credits from the Fund Manager (Number)		0.00	8.00
Fund Manager has operational tracking system to monitor portfolio quality of loans/credit extended to enterprises and FIs (Yes/No)		No	Yes
3. Support the Enabling Environment for Green Energy and Digital Infrastructure			
Price of 1 Gb of mobile data, as percentage of GNI per capita (Percentage)		3.50	1.50
Standards for climate-resilient energy and digital infrastructure adopted (Yes/No) (Yes/No)		No	Yes
JIRAMA's connection policy updated and extended to classic connection (Yes/No) (Yes/No)		No	Yes
4. Project Management and Implementation Support			
Private Capital Mobilized under the project (Amount(USD))		0.00	30,000,000.00
Percentage of grievances receiving a satisfactory response within the target time limit (%) (Percentage)		0.00	90.00

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		Quarterly	JIRAMA/ADER/Fund manager	Surveys	JIRAMA/ADER/Fund manager
People provided with new or enhanced access to broadband internet		Annually	Mobile Network Indicators	The Project will conduct household and individual ICT surveys at intervals throughout project implementation. The PCU will also track the number of people that benefit from enhanced internet access under the project. The definition of "people" includes all beneficiaries, including individuals, Government civil servants, students and teachers, medical personnel in health centers, etc.	PCU
People provided with new or enhanced access to broadband internet – Female		Annually	As parent indicator	As parent indicator	As parent indicator

People provided with new or enhanced broadband internet access in rural areas	Measures number of people provided with new or enhanced broadband internet access in rural areas	Annually	GSMA, Telecom operators data	PCU to consolidate available information	PCU

Monitoring & Evaluation Plan: Intermediate Results Indicators					
Indicator Name	**Definition/Description**	**Frequency**	**Datasource**	**Methodology for Data Collection**	**Responsibility for Data Collection**
Generation capacity of energy constructed or rehabilitated		Quarterly	JIRAMA, ADER and Fund Manager	Computed from sales / systems installed	JIRAMA, ADER and Fund Manager
Renewable energy generation capacity (other than hydropower) constructed under the project		Quarterly	JIRAMA, ADER and Fund Manager	Computed from sales / systems installed	JIRAMA, ADER and Fund Manager
New or improved electricity connection for female-headed households (Percentage of households connected.)	Measures percentage of new or improved electricity connection for female-headed households	Quarterly	JIRAMA, ADER and Fund Manager	Surveys	JIRAMA, ADER and Fund Manager
Percentage of the population that is covered by a broadband cellular signal (3G+)	This indicator measures the percentage of the population that lives in areas covered by fast broadband mobile signal (3G, 4G, 5G +)	Twice-yearly	GSMA, ARTEC	Mapping of coverage of 4G signals (based on location of base stations, overlaid on map of population density. Note, there is a	PCU, ARTEC

				tendency for operators to overestimate the real level of coverage, and thus independent, crowd-sourced data can also be useful, such as OpenSignal, net, or data from social media sites on who is using what connection from where.	
Mobile broadband penetration rate (unique subscribers)	"Unique" mobile-broadband subscriptions per 100 inhabitants	Annually	GSMA	GSMA Mobile Broadband Capable Connections / GSMA SIMs Per Unique Subscriber / United Nations Population	PCU
Households provided with new or improved isolated grid & mini-grid electricity access	Measures number of households provided with new or improved isolated grid & mini-grid electricity access	Quarterly	JIRAMA and ADER	JIRAMA and ADER reporting on new connections, independent verification if necessary	JIRAMA and ADER
Households and businesses provided with new off-grid electricity access	Measures number of households and businesses provided with new off-grid electricity access	Quarterly	Fund Manager	Surveys	Fund Manager
Affordable digital devices distributed under the project	This indicator measures the number of affordable digital devices (feature phones,	Annually	PCU, drawing upon data from Fund	Contract monitoring	PCU

	laptops, smartphones) distributed under the project, notably through the device affordability financing scheme under sub-component 2.1. This is disaggregated by gender.		Manager		
Affordable digital devices distributed under the project to women and girls	See main indicator definition	Annually	See main indicator definition	See main indicator definition	PCU
Number of schools, healthcare centers and Government ministries departments and agencies provided with new or enhanced broadband internet access, under the project	This indicator measures the number of institutions (MDAs, schools and healthcare centers) that are provided with new or enhanced broadband internet access, under the project	Annually	Monitoring of implementation of contract awards, under sub-component 2.3	Based on a simple count of institutions that have benefitted from project services under sub-component 2.3	PCU
Health centers and schools provided with new electricity service under the project (Number)	Measures number of health centers and schools connected to grid and off-grid solutions	Quarterly	MEH	Surveys	MEH
Number of beneficiaries who received digital literacy trainings	This indicator measures the number of beneficiaries that are provided with digital literacy courses, under the project.	Annually	PCU monitoring and project documents.	Monitoring of implementation of contract awards, under sub-component 2.2.	PCU
Number of women and girls beneficiaries who received digital	Derived from main definition, but measuring	Annually	See main indicator	See main indicator definition	PCU

literacy trainings	only the number of women and girls		definition		
Number of enterprises and FIs that have received loans/credits from the Fund Manager	Measures number of renewable energy and digital enterprises and financial institutions that have received loans/credits from the Fund Manager to expand energy and digital access for the target populations	Quarterly	Fund Manager report	Fund Manager quarterly reports	Fund Manager
Fund Manager has operational tracking system to monitor portfolio quality of loans/credit extended to enterprises and FIs	Measures whether the Fund Manager has operationalized a risk tracking system to monitor the portfolio quality of participating FIs and enterprises	Annually	PCU based on Fund Manager reports	N/A	PCU based on Fund Manager reports
Price of 1 Gb of mobile data, as percentage of GNI per capita	This indicator measures the price of 1 Gigabyte (Gb) of mobile broadband data per month, as expressed as a percentage of monthly GNI per capita. The price is typically measured as an average of market offers, using the methodology developed by ITU. Price data for the current year would be divided by GNI per capita data for the previous year	Annually	ITU and cable.co.uk	See above	ARTEC, PCU

Standards for climate-resilient energy and digital infrastructure adopted (Yes/No)	Whether standards for climate-resilient energy and digital infrastructure have been adopted by the relevant regulatory bodies	Annually	ARTEC, ORE	Tracking of policies and standards produced by relevant regulatory authorities	PCU
JIRAMA's connection policy updated and extended to classic connection (Yes/No)	Measures whether the GoM has adopted connection policy extended to classic connection that will be applicable nationwide and will provide the process for, and cost to consumers of connections .	Once	MEH	n/a	MEH
Private Capital Mobilized under the project	This indicator measures the private sector capital investments that are mobilized through project initiatives. It covers all components and both energy and digital. The measurement of private capital mobilized (PCM) will follow WBG guidelines on eligibility for inclusion and attribution. Examples would include, for instance, private capital committed as part of the reverse auctions planned under sub-component 1.2	Annually	PCU	Monitoring of contracts awarded under the project, and general private sector investment that is enabled by the project	PCU
Percentage of grievances receiving a satisfactory response within the target	Measures response rate to GRM complaints	Quarterly	PCU	PCU's reporting	PCU

time limit (%)					

ANNEX 1: Implementation Arrangements and Support Plan

Detailed Financial Management arrangements

FM risk assessment and mitigation. The content of these risks is described in table 2 below.

Specific FM arrangements

1. **Staffing**. The PCU will recruit one Financial Management Specialist and one Accountant to perform the FM tasks related to the project. The recruitment should be initiated early and the existing staff within the PCU MoE will temporarily perform the FM tasks with the guidance of the World Bank until this recruitment. Upon their recruitment, the World Bank will deliver a training session to the project staff to inform and clarify the World Bank requirements in terms of FM and disbursement.

2. **Budgeting and planning.** Budget arrangements should be described in the FM procedures' manual as part of the POM. The PCU will prepare the annual budget, which will be cleared by the Technical Committee. The budget will be then approved by the project Steering Committee prior to its transmittal to the World Bank. Budget monitoring will be streamlined through the accounting software that will be acquired by the project. The periodic variance analysis will enable the timely identification of deviations from the budget. These reports will be part of the unaudited IFRs that will be submitted to the Association on a quarterly basis.

3. **Accounting and financial reporting**

   a. The PCU will purchase accounting software and prepare accounting reports on a modified accrual basis. The accounting system will be maintained on a modified accruals cash basis with disclosure of commitments and will comply with the Malagasy General Chart of Accounts (*Plan Comptable Général* 2005) which is broadly in line with the International Accounting Standards IAS/International Financial Reporting Standards. The PCU will purchase and use adequate accounting software to record the project's financial transactions, monitor the budget execution, and prepare the financial reporting. The accounting records will reflect adequately the project's structure in terms of components and subcomponents and the source of funds.

   b. The PCU will prepare separate quarterly interim unaudited IFRs for the project. The format of the report will be agreed with the World Bank. These IFRs will be submitted to the World Bank within 45 days after the end of the quarter to which they relate.

   c. At the end of each fiscal year, the PCU will prepare annual financial statements which will be subject to an external audit.

   d. The Fund Manager will provide quarterly financial report, as implementing entity, covering funds received and funds on-lent, capturing loans by Participating Financial Institutions. The annual financial statements of the entity will also be regularly audited.

4. **Internal controls**

(a) The Project Operational Manual

a. The PCU has developed an internal control procedures manual through the existing projects it is implementing. A specific procedures manual (POM) will be developed for the implementation of the DECIM project. The POM will be based on the existing procedures including budgeting process, stock and assets management, payment authorization process, etc...
b. The POM will consider specificities of the new project to be implemented as well as World Bank requirements in terms of reporting and auditing, disbursement and flow of funds, the authorization process for payments as well as the subsequent controls to be undertaken, accounting, and contracts' management related to works.

c. The POM will also provide clarity on the role of the Technical Committee and the modalities of collaboration with the PCU in the implementation.

d. The POM will clearly define the eligibility criteria for the Participating Financial institutions (PFIs), the flow of funds applicable to the sub-components 1.3 and 2.1 (performance-based and catalytic grants, sub loans, line of credit), the eligible expenditures linked to these sub-components, the applicable grievance redress mechanism, the monitoring and evaluation procedures, and the reporting requirements.

(b) Grants, loans, line of credit management

a. The sub-components 1.3 and 2.1 will finance performance-based grants, catalytic grants and sub-loans in the form of line of credit. The MoE will appoint a Fund Manager for the execution of the sub-components based on TOR agreed with the World Bank. The MoE will be supported by a Transaction advisor in the development of the TOR and the recruitment of the Fund Manager.

b. **Fund Manager Manual.** The Fund manager will develop an operation manual (Fund Manager Manual) that will be submitted to the World Bank for approval before use. The Fund Manager Manual will cover eligibility criteria, selection, and procedures for the operationalization of the Fund Manager's activities under components 1.3 and 2. 1 of the Project and the payment of Smart Grants under Components 1. 2 and 2.3 of the Project. The Fund Manual updates will include templates of relevant sub-grant agreements, will be considered part of the POM (the "Commercial Transactions Manual" and "Fund Manager's Manual" respectively). An appropriate grievance mechanism will be developed in the context of the financial intermediary financing. The Fund Manager Manual will be part of the POM.

c. **Commercial Transaction Manual.** The financial incentives (sub-component 1.2) and the smart subsidies (sub-component 2.3) will be managed by the PCU and guided by the Commercial Transaction Manual (CTM). The CMT will be part of the POM.

d. An agreed-upon procedure (AUP) will be undertaken by the external audit firm to confirm the adequacy of the procedures applied in managing the sub-components 1.3 and 2.1. Such a review will cover a 12-month period following the first disbursement under these activities.

e. **Independent Verification Agent.** An Independent Verification Agent (IVA) will be recruited to support

fiduciary monitoring by independently verifying compliance and results. The IVA will report biannually to the PCU. Such a report will be shared with the World Bank.

5. **Internal audit**

a. An internal auditor (consultant) will be recruited within the PCU, based on ToRs agreed with the World Bank, to continuously review the governance, risk management, and control over the project's activities.
b. During the project implementation, the internal auditor will be required to conduct at least three reviews per year to confirm adequacy and adherence of internal controls and submit the reports to the project management, the Steering Committee, and the World Bank.

6. **External Audit**

a. The project accounts will be audited annually. The audit report, the audited financial statements, and the management letter will be submitted to the World Bank no later than six months after the end of each fiscal year. At the time of this assessment, there is no overdue audit report for the sector. The project financial statements will be audited by a private audit firm acceptable to the World Bank. The project will comply with the World Bank disclosure policy on audit reports.

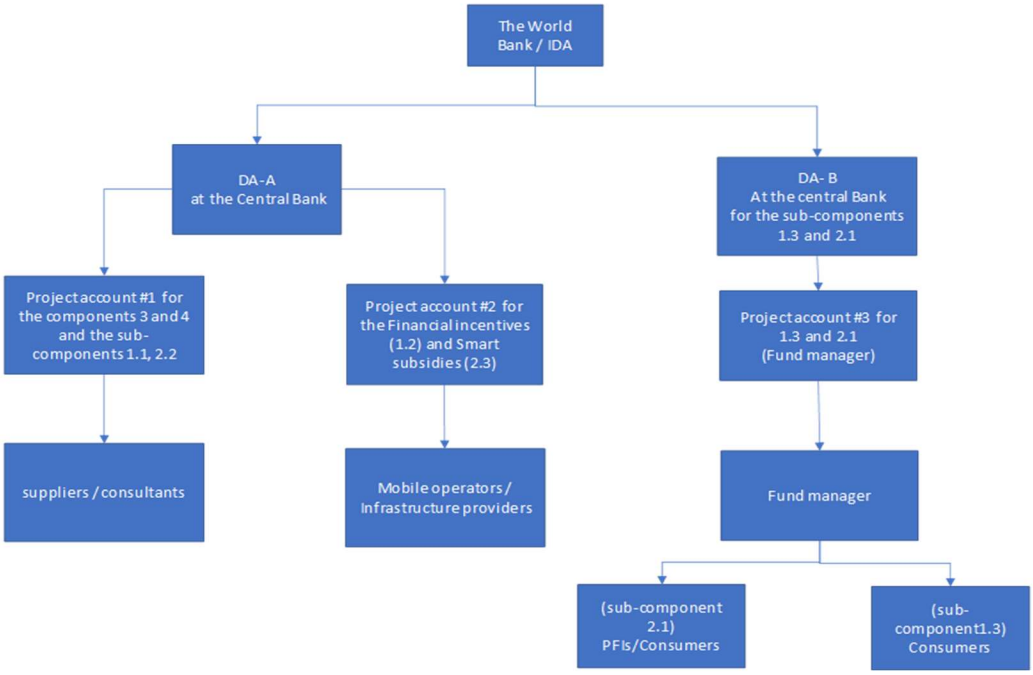
b. The Fund Manager will also submit its financial statements to an independent auditor acceptable for the World Bank. This audit report will be transmitted to the World Bank within six months following the closing of the audited fiscal year.

7. **Flow of Funds - Disbursement arrangements.**

a. The PCU will open two designated accounts (DAs) denominated in U.S. dollars at the BFM, to receive funds of the project from the World Bank, in accordance with the applicable regulation[54] The first DA (DA-A) will receive funds related to components 3 and 4 as well as sub-components 1.1, 2.2 and 2.3. the second DA (DA-B) will receive funds related to the sub-components 1.3 and 2.1. The secondary accounts (Project accounts), denominated in Malagasy ariary or U.S. dollars, will be opened by the PCU at a commercial bank to enable payment of eligible expenditures.

[54] Decree No. 2015–1457, amended by Decree No. 2016–1160, defining the modalities of opening, management, and regularization of transactions on the project accounts opened at the Bank.

Figure 1.1: Flow of Funds - Disbursement arrangements.



b. Transaction-based disbursements will be used for this project. An initial advance of up to the ceiling of each DA and representing four to six months of forecasted project expenditures payable through the DAs will be transferred after credit/grant effectiveness, and subsequent disbursements will be made monthly against submission of the Statement of Expenditures or other documents as specified in the Disbursement and Financial Information Letter. The project will be allowed to use direct payment, advance, reimbursement, and special commitment as disbursement methods.
c. The procedures governing the replenishment of the dedicated account of the Fund manager will be developed in the POM.

8. **Retroactive financing.** The Borrower could request retroactive financing up to US$1.5 million. In accordance with the World Bank policies, retroactive financing is permitted under the following conditions: (a) the activities financed are included in the project description and are procured in accordance with the applicable Bank procurement rules; (b) such payments do not exceed 20 percent of the loan amount; and (c) the payments were made by the Borrower not more than 12 months before the expected date of the Financing Agreement signing. In this context, the Government may make withdrawals up to the approved RF amount for payments made prior to the date of the Financing Agreement but on or after the retroactive financing date to be specified in the financing agreement, for Eligible Expenditures under agreed categories.

9. **Governance and accountability**

a. To prevent from the possibility of corrupt practices including bribes, abuse of administrative and political positions, mis-procurement, and misuse of funds, robust FM arrangements (effective internal control and implementing agency arrangements) will be in place. In addition, the World Bank FM and procurement supervision plan will be tailored to help mitigate this risk.
b. The POM will clarify the World Bank directives on preventing and combating fraud and corruption in World

Bank-financed projects[55].[2] The PCU will put in place an adequate grievance redress mechanism for the project and particularly regarding the financial intermediate financing components.

c. Subject to the Anti-Corruption Guidelines and in accordance with the national anti-corruption laws and regulations corruption grievances related to the project's activities could be submitted and handled by BIANCO or other relevant domestic agencies in the national anti-corruption system.

10. **Supervision plan.** Based on the current overall FM risk, the Project will be supervised at least twice a year. The World Bank will use an enhanced supervision approach and shall supervise the project on an ongoing basis through virtual means and site visits, when possible. The World Bank shall review the SOEs, expenditure, reports, supporting documents, internal and external audit reports, internal control and the use of assets procured under the project. The World Bank will consider feedback from stakeholders collected through the grievance mechanism in the periodic risk assessment. The FM team will work in close collaboration with the Procurement team, WFA and other task team members to identify and mitigate any issues during the supervision, including shortage of funds. Joint missions will be undertaken with the Procurement team to review fiduciary red flags. The World Bank will provide the required training to the PCU staff on the World Bank FM and disbursement procedures to make them familiar with these procedures and to ensure that the funds are used for the project purposes.

11. **FM Action Plan.** The FM Action Plan described below has been developed to strengthen FM arrangements.

Table 1.1: Project FM Action Plan

Remedial action recommended	Responsible entity	Completion date
Develop a POM considering comprehensively the specifics of the project.	PCU	By the effectiveness date.
Develop TOR for the Fund Manager with support of a Transaction Advisor Recruit the Fund Manager based on TOR acceptable for the Bank	PCU PCU	Prior to disbursement under the disbursement category concerned
Recruit an Independent Verification Agency to monitor the performance of the Fund Manager	PCU	No later than six months after effectiveness
Recruit qualified staff to support the PCU: - One FM officer and - One accountant. Provide appropriate training on World Bank procedures.	PCU World Bank	No later than three months after effectiveness Upon recruitment
Recruit one internal auditor (consultant) to support the PCU.	PCU	No later than three months after effectiveness
Acquire adequate accounting software.	PCU	No later than three months after effectiveness
Recruit an external auditor based on the ToR agreed with the World Bank.	PCU	No later than six months after effectiveness

[55] Bank Directive - Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants (revised as of July 1, 2016).

Remedial action recommended	Responsible entity	Completion date
Appoint the external auditor for an Agreed Upon Procedures review covering the first 12-month activity period of the Fund Manager	PCU	Report due within 18 months following the 1st funds transferred to the Fund Manager

Table 1.2: Risk and mitigation measures

Risk	Risk Rating	Risk Mitigating Measures Incorporated into Project Design	Residual Risk
Inherent Risk	S		S
Country level: As public entities, the MoE's system mirrors the central-level PFM system and its weaknesses, resulting in the risk of lack of transparency and accountability in the use of public funds. As an SOE, the JIRAMA operation is also affected by governance weaknesses.	S	The country's PFM systems are assessed as weak. The GoM is committed to implement further reforms of the country's PFM systems (with support from development partners).	S
Entity level: FM requirements not met, weak FM capacity	S	The PCU will recruit qualified FM staff (one finance officer and one accountant) to perform FM tasks. The PCU will appoint an independent Fund Manager that will provide micro-credit to retailers and consumers.	M
Project level: The resources of the project may have been distracted due to weak control environment, the multiplicity of technical stakeholders and potential lack of coordination,	S	The PCU will comply with the internal control processes as set out in the POM once adopted. Specific manual will clarify the procedures governing the different grants, loans, line of credits, subsidies financed through the project (Fund Manager Manual, Commercial Transactions Manual). The Fund Manager will be appointed based on TOR in compliance with Bank Guidance on Financial Intermediary Financing. The eligibility criteria for participating financial institutions will be defined considering Bank guidance on Financial intermediary financing.	S
Control Risk			
Budgeting: Weak budgetary execution and control leading to budgetary overruns or inappropriate use of project funds.	S	The POM will spell out the budgeting and budgetary control arrangements to ensure appropriate budgetary oversight. The budget follow-up will be documented in the quarterly IFR.	S
Accounting: Reliable and accurate information not	S	The PCU will recruit qualified FM staff to ensure	M

Risk	Risk Rating	Risk Mitigating Measures Incorporated into Project Design	Residual Risk
provided to inform management decision.		appropriate performance of the accounting and FM functions. They will be trained on World Bank requirements by the World Bank FM team.	
Internal Control: Business process, roles, and responsibilities within the project are not clear, leading to ineffective control. Delay in project implementation due to weaknesses in contract management (large contracts related to works and equipment). Loss of assets and equipment Damages/default in work's contract execution. Weak capacity of the Fund manager resulting to delay in providing credits/subsidies to consumers, non-compliance in beneficiaries selection.	S	The POM will contain all the key internal control processes pertaining to the various project activities. The POM will establish robust contracts' management procedures (particularly on works) and assets management. Specific manual will clarify the procedures governing the different grants, loans, line of credits, subsidies financed through the project (Fund Manager Manual, Commercial Transactions Manual). Robust arrangements in the Fund manager contract. An agreed-upon procedures (AUP) will be undertaken by the external audit firm to confirm the adequacy of the procedures applied in managing the sub-components 1.3 and 2.1. Such review will cover a 12-month period following the first disbursement under these activities. For assets safeguard across the country, property is clearly defined in the POM. The internal auditor unit will periodically review the adequacy of the internal control and the compliance in practice.	S
Funds Flow: Inappropriate funds arrangements may lead to non-financing of the project activities. Delay and misuse due to inadequate Financial Intermediary Financing arrangements. Frauds and corruption on works contract.	S	The POM will clearly set the authorization process regarding payment requests as well as the subsequent controls required, particularly for requests from the regions. TOR of the Fund manager to be developed considering Bank requirements in terms of financial intermediates. The MoE will be supported by a Transaction advisor in this recruitment process. The Fund manager manual will clearly define the flow of funds applicable to the sub-components to be managed by the Fund Manager. An AUP will be undertaken by the external audit firm to confirm the adequacy of the procedures	S

Risk	Risk Rating	Risk Mitigating Measures Incorporated into Project Design	Residual Risk
		applied in managing the sub-components 1.3 and 2.1. Such review will cover a 12-month period following the first disbursement under these activities. An independent Verification Agent (IVA) will be responsible for monitoring the Fund Manager's performance under Component and will report biannually to the PCU. Such report will be shared with the Bank. A robust Grievance Redress Mechanism will be developed under this project.	
Financial Reporting: The project may not be able to produce the financial reports required on time as required for project monitoring and management.	S	The financial reporting processes will be facilitated by the utilization of appropriate accounting software. This will enable timely generation of financial information. The Fund manager will provide the PCU and the Bank with quarterly financial reports. The first report will be due 45 days following the 1st quarter of disbursement.	M
Auditing: Delays in submission of audit reports. Poor quality of audit report.	S	The external auditor, private audit firm, will be recruited early. The accounting software will lead to timely generation of quality reports.	M
Governance and Accountability: Possibility of corrupt practices including bribes, abuse of administrative and political positions, mis-procurement and misuse of funds, and so on are a critical issue.	S	Robust FM arrangements, World Bank FM and procurement supervisions will be maintained. Effective internal control and internal audit arrangements will be in place. The Fund Manager will maintain FM arrangements that are acceptable to the Bank during the project implementation. All participating financial institutions will be required to maintain compliance with eligibility criteria throughout the project implementation period, considering Bank guidance on Financial Intermediate Financing. A robust Grievance Redress Mechanism will be developed under this project. In addition to the mechanisms set out in the Anti-Corruption Guidelines for fraud and corruption-related sanctionable practices, corruption grievances related to the project's activities could also be submitted and handled	S

Risk	Risk Rating	Risk Mitigating Measures Incorporated into Project Design	Residual Risk
		by *Bureau Indépendant Anti-corruption* (BIANCO) or other relevant domestic agencies in the national anti-corruption system.	
Overall FM Risk	**S**		**S**
S = substantial; M = Moderate			

Procurement

12. **Applicable rules and procedures.** This project will use the World Bank's New Procurement Framework, the procedures specified in the 'World Bank Procurement Regulations for IPF Borrowers' dated July 1, 2016, and updated in 2020, (Procurement Regulations); and the World Bank's Anti-Corruption Guidelines: 'Guidelines on Preventing and Combatting Fraud and Corruption' revised as of July 1, 2016, as well as provisions stipulated in the Financing Agreement. During its implementation, the Project will update the POM in accordance with these abovementioned World Bank references.

13. All goods and non-consulting services will be procured in accordance with the requirements set forth or referred to in Section VI. Approved Selection Methods: Goods, Works and Non-Consulting Services of the Procurement Regulations, and the consulting services will be procured in accordance with the requirements set forth or referred to in Section VII. Approved Selection Methods: Consulting Services of the Procurement Regulations, as well as according to the PPSD and the Procurement Plan approved by the World Bank.

14. **Institutional arrangement for procurement.** The PCU will be responsible for the project fiduciary aspects. The Project will strengthen its procurement capacity by training their procurement team. Additionally, the World Bank will provide coaching and continuous hands-on support to the project.

15. **Procurement risk assessment**. A procurement capacity assessment of the PCU to implement the project procurement activities revealed that the PCU has previous experience with World Bank Procurement Regulations. However, based on its current evaluation and experience, we noticed that moderate shortcomings in Borrower procurement processes and contract administration have jeopardized the timely achievement of one or more major outputs and/or limited achievement of value for money, economy, efficiency, effectiveness, integrity, fairness, transparency, and accountability, but resolution(s) is/are likely. The assessment concluded that overall procurement risk rating is Substantial.

16. The following mitigations measures are proposed: (a) the World Bank will provide training based on all project staff involved in procurement activities needs; (b) the PPSD was developed with a fit-for-purpose approach and methods to address the project's objective and specificity.

17. **Brief summary of the PPSD.** Given the specificity of the project, the market analysis concluded that purchase of photovoltaic hybridization system, purchase of system for the development of digital connectivity in selected rural areas, purchase of solar kit, all activities related to network automation will use an international approach. The Project favors the open competitive process for all its procurement activities including the recruitment of PCU Staff. The full PPSD providing the detailed approach to market and methods justification will be included in the POM.

18. **Procurement item:** The Project plans to procure photovoltaic hybridization system, purchase of system for the

development of digital connectivity in selected rural areas, purchase of solar kit, all activities related to network automation, project tools work, funds manager for cash transfer, technical assistance to beneficiaries of the Project including JIRAMA, ARTEC and other stakeholders, recruitment of PCU Staffs.

19. **Frequency of procurement supervision.** In addition to the prior review carried out by the World Bank, a supervision mission will be conducted every six months and a post-procurement review will be conducted on an annual basis.