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Project Information Document (PID)

Appraisal Stage | Date Prepared/Updated: 15-Feb-2023 | Report No: PIDA34444

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Project Name	Parent Project ID (if any)
Madagascar	P178701	Digital and Energy Connectivity for Inclusion in Madagascar (DECIM)	
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
EASTERN AND SOUTHERN AFRICA	17-Feb-2023	30-Mar-2023	Energy & Extractives
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Ministère de l'Economie et des Finances (MEF)	Ministre de l'Energie et des Hydrocarbures (MEH), Ministre du Développement Numérique, de la Transformation Digitale, des Postes et des Télécommunicat	

Proposed Development Objective(s)

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

Components

1. Expanding Energy and Digital Infrastructure
2. Enhancing Energy and Digital Inclusion
3. Supporting the Enabling Environment for Green Energy and Digital Infrastructure
4. Project Management and Implementation Support
5. Contingent Emergency Response Component

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

Environmental and Social Risk Classification

Substantial

Decision

The review did authorize the team to appraise and negotiate

Other Decision (as needed)

B. Introduction and Context

Country Context

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 GDP growth rate was estimated at 4.4 percent in 2019[1], the largest growth levels 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 flows of concessional financing, and encouraged structural reforms. Labor market conditions improved, and poverty declined, although about 79.4 percent of the population lived below the international poverty line of US$2.15 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 to due extreme climate change: river, urban, and coastal floods, along with landslides, cyclones, and wildfires. Madagascar ranked 167 out of 182 in the Notre Dame Global Adaptation Index, indicating high vulnerability and low readiness to combat the effects of climate change.[2] These increasing weather-related hazards creates significant

[1] Source: Instat, World Bank, (2020).
[2] https://gain.nd.edu/our-work/country-index/

adaptation needs in Madagascar, included for climate resilient infrastructures, and inclusion of climate-adapted solutions.

3. **Gender gaps in employment and human endowments are significant in Madagascar**. Out of 156 countries, Madagascar ranked number 57 in the Gender Gap Index (GGI) in 2021 and number 93 and 111 regarding educational attainment and health and survival, respectively. In terms of health, since 2008, the infant mortality rate has stagnated at 72 per 1000 live births per year. For the last eight years, the maternal mortality ratio has been 478 per 100,000 live births. Concerning affordability of health services, the cost of treatment is one of the main deterrents for accessing care, with women's economic empowerment continuing to be limited. Among other factors, high illiteracy rates and generally lower access to information continue to pose barriers for women to benefit from economic opportunities, for instance to access credit or to expand their businesses.

4. **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.[3] This has been exacerbated by the impact of the war in 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.

5. **Reduced economic activity in key trading partners of Madagascar is likely to significantly reduce growth in 2022 and beyond.** This includes the deteriorated outlook of the European Union 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. **In 2021, the IMF approved a 40-month Extended Credit Facility (ECF) arrangement with total access of SDR 219.96 million (about US$312.4 million), with SDR122.2 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 JIRAMA, the electric utility, reforming spending commitment authorization process and public investment management.

7. **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

[3] World Bank (2022). Madagascar Economic Update: Navigating Through the Storm.

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. According to the 2020 Madagascar Country Economic Memorandum[4] (CEM), this sector is contributing to job creation at the fastest pace, is 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.

Sectoral and Institutional Context

8. **Access to infrastructures 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 populations 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 infrastructures, 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.

9. **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 facilitate financial access to energy solutions such as Solar Home Systems. Furthermore, infrastructure sharing across the two sectors can enable to lower the 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

10. **An estimated 33.7 percent of the population have access to electricity, compared with an average of 48.4 percent for Sub-Saharan Africa in 2020**[5]**.** Over 18 million people currently lack electricity

[4] World Bank. 2020.
[5] https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2020&most_recent_value_desc=false&start=1996&view=chart

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. Even 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 mean an average company outside the capital city loses almost a seventh of sales per year.

11. **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, populations are being served by private sector mini grids (including about 150 private sector mini grids, of which, however, only half are fully operational) and multiple companies offering off-grid solar (OGS) systems. According to the latest energy access survey[6], 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.

12. **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 GHG emissions. According to its NDCs, Madagascar aims to reduce approximately 30 MtCO2 of GHG emissions, representing 14% of national emissions compared to the Business as usual (BAU) scenario[7]. It intends to achieve this by facilitating access to energy, by strengthening existing systems and by promoting renewable and alternative energies, in particular increasing share of hydro and solar in the generation mix from 35% to 79% by 2030.

13. **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; (iv) monitor compliance with quality-of-service standards as well as the Grid Code; (v) carry out or commission specific audits, surveys and investigations on the electricity sector; and (vi) 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

[6] Multi-Tier Survey, carried out in 2020

[7] with projections based on GHG inventory from year 2000 to 2010. Madagascar's GHG emissions are about 0.2 percent of global emissions.

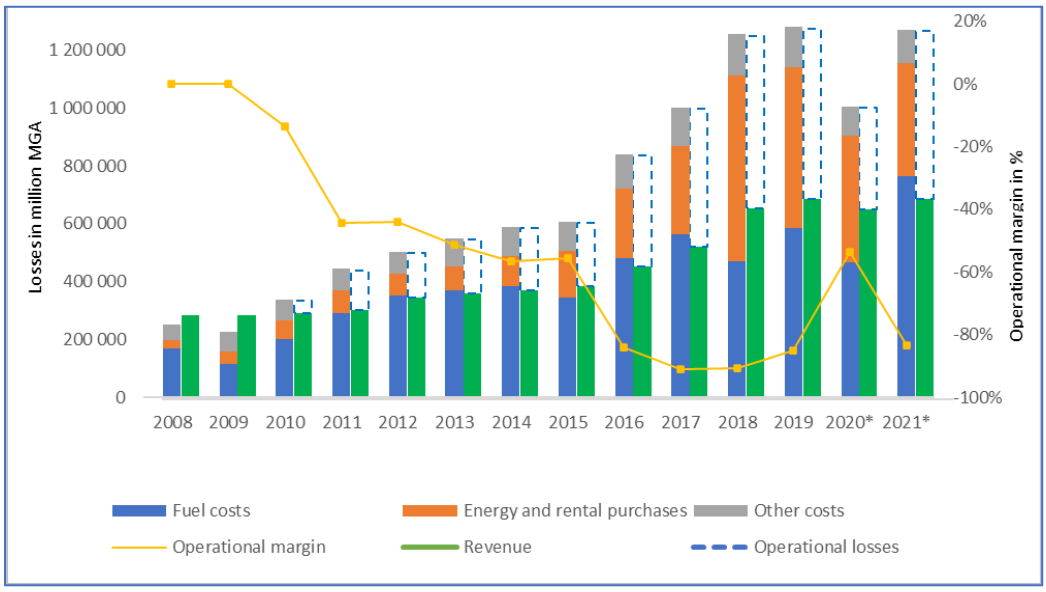
mandate has not been adopted for more than four years. Also, the existing regulation related to tariffs is outdated.

14. **JIRAMA, the vertically integrated state-owned utility, is facing 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 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[8]. 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.

15. **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 the war in 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[9], did not manage to close the cash flow gap and JIRAMA has accumulated arrears to suppliers over the years amounting to US$486 million 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.

[8] Source: JIRAMA Financial model version dated 24.04.2022
[9] Source: JIRAMA and MEF data aggregated by WB Task Team

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



16. **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 LV 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 5 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.

17. **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 privately owned but operated by JIRAMA 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 PV) in 2018. 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 2023.

18. **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**. Government and JIRAMA have started to address the issue. For example, a new connection policy was adopted that foresees that the poorest customer segment would pay US$7-10 for a connection including wiring kit, and a monthly bill of between US$2-3, 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.

19. **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 l'Electricité (FNE) 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.

20. **Despite these challenges, since its creation in 2004, ADER has managed to finance about 150 private sector mini grids in 400 localities, in addition to a number of privately funded mini grids, marking Madagascar as one of the most active mini grid markets in SSA.** ADER receives proposals and launches tenders to private sector on the basis of regularly updated plans. Bids are then evaluated on the basis of number of connections proposed, the type of generation and distribution infrastructure, the proposed tariff structure, the subsidies requested and the financial standing of the developer. 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. In fact, about half 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.

21. **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. Up to recently, 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, GoM, with the support of the 'Least-Cost Electricity Access Development Project'' (LEAD, P163870) launched 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 (IVA) ensures the actual verification of sales made by distributors. 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 (PAYG) 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 recent SEforALL study has found that only 60 percent of people in Madagascar can pay more than US$3 for electricity, and only 20% can pay more than US$7.50. Consequently, OMDF is designing a pilot for end-user subsidies, which will be implemented in the next 18 months.

22. **The Bank has been supporting GoM in its efforts to expand energy access and improve energy sector sustainability through two investment operation, as well as policy dialogue, in close coordination with the IMF.** A DPO currently under preparation, aims to mitigate the adverse effects of shocks on the Malagasy economy and facilitate a robust and resilient recovery by (i) building macro-fiscal resilience, including through fiscal space, budget management reforms, and disaster risk management; and (ii) deepening structural reforms in critical areas, including the investment climate, energy, and digital connectivity**.** The policy dialogue has been concentrating on improving financial performance of JIRAMA, strengthening energy sector governance structures and unlocking policy and regulatory bottlenecks in order 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 DECIM project and generated valuable lessons that are being integrated in the project design.

23. **The LEAD project, 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 GIZ, AFD, KfW, EIB and 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, ESMAP-funded Multi-Tier Framework (MTF) 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.

24. **Universal electricity access in Madagascar can only be achieved if grid, mini grid and off-grid solar electrification are ALL significantly accelerated.** Grid continues being 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, however, 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 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 3819 solar PV mini grids.

25. **Accelerated energy access expansion, however, 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 O&M arrangements.

26. **Based on these considerations, the proposed 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, offgrid 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 TA and mini grid hybridization, building foundations for more significant grid scale up in the future.

27. **Considering the Project's potential to scale up distributed renewable energy through private sector engagement, Madagascar was included among the priority countries for the WBG Distributed Access with Renewable Energy Scale-up (DARES) platform,** which was launched at COP27 and aims to leverage private sector investment through joint WBG 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 IFC and MIGA to explore collaboration on Scaling Mini Grids and piloting a model for sustainable electrification of public institutions in Madagascar.

Digital sector

28. **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.[10] 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.

29. **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 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[11]. 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[12], and men are 12 percent more likely to access the internet than women[13].

30. **The GoM has put ICT at the heart of its 2018 development strategy, "*Madagascar's Emergence Initiative*"**. The 2018 strategy identifies the development of 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 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

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

government capacity to deliver public services through digitalization, which requires improving connectivity of public institutions.

31. **This focus on the digital sector reflects the recognition that digital transformation, if harnessed strategically, can help promote economic growth and value-added job creation**. Numerous studies have demonstrated that increased broadband penetration is associated with a high impact on economic growth, especially in low- and middle-income countries[14]. The estimates for Africa are at the higher end, with 2.5 percent of additional GDP growth associated with a 10 percent higher broadband penetration. Broadband infrastructure can also increase employment while enabling digital enterprises[15], which can help lift the Malagasy economy. Similarly, digital technologies can have a tangible potential impact on poverty reduction, as well as on inclusion - through improved access to public services, and government efficiency. Narrowing the gender digital divide is also likely to improve gender equality outcomes, offering gains for women's employment, financial inclusion, and well-being.

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

- 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. In recent years, the MNDPT has implemented some initiatives to increase digital inclusion, such as the WiFi Hotspots project, which has already provided more than 10 public Wi-Fi access points, as well as the ICT Bus project, which provides buses that travel around the country to promote digital awareness programs.
- The Regulatory Authority for Communication Technologies (*Autorité de Régulation des Technologies de Communication*, ARTEC), under the aegis of MNDPT, has responsibilities, amongst others, for: (i) granting licenses and authorizations; (ii) studying and proposing to MNDPT policies aiming at defining completing or modifying the legal or economic framework for telecommunications and ICT; (iii) ensuring the management of scarce resources (spectrum, numbering, right of way, etc.); (iv) ensuring compliance with the regulations in force in the sector; (v) protecting the interests of consumers and citizens; and (vi) ensuring that competition between operators is fair. While admittedly, the 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 digital connectivity and adoption. Despite

[14] Briglauer and Gugler (2019); Katz and Callorda (2018); Koutroumpis (2018); Endquist et al. (2018), ITU (2020). In line with these findings, reaching the AU's 2030 "*Digital Transformation for Africa*" goal of universal and affordable internet coverage combined with appropriate human capital investment is estimated to raise real GDP growth per capita by 5 percentage points per year, while reducing the poverty headcount by 2.5 percentage points per year across SSA. See: Choi, J., Dutz, M., Usman, Z. 2019. *The Future of Work in Africa: Harnessing the Potential of Digital Technologies for All*. World Bank.

[15] Shapiro and Hassett, 2012; Hjort and Poulsen, 2019.

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[16].

- 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 digitalization reforms and programs.

33. **While large investments have been made in submarine cables, gaps remain in middle and last mile connectivity**. The country is relatively well served in terms of international connectivity, with three international submarine cables in use, with three geographically disbursed landing stations, and a fourth planned.[17] 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 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.

34. **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,[18] do not appear to be using broadband services. This usage gap is higher than in comparable low-income economies in Africa.[19] It highlights the existence of underlying factors, in addition to the unavailability of the network, that are hindering people from using the internet. 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 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[20], 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 adopted by the UN Broadband

[16] 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.
[17] 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.
[18] Author calculations, based on GSMA data, 2021.
[19] World Bank. 2021 *World Development Report: Data for better lives*
[20] Cable.co.uk; data for April 2022.

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.[21] 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.[22]. 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.

35. **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. While three operators (Telma, Orange, Airtel) compete on mobile services, the level of competition in some segments remains limited, [23], with a *de jure* monopoly for fixed services, a *de facto* monopoly for the backbone infrastructure, and a duopoly for international infrastructure. Analysis of the current regulations shows 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[24]. 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.

36. **Following the closure of the Madagascar Communications Infrastructure Project (CIP3, P094103)[25] in 2015, the Bank has been supporting 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. Trust funds from the Digital Development Partnership (DDP) will also be leveraged to strengthen the technical capacity of ARTEC for it to become a stronger and more credible regulatory

[21] Alliance for Affordable Internet, 2021.
[22] Salience Consulting for IFC. 2021 *Digital Infrastructure Deep Dive in Madagascar*.
[23] The standard measure of market dominance, the Herfindahl-Hirschmann Index, has actually *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.
[24] 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.
[25] CIP3 was part of the First Phase for the Regional Communications Infrastructure Program, approved by the World Bank board in March 2007.

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[26]. These decrees have been proposed as the prior actions for the first phase of the new Madagascar First Equitable And Resilient Growth Development Policy Operation (MIRG 1, P180288). The President of the Republic has also called for a revision to the Telecommunications Law, which could serve as a trigger for the second phase of the Development Policy Series.

37. **Based on past efforts, the proposed DECIM proposed 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 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 only to extend mobile services to underserved areas. Years later, the situation has not changed, and the market structure of the backbone is not conducive to donor support in the absence of the required reforms. While, ideally, the DECIM Project would provide support for end-to-end connectivity, it proposes to focus rather on the last-mile segment only, 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. Proposed Development Objective(s)

Development Objective(s) (From PAD)

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

Key Results

PDO Level Indicators

Expand access to renewable energy services:

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

Expand access to digital services[27]:

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

[26] The ministerial order setting price caps for the use of the backbone network, was adopted on February 8, 2023.

[27] "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.

D. Project Description

38. **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 proposed 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 (see Table 1 and below for a breakdown of the components).

Table 1: Proposed budget allocation by Component and Sub-component

Project Component/Subcomponent	Indicative Budget (USD M)
Component 1: Expanding Energy and Digital Infrastructure	**160**
Subcomponent 1.1: Hybridization and digitization of isolated grids	35
Subcomponent 1.2: Deployment of digital infrastructure in rural areas	65
Subcomponent 1.3: Greenfield renewable energy mini grids	60
Component 2: Enhancing Energy and Digital Inclusion	**200**
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	5
Subcomponent 2.3: Off-grid solar and broadband connectivity for public institutions, including schools and health centers	60
Component 3: Supporting the Enabling Environment for Green Energy and Digital Infrastructure	**20**
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 (to be funded in event of an emergency)	**0**
TOTAL	**400**

39. **The project addresses the problem of access and affordability of both energy and digital services in Madagascar, while improving the enabling environment and making optimal use of public and private sector resources.** The aggregate effect of improved electrification and increased uptake of digital services is expected to have enormous benefits in critical sectors such as health or education, through services such as online education, remote medical care, mobile money, and will support trade and livelihood opportunities**.**

- *On the supply side*, low access is in part due to the lack of deployment of infrastructure, particularly rural, areas. This deployment generally requires significant investment, the financial return on which is often not assured, e.g., due to persistent market failures in rural, remote areas. The project will thus provide incentives to encourage the private sector to invest in mobile broadband infrastructure and services for the digital sector, and in energy infrastructure, such as mini grids. These incentives can be based on the establishment of attractive financing

mechanisms for the private sector, notably through public subsidies catalyzing private sector investment and the use of dedicated funds (FDTIC, FNED, OMDF).

- *On the demand side*, i.e., for beneficiaries of digital or energy services, the problem of access is often related to low customer ability to pay, even when the infrastructure is present, and to other demand-side barriers, such as low digital literacy or low awareness of benefits of off-grid solar systems (OGS). The project will support mechanisms to enable end-user customers to have more affordable access to equipment (digital devices, OGS). Studies will identify the specific barriers faced by Malagasies, including lower-income households, persons with disabilities and marginalized groups and communities. Data and evidence will be also used to design targeted interventions to close the digital gender divide and gender gaps in energy access.
- *In parallel, support for critical reforms* will be provided to facilitate a more enabling environment in both sectors, in favor of increased affordability and expansion of services in a sustainable manner.

40. **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$160 million)

41. **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.**

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

42. **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) mini grid operation automation through the use of digital technologies, (iii) strengthening, densifying and extending climate-resilient distribution grids and connecting additional customers, and (iv) feasibility, affordability and other relevant studies.

43. **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 (LCOE), 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.

44. **In parallel, the project will also invest in the automation and digitization, deploying "smart grid" and “smart metering” climate resilient 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.

45. **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. With an investment of US$35 million, 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 battery energy storage system (BESS), which will lighten the burden of fuel charges. During the project implementation, the team will explore opportunities for hybridizing privately operated generation assets and for seeking private sector management of hybridized isolated grids (which could include both generation and distribution).

Subcomponent 1.2: Deployment of digital infrastructure in rural areas (US$65 million equivalent)

46. **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.** Specifically, the project will finance (i) a mapping and feasibility study to identify priority coverage 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. A Commercial Transactions Manual will be developed to guide the allocation of gap-financing subsidies; (ii) allocating financial incentives 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); and (iii) 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.

47. **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, so 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-add for economic activity, growth and service provision.

48. **This subcomponent is expected to mobilize significant private capital**[28]. 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 WBG's twin goals 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.

49. **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).

50. **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 equivalent)

51. **This subcomponent will support deployment of private sector-operated renewable energy 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 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 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.

[28] 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.

52. ***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.).

53. ***Second*, the subcomponent will also provide viability gap funding and performance-based grants 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 operations and maintenance (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 Operating Manual. 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.

54. **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 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 WBG Scaling Mini Grid approach, and the team is exploring with IFC and MIGA whether 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 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 DRC) may be sought from other stakeholders (e.g. Rockefeller Foundation/GEAPP/SRMI).

55. **While Scaling Mini Grid or a similar large-scale tender approach is anticipated to be the main implementation modality, performance-based rants could 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 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 be also 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.

56. **The Operations Manual will include detailed provisions for grantmaking**, 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 credit line operations manual will also include specific eligibility and evaluation criteria for the prospective inclusion of mini grid companies in the credit line.

Component 2: Enhancing Energy and Digital Inclusion (US$230 million equivalent)

57. **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, in order 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.

58. **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 and marginalized groups.** For digital access, the target areas for this component would be those 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., peri-urban areas/secondary cities where the usage gap is high). 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 equivalent)

59. **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.

60. **This sub-component will specifically finance (i) performance-based grants to distribute OGS, digital devices and productive use equipment and appliances among target populations; (ii) a credit line for working capital for OGS distribution, and (ii) related technical assistance.** The eligible beneficiaries of grants will be the qualified distributors of off-grid solar products, digital devices and productive equipment and appliances. The eligible beneficiaries of loans will be qualified decentralized renewable energy companies and financial institutions (including micro-finance institutions) financing off-grid solar systems and other decentralized renewable energy products and services. This sub-component will follow the approach established with OMDF under the existing LEAD Project. Both grants and loans are needed to achieve the Project's ambitious targets. Grants will be primarily use 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 by 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.

Performance-based grants

61. Following OMDF experience, the Subcomponent will continue financing performance-based grants (in the form of results-based financing (RBF) grants and catalytic grants), with a few modifications reflecting lessons learned, as described below.

62. ***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: (1) the subsidy will only be made available for Tier 1 off-grid solar systems, targeting only households with low electricity consumption; (2) socio-economic data will be used to identify regions and districts with higher poverty incidents to benefit from the subsidy; and (3) 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 the conclusions from an affordability study.

63. ***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.

64. ***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 credit line.** The innovations supported in particular includes OGS productive use equipment (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 modes 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. .

Credit line

65. **DECIM Project will and expand on and enhance the credit line 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 credit line has up to date provided loans to three OGS distributors and one MFI in the total value of about US$5 million. While the total amount of loans remains relatively low, this cash injection has fueled the acceleration of the market, and the companies' working capital needs are expected to grow in the future. The loans have been provided by OMDF on market terms, benchmarked against typical FI lending to similar size of companies. The OMDF credit line 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 unfamiliarity with the technologies and business models and lack of longer-term track record of the OGS companies in Madagascar). As market matures, however, and as track record of OGS companies is built (including their repayment of loans to OMDF), it is expected that local FIs could be incentivized to lend.

66. **The DECIM Project, therefore, aims at following a two-pronged approach. It would continue the credit line established under OMDF, in order 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 credit line will also be open to other DRE companies in need for working capital, including companies selling larger systems for productive uses and mini grid companies. In parallel, the Project will explore a partial-credit guarantee, which would complement and eventually replace the credit line to incentivize local FIs to lend directly to the OGS companies. In parallel, the Fund Manager will provide TA to local FIs to make them more familiar with the OGS/PAYG business model, credit risk assessment etc., and its payment structure will include incentives for mobilizing co-financing from FIs along the loans extended from the credit line. While the credit line under OMDF has been set up in compliance with FI policies, its continued compliance will be reviewed, changes as needed introduced, and evidence of compliance with the FI policies will be sought as a condition of disbursement for the credit line.

67. **The Operations Manual will include detailed provisions** for performance-based grants and loans from the credit line, 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 loans will be provided on market terms, building on the process already in place for loan provision under the LEAD Project. The Operations Manual will be revised when the Partial Credit Guarantee is set up and ready to be activated.

68. **The administration of grants will leverage a digital platform, linking up with OGS companies' PAYG 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$5 million equivalent)

69. ***On the digital side*, this subcomponent will aim to facilitate the adoption of digital services by improving digital awareness, literacy and skills**. 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 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.

70. **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. 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.

71. **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.

72. **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.

73. **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: Support off-grid solar and broadband connectivity of public institutions to increase service delivery and access for underserved communities (US$60 million equivalent)

74. **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.

75. **Building on a pilot initiated under LEAD, implementation of this subcomponent will allow GoM to complete electrification of all country's health centers and tertiary schools, and 66 percent of secondary school, while ensuring that most of them have also 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 mitigation 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.

76. **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.) in order 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.

77. **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 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.

78. **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 grant covering (full or a portion of the CAPEX costs), but this grant will be disbursed only gradually 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. These can be initially covered by the Project funds; (iv) The Government will establish an escrow account will be capitalized during implementation by Government and/or through donor contributions. This escrow account will be used for O&M/service payments post WB project closure. Under the DARES platform, the team 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.

79. **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.

80. **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**[29], so that it benefits from the boost in international bandwidth and access to open educational resources that the program offers.

81. **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 a 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$25 million)

82. **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 equivalent)

83. **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

[29] https://africaconnect3.net/

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 complement the support currently provided under the PRODIGY project and the planned DPO. Interventions will include technical assistance 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[30], and information dissemination through the strengthening of the ICT Observatory.
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[31] 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; d (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.
e) **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

[30] This could include the financing of a household survey on the usage of digital services.
[31] This could build on the preparation of a Commercial Transaction Manual to guide the award of smart subsidies under Sub-component 1.2.

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 equivalent)

84. **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.
- **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 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 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$5 million equivalent)

85. **This subcomponent will support the transition towards investments in climate-smart 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 would be provided to ARTEC and ORE, 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[32].

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 health and climate related shocks; and (ii) minimize the climate and environmental impact of ICT infrastructure, devices and services (including an e-waste management plan, specifications for green data centers, reducing the climate footprint stemming from the telecoms sector).

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

86. **The 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 costs of the Fund Manager(s) 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)

87. **The objective of this component is to support the GoM's response to an eligible emergency.** The component will be governed by paragraph 12 of the World Bank Policy on *Investment Project Financing (Rapid Response to Crises and Emergencies)*. If an eligible emergency is being declared, the GoM may request the World Bank to reallocate project funds to support the response effort. The component would be capitalized by drawing on unused (or uncommitted funds) under Components 1 to 4. The component could also be utilized for processing additional financing should funding for this become available due to an eligible emergency.

E. Project Beneficiaries

88. **The project's main beneficiaries are households, SMEs, health centers and schools that currently have extremely limited access to affordable and reliable energy and digital connectivity.** 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.

89. **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.

90. **While the project will have a national approach, some interventions will be more geographically focused, prioritizing underserved areas.** , the project will also seek to actively address the digital and energy inclusion of vulnerable or marginalized populations through proactive targeting of these groups and a granular approach to beneficiary selection, differentiated by region. 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. In addition, spatial and beneficiary targeting will be refined to complement other World Bank-funded projects, such as PRODIGY in order to facilitate more productive use of internet-connected devices among beneficiaries and enable them to access new supported services or mobile money transfers.

Legal Operational Policies

	Triggered?
Projects on International Waterways OP 7.50	No

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

Projects in Disputed Areas OP 7.60	No

Summary of Assessment of Environmental and Social Risks and Impacts

The environmental and social risk classification (ESRC) is substantial. The relevant standards 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.

Environmental risks and impacts. The Environmental 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, 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, (vi) noise and vibration caused by generators, and (vi) 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.

Social risks and impacts. The social risk rating (SRR) for this project is considered to be 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 buildings activities. The anticipated social risks and impacts of the project are expected to be temporary and reversible. However, potential social risk identified 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) the gaps between digitally included and excluded people are possibly widening for 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. However, these can be mitigated through a robust and inclusive stakeholder engagement process which will be developed by the project and the TA interventions under component 1 and 2 which will help the vulnerable groups to ensure their equitable participation and that design training programs suit their needs; (ii) risks related to health and safety of workers to be hired by the project or the private operators; and (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 many enumerators for the ICT household survey under component 1. Moreover, based on the available information at this stage, it is not certain that the future Project Management Unit (PMU) will have environmental and social risk management capacity especially on the ESF, but the project will ensure that the PMU will have environmental and social safeguard specialists and implement ongoing capacity building trainings for project staff.

Mitigation and risk management. To limit these risks, 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 will list the training sessions to be included in the capacity-building programs ; (iii) a draft Environmental 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) a draft 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 shall be developed, and disclosed prior to disbursement of component 1 and 2 of the Project; and the final version of the RF shall be developed, and disclosed prior to disbursement of component 1of the Project. The selection of micro-hydropower system location is not yet available during the project preparation.

A standalone ESIA with its ESMP is required for any mini-hydropower at the water line without large reservoirs and dams and transmission lines for each selected site to be submitted to WB?s review and approval prior launching bidding document. It will be developed, adopted and implemented the dam safety manual in accordance with ESS4 to manage the environmental and social risks of mini-hydropower systems, 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 Off-grid Market Development Fund (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 PIU 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 national laws.

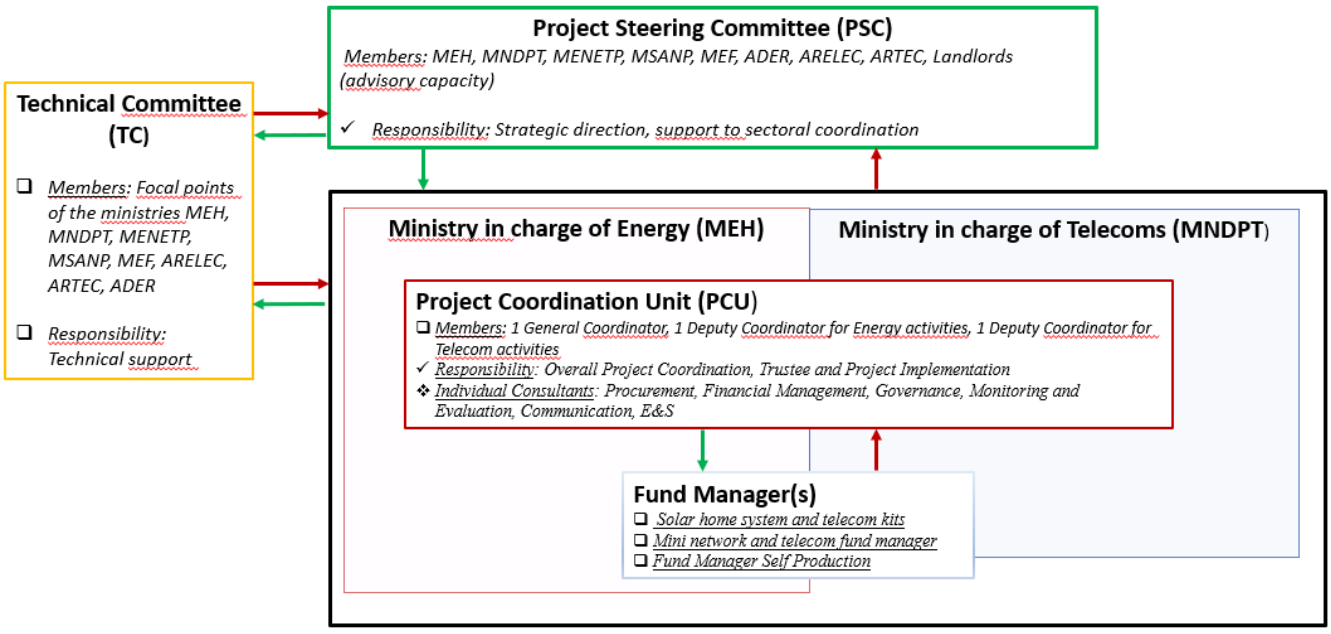
Safeguard monitoring. The Monitoring and Evaluation (M&E) systems of the project will include monitoring of Environmental and Social (ESS) impacts and measures. The PIU as the implementing agency for the project, with the guidance of its environmental and social specialists and with support of World 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.

Social inclusion, gender equality and citizen engagement. In accordance with corporate directives on citizen engagement (CE) in IPF projects, the project will emphasize approaches that maximize outreach and participation of communities and broader public awareness of project activities. In addition to at least one indicator monitoring progress on CE, 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 Stakeholder Engagement Plan (SEP). In accordance with the Environmental and Social Standard (NES10) 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 Stakeholder engagement Plan (SEP), which will also include the establishment and operationalization of a project Grievance Redress Mechanism (GRM).

E. Implementation

Institutional and Implementation Arrangements

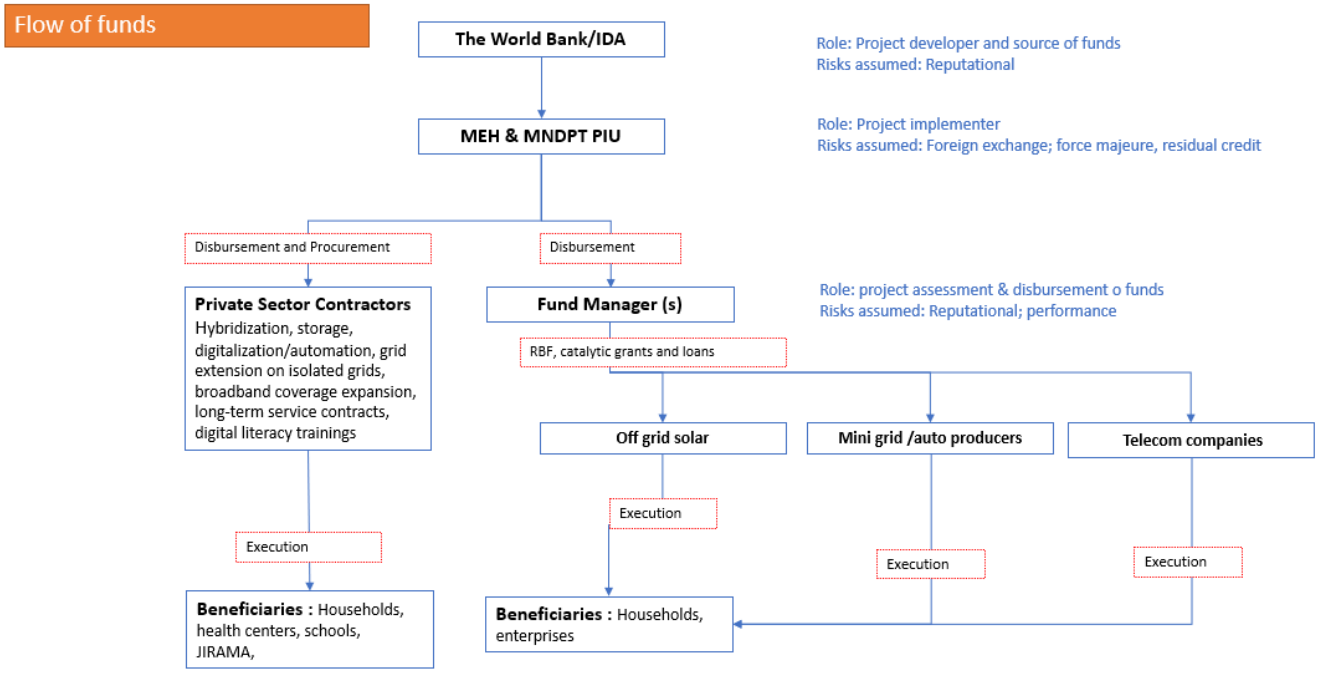


The Ministry of Energy (MEH) and the Ministry of Telecom (MNDPT) will be the implementing agencies with fiduciary oversight of project activities expected to be implemented over five years. Project activities will be carried out by a Project Coordination Unit (PCU), which will be staffed with a project coordinator, a deputy coordinator for energy and a deputy coordinator for digital activities. 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, M&E, communications and safeguards, among others, will further strengthen the capacity of the PCU.

To improve sectoral coordination, an inter-Ministerial Project Steering Committee (PSC), chaired by MEH and MNDPT and comprising members from relevant agencies (including MENETP, MEF, MSANP, MEN, MAE, ADER, ARELEC, JIRAMA, ARTEC and others) will be established to provide overall policy guidance and strategic direction. A technical committee with focal points from MEH and MNDPT and other relevant institutions will provide additional technical support.

The PCU will be tasked with the procurement activities under Component 1.1, 1.2, 2.2, 2.3, 3 and 4. For implementation of 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 Component 1.3 and 2.1. Terms and selection criteria of the grant and loan schemes will be spelled out in a Project Implementation Manual (PIM), to be prepared jointly by PCU and Fund Manager. The PIM for Subcomponents 1.1, 2.2, 2.3, 3. and 4. will be a Condition of Effectiveness. The PIM 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. Contracting a Fund Manager will also be a disbursement condition for the same Subcomponents, implemented through the Fund Manager. FI Assessment in line with OP10 will be carried out once the Fund Manager is contracted and will also be a condition of disbursement for the credit facility under the same Subcomponents. For Sub-components 1.2 and 2.3, 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 will be 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 has published an annual on the activities financed by the Fund*' and '*ARTEC has published a Draft Directive on national roaming and conducted stakeholder consultations*'.



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