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Report No: PAD2723

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT PAPER

ON A

PROPOSED ADDITIONAL CREDIT

IN THE AMOUNT OF SDR 27.9 MILLION
(US\$40 MILLION EQUIVALENT)

TO THE

REPUBLIC OF MADAGASCAR

FOR THE

ELECTRICITY SECTOR OPERATIONS AND GOVERNANCE IMPROVEMENT PROJECT

May 23, 2018

Energy and Extractives Global Practice
Africa Region

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CURRENCY EQUIVALENTS
(Exchange Rate Effective April 30, 2018)

Currency Unit = Malagasy Ariary (MGA)

MGA 3,230.49 = US\$1

US\$1 = SDR 0.69538128

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ADER	Agence de Développement de l'Électrification Rurale/Rural Electrification Development Agency
AF	Additional Financing
AGOA	African Growth and Opportunity Act
ARELEC	Autorité de Régulation de l'Électricité / Electricity Regulation Authority
CMS	Commercial Management System
DCC	Distribution Control Center
DMS	Distribution Management System
DPO	Development Policy Operation
EBIT	Earnings Before Interest, Taxes,
EIRR	Economical Internal Rate of Return
EPC	Engineering Procurement Contract
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESOGIP	Electricity Sector Operations & Governance Improvement Project
FM	Financial Management
FIRR	Financial Internal Rate of Return
GDP	Gross Domestic Product
GIS	Geographic Information System
GHG	Greenhouse Gas
GoM	Government of Madagascar
HFO	Heavy Fuel Oil
IFC	International Finance Corporation
IFR	Interim Financial Report
IP	Investment Plan
IPF	investment project financing
IPP	Independent Power Producer
IRM	Immediate Response Mechanism
ISR	Implementation Status and Results Report

JIRAMA	Jiro sy Rano Malagasy / National Electricity Utility
LCPDP	Least Cost Power Development Plan
LEAD	Least-Cost Electricity Access Development
M&E	Monitoring and Evaluation
MIGA	Multilateral Investment Guarantee Agency
MIS	Management Information Systems
MWEH	Ministry of Water, Energy, and Hydrocarbons
NEP	New Energy Policy
NES	National Electrification Strategy
NPV	Net Present Value
PDO	Project Development Objective
PIM	Project Implementation Manual
PIP	Performance Improvement Plan
PIU	Project Implementation Unit
PPA	Power Purchase Agreement
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework (RPF)
RPP	Revenue Protection Program
SCADA	Supervisory Control and Data Acquisition
SREP	Scaling-up Renewable Energy Program
STEM	Science, Technology, Engineering and Mathematics
VRE	Variable Renewable Energy
WBG	World Bank Group
WEF	World Economic Forum

<p style="text-align: center;">Regional Vice President: Makhtar Diop Country Director: Mark Lundell Senior Global Practice Director: Riccardo Puliti Practice Manager: Sudeshna Ghosh Banerjee Task Team Leader(s): Miraintsoa Vonjy Rakotondramanana, Massan Elise Akitani</p>

BASIC INFORMATION – PARENT (MG-Electricity Sec Operations & Governance Improvement Project(ESOGIP) - P151785)

Country Madagascar	Product Line IBRD/IDA	Team Leader(s) Miarintsoa Vonjy Rakotondramanana		
Project ID P151785	Financing Instrument Investment Project Financing	Resp CC GEE01 (9257)	Req CC AFCS2 (5547)	Practice Area (Lead) Energy & Extractives

Implementing Agency: JIRAMA, Ministry of Energy and Hydrocarbons

Is this a regionally tagged project?	
No	

Bank/IFC Collaboration	
No	

Approval Date 22-Mar-2016	Closing Date 30-Jun-2020	Original Environmental Assessment Category Partial Assessment (B)	Current EA Category Partial Assessment (B)
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<input type="checkbox"/> Situations of Urgent Need or Capacity Constraints	<input type="checkbox"/> Financial Intermediaries (FI)
<input type="checkbox"/> Series of Projects (SOP)	<input type="checkbox"/> Project-Based Guarantees

Development Objective(s)

The Project Development Objective is to improve the operational performance of the national electricity utility (JIRAMA) and improve the reliability of electricity supply in the project area and, in the event of an eligible crisis or emergency, to provide immediate and effective response to said eligible crisis or emergency.

Ratings (from Parent ISR)

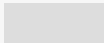


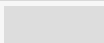
	Implementation			Latest ISR
	27-May-2016	11-Dec-2016	25-Jun-2017	15-Jan-2018
Progress towards achievement of PDO	S	S	S	S
Overall Implementation Progress (IP)	S	S	MS	MS
Overall Safeguards Rating	S	S	MS	MS
Overall Risk	H	H	H	H

BASIC INFORMATION – ADDITIONAL FINANCING (Madagascar Electricity Sector Operations and Governance Improvement Project - AF to ESGIP - P164318)

Project ID	Project Name	Additional Financing Type	Urgent Need or Capacity Constraints
P164318	Madagascar Electricity Sector Operations and Governance Improvement Project - AF to ESGIP	Restructuring, Scale Up	No
Financing instrument	Product line	Approval Date	
Investment Project Financing	IBRD/IDA	14-Jun-2018	
Projected Date of Full Disbursement	Bank/IFC Collaboration	Joint Level	
29-Apr-2022	Yes	Complementary or Interdependent project requiring active coordination	
Is this a regionally tagged project?			
No			
<input type="checkbox"/> Situations of Urgent Need or Capacity Constraints		<input type="checkbox"/> Financial Intermediaries (FI)	
<input type="checkbox"/> Series of Projects (SOP)		<input type="checkbox"/> Project-Based Guarantees	

<input type="checkbox"/> Disbursement-linked Indicators (DLIs)	<input checked="" type="checkbox"/> Contingent Emergency Response Component (CERC)
<input type="checkbox"/> Alternative Procurement Arrangements (APA)	

Disbursement Summary (from Parent ISR)

Source of Funds	Net Commitments	Total Disbursed	Remaining Balance	Disbursed
IBRD				 %
IDA	65.00	29.88	36.53	  45 %
Grants				 %

PROJECT FINANCING DATA – ADDITIONAL FINANCING (Madagascar Electricity Sector Operations and Governance Improvement Project - AF to ESOGIP - P164318)

FINANCING DATA (US\$, Millions)

SUMMARY

Total Project Cost	40.00
Total Financing	40.00
of which IBRD/IDA	40.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	40.00
IDA Credit	40.00

COMPLIANCE

Policy

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

Yes No

Does the project require any other Policy waiver(s)?

Yes No

INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change and Disaster Screening

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

Gender Tag

Does the project plan to undertake any of the following?

a. Analysis to identify Project-relevant gaps between males and females, especially in light of country gaps identified through SCD and CPF

Yes

b. Specific action(s) to address the gender gaps identified in (a) and/or to improve women or men's empowerment

Yes

c. Include Indicators in results framework to monitor outcomes from actions identified in (b)

Yes

PROJECT TEAM

Bank Staff

Name	Role	Specialization	Unit
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Massan Elise Akitani	Team Leader		GEE07
Sylvain Auguste Rambeloson	Procurement Specialist (ADM Responsible)		GGOPF
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Mariano Salto	Team Member		GEE01
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Paul-Jean Feno	Environmental Safeguards Specialist		GEN07
Siobhan McInerney-Lankford	Counsel		LEGAM

Extended Team

Name	Title	Organization	Location
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I. BACKGROUND AND RATIONALE FOR ADDITIONAL FINANCING

A. Introduction

1. This Project Paper seeks the approval of the Board of Directors to provide additional financing (AF) for The Madagascar Electricity Sector Operations and Governance Improvement Project (ESOGIP-P151785) in the form of an additional IDA credit of SDR 27.9 million (US\$40.0 million equivalent) to the Republic of Madagascar and to extend the ESOGIP closing date by 18 months, bringing the closing date to December 31, 2021 to allow sufficient time to complete the activities under the AF. While the Project Development Objective (PDO) will remain unchanged, the project results framework will be adjusted to reflect the additional funds and time frame.

2. The parent project, approved by the World Bank Board of Directors on March 22, 2016, provides IDA credit financing to achieve the project development objective (PDO) to improve the operational performance of Jiro sy Rano Malagasy (JIRAMA), improve the reliability of electricity supply in the project area, and to provide immediate and effective response in the event of an eligible crisis or emergency. Progress towards the achievement of the development objective and implementation progress of ESOGIP in the past 12 months have been rated as satisfactory and moderately satisfactory respectively.

3. The proposed activities of the AF support the five components of the parent project. Component 1 (US\$2.48 million) aims to improve electricity sector planning and financial sustainability by supporting adoption of systematic planning of the optimum (least-cost) investments needed to develop the power sector in Madagascar and strengthening in a sustainable manner the capacity of Government agencies responsible for planning the power sector; Component 2 (US\$12.56 million) aims to strengthen operational performance and governance of the national electricity and water utility JIRAMA through the preparation and effective implementation of a performance improvement plan (PIP) for the company, including organizational restructuring and competitive selection of a new top management team, incorporation of Management Information Systems (MIS) to enhance efficiency, transparency and accountability in operations, and implementation of a revenue protection program (RPP) targeting large customers; Component 3 (US\$48.62 million) aims to finance priority investments to rehabilitate, reinforce and upgrade existing electricity transmission and distribution infrastructure; Component 4 (US\$1.34 million) supports project management; and Component 5 (US\$0 million) refers to contingent emergency response.

4. The proposed AF aims at consolidating and scaling up significant positive impacts on power sector performance achieved through implementation of ESOGIP by: (a) providing additional technical assistance to ensure full implementation of the PIP of JIRAMA, in particular the organizational restructuring of the company; (b) financing the upgrade of JIRAMA's dispatch center and network automation systems and rehabilitation and reinforcement of distribution networks, to improve quality in electricity supply and allow the integration of variable renewable energy (VRE) generation; and (c) financing preparatory studies and providing technical assistance for the development of small hydropower projects able to produce low-cost electricity contributing to the reduction of generation cost.



5. The activities of the proposed AF does not change the ESOGIP current safeguard classification of 'B'. However, three additional policies would be triggered - OP 4.04 (Natural Habitat), OP 4.36 (Forest) and OP 4.37 (Dam Safety) - because of the AF support to the preparation of small hydro power plants.

B. Country Context and Sector Context

6. **The recent gross domestic product (GDP) per capita growth trend is positive but poverty remains pervasive.** For a second year in a row, real GDP increased by an estimated 4.2 percent in 2017 compared to only 2.6 percent for the period 2011–2015.¹ Recent economic growth was primarily driven by construction activities related to the scale-up of public investment and textile exports following the reinstatement of Madagascar's eligibility for the African Growth and Opportunity Act (AGOA).² For 2018, the growth rate is projected to increase to 5 percent. In 2012, only 30 percent of the population in Madagascar lived above the national poverty line and 10 percent above the international poverty line. Moreover, the country's population growth of 2.78 percent per year imposes significant burden on the capacity to deliver basic services, on the use of natural resources, and on per capita growth.

7. **Madagascar's social and economic development continues to be constrained by the lack of reliable electricity services.** Only 15 percent of the population had access to electricity in Madagascar in 2016 (39 percent of the population in urban and peri-urban areas and only about 5 percent of the population in rural areas). The sector financial situation is weak, the quality of electricity services poor, and access rates have not increased significantly in recent years. Consequently, Madagascar continues to perform poorly on the Doing Business Report 2017's 'Getting Electricity' indicator, ranking 185 out of 190 countries, with applicants waiting an average of 450 days³ to get an electricity connection.

8. **The Government adopted a "New Energy Policy" (NEP) and issued a Sector Policy Letter in 2015 to scale up renewable energy generation and to increase the electrification rate.** The NEP encourages a rapid scale-up of renewable energy including hydropower and solar generation, and the development of public-private partnership schemes and concessions. Consistent with the NEP, the sector policy letter for the period 2015–2030 highlights the Government of Madagascar (GoM) goal to increase household electricity access in the country from 15 to 70 percent by 2030.

¹ Madagascar's annual population rate is estimated at 2.78 percent.

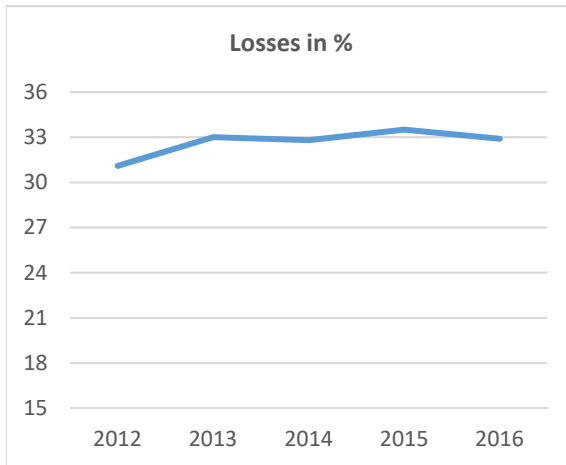
² The AGOA is a United States Trade Act that enhances market access for Sub-Saharan African countries, which improve the rule of law, human rights, and respect for core labor standards. Madagascar lost AGOA eligibility in 2009, following the political crisis, and regained it in 2014 after the return to constitutional order.

³ Doing Business Report 2017.



9. **Madagascar’s energy mix for electricity generation is dominated by expensive thermal sources.**

Figure 1. System Losses (%)



In 2016, about 58 percent of the country’s power generation came from low-efficiency generators running on imported fuel, with the remaining 42 percent produced by hydropower plants. The cost of thermal generation has consistently increased in recent years due to the impact of expensive directly negotiated power purchase agreements (PPAs) for new thermal plants signed between JIRAMA and independent power producers (IPPs). In 2016, the electricity system of the country generated 1,651 GWh with a peak demand of 342 MW. JIRAMA has to resort to state subsidies to pay for fuel purchase invoices and energy purchases to IPP, adding pressure on the already resource-starved State.

Source: Electricity Regulatory Agency (Office de Régulation de l’Électricité, ORE)

The electricity sector faces multiple challenges

10. **First, JIRAMA’s cost-revenue imbalance is substantial and unsustainable in the medium-term.**

JIRAMA has continuously received subsidies from the GoM. In 2017, the subsidy amounted to approximately US\$141 million. On one hand, JIRAMA’s supply cost is high (estimated at US\$0.30 per kWh in 2017) due to dependence on expensive thermal generation and high losses in supply to customers. On the other hand, the average revenue was only about US\$0.15 per kWh billed in 2017, requiring JIRAMA to rely on government subsidies. The operational performance of JIRAMA declined over the last five to seven years, mainly because of poor management. System losses during the past five years averaged around 33 percent, with about one-third of electricity produced not sold to JIRAMA’s customers. In January 2018, the GoM increased the average tariff of JIRAMA by 10 percent to increase the utility’s revenue, to contribute to the objective of attaining financial equilibrium by 2020, which, in addition to revenue increase, requires cost optimization and system efficiency enhancement. The GoM has applied tariff adjustments during the past three years increasing the average tariff by 7.4 percent from 380 Ar/kWh in 2015 to 408 Ar/kWh in 2016. To continue the effort, the GoM increased the tariff by an average of 7.5 percent in July 2017 and again by an average of 10 percent in January 2018.

11. **Second, the electricity network infrastructure is in poor operational condition, with overload and bottlenecks in several segments, as a consequence of long-term underinvestment.**

Madagascar’s power grid is composed of three main networks: Antananarivo, Toamasina, and Fianarantsoa, all of which are operated by JIRAMA. The interconnected network of Antananarivo is the largest system and covers about 60 percent of the total electricity consumption in Madagascar. Decades of underinvestment in grid extension and rehabilitation have led to a chronically overloaded grid, resulting in low service quality and severely constraining the possibility to connect new consumers. The existing



distribution networks in the capital city and in major towns of Madagascar were installed in the 1980s, and have reached in most cases the end of their lifetimes.

12. **Third, Madagascar will need significant additions of generation capacity to meet rising demand.** The results of the Least Cost Power Development Plan (LCPDP) were discussed in a workshop in February 2018. The findings show that an additional capacity of 339 MW, generating about 1,649 GWh/year, is needed in the Interconnected Network of Antananarivo by 2035 to balance the expected 2.5 times increase of the demand underpinned by the high rate of population growth (about 2.8 percent/year), public works, and industrial activities. A recent World Bank assessment of expected timelines and delays in the development of hydropower resources in the country showed that integration of solar generation and/or small hydropower into the main grid in the next two to four years will be needed to satisfy demand at an affordable cost. Thus far, only 40 MW of grid-connected PV projects have been identified, including a 23 MW Scaling Solar Initiative implemented jointly by the World Bank and International Finance Corporation (IFC).

There are significant opportunities to transition to a lower carbon path and to strengthen the operation and financial foundations of the sector

13. **Madagascar possesses significant potential in terms of renewable resources for electricity generation,** particularly hydropower with a potential of about 7.8 GW, of which only 160 MW is currently exploited. There are about 1,500 untapped hydro sites ranging from 10 kW (or less) to 600 MW, located throughout the country. With an average solar irradiation of about 2,200 kWh/m²/year and average wind speeds of up to 7 m/s in many parts of the country, Madagascar also has considerable solar and wind energy resources. The results of the LCPDP indicate that Madagascar could diversify its generation mix through the development of hydro and solar resources, complemented with thermal generation using heavy fuel oil (HFO) to satisfy the short and long-term needs. The incorporation of renewable generation capacity following competitive bidding processes could significantly reduce the generation cost. However, major upgrades in grid automation and dispatch technologies, including Supervisory Control and Data Acquisition (SCADA) systems, are urgently needed before significant amounts of renewable energy can be injected into the grid. The current dispatching system operated by JIRAMA is outdated, severely limiting the capacity of the networks to receive and transmit renewable energy generation.

14. **Madagascar is also pursuing the preparation of the Scaling-up Renewable Energy Program (SREP) Investment Plan (IP) as complement to LCPDP** – focusing on potential projects in areas which are not covered in the LCPDP. The SREP IP covers two main components: (a) a rural electrification through the development of small hydro and if possible through solar mini-grid system; and (b) hybridization of existing thermal plants in isolated centers of JIRAMA with solar generation. The IP identifies about 15.8 MW of small hydro and about 39 MW of thermal-solar hybridization projects. The IP is expected to be presented to the SREP Sub-Committee on June 6th, 2018 for approval.

15. **The development of a small hydro generation project pipeline has advanced significantly.** The World Bank has supported an assessment of Madagascar’s small (less than 20 MW) hydro power generation (“hydro”) sites. A small hydro atlas and pre-feasibility studies of two priority sites (G407 and SF196) were developed through an Energy Sector Management Assistance Program (ESMAP) funded activity. The results of the pre-feasibility study showed that there are 17 highly promising small hydro



sites with a total installed capacity of about 160 MW. The study also recommended that small hydro sites should be used more extensively to satisfy medium-term demand because they allow for a more decentralized generation footprint and can be developed within much shorter timeframes than large hydro projects. In addition, standard PPAs, standard Concession Agreements, and Safeguard Frameworks have been prepared to facilitate the development of these priority small hydro sites by the private sector, given the scarcity of public resources.

16. **Strengthening the operational and financial performance of JIRAMA is at the heart of sustainable development of the power sector** - to scale-up electrification and enable private investments as a reliable off-taker. With the support of the World Bank, the GoM has started implementing measures to strengthen the management of the company, and to improve its operational performance. The PIP prepared in 2016 is currently under implementation. It includes the organizational restructuring of the company and appointment of top managers through competitive processes, the incorporation of an integrated MIS to support efficient, transparent and accountable development of operations in key business areas, and the implementation of a RPP to reduce non-technical losses. At present most of the Directors in the new organizational structure of JIRAMA have been appointed, and the process to select managers at lower levels is progressing satisfactorily. However, in order to boost effectiveness of the new structure and management team, the company needs to complement selection of its new management team with the immediate implementation of a performance linked incentive program for management and employees at other levels. JIRAMA needs short-term financial support to implement that program, while the company moves towards achieving operational and financial viability. From 2022 onwards, it is expected that JIRAMA would reach financial equilibrium without Government subsidy.

The proposed project is a vital building block of the World Bank's long-term engagement to address the sector's challenges in a holistic manner

17. **ESOGIP and the ESOGIP AF can potentially contribute to the financial turnaround of JIRAMA.** Five policy actions to reduce the subsidy requirement are considered: (a) 10 percent increase of tariff; (b) system loss reduction from 35 percent to 24 percent (consistent with the project results framework); (c) 5 percent reduction in specific consumption of generation plants; (d), reduced rental generation cost; and (e) integration of 40 MW solar IPPs in the generation mix - all are a direct or indirect outcome from the implementation of the ESOGIP project and its AF. Financial analysis demonstrates that, implementing these actions could reduce the subsidy requirement by 94 percent (US\$534 million) over five years, contributing significantly to JIRAMA's financial turnaround and consequently GoM's fiscal health.

18. **The ongoing and planned investment project financing (IPFs) represent a conscious effort to improve sector outcomes.** The parent ESOGIP, the proposed ESOGIP AF, and the proposed Least-Cost Electricity Access Development (LEAD- P163870) are complementary and their implementation is sequential. First, the ESOGIP focuses on the improvement of sector governance, restructuring of JIRAMA to improve its management, and the rehabilitation and reinforcement of electricity transmission and distribution infrastructure to reduce technical and commercial losses. The ESOGIP also includes a significant Technical Assistance component that has financed, among other studies, the LCPDP, that will set the course for generation and transmission planning in the medium term, and the National Electrification Strategy (NES) that will lay out the technical, institutional, and financial pathways to expanding access, and the tariff study that will determine the level of average tariff



necessary to cover costs in the short and long terms and how it will be distributed to different segments of consumers. Second, the ESOGIP AF sustains the restructuring of JIRAMA by preparing and implementing a Human Resource Development Plan to increase the efficiency of the workforce; and finances additional key transmission and distribution investments to facilitate the development of the power sector in the medium and long term. Third, the proposed LEAD project (FY19) aims to implement the national electrification strategy via grid densification and expansion of networks to increase on-grid electricity access rate in the country while supporting market-driven standalone systems such as Solar Home System to promote off-grid electrification.

19. Madagascar showcases the use of World Bank Group (WBG) credit enhancement tools under the ‘Scaling Solar’ umbrella to facilitate the first competitively procured grid-connected solar project.

The Scaling Solar initiative brings together a suite of WBG services and instruments under a single engagement aimed at creating viable markets for solar power. Scaling Solar is an open, competitive and transparent approach that facilitates the rapid development of privately-owned, utility-scale solar PV projects in sub-Saharan Africa. The International Finance Corporation (IFC), World Bank, and Multilateral Investment Guarantee Agency (MIGA) participated in drafting a set of template documents (mainly a PPA and a Government Support Agreement (GSA)). The World Bank is expected to provide partial risk guarantee(s) backstopping risks for a project comprising: (a) an approximately 23 MW_{pAC} IPP solar PV power plant; (b) up to 10 MWh of battery storage infrastructure; and (c) a high-voltage (138 kV) transmission line—with ownership of the latter being transferred to JIRAMA after commissioning.

20. A standalone Development Policy Operation (DPO) is being considered to support improving transparency of public investment financing and governance in the energy sector.

The DPO (FY19) will be complemented by comprehensive technical assistance to help JIRAMA and Ministry of Water, Energy, and Hydrocarbons (MWEH) define a financial recovery trajectory for both the utility and the power sector at large. The World Bank’s technical assistance will support the GoM’s efforts towards the financial recovery of JIRAMA by defining an energy subsidy reduction trajectory and enabling policy actions towards the long term financial viability of the power sector. Specifically, the financial recovery technical assistance will prepare four outputs to support the Government’s subsidy reform efforts: (1) Inventory and Review of Liabilities of JIRAMA; (2) Update of JIRAMA’s Financial Model; (3) JIRAMA Financial Recovery Plan 2018–2023; and (4) Sector Fiscal Sustainability Plan 2018–2023.

C. Original Project Description and Performance

21. The parent project, ESOGIP (P151785), was approved by the Board on March 22, 2016 and became effective on August 24, 2016. The project closing date is June 30, 2020. The total financing of the ESOGIP consists of an IDA Credit in the amount of SDR 47.1 million (US\$65 million equivalent). The PDO is to improve the operational performance of the national electricity utility (JIRAMA), to improve the reliability of electricity supply in the project area, and in the event of an eligible crisis or emergency, to provide immediate and effective response to said eligible crisis or emergency. The project has five components: (a) Component 1: Improving electricity sector planning and financial sustainability; (b) Component 2: Strengthening operational performance and governance of JIRAMA; (c) Component 3: Investing in enhanced reliability of electricity; (d) Component 4: Project management; and (e) Component 5: Contingency emergency response.



22. Overall, the performance of the parent project has been satisfactory. The progress toward the achievement of the PDO and ‘Overall Implementation Progress’ have been rated ‘Satisfactory’ or ‘Moderately Satisfactory’ over the past 18 months as recorded in the project Implementation Status and Results Reports (ISRs). The ratings of PDO and implementation progress, and the disbursement rate of the Parent Project are as follows:

Table 1. Latest Performance of the Parent Project

	ISR of December,11 2016	ISR of June,25 2017	ISR of January,15 2018	Situation at end-April 2018
PDO rating	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Implementation progress rating	Satisfactory	Moderately Satisfactory	Moderately Satisfactory	Moderately Satisfactory
Disbursement ratio	1.52%	15.44%	34%	43%

23. Overall, project implementation is on track, despite initial delays in the preparation of sector studies under Component 1. Progress has been satisfactory in implementation of Components 2 and 3 related to the PIP for JIRAMA. The reinforcement, rehabilitation and upgrade of existing transmission and distribution networks has moved forward faster than scheduled. As of April 2018 (20 months after the project effectiveness), the project has disbursed US\$29.32 million equivalent - about 44.1 percent of the total credit, exceeding the planned disbursements for the same period. Commitments are expected to reach a cumulative amount of US\$50 million (77 percent), with an estimated cumulative disbursement of US\$30 million (46.15 percent) by June 2018, which would be about US\$9 million more than the original planned disbursement for that period.

Components Description and Status

Component 1: Improving electricity sector planning and financial sustainability (US\$2.48 million)

24. This component supports improving electricity sector planning and achieving financial sustainability through the provision of TA, capacity building, and consultancy services for: (a) preparation of a LCPDP providing the roadmap for the development of least cost generation projects and associated transmission networks; (b) elaboration of a NES defining the technical, institutional, and financial arrangements to scale-up sustainable provision of electricity services; (c) development of a tariff study to address sector financial viability; (d) strengthening capacity of public agencies responsible for least-cost planning and electrification; and (e) implementation of the LCPDP and NES.

25. The Government, with the support of the consultant hired to prepare the LCPDP, conducted a workshop in February 2018 to present and discuss the preliminary results of the plan with the sector stakeholders in the country. The study is being finalized and will be complemented by a financial analysis to understand the fiscal impact of selected investments. It is expected that the GoM would approve the LCPDP by June 2018. The preparation of NES has progressed well. The key reports were prepared as scheduled, and main contents and findings were discussed with stakeholders in January 2018. The implementation of the tariff study has been on hold for several months, as it builds on the outcomes of the LCPDP. The consultant will be able to resume implementation of the tariff study shortly, as soon as the preparation of the LCPDP is completed. The performance of this component was rated Moderately Satisfactory in the last ISR (January 2018).



Component 2: Strengthening operational performance and governance of JIRAMA (US\$12.56 million)

26. This component comprises of technical assistance, capacity building, consultancy services, and financing of supply and installation of goods and services to strengthen operational performance and enhance governance of JIRAMA. It consists of preparation and implementation of the PIP, which provides a roadmap for implementation of an optimal organizational structure for JIRAMA (including description of functions and responsibilities of positions at the management level and definition of skills required for each position), as well as the incorporation of a MIS to improve efficiency, transparency and accountability in operations. The implementation of the organizational structure for JIRAMA is being carried out through the selection of staff to occupy positions at the two top levels in the organizational structure below the Director General, applying competitive and transparent processes. The contract for incorporation of MIS includes the installation of a commercial management system (CMS), an integrated distribution management system (DMS), and an enterprise resource planning system (ERP), to be complemented with the update of respective databases supported by a geographic information system (GIS). The PIP also includes the implementation of a RPP to ensure sustainable reduction of non-technical losses in supply through systematic remote recording and monitoring of consumption of large users.

27. The organizational restructuring of JIRAMA has been progressing well. The new organizational structure of JIRAMA was approved by its Board of Directors in January 2017. The new Director General was appointed in March 2017 following a competitive and transparent process. The hiring of 24 top managers (Deputy General Director, Principal Director, and Director) was launched in June 2017 and most of the positions have been filled. The implementation of the contract for the installation of 8,500 smart meters in RPP is at an advanced stage. All the 8,500 meters arrived in the country in September 2017. The installation has commenced and the contractor is aiming to complete it by the end of June 2018. Finally, the contract for incorporation of the integrated MIS is progressing. The IT equipment has arrived in the country and the installation has started. JIRAMA is supervising works with the support of international consultants. The performance of this component was rated Satisfactory in the last ISR (January 2018).

Component 3: Investing in enhanced reliability of electricity (US\$48.62 million)

28. This component supports (a) the reinforcement of an existing 138/63 kV substation and construction of 63 kV electricity transmission lines; (b) rehabilitation and/or upgrading of existing distribution networks; (c) rehabilitation of auxiliaries of generation plants; and (d) the provision of TA and equipment/logistics to support JIRAMA to finalize the design of the activities, to prepare the bidding documents, to supervise the implementation of electricity transmission and distribution works, and to implement part of the distribution works.

29. The implementation of the contract for the design of the 63 kV transmission lines of about 27 km for looping the networks is completed and the draft bidding document for the construction of lines was prepared. The implementation of contracts for the procurement of power transformers, distribution materials including cables and accessories, and concrete and wooden poles is at an advanced stage. Two transformers, 60 MVA - 138/63 kV, are being shipped. Most of the distribution equipment arrived in the country in December 2017. The supply of 4,000 concrete poles out of 7,123 materialized at end of February 2018. The contract for supply of wooden poles was signed in February 2018. The performance of this component was rated Satisfactory in the last ISR (January 2018).



Component 4: Project management (US\$1.34 million)

30. This component finances the following:

- (a) Project management support to MWEH through the provision of TA, training, capacity building, equipment, and supporting incremental operating costs related to the coordination and implementation of project activities for Component 1 of the project, monitoring and evaluation (M&E), implementation of safeguards requirements, and assessment of the impacts of the project activities, including the recruitment of project staff, the financing of audits and financial management software, and purchasing of selected office and IT equipment; and
- (b) Project management support to JIRAMA through the provision of technical assistance, training, capacity building, equipment and supporting incremental operating costs related to the coordination and implementation of project activities for Components 2 and 3 of the project, M&E, implementation of safeguards requirements and assessment of the impacts of project activities, including the recruitment of social and environmental safeguards experts, the design and implementation of the customer satisfaction survey, and selected office and IT equipment.

31. A firm specialized in social and environmental safeguards was hired and is supporting JIRAMA in a continuous manner. In addition, an external auditor has been recruited to prepare the financial audit of the project. A procurement specialist and an accountant were hired and are supporting the Ministry of Water, Energy, and Hydrocarbons (MEEH). Selected training programs such as project identification and preparation, sector planning, and project management are being developed by the ministry and JIRAMA and will be implemented in the coming months. The customer satisfaction survey (the baseline) has been completed. The Project Implementation Units (PIUs) purchased IT equipment necessary for project management.

32. The performance of this component was rated Satisfactory in the last ISR (January 2018).

Component 5: Contingency emergency response (US\$0 million)

33. There has been no eligible crisis or emergency so far. The performance of this component is rated Satisfactory.

D. Rationale for Additional Financing

34. In the course of the parent project implementation, the sector landscape has evolved to include the development of JIRAMA's new Human Resource Plan, opportunities to harness lower cost of electricity through solar PV and small hydro generation, and heightened momentum to scale-up electricity access. In this context, the following additional needs have been identified to ensure that the project achieves the PDO.

35. **JIRAMA needs additional technical assistance to ensure fully successful implementation of its organizational restructuring.** With the support of the ESOGIP, the GoM has made substantial progress on



the restructuring of JIRAMA. As explained above, a new organizational structure for the company was adopted and a new Director General hired competitively, and the hiring of the utility's top managers was launched in June 2017 and most of the positions have been filled. To sustain this effort, JIRAMA will need to implement a human resources development plan to fully integrate newly hired managers, build functional teams, train staff at all levels in the systematic use of the information systems incorporated under the ESGIP and other skills. The company will need to complement this with the definition and implementation of performance-based incentive systems (including the payment of compensation) to increase the effectiveness of the company's workforce, complemented by a retirement and voluntary redundancy plan which will involve severance payments. The severance payments are not financed by the World Bank. As part of the AF, precedents on how to properly assess risks involved when supporting corporate restructuring will be studied. All arrangements will be based on the recommendations arising from the **HR development plan** being developed under the Parent Project.

36. JIRAMA's dispatch and network automation systems needs to be updated to operate existing facilities and ensure integration of variable renewable energy (VRE) generation, and existing distribution networks need to be rehabilitated and upgraded, to improve quality of electricity supply.

Current operating conditions include overloads and inadequate protection of a significant percentage of network equipment, which adversely affect quality and reliability of supply and require immediate correction. Besides, JIRAMA will need to substantially increase intermittent solar generation capacity while medium and large hydro sites are being developed to come online over the next five to ten years. As JIRAMA's current dispatch system is outdated and not able to absorb even small quantities of VRE, the incorporation of adequate technology for system operations and dispatch, including SCADA and other automation facilities, is an essential precondition for the integration of VRE into the grid. A state-of-art SCADA will enable proper operation of new generation plants and transmission and distribution infrastructure to be built to supply increasing demand, both in currently electrified areas and in those to be served in the future. JIRAMA also needs to purchase equipment to improve performance in networks maintenance.

37. Capacity building is needed to create a pipeline of investment-ready small hydropower projects.

The development of small hydropower projects has been identified in the ESMAP-funded study⁴ as the solution to satisfy the shorter-term needs. Such projects could be developed as public-private partnerships. The MWEH and JIRAMA would need to enhance their capacity to handle (a) the review of several technical aspects including the hydrology and geology validation, the project design, and the Environmental and Social Impact Assessment (ESIA); and (b) the commercial and legal aspect of PPA. The AF will provide financing to hire an international firm with technical, commercial, and legal experts to assist the GoM and JIRAMA to (a) complete feasibility studies and ESIA's; (b) prepare tenders of bankable projects to accelerate the implementation of priority small hydro sites; and (c) build capacity within the MWEH and JIRAMA to facilitate the development of small hydro potential in the country. This activity will help the MEEH to advance the preparation of the projects identified in the first component of the SREP IP.

38. Transmission and distribution networks need to be rehabilitated and reinforced to improve quality of supply and create conditions for scaling up electricity access. Rehabilitation and reinforcement

⁴ See paragraph 15



of existing transmission and distribution infrastructure are included in the parent project, but limited to the most urgent situations. The AF will finance rehabilitation and reinforcement works in other areas to complement the effort initiated under the parent project. The investments would allow JIRAMA to ensure the connection of about 25,000 new customers who have already paid their connection fees, and to make available transmission and distribution capacity needed to implement the proposed LEAD Project (P163870) and other electrification projects.

39. **The AF to the ESOGIP is a Maximizing Finance for Development (MFD) enabling operation.** The project finances the installation of a dispatching center and distribution control center that would allow utilities to absorb more electricity from existing and future private generation. This allows the evacuation of solar energy of the 25 MW generation plant under the ongoing IFC Scaling Solar Initiative. In addition, this would facilitate the integration of a large hydro project recommended in the LCPDP to be developed with the private sector. The project also supports GoM to improve JIRAMA’s creditworthiness through the implementation of a Management Improvement Plan including the rehabilitation and reinforcement of transmission and distribution networks to reduce technical losses and the implementation of a RPP to reduce commercial losses.

II. DESCRIPTION OF ADDITIONAL FINANCING

A. Description of New Activities

40. The activities under the proposed AF are aligned with the PDO of the parent ESOGIP project and aim to consolidate and increase the expected positive impacts from implementation of each of its components. The AF introduces new subcomponents and new activities under the components of the parent project.

Component 1: Improving electricity sector planning and financial sustainability (SDR 2.43 million; IDA US\$3.5 million equivalent)

41. The AF will support a new activity “Provision of technical assistance, capacity building, and consultancy service for the development of small hydro” to prepare tenders for high-priority small hydropower plants (assessed under the ESMAP funded TA). This will include reviewing pre-feasibility works for sites, finance detailed engineering, environmental and social studies needed to prepare bankable feasibility studies, and provision of transaction support and advisory services required to ensure competitive and transparent procurement processes. The component will also help to build capacity of institutions involved in sector planning (MWEH, Electricity Regulation Authority [ARELEC], Rural Electrification Development Agency [ADER], and JIRAMA) to facilitate the development of small hydro potential in the country through incorporation of new tools (models for long, medium, and short-term planning) and intensive training in their application, adoption of arrangements to systematize and ensure permanency to the planning process, and other related activities. Specifically, this component will use consultancy services and trainings to implement the following activities:

- (a) Feasibility studies and detailed layout design;



- (b) Environmental studies, as well as the Environmental and Social Management Plan (ESMP) and the compensation and resettlement plan (CRP);
- (c) Training in the establishment of different preliminary planning phases, and the processes for awarding PPAs and Engineering Procurement Contract (EPC);
- (d) Technical and financial evaluation and validation of studies and award of contracts to project companies;
- (e) Evaluation of the ecological, environmental, and social aspects of the proposed projects, in accordance with international standards;
- (f) Analysis and evaluation of financial risks;
- (g) Negotiation and finalization of power purchase and/or concession agreements;
- (h) Economic impacts of change on each scenario proposed;
- (i) Strengthening of the capacity of staff at the MWEH and the sector institutions in technical and financial evaluation of studies; and
- (j) Small hydro project implementation manual.

Component 2: Strengthening operational performance and governance of JIRAMA (SDR 3.47 million; IDA US\$5.0 million equivalent)

42. The AF will support the preparation and implementation of a human resource development plan and communication strategy for JIRAMA following the utility's organizational restructuring and hiring of new senior management. Specifically, this component will help JIRAMA to fully integrate newly hired staff, build functional teams, train staff at all levels in the systematic use of the information systems instituted under the ESOGIP, introduce performance-based pay, increase the overall effectiveness of the company's workforce, and prepare a voluntary early retirement and redundancy plan to be implemented by JIRAMA with Government funding to reduce overstaffing. The component would primarily fund performance based incentives in line with the recommendations of the HR development plan. It will also finance the acquisition of some equipment and tools for logistic support (office equipment, and so on) needed to improve working conditions and achieve acceptable levels in staff productivity. Finally, the acquisition of vehicles to support the mobility needs of commercial and maintenance departments will be also financed to cover specific residual needs.

43. This Human Resource plan will be implemented in two phases. An immediate phase includes the following activities:

- (a) Plan for recruiting managers reporting directly to Directors (already recruited);
- (b) The preparation of the manual for all JIRAMA operational procedures; and
- (c) Plan for restructuring JIRAMA, including preparation of a possible voluntary retirement plan.



44. A second follow-up phase with a firm experienced in utility management and operations. The firm would support the new staff, through a hands-on approach basis, to prepare the operational procedures manual, provide mentoring, coaching and capacity building with a key objective of ensuring that the new practices and processes are internalized and applied. The firm will propose the following activities:

- (a) A proposed organizational chart with the required number of staff in all units and positions and the respective job descriptions;
- (b) Skills upgrading plan for new managers at JIRAMA;
- (c) A performance-based compensation plan; and
- (d) M&E of performance.

45. This component will also finance the installation of auxiliary IT infrastructure and equipment necessary for the operating of the Management Information System (MIS) which implementation is ongoing under the parent project.

Component 3: Investing in enhanced reliability of electricity (SDR 20.51 million; IDA US\$29.5 million equivalent)

46. The AF will finance the reinforcement of existing distribution networks and the upgrade of the dispatch system of JIRAMA to (a) improve reliability and flexibility in network performance and quality of service provided to customers; and (b) enable the integration of intermittent renewable energy into the grid. Activities in this component comprise the construction of a new dispatching center with state-of-the-art SCADA, and the procurement of network infrastructure equipment and of implementation works (including supervision) for system improvements and upgrades, such as rehabilitation of existing old 5 kV lines to operate at the current standardized medium voltage 20 kV, replacement of existing distribution transformers and associated equipment by others with larger capacity, replacement of rotten wooden poles and associated equipment in transmission and distribution lines. The component will also finance purchase of mobile substations and equipment for network maintenance, including mobile equipment for live-line works. In addition, the component will support the rehabilitation of an existing transmission line. Specifically, a new activity on the rehabilitation of the Antananarivo -Antsirabe 63 kV transmission lines will be added.

Subcomponent 3.1. Rehabilitation of existing 138/63 kV substations and rehabilitation and construction of existing 63 kV transmission lines (IDA US\$3.0 million equivalent)

47. At present, almost 80 percent of the wooden poles of the 63 kV transmission line Antananarivo-Antsirabe are rotten. Frequent outages occur, leading to disruptions in the power supply to the city of Antsirabe. The AF will finance the procurement of concrete poles and 63 kV line accessories, and the rehabilitation works will be undertaken by JIRAMA.

48. This Subcomponent will also finance the implementation of safeguard mitigation measures such as sensitization campaign, cleaning, and waste management related to the rehabilitation of the Antananarivo-Antsirabe transmission lines.



Subcomponent 3.2. Rehabilitation and/or upgrading of distribution network (IDA US\$14.0 million equivalent)

49. Poor quality service, frequent outages, and prolonged power disruptions are due primarily to overloaded equipment and to failures in, and/or the absence of, protection devices and switchgear, in addition to obsolete line components. The AF will finance the following activities under this subcomponent:

- (a) Increasing equipment capacity (transformers, circuit breakers, line);
- (b) Replacing and installing protection and switchgear equipment, as well as line accessories (circuit breakers, switches, isolating spark gaps, fuses, line accessories);
- (c) Acquiring mobile medium voltage/low voltage substations;
- (d) Acquiring testing, measurement, and analysis devices for equipment and networks (such as protective relays, cables, transformers...);
- (e) Replacing rotten wooden poles with concrete poles; and
- (f) Installing overhead lines and upgrading to 20 kV at selected distribution substations.

50. The subcomponent includes supplies and works with about 255 km of cables and bare conductors, 5,000 concrete poles, 6,000 wooden poles, 160 transformers, 300 circuit breakers, 200 isolating spark gaps, and 160 line-switches. In addition, this subcomponent will support JIRAMA to improve its maintenance workshop. The key activity is to repair the defective distribution transformers for fast reincorporation to the network. The subcomponent will finance the procurement and installation of a rewinding machine, measuring equipment, processing devices, mobile workshop, and test platform. The subcomponent will also help JIRAMA to improve network maintenance and reduce the duration of planned outages for maintenance, by financing acquisition of equipment for maintenance, in particular under the live-line modality.

51. This Subcomponent will also finance the implementation of safeguard mitigation measures such as a sensitization campaign, cleaning, and waste management related to the rehabilitation and/or reinforcement of distribution networks.

Subcomponent 3.3. New dispatching center and new distribution control center for the Antananarivo interconnected network (IDA US\$12.5 million equivalent)

New dispatching center (IDA US\$7.5 million equivalent)

52. JIRAMA needs to upgrade its control and supervisory system (SCADA) to equip it with modern technology required to operate the power system meeting international standards on quality and reliability in service delivery under current conditions and those resulting from implementation of new generation and transmission projects, including those using intermittent renewable resources.



53. To integrate renewable energy resources, particularly hydro and solar generation in the Antananarivo Interconnected Network that is expected to be connected to the Toamasina and Fianarantsoa networks, JIRAMA needs to upgrade its control and supervisory system (SCADA) to equip it with modern technology to manage these energy resources under optimum quality, cost and safety conditions. The activities under this subcomponent comprise:

- (a) Feasibility study to upgrade the dispatching center to
 - (i) allow the integration of renewable energy resources, particularly large hydropower and solar generation projects;
 - (ii) facilitate the interconnection of the Antananarivo network (RIA) with the Toamasina network (RIT) and the Fianarantsoa network (RIF).
- (b) Acquisition and installation of new SCADA system including the establishment of network applications to manage all current and future energy generation;
- (c) Construction of a new building in JIRAMA's premises in Antananarivo to house the new control and dispatching center;
- (d) Works supervision through consultancy services.

54. This Subcomponent will also finance the implementation of safeguard mitigation measures such as a sensitization campaign, cleaning, and waste management related to the installation of dispatching center.

New distribution control center (IDA US\$5 million equivalent)

55. The establishment of a new Distribution Control Center (DCC) is needed to improve electricity distribution operations in the Antananarivo interconnected network, and:

- (a) Improve the electricity supply to customers and minimize the duration of outages due to incidents;
- (b) Optimize the management and operation of the distribution network;
- (c) Minimize financial losses from energy not supplied to customers, particularly with the incorporation of lower cost hydro and solar generation;
- (d) Ensure global monitoring and supervision of the network condition.

56. The activities under this subcomponent consist of:

- (a) A feasibility study and establishment of the new system for management and operation of the distribution network;
- (b) Procurement, installation, and commissioning of the new DCC, which includes:



- (i) Hardware (servers and work stations);
- (ii) SCADA management and operation systems that are modular, expandable, and compliant with international standards;
- (iii) Communication support and remote transmission equipment;
- (iv) Associated terminal equipment (for example, overhead line switches);
- (v) Construction of a new building in JIRAMA's premises in Antananarivo to house the new control and dispatching center;
- (vi) Works supervision through consultancy services.

57. This Subcomponent will also finance the implementation of safeguard mitigation measures such as sensitization campaign, cleaning, and waste management related to the installation of distribution control center.

58. The ToRs for the hiring of support Consultants that will be financed under this component to design the SCADA and the Distribution Control Center would be carefully reviewed to ensure consistency.

Component 4: Project management (SDR 1.39 million; IDA US\$2.0 million equivalent)

59. The AF will provide support to the Project Implementing Unit within the MWEH and JIRAMA for management of activities proposed under the AF.

Subcomponent 4.1: Project management support to MWEH (IDA US\$0.64 million equivalent)

60. This subcomponent includes (a) financing the contracting of financial management specialists and procurement specialists as required to support project implementation; (b) financing the project audit for the extended implementation period and the incremental operating cost; (c) financing for capacity building through training focused on MWEH, ARELEC, and ADER staff on different subjects related to the development of the energy sector; and (d) purchasing of vehicles and commercial type vehicles for project activities monitoring and supervision.

Subcomponent 4.2: Project management support to JIRAMA (IDA US\$1.36 million equivalent)

61. This subcomponent includes (a) financing the contracting of social and environmental safeguard consultants to prepare the safeguards studies and to monitor their implementation; (b) financing Financial Management (FM) specialists and procurement specialists as required to support project implementation; (c) financing the project audit for the extended implementation period and the incremental operating cost; (d) financing for capacity building through training focused on JIRAMA staff on different subjects related to the improvement of the performances of JIRAMA; (e) financing the functioning of the Grievance redress mechanism of the project, participatory M&E of JIRAMA and sensitization campaign on the beneficiaries survey's result including gender initiative, for JIRAMA and its customers; and (vi) purchasing of commercial type vehicles for project activities monitoring and supervision.

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

62. This component will be providing immediate response to an eligible crisis or emergency, as needed. This would finance emergency works in case of a disaster event by including a “zero-dollar” component. Following an adverse event that causes a major disaster, the Government may request the World Bank to channel resources from this component into an Immediate Response Mechanism (IRM). The IRM would enable the use of a portion of uncommitted funds from the overall IDA portfolio to respond to emergencies. Specific details around this component (including activation criteria, eligible expenditures, and specific implementation arrangements as well as required staffing for the Coordinating Authority) are defined in greater detail in the IRM Operations Manual, which is already available.

B. Project Cost

63. The proposed AF will be an IDA credit in the amount of US\$40 million equivalent. The total amount of funding including both the original and AF will be of US\$105 million equivalent. The revised component costs are shown in the table 2.

Table 2. Summary of Project Costs by Component (US\$, million)

Component	IDA - Parent Project	Counterpart Financing	IDA - AF	Total
Component 1. Improving electricity sector planning and financial sustainability	2.48	0	3.50	5.98
- <i>Preparation of LCPDP</i>	0.50		0	0.50
- <i>Definition of a strategy and action plans to increase access</i>	0.23		0	0.23
- <i>Preparation of studies to address sector financial viability</i>	0.35		0	0.35
- <i>Strengthening the capacity of public agencies</i>	0.40		0	0.40
- <i>Other complementary technical assistance needed for the implementation of the LCPDP</i>	1.00		0	1.00
- <i>Technical Assistance for the development of small hydro</i>	-		3.50	3.50
Component 2. Strengthening operational performance and governance of JIRAMA	12.56	0	5.00	17.56
- <i>Preparation of PIP for JIRAMA</i>	0.16		0	0.16
- <i>Implementation of JIRAMA organizational structure</i>	0.40		4.00	4.40
- <i>Incorporation of MIS</i>	9.00		1.00	10.00
- <i>Implementation of RPP</i>	3.00		0.00	3.00
Component 3. Investing in enhanced reliability of electricity	48.62	0	29.50	78.12
- <i>Reinforcement of existing 138/63 kV substation and construction and rehabilitation of 63 kV transmission lines</i>	10.67		3.00	13.67
- <i>Rehabilitation and/or upgrading of existing distribution networks</i>	34.50		14.00	48.50

Component	IDA - Parent Project	Counterpart Financing	IDA - AF	Total
- Installation of a new Dispatching Center and a new Distribution Control Center	-		12.50	12.50
- Rehabilitation of auxiliaries of generation plants				
- Technical assistance	2.45		0	2.45
	1.00		0	1.00
Component 4. Project management	1.34	0	2.00	3.34
- Project management support at MEEH	0.60		0.64	1.24
- Project management support at JIRAMA	0.74		1.36	2.10
Component 5. Contingency emergency response	0	0	0	0
Total	65.00	0	40.00	105.00

C. Change in Result Indicators

64. In order to capture new activities under the AF, the result framework will be modified as follows:

Table 3. Change in Result Indicators

New/Current	Indicator	Description	Baseline	Parent Project Target	Revised Target	Target Date
Current PDO	Total electricity losses per year in the project area	Unit: Percentage This indicator measures the total losses, including technical and non-technical (that is, commercial) losses, under the project.	35	28%	24%	12/31/21
Current PDO	Interruptions in electricity service per year in the project area	Unit: Number Number of incidents at the level of the distribution network caused by an equipment overload in the project area.	870	650	450	12/31/21
Current PDO	Direct project beneficiaries	Unit: Number Direct beneficiaries are the people connected by JIRAMA in the project area who will benefit from	0	175,000	350,000	12/31/21



New/Current	Indicator	Description	Baseline	Parent Project Target	Revised Target	Target Date
		improved electricity services as a result of the construction and/or rehabilitation of transmission and distribution lines. For purposes of calculating the number of people connected, JIRAMA considers that for each customer/contract there are on average 1.5 households connected, and an average of 5 people per household.				
Current Intermediate indicator	Transmission lines constructed or rehabilitated	Unit: km This indicator measures the length of the transmission lines constructed or rehabilitated under the project	0	34	134	12/31/21
Current Intermediate indicator	Transmission lines constructed	Unit: km This indicator measures the length of the transmission lines constructed under the project.	NA	34	34	12/31/21
New Intermediate indicator	Transmission lines rehabilitated	Unit: km This indicator measures the length of the transmission lines rehabilitated under the project.	NA	0	100 km	12/31/21
Current Intermediate indicator	Distribution lines constructed	Unit: km This indicator measures the	0	195 km of which 165 km new	300 km of which 165 km new	12/31/21



New/Current	Indicator	Description	Baseline	Parent Project Target	Revised Target	Target Date
	or rehabilitated	length of the distribution lines constructed and rehabilitated under the project.		lines and 30 km lines rehabilitated	lines and 135 km lines rehabilitated	
New Intermediate indicator	New Dispatching Center and new distribution control center constructed and commissioned	Unit: Text This indicator measures whether JIRAMA has installed and commissioned a new dispatching center and a new distribution control center	NA	No	Yes	12/31/21
New Intermediate indicator	Competitive Bidding process for the development of one priority small hydro site launched	Unit: Text This indicator measures whether the MWEH has launched a competitive bidding process for the development of at least one priority small hydro site.	NA	0	1	12/31/21
New Intermediate indicator	Percentage of technical positions held by female that report directly to Directors in JIRAMA	Unit: Text This indicator measures whether JIRAMA has increased the percentage of technical positions held by female	TBD	NA	Increased by 15%	12/31/21
New intermediate indicator	Public availability of customer satisfaction survey	Unit: Text This indicator measures whether JIRAMA has made publicly available the customer satisfaction survey	NA	No	Yes	12/31/21
Current Intermediate indicator	Time taken for first disbursement of funds	Unit: weeks This indicator will measure effectiveness of	0	8	8	12/31/21



New/Current	Indicator	Description	Baseline	Parent Project Target	Revised Target	Target Date
	requested by Government for an eligible emergency or crisis	the instrument to provide rapid access to financing to Madagascar in the event of an eligible emergency or crisis. Time will be measured from the moment the Bank receives the Government's request for assistance				

D. Institutional Arrangement

65. The activities in the proposed AF are fully incorporated into components of the ongoing ESOGIP; hence, the implementation arrangements will remain the same. The MWEH would be responsible for the implementation of Component 1 and part of Component 4 and JIRAMA would implement Components 2 and 3, and part of Component 4. The project coordinator of the Parent Project who is based at the MWEH would also be responsible for the coordination of the activities of the AF. The MWEH would be responsible for consolidating information on the various project activities and prepare and submit project monitoring reports to the World Bank. The Project Coordination Committee, chaired by the MWEH with members from sector institutions will provide development guidance and advice on alignment with sector policy and ensure overall governance and fiduciary oversight of the AF. The Development Committee for the reform of JIRAMA, established under the Parent Project, will oversee any actions related to the reform of the company.

66. The proposed AF will also finance, under Component 4, additional TA activities to strengthen the existing implementation arrangements, particularly to increase implementation capacity, and to strengthen the M&E aspect of the project through targeted trainings and hiring of support consultants within the MWEH in the procurement and Financial Management (FM) areas.

E. Consideration of Other Options

67. Given the alignment of the proposed activities with the PDO of the Parent project (P151785) and the existing safeguard frameworks, the use of the same implementation arrangement, and the time sensitivity on the implementation of the restructuring of the utility JIRAMA, providing an AF to the ESOGIP was a more efficient option than including these activities in a new operation.



III. APPRAISAL SUMMARY

A. Economic and Financial Analysis

68. **Rationale for Public Financing.** The rationale for public sector financing for investments under the proposed project rests primarily on the present characteristics of the sector (i) upgrading of distribution and transmission networks are not normally conducive to public private arrangements, particularly if those investments are not linked to a private and bankable project; and (ii) the scale of investments required, and associated long payback periods. It is highly unlikely that a private investor will finance the proposed investments given the status of the sector.

69. **World Bank's added value.** The World Bank Group is already a close partner of the GoM in the development of its electricity sector through the support to the development of Electricity Access Project, the reform of the utility JIRAMA as well as through the DPO that includes support to the energy sector. The World Bank is well positioned to continue its commitment to assist the GoM to sustain the reform of the utility JIRAMA, and also building on its experience in similar programs in the region.

70. **Economic Analysis.** The economic analysis has been undertaken deploying a standard cost-benefit methodology for the enhanced scope, comprising both the original parent project (US\$65 million equivalent) and the proposed additional finance (US\$40 million equivalent). Consistent with the evaluation of the parent project, the analysis focused on benefits deriving from Components 2 and 3. It resulted in an economical internal rate of return (EIRR) of 26.3 percent and net present value (NPV) of US\$169.0 million, which reports a robust economic viability of the project. Sensitivity analyses and greenhouse gas (GHG) accounting and valuation were carried out. Results are shown in Annex 2.

71. **Project Financial Analysis.** A financial analysis has been carried out to assess the financial viability of the project. The analysis focuses on the financial cost and revenue to JIRAMA, the implementation agency that generates its own revenue. In line with the economic analysis, the financial analysis solely focused on benefits from implementation of Components 2 and 3. The analysis shows that the project will result in a financial internal rate of return (FIRR) of 21.7 percent, and NPV of US\$94.6 million, indicating the project's financial viability for JIRAMA. Results are shown in Annex 2.

72. **JIRAMA Financial Analysis.** A financial analysis of JIRAMA has been carried out to show the expected impacts of the project on future financial performance and sustainability of the utility. For many years, JIRAMA's financial performance has been very poor, with the company unable to recover even its operating costs from its revenue. This is due to the high costs of energy purchases and fuels for own generation, combined with high system (technical and non-technical) losses. The financial projection has shown that the poor financial performance of JIRAMA will continue in the near term albeit with lower subsidy requirements. Under a "business as usual" scenario, it is estimated that JIRAMA would require a US\$567 million subsidy from GoM between 2017 to 2021. The analysis has shown that, by achieving the project's direct and indirect outcomes, the subsidy requirement could be reduced by 94 percent. Results are shown in Annex 2.



B. Technical

73. The investment component of the project including the rehabilitation or construction of transmission and/or distribution lines, and the upgrading of the dispatching system of JIRAMA uses well-proven technologies and presents no unusual installation, commissioning or operational challenges. The equipment and the technologies to be used in construction and operation of lines and substations will be of international standard. JIRAMA has successfully implemented similar activities in the past. Cost estimates are derived from recently completed installations in Madagascar and in other similar countries under projects financed by World Bank or by other donors and aligned with current market prices. Regarding project implementation, international consultants will be hired to support design of activities under Component 2 in line with best practices and supervision of the implementation of key contracts.

74. The TA for the development of a small hydro will use well-known consultancy services. Skills needed for the implementation of this activity exist in the market. The restructuring of the utility JIRAMA benefits from previous experience in Madagascar and in the region. In addition, the new management team has been successfully put in place under the Parent project.

C. Financial Management

75. The proposed AF will support a four-year program that would expand and maximize the development impact of the project. The AF implementation will rely on the same institutional arrangements as for the Parent Project (P151785). The MWEH would be responsible for the implementation of Component 1 and part of Component 4 and JIRAMA would implement Components 2 and 3, and part of Component 4. The MWEH will assume the ultimate responsibility for the coordination and the implementation of the project.

76. The Parent Project is in substantial compliance with financial management reporting requirements. There are no overdue financial audits and interim financial reports have been submitted on time and have been acceptable. No ineligible expenditures were noted from successive supervision missions and external audit opinion is unqualified. However, the FM performance of the project is deemed Moderately Satisfactory due to the weaknesses of the control environment particularly for JIRAMA.

77. The overall risk for the project has been assessed as Substantial and the proposed mitigation measures are (a) the MWEH will maintain a qualified Financial Officer and Accountant; (b) the JIRAMA will reinforce the FM capacity by hiring a qualified FM officer to support the existing team and will provide adequate capacity building; (c) the JIRAMA will enhance budget follow-up by optimizing the use of accounting software; (d) the JIRAMA will reinforce capacity of its internal audit department through trainings and the review of the project activities will be part of the internal audit program; and (e) the JIRAMA will provide annual audited financial statements to the World Bank.

78. A detailed FM assessment is presented in Annex 1.

D. Procurement

79. **The procurement part of the project will be implemented by the MWEH and JIRAMA.** The two agencies are implementing the parent ESOGIP and have extensive experience with World Bank



procurement process and policies. A procurement assessment was undertaken on the two agencies and in conclusion, the risk is maintained as Substantial. This is mainly due to the changes in conditions of implementation and the requirements of the Procurement Regulations for IPF Borrowers. The risk will be mitigated through regular reporting on the progress and implementation of fiduciary activities by the two agencies, World Bank supervision, World Bank procurement team hands-on support when required, and further capacity building. Procurement under the proposed operation will be guided by the following documents: (a) the 'World Bank Procurement Regulations for IPF Borrowers' dated July 1, 2016, revised in November 2017 (Procurement Regulations); and (b) the World Bank's Anticorruption guidelines 'Guidelines on Preventing and Combatting Fraud and Corruption', revised July 1, 2016. The Project Implementation Manual (PIM) will be up-dated in accordance with these documents and detailed procedures for administration and handling of procurement-related complaints. As required by the procurement regulations, the Project Procurement Strategy for Development (PPSD) has been developed and a Procurement Plan covering the first 18 months of implementation has been approved by the World Bank. The main activities of the approved Plan concern (i) the procurement, installation of the Dispatching Center and the Distribution Control Center; (ii) the preparation of Human Resources Development Plan. These activities represent about 40% of the total funding of the AF.

80. The project will use the World Bank's online procurement planning and tracking tools to carry out all procurement transactions. The Systematic Tracking of Exchanges in Procurement (STEP) will be used for submission, clearance, and updating of the Procurement Plan.

- All goods and non-consulting services will be procured in accordance with the requirements set forth or referred to in Section VI of the procurement regulations.
- Approved Selection Methods: Consulting services will be procured in accordance with the requirements set forth or referred to in Section VII of the procurement guidelines.

81. Madagascar has a procurement regulatory framework and the national procurement procedures are widely used in Madagascar and will be used for this project. The proposed project has no complex procurement that will challenge the Borrower capacity. Procurement activities are like those for the on-going parent project. As such, the Client is already familiar with the types of procurement that will be undertaken under this project.

E. Social (including Safeguards)

82. Resettlement. Like the parent project, the AF triggers OP 4.12 on Involuntary Resettlement. Component 1 under the AF supports the development of safeguards documents for future small hydropower projects in Madagascar. In line with this change, the Resettlement Policy Framework for the parent project was updated and disclosed locally in the World Bank's external website on April 19, 2018 to guide the preparation of a Resettlement Action Plan (RAP) for each priority small hydropower that satisfies the eligibility criteria.

83. No potential large scale, significant and/or irreversible social impacts are anticipated given that the investment activities of the AF mainly concern the improvement of existing installations. However, the rehabilitation and reinforcement of the existing distribution network for Component 3 which comprises the replacement of around 3,000 rotten wooden poles with concrete poles, and the upgrading



to 20 kV of overhead lines in urban areas could generate temporary displacement or temporary loss of incomes. In addition, the TA to the development of small hydro under Component 1 would not have substantial social impacts since sites are distant from villages. Any small hydro that would be categorized as A based on screening will be ineligible under the AF.

84. **Worker conditions.** The Project will not include civil works, apart from the demolition of existing offices and the construction of a new dispatching center and installation of SCADAs and the replacement of rotten wooden poles and the installation of overhead lines. During these activities, the project will pay attention to the safety of workers and will develop specific actions to limit the likelihood of possible gender based violence as a result of mobilization of workers.

85. Grievance redress mechanism. The AF will use the grievance redress mechanism of the parent project regarding actions and project stakeholder implication. The project will report periodically information related to grievances received and treated by the project. The GRM has been developed into the operational manual of the project, and in the Environmental and Social Management Framework (ESMF), Resettlement Action Plan (RAP), Resettlement Policy Framework (RPF).

F. Environment (including Safeguards)

86. Activities under Components 1 and 3 have environmental and social impacts. Technical assistance to MWEH and JIRAMA to develop small hydro in Madagascar is based on the priority sites identified under the ESMAP study. Based on the result of the ESMAP study and during the implementation of component 1 of the AF, a few sites would be selected to prepare bankable project. The AF will not include significant civil works, apart from the demolition of existing office and the construction of a new dispatching center and installation of SCADAs which is to be located in JIRAMA's premises in Ambohimambola municipality and occupy an area of around 100 m².

87. Implementation experience during the original project indicates that the project involves the reinforcement of an existing substation and construction of electricity transmission lines; rehabilitation and/or upgrading of existing distribution networks and rehabilitation of auxiliaries of generation plants with no significant environmental and social impacts. The environmental impacts of activities of the parent project include: (a) the effects of noise to residential areas; (b) liquid waste (waste oils) pollution to surrounding areas and groundwater; (c) occupational health and safety hazards to employees that are not equipped with appropriate protective materials; (d) accidental hazards associated with machinery; and (e) hazardous solid waste from old transformers. The parent project is classified category B and has triggered three safeguard policies: Environmental Assessment OP/BP 4.01, Physical Cultural Resources OP 4.11, and Involuntary Resettlement OP 4.12.

88. The Environmental and Social Management Framework for the parent project was updated and disclosed by JIRAMA on April 19, 2018 to factor in the new activity to support the development of small hydro projects.

89. JIRAMA has experience in managing social and environmental safeguards risks in implementing the activities of the parent project. JIRAMA has an environment and safety Department with full-time environmental staff. It has also received assistance from an environmental and social consultant firm. An ESMP and RAP for each selected subproject have been prepared by JIRAMA, reviewed and approved by



the World Bank and disclosed in -country and on the World Bank’s external website before the launching of works. The implementation of safeguard management was rated moderately satisfactory because JIRAMA experienced delays on the elaboration of ESMPs and RAPs for subprojects. The safeguard implementation arrangement for the AF will remain the same as the parent project but JIRAMA will receive more support from consultants to better manage the increased volume of works.

90. The support provided under the AF to the development of small hydro means that three additional safeguard policies need to be triggered as follows: OP 4.04 (Natural Habitat) given that the 17 identified potential small hydropower plants could affect natural habitats such as rivers and streams and their ecology; OP 4.36 (Forest) because the design of small hydropower plants could have impacts on health and forest-dependent communities; and OP 4.37 (Dam Safety) because technical assistance to support the implementation of priority small hydroelectric power plants should include a geotechnical study to assess potential failure on the bedrock of the dam (presence of cracks in the rock) that could result in significant negative impacts for communities and local assets. Only category B hydro power subprojects will be supported by the project. The updated ESMF includes risk evaluation of new activities and ToRs of ESIA/ESMP for small hydropower, as well as the screening form for small hydro and criteria for category A subprojects ineligible under AF project, and environmental and social profile of priority small hydropower sites.

G. Gender

91. According to the World Economic Forum (WEF) 2017 Global Gender Gap Report, Madagascar occupies the 80th rank out of 144 countries and has widened somewhat the country’s gender gaps compared to the previous year. Although the Government is undertaking efforts to achieve greater gender equality, women’s economic empowerment is still limited. In 2017, female labor force participation was 83.6 percent, however women’s earnings are substantially disadvantaged compared to men, despite slight progress in wage equality. High illiteracy rates continue to pose barriers for women to benefit from economic opportunities, for instance to access credit or to expand their smaller and informal businesses. Moreover, female-headed households seem to be relatively disadvantaged in terms of access to services and, in general, enjoy lower consumption than male-headed households in both rural and urban areas across the country. (The World Bank, Poverty, Gender and Inequality Assessment 2014). Finally, although enrollment in tertiary education has almost reached parity, different initiatives are being implemented in the country to close the gender gap in the science, technology, engineering and mathematics (STEM) field.

92. A preliminary gender analysis carried out under the proposed project identified two main gender gaps: (a) the lack of female staff in technical positions that report directly to Directors in JIRAMA; and (b) the lack of sex-disaggregated data in the energy sector at the national level. First, measures to address the lack of female staff in JIRAMA will include the launching of a recruitment program by the utility that will target specifically female candidates for new positions. Gender-sensitive campaigns to attract female candidates will also contribute to address this gap. These measures are most relevant to Component 2 in the context of JIRAMA’s HR strategy, as well as Component 4 in hiring of experts to the PIUs. Secondly, in order to address the data gap, the JIRAMA’s customer satisfaction survey will be disaggregated by sex to analyze whether women are satisfied with JIRAMA’s service. In addition, JIRAMA’s call service center will increase the number of female staff to effectively respond to female claims. Going forward, the project will aim to improve the service provision aspects of the national



utility through an enhanced feedback mechanism that could be via a SMS service, or through female local agents who serve as the interface between the end consumers and the utility.

IV. WORLD BANK GRIEVANCE REDRESS

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

94. **Risks.** The overall risk rating of the project is High. Key factors contributing to the High risk rating are: political and governance (High), sector strategies and policies (Substantial), and sustainability (Substantial). On the political and governance risk, the impending elections scheduled for November-December 2018 may result in the establishment of a new Government and change of high-level staff at the Ministry of Energy. On the sector strategies risk, the AF will support improved governance in JIRAMA through the implementation of the Management Improvement Plan. The ongoing power sector dialogue and complementary World Bank-funded projects mitigate challenges related to the reversal of the ongoing sector operating environment. On the sustainability risk, the project involves rehabilitation and reinforcement of existing infrastructure and consequently resettlement will only be necessary if there are encroachers that need to be relocated. Therefore, significant social impacts are not expected as the labor force at each site will be small. Environmental and Social Management Plans will incorporate provisions on gender based violence as well and will be included in the contracts of contractors and supervising engineers.

V. SUMMARY TABLE OF CHANGES

	Changed	Not Changed
Change in Results Framework	✓	
Change in Components and Cost	✓	
Change in Loan Closing Date(s)	✓	
Change in Safeguard Policies Triggered	✓	
Change in Legal Covenants	✓	
Change in Implementing Agency		✓
Change in Project's Development Objectives		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
Change in Disbursements Arrangements		✓
Change of EA category		✓
Change in Institutional Arrangements		✓
Change in Financial Management		✓
Change in Procurement		✓

VI. DETAILED CHANGE(S)

RESULTS FRAMEWORK

Project Development Objective Indicators

Total electricity losses per year in the project area

Unit of Measure: Percentage

Indicator Type: Custom

	Baseline	Actual (Current)	End Target	Action
Value	35.00	35.00	24.00	Revised



Date	30-Nov-2015	18-Dec-2017	31-Aug-2021	
Interruptions in electricity service per year in the project area Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	870.00	870.00	450.00	Revised
Date	30-Nov-2015	01-Mar-2018	31-Aug-2021	
Direct project beneficiaries Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	350,000.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Aug-2021	
Female beneficiaries Unit of Measure: Percentage Indicator Type: Custom Supplement				
	Baseline	Actual (Current)	End Target	Action
Value	50.00	50.00	50.00	No Change

Intermediate Indicators

Distribution lines constructed or rehabilitated under the project Unit of Measure: Kilometers Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	300.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Dec-2021	
Distribution lines constructed under the project Unit of Measure: Kilometers Indicator Type: Custom Breakdown				



	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	165.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Dec-2021	
Distribution lines rehabilitated under the project Unit of Measure: Kilometers Indicator Type: Custom Breakdown				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	135.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Dec-2021	
Transmission lines constructed or rehabilitated under the project Unit of Measure: Kilometers Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	134.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Dec-2021	
Transmission lines constructed under the project Unit of Measure: Kilometers Indicator Type: Custom Breakdown				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	34.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Dec-2021	
Transmission lines rehabilitated under the project Unit of Measure: Kilometers Indicator Type: Custom Breakdown				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	100.00	New
Date	09-Mar-2018	10-Mar-2018	31-Dec-2021	
JIRAMA customer satisfaction survey undertaken in project area and report on customer feedback and how it was addressed by JIRAMA Unit of Measure: Text Indicator Type: Custom				



	Baseline	Actual (Current)	End Target	Action
Value	No survey	Customer Satisfaction Baseline survey completed	Customer satisfaction survey administered by JIRAMA	Revised
Date	30-Nov-2015	30-Mar-2018	31-Dec-2021	
Time taken for first disbursement of funds requested by Government for an eligible emergency or crisis Unit of Measure: Weeks Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	8.00	Revised
Date	30-Nov-2015	18-Dec-2017	31-Dec-2021	
Dispatching Center and Distribution Control Center constructed and commissioned Unit of Measure: Yes/No Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	No	No	Yes	New
Date	09-Mar-2018	09-Mar-2018	31-Dec-2021	
Competitive Bidding process for the development of one priority small hydro site launched Unit of Measure: Number Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	0.00	0.00	1.00	New
Date	09-Mar-2018	09-Mar-2018	31-Dec-2021	
Percentage of technical positions held by females that report directly to Directors in JIRAMA Unit of Measure: Text Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	TBD	TBD	Increased by 15%	New
Date	23-Mar-2018	23-Mar-2018	31-Dec-2021	
Public availability of customer satisfaction survey Unit of Measure: Yes/No				



Indicator Type: Custom				
	Baseline	Actual (Current)	End Target	Action
Value	No	No	Yes	New
Date	26-Mar-2018	26-Mar-2018	31-Dec-2021	

COMPONENTS

Current Component Name	Current Cost (US\$, millions)	Action	Proposed Component Name	Proposed Cost (US\$, millions)
Improving electricity sector planning and financial sustainability	2.48	Revised	Improving electricity sector planning and financial sustainability	5.98
Strengthening operational performance and governance of JIRAMA	12.56	Revised	Strengthening operational performance and governance of JIRAMA	17.56
Investing in enhanced reliability of electricity	48.62	Revised	Investing in enhanced reliability of electricity	78.12
Project management	1.34	Revised	Project management	3.34
Contingent Emergency Response	0.00	Revised	Immediate Response Mechanism	0.00
TOTAL	65.00			105.00

LOAN CLOSING DATE(S)

Ln/Cr/Tf	Status	Original Closing	Current Closing(s)	Proposed Closing	Proposed Deadline for Withdrawal Applications
IDA-57730	Effective	30-Jun-2020	30-Jun-2020	31-Dec-2021	30-Apr-2022

Expected Disbursements (in US\$, millions)

Fiscal Year	2016	2017	2018	2019	2020	2021	2022
Annual	0.26	3.82	5.33	13.79	27.03	37.35	17.43
Cumulative	0.26	4.08	9.41	23.20	50.22	87.57	105.00



SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Latest ISR Rating	Current Rating
Political and Governance	● High	● High
Macroeconomic	● Low	● Low
Sector Strategies and Policies	● Substantial	● Substantial
Technical Design of Project or Program	● Moderate	● Low
Institutional Capacity for Implementation and Sustainability	● High	● Substantial
Fiduciary	● Substantial	● Substantial
Environment and Social	● Substantial	● Substantial
Stakeholders	● Substantial	● Substantial
Other		
Overall	● High	● High

COMPLIANCE

Change in Safeguard Policies Triggered

Yes

Safeguard Policies Triggered	Current	Proposed
Environmental Assessment OP/BP 4.01	Yes	Yes
Performance Standards for Private Sector Activities OP/BP 4.03	No	No
Natural Habitats OP/BP 4.04	No	Yes
Forests OP/BP 4.36	No	Yes
Pest Management OP 4.09	No	No
Physical Cultural Resources OP/BP 4.11	Yes	Yes
Indigenous Peoples OP/BP 4.10	No	No



Involuntary Resettlement OP/BP 4.12	Yes	Yes
Safety of Dams OP/BP 4.37	No	Yes
Projects on International Waterways OP/BP 7.50	No	No
Projects in Disputed Areas OP/BP 7.60	No	No

LEGAL COVENANTS – MG-Electricity Sec Operations & Governance Improvement Project(ESOGIP) (P151785)

Loan/Credit/TF	Description	Status	Action
IDA-57730	Finance Agreement :Recruitment of external audit firm Description :Schedule 2, Section V.1: By no later than 6 months after the Effective Date, the Recipient shall recruit an external auditor in accordance with the provisions of Section III of Schedule 2 to the Financing Agreement, and on the basis of terms of reference, qualifications and experience acceptable to the Association. Due Date :24 February 2017	Complied with	No Change
IDA-57730	Finance Agreement :Appointment or recruitment of a qualified accountant and procurement assistant Description :Schedule 2, Section V.2: By no later than 3 months after the Effective Date, the Recipient shall appoint or recruit a qualified accountant and a procurement assistant at the MEH in accordance with the provisions of Section III of Schedule 2 to the Financing Agreement, and on the basis of terms of reference, qualifications and experience acceptable to the Association. Due Date :24 November 2016	Complied with	No Change
IDA-57730	Finance Agreement :Launching of a competitive and transparent selection of staff at JIRAMA Description :Schedule 2, Section V.3: By no later than 12 months after the Effective Date, the	Complied with	No Change



	Recipient, with the support of specialized consultants, shall launch a competitive and transparent selection of staff at JIRAMA to occupy the top management positions. Due Date : 24 August 2017		
IDA-57730	Finance Agreement :Launching of a competitive and transparent selection of staff at JIRAMA Description :Schedule 2, Section V.3: By no later than 12 months after the Effective Date, the Recipient, with the support of specialized consultants, shall launch a competitive and transparent selection of staff at JIRAMA to occupy the top management positions. Due Date : 24 August 2017	Complied with	New

LEGAL COVENANTS – Madagascar Electricity Sector Operations and Governance Improvement Project - AF to ESOGIP (P164318)

Sections and Description

FA, Schedule 2, Section IV, 1: No later than six (6) months after the Effective Date the Recipient shall have caused JIRAMA to have elaborated and adopted the Human Resource Development Plan and communications strategy in form and substance satisfactory to the Association.

FA, Schedule 2, Section IV, 2: No later than six (6) months after the Effective Date the Recipient through the MWEH shall have hired a consultant to assist with technical assistance in the development of small hydro on the basis of terms of references, qualifications and experience acceptable to the Association

FA, Schedule 2, Section IV, 3: No later than six (6) months after the Effective Date the Recipient shall have caused JIRAMA to hire a consultant to assist it in the procurement and installation of the new dispatching center and the new Distribution Control Center on the basis of terms of references, qualifications and experience acceptable to the Association.

PA, Schedule, Section IV, 1: Not later than six (6) months after the Effective Date, JIRAMA shall have elaborated and adopted the Human Resource Development Plan and Communications Strategy in form and substance satisfactory to the Association.

PA, Schedule, Section IV, 2: Not later than six (6) months after the Effective Date, JIRAMA shall have hired a consultant to assist JIRAMA in the procurement and installation of a new dispatching system and a new distribution control center, on the basis of terms of reference, qualifications, and experience acceptable to the Association.

Conditions

Type	Description
Effectiveness	The Subsidiary Agreement has been executed on behalf of the Recipient and the Project Implementing Entity



Type Effectiveness	Description The Project Implementation Manual has been updated in form and substance satisfactory to the Association
Type Effectiveness	Description The Subsidiary Agreement has been duly authorized by the Recipient and the Project Implementing Entity and is legally binding upon the Recipient and the Project Implementing Entity in accordance with its terms.
Type Disbursement	Description No withdrawal shall be made under Category 3 b) of Schedule 2, Section III, A.2 of the Financing Agreement, unless and until the Recipient has adopted the Performance Based Incentives Manual in form and substance satisfactory to the Association.



VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

COUNTRY : Madagascar

Madagascar Electricity Sector Operations and Governance Improvement Project - AF to ESOGIP

Project Development Objectives

The Project Development Objective is to improve the operational performance of the national electricity utility (JIRAMA) and improve the reliability of electricity supply in the project area and, in the event of an eligible crisis or emergency, to provide immediate and effective response to said eligible crisis or emergency.

Project Development Objective Indicators

Action	Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
Revised	Name: Total electricity losses per year in the project area		Percentage	35.00	24.00	Annual	JIRAMA data system	JIRAMA
Description: This indicator measures the total losses, including technical and non-technical (i.e., commercial) losses, under the project.								
Revised	Name: Interruptions in electricity service		Number	870.00	450.00	Annual	JIRAMA data	JIRAMA



	per year in the project area						system	
Description:								
Revised	Name: Direct project beneficiaries		Number	0.00	350,000.00	Annual	JIRAMA data system	JIRAMA
No Change	Female beneficiaries		Percentage	50.00	50.00	Annual	JIRAMA data system	JIRAMA

Description: Direct beneficiaries are people or groups who directly derive benefits from an intervention (i.e., children who benefit from an immunization program; families that have a new piped water connection). Please note that this indicator requires supplemental information. Supplemental Value: Female beneficiaries (percentage). Based on the assessment and definition of direct project beneficiaries, specify what proportion of the direct project beneficiaries are female. This indicator is calculated as a percentage.

Intermediate Results Indicators

Action	Indicator Name	Core	Unit of Measure	Baseline	End Target	Frequency	Data Source / Methodology	Responsibility for Data Collection
No Change	Name: JIRAMA's Management Improvement Plan (MIP) completed and key management positions recruited		Text	MIP adopted by Government, key management positions	JIRAMA business plan published, Director-level and above	Semi-annual	Project progress report	JIRAMA



				advertised	competitively recruited			
<p>Description: This indicator measures whether JIRAMA MIP has been prepared and completed, and top management positions based on the MIP recruited in a transparent and competitive manner.</p>								
No Change	Name: Completion of key studies: Least Cost Power Development Plan (LCPDP), Tariff Study		Text	No	LCPDP and Tariff Studies completed and published	Semi-annual	Project progress report	MEH
<p>Description: This indicator measures whether the LCPDP and Tariff Study have been prepared and completed.</p>								
No Change	Name: Percentage of total sales (kWh) covered by the Revenue Protection Program (RPP).		Percentage	0.00	40.00	Semi-annual	JIRAMA data system	JIRAMA
<p>Description: This indicator measures the percentage of total electricity customers connected to the network that are covered by the RPP.</p>								
No Change	Name: Installation of Management Information System (MIS) at JIRAMA, and populated with data		Text	No	MIS functioning and used for sector monitoring and reporting	Semi-annual	Project progress report	JIRAMA
<p>Description: This indicator measures whether the MIS (including CMS, IDMS, ERP, and GIS) have been installed and populated with updated data.</p>								
Revised	Name: Distribution lines constructed or		Kilometers	0.00	300.00	Semi-annual	Project progress report	JIRAMA



	rehabilitated under the project							
Revised	Distribution lines constructed under the project		Kilometers	0.00	165.00	Semi-annual	Project Progress Report	JIRAMA
Revised	Distribution lines rehabilitated under the project		Kilometers	0.00	135.00	Semi-annual	Project progress report	JIRAMA
<p>Description: This indicator measures the length of the distribution lines constructed or rehabilitated/upgraded under the project. The baseline value for this indicator is expected to be zero.</p>								
Revised	Name: Transmission lines constructed or rehabilitated under the project		Kilometers	0.00	134.00	Semi-annual	Project progress report	JIRAMA
Revised	Transmission lines constructed under the project		Kilometers	0.00	34.00	Semi-annual	Project progress report	JIRAMA
New	Transmission lines rehabilitated under the project		Kilometers	0.00	100.00	Semi-annual	Project progress report	JIRAMA
<p>Description: This indicator measures the length of the transmission lines constructed or rehabilitated/upgraded under the project.</p>								
Revised	Name: JIRAMA customer satisfaction survey undertaken in		Text	No survey	Customer satisfaction survey	Semi-annual	JIRAMA report	JIRAMA



	project area and report on customer feedback and how it was addressed by JIRAMA				administered by JIRAMA			
Description: This indicator measures whether JIRAMA has designed and administered a customer satisfaction survey and taken into account feedback received.								
Revised	Name: Time taken for first disbursement of funds requested by Government for an eligible emergency or crisis		Weeks	0.00	8.00	Semi-annual	Project Progress report	Ministry of Finance
Description: Time taken for first disbursement of funds requested by Government for an eligible emergency or crisis (weeks)								
New	Name: Dispatching Center and Distribution Control Center constructed and commissioned		Yes/No	No	Yes	Semi-annual	Project progress report	JIRAMA
Description:								
New	Name: Competitive Bidding process for the development of one priority small hydro site launched		Number	0.00	1.00	Semi-annual	Project progress report	MWEH
Description:								
New	Name: Percentage of technical positions held		Text	TBD	Increased by 15%	Semi-annual	Project progress report	JIRAMA



	by females that report directly to Directors in JIRAMA							
Description:								
New	Name: Public availability of customer satisfaction survey	Yes/No	No	Yes	Semi-annual	Project progress report	JIRAMA	
Description:								



Target Values

Project Development Objective Indicators

Action	Indicator Name	Baseline	End Target
Revised	Total electricity losses per year in the project area	35.00	24.00
Revised	Interruptions in electricity service per year in the project area	870.00	450.00
Revised	Direct project beneficiaries	0.00	350,000.00
No Change	Female beneficiaries	50.00	50.00

Intermediate Results Indicators

Action	Indicator Name	Baseline	End Target
No Change	JIRAMA's Management Improvement Plan (MIP) completed and key management positions recruited	MIP adopted by Government, key management positions advertised	JIRAMA business plan published, Director-level and above competitively recruited
No Change	Completion of key studies: Least Cost Power Development Plan (LCPDP), Tariff Study	No	LCPDP and Tariff Studies completed and published
No Change	Percentage of total sales (kWh) covered by the Revenue Protection Program (RPP).	0.00	40.00
No Change	Installation of Management Information System (MIS) at JIRAMA, and populated with data	No	MIS functioning and used for sector monitoring and reporting



Revised	Distribution lines constructed or rehabilitated under the project	0.00	300.00
Revised	Distribution lines constructed under the project	0.00	165.00
Revised	Distribution lines rehabilitated under the project	0.00	135.00
Revised	Transmission lines constructed or rehabilitated under the project	0.00	134.00
Revised	Transmission lines constructed under the project	0.00	34.00
New	Transmission lines rehabilitated under the project	0.00	100.00
Revised	JIRAMA customer satisfaction survey undertaken in project area and report on customer feedback and how it was addressed by JIRAMA	No survey	Customer satisfaction survey administered by JIRAMA
Revised	Time taken for first disbursement of funds requested by Government for an eligible emergency or crisis	0.00	8.00
New	Dispatching Center and Distribution Control Center constructed and commissioned	No	Y
New	Competitive Bidding process for the development of one priority small hydro site launched	0.00	1.00
New	Percentage of technical positions held by females that report directly to Directors in JIRAMA	TBD	Increased by 15%
New	Public availability of customer satisfaction survey	No	Y



ANNEX 1: FINANCIAL MANAGEMENT ASSESSMENT REPORT

Summary of the Project and Institutional Arrangements

1. The FM assessments of the MWEH and JIRAMA as PIUs were carried out in March 2018 to confirm whether acceptable FM arrangements are in place. The assessment considered the degree to which: (a) reasonable records are maintained and financial reports produced and disseminated for decision-making, management and reporting; (b) funds are available to finance the project; (c) there are reasonable controls over project funds; and (d) independent and competent audit arrangements are in place.

2. The financial arrangements for the parent project in place are compliant with the Financial Management Manual for the World Bank-financed Investment Operations dated February 10, 2017. These arrangements aim at mitigating the risk linked to these issues and will be strengthened as needed for this AF.

Country PFM Situation and Use of Country System

3. The overall country fiduciary risks including fraud and corruption risks is high. The 2014 PEFA self-assessment indicates that limited progress has been made on improving the credibility of the budget. This finding reflects the policy adopted by the authorities during the political crisis, where cash was tightly controlled as revenues declined. A 2017 PEFA self-assessment is currently underway.

4. The governance issues of JIRAMA as a State-owned Company are reflected by the frequent changes in the administration as well as the significant deficits accumulated during successive years and affect the fiduciary risk level of the project.

FM Conditions

5. The overall fiduciary risk rating is assessed as Substantial and mitigation measures proposed (see FM Action Plan) will strengthen the internal control environment and maintain the continuous timeliness and reliability of information produced by the PIU and an adequate segregation of duties

FM Action Plan

Table 1.1. FM Action Plan

Action	Responsible Party	Deadline and Conditionality
1. Recruitment of an FM officer	JIRAMA	No later than 3 months after effectiveness
2. Provide appropriate capacity building to the Internal audit department through trainings	JIRAMA	No later than 3 months after effectiveness
3. Provide audited annual financial statements of the entity	JIRAMA	No later than 3 months after effectiveness



Financial Covenants

6. The Borrower shall establish and maintain a financial management system including records, accounts and preparation of related financial statements in accordance with accounting standards acceptable to the Bank.
7. The Project will submit the Interim Financial Report(IFR) to the World Bank within 45 days after the end of each reporting period. The format of the IFR has been agreed during the negotiation of the project.
8. The financial statements of the AF will be audited in accordance with international auditing standards. The audited financial statements for each period shall be furnished to the Association not later than six (6) months after the end of the project fiscal year.
9. The JIRAMA will furnish annual financial statements audit report (entity report) to the World Bank within six (6) months after the fiscal year end.

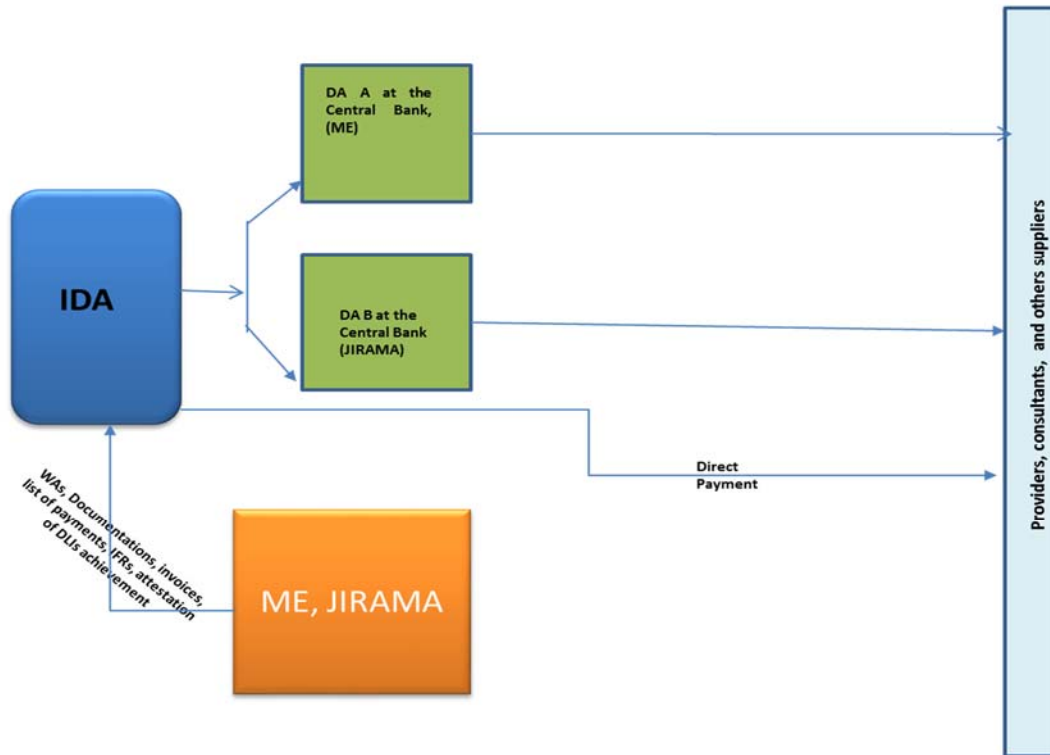
Detail of Financial Management Arrangements

- (a) **Staffing.** The MWEH will maintain qualified staff composed of one Finance officer and one Accountant. Due to the expected increase in workload and the capacity weaknesses noted, JIRAMA will recruit one qualified Finance Officer to support the existing team composed of one Financial Supervisor and two Accountants.
- (b) **Budgeting.** The same planning and budgeting process as for the parent project will apply for the AF. The budget forecast shall be reliable and based on the best assumptions, and aligned with the work program, technical constraints and the procurement plan. The PIUs will enhance budget follow-up through the accounting software.

Funds flow and Disbursement Arrangements.

10. Disbursements will be made in accordance with the *World Bank Disbursement Guidelines for Projects*, dated February 2017. The financing proceeds will be disbursed using the disbursement methods as per the disbursement letter and financial information (DLFI). One designated account (DA) per PIU denominated in U.S. dollars will be opened at the Central Bank. A secondary U.S. dollar account will be opened for each PIU at an acceptable commercial bank to enable payment of eligible expenditures. Both accounts will be managed by each PIU team (Joint signatories of the Coordinator and Finance Officer). The DA will receive an initial advance equivalent to four months of forecasted expenditures and will be replenished regularly through monthly Withdrawal Applications (WA) supported with Statements of Expenditures (SOEs). Direct payments may be made to service providers at the request of the Recipient.

Figure 1.1. Funds Flow



11. **Internal Controls, Accounting and Reporting.** The current practice on accounting and reporting as well as the procedures manual of the parent project will apply to the AF.
12. **Internal Audit.** The internal audit department of the JIRAMA will include the review of the project in its audit plan.
13. **External Financial Audit.** The external audit of the project financial statements will be carried out by the auditors appointed per TOR agreed with the World Bank. The audit will comply with the International Standards on Auditing and the audit report.
14. **Implementation Support and Supervision plan:** Considering the current overall residual FM risk level, the supervision plan is described below:

Table 1.2 Categories of Eligible Expenditures

Category	Amount of the Financing Allocated (expressed in SDR)	Percentage of Expenditures to be Financed (inclusive of Taxes)
Goods, works, non-consulting services, consultants' services,	2,900,000	100%



Training and Operating Costs for Part 1.2 and 4.1 of the Project.		
Goods, works, non-consulting services, consultants' services, Training and Operating Costs for Part 2.2, 3 and 4.2 of the Project.	22,200,000	100%
(a) Goods, works, non-consulting services, consultants' services, Training and Operating Costs under part 2.2	700,000	
(b) Performance-based incentives under Part 2.2 of the Project	2,100,000	
IRM	0	100%
TOTAL AMOUNT	27,900,000	

15.

Table 1.3. FM Supervision Plan

Action	Description	Frequency
Desk reviews	Interim financial reports review; Review of the audit report on the financial statements of the project; Review of other relevant information such as internal audit reports.	Quarterly Annually Continuous as they become available
On site visits	Review of overall operation of the FM system; Monitoring of actions taken on issues highlighted in audit reports, auditors' management letters, internal audit and other reports, Transaction review (if needed)	Twice a year As needed As needed
Capacity building support	FM training sessions for regional and central staff provided by the Bank and regular FM meetings	During implementation and as and when needed

Table 1.4. FM Risk Assessment and Mitigation Measures

Risk	Risk	Risk Mitigating Measure Incorporated into Project Design	Residual Risk
Inherent risk	S		S
Country level PFM reform is experiencing implementation delays and weaknesses identified by the PEFA 2014 in the PFM cycle generate the risk of lack of transparency and accountability in the use of public funds.	H	Implement the PFM reform agenda with the support of the World Bank and other donors (African Development Bank and EU). The World Bank financed project (P150116, Public Sector Services Delivery and Accountability Project) is at implementation stage and is supporting	H



Risk	Risk	Risk Mitigating Measure Incorporated into Project Design	Residual Risk
		the improvement of the Madagascar public sector and PFM system	
Entity level The MEWH and JIRAMA FM system mirrors the Central level PFM system and its weaknesses resulting in the risk of lack of transparency and accountability in the use of public funds.	S	Rely on independent and competent auditor opinions and consider relevant recommendations to improve the internal control system Recruit one qualified Finance officer to support JIRAMA’s FM team. Maintain qualified staff at MWEH level.	S
Project level Misunderstanding of the responsibility as the project involve several stakeholders.	S	The manual will be updated to incorporate internal audit roles and clear budget follow-up process.	S
Control Risk	S		S
Budgeting Delay in preparing annual budget and inappropriate monitoring of budget execution resulting in delay in achieving project’s objectives.	S	Follow strictly budget procedures and timeline as per the manual.	S
Accounting Weak capacity in financial management which will result in delay in recording financial transactions.	S	Recruit/maintain qualified FM staff. Provide adequate capacity building to the existing FM staff of JIRAMA.	S
Internal Controls and Internal audit Ineffective audit function	S	Provide adequate capacity building to the internal audit department to support the improvement of the effectiveness and efficiency of the internal control system.	S
Risk of ineligible expenditures	S	Monitor the risk on non-compliance of the expenditures by using a risk based approach for internal audit.	S



Risk	Risk	Risk Mitigating Measure Incorporated into Project Design	Residual Risk
Funds Flow Risk of delay in the disbursement of the funds due to the location of the designated account at the Central Bank.	S	Provide support to the Government to identify and mitigate the risk of the transfer of the funds to the Central Bank (dedicated unit for donor-funded projects at the Central Bank).	S
Financial Reporting and Monitoring Unreliable IFRs and delay in submitting the IFRs	S	Assess periodically the adequacy of the information system at PIU level	M
External Auditing Audit carried out with unqualified audit firms, not in accordance with acceptable international audit standards	S	Recruit qualified and independent external auditors under TOR satisfactory to the World Bank. The audit will be performed per internationally recognized standards; the scope and the objectives of the audit will be tailored to the particularity of the project. Review annual audit report of financial statements of JIRAMA (entity report).	M
Fraud and Corruption Risk of fraud and corruption in the contracts management	S	Ensure that the grievance redress mechanism is part of the project.	S
Overall Risk	S		S

16. **Conclusions of the FM Assessment:** The overall residual FM risk is considered **Substantial**. The proposed financial management arrangements for this project are considered adequate subject to the implementation of the mitigation measures, and meet the Bank’s minimum fiduciary requirements under World Bank policy and directive.



ANNEX 2: ECONOMIC AND FINANCIAL ANALYSIS

Economic Analysis

1. The economic analysis has been undertaken for the project as a whole, capturing both the original parent project (US\$65 million equivalent) and the proposed additional finance (US\$40 million equivalent). The project component structure remains the same as the original project; (a) Component 1: Improving electricity sector planning and financial sustainability; (b) Component 2: Strengthening operational performance and governance of JIRAMA; (c) Component 3: Investing in enhanced reliability of electricity; (d) Component 4: Project management; and (e) Component 5: Contingency emergency response.

2. The analysis has been carried out using a standard cost-benefit analysis. Consistent with the parent project, the analysis focused on Components 2 and 3. This is due to the fact that Components 1 and 4 will finance technical assistance activities for which the economic benefits cannot be logically quantified, and Component 5 is an emergency response window with zero funding allocation. A summary of costs and benefits captured in the analyses is provided below as well as in Table 2.1.

3. **Cost:** The project cost primarily arises from capital cost for Components 2 and 3. These include investments in meters to optimize JIRAMA's revenue, as well as reinforcement and rehabilitation on key segments of JIRAMA's generation, transmission and distribution infrastructure. The cost also includes new additional investment in JIRAMA's dispatch center and control center, which are expected to strengthen JIRAMA's capacity to integrate variable renewable energy into the grid, and also contribute to improve the reliability of power supply in general. The costs are exclusive of value-added tax (VAT) at 20 percent, which is considered to be a pure financial transfer within the economy and therefore is excluded from the economic analysis. Furthermore, it is assumed that 2 percent of accumulative capital cost will be needed for operation and maintenance of the assets.

4. **Benefit:** The primary benefits captured in the economic analysis are twofold. The first is the avoided electricity generation, resulting from consumers' price response through the RPP under Component 2. The avoided generation is estimated to be 2.7 percent of annual generation, consistent with the assumption in the parent project. JIRAMA will also benefit from increased revenue through the RPP, but this is considered to be a financial transfer from electricity users to JIRAMA, which does not result in overall economic benefit. The second is the avoided generation resulting from technical loss reduction through the grid reinforcement and rehabilitation under Component 3. It is estimated that the investment will reduce the technical loss from 15 percent to 11.5 percent.⁵ The avoided generation is valued at US\$0.30/KWh, based on JIRAMA's cost of service.

5. **Discount Rate:** The discount rate has been determined based on the World Bank's internal guidance⁶ which recommends using twice the prospect real per capita GDP growth as a proxy of the discount rate. As the IMF forecasts an average growth rate of approximately 3 percent in Madagascar, the discount rate of 6 percent is employed.

⁵ In the absence of the concrete figure on expected technical loss reduction, assumptions made in the parent project have been multiplied by the increased percentage of investment in component 3.

⁶ OPSPQ (Operations Policy and Quality). 2016. Discounting Costs and Benefits in Economic Analysis of World Bank Projects.



Table 2.1. Key Assumptions used for Economic Analysis

General	
- Project lifetime	20 years starting 2016
- Discount rate	6%
Cost	
- Capital cost (exclusive of VAT)	US\$14.0 million (Component 2), disbursed evenly between 2016–2018 US\$62.5 million (Component 3), disbursed evenly between 2016–2020
- VAT	20%
- O&M cost	2% of capital cost
Benefit	
- Cost of Electricity	US\$0.30/KWh (2017 cost of service)
- Technical loss reduction	3.5 % (from 15% to 11.5%)
- Avoided generation	2.7% of annual generation (1,702 GWh in 2017)
- GHG Grid Emission Factor	0.27tCO ₂ /MWh ⁷ avoidance per generated electricity

6. The analysis has resulted in an EIRR of 26.3 percent and NPV of US\$169.0 million, demonstrating a sound economic viability of the project.

7. **Benefit from avoided greenhouse gas emissions (GHG):** The project will deliver additional benefit through avoidance of GHG emissions, thanks to reduced thermal generation. Across the 20 years of economic life, it is estimated that 457,212 tCO₂ of GHG emissions will be avoided. By including these global environmental benefits of GHG abatement, the EIRR increases to 27.2–28.0 percent, and NPV US\$179.6 million - \$190.2 million, depending on the assumed shadow price of carbon.⁸

8. **Sensitivity Analysis:** To factor in the potential variation in key project parameters, sensitivity analysis has been carried out by (a) increasing the capital cost (Component 3) by 20 percent; (b) reducing the generation saving achieved through RPP by 50 percent; and (c) using the higher discount rate at 10 percent. The result, summarized below, demonstrated continued economic viability of the project.

Table 2.2. Result of Economic Analysis

	EIRR (%)	NPV (US\$, million)
Base case	26.3	169.0
- Component 2	53.5	104.1
- Component 3	16.4	64.9
Inclusion of GHG abatement benefits		
Low shadow price of carbon (US\$37 up to US\$56)	27.2	179.6
High shadow price of carbon (US\$75 to US\$112)	28.0	190.2
Sensitivity Analysis		
20% increase in Component 3 capital cost	23.1	156.1
50% less generation saving through RPP	19.8	108.8
Discount rate at 10%	26.3	96.6

⁷ Estimated based on 2016 power mix in Madagascar (42 percent diesel generation, 58 percent hydro) and default emission factors as per the Bank’s GHG Accounting Guideline

⁸ World Bank (2017) Guidance note on shadow price of carbon in economic analysis.



Project Financial Analysis

9. Financial analysis has been carried out to assess the financial viability of the project. The analysis focuses on financial cost and revenue to JIRAMA, the project implementation agency that generates its own revenue. In line with the economic analysis, the financial analysis solely focused on Component 2 and Component 3.

10. The financial cost of the project is the capital cost to implement Components 2 and 3 (inclusive of tax), as well as its O&M cost. The revenue is derived from two sources:

- (a) Increased revenue from implementing RPP under Component 2. This is calculated based on the annual sales of JIRAMA, expected reduction of non-technical loss, and current tariff.
- (b) Reduced technical loss reduction. JIRAMA will financially benefit from reduced technical loss reduction. The revenue is based on annual electricity demand in targeted areas under Component 3, expected technical loss reduction and cost of electricity service.

Table 2.3. Key Assumptions used for Financial Analysis

General	
- Project lifetime	20 years starting 2016
- Discount rate	9% (Weighted Average Cost of Capital with JIRAMA’s expected equity/debt financing ratio)
Cost	
- Capital cost	US\$17.6 million (Component 2), disbursed evenly between 2016–2018 US\$78.1 million (Component 3), disbursed evenly between 2016–2020
- O&M cost	2% of capital cost
Benefit	
- Cost of Service	US\$0.30/kWh
- Technical loss reduction	3.5% (from 15% to 11.5%), out of annual generation 1,702 GWh in 2017
- Non-technical loss reduction	5.5% (from 20% to 14.5%),
- Average Tariff	457 MGA/kWh (US\$ 14.8 /kWh) at US\$1=MGA 3,085

11. Based on these assumptions, the project will result in an FIRR of 21.7 percent, and an NPV of US\$94.6 million, indicating the project’s financial viability for JIRAMA. A sensitivity analysis has also confirmed that the project remains financially viable even with an increase in component capital cost, decrease in the cost of generation, and less saving on electricity generation.

Table 2.4. Result of Financial Analysis

	FIRR (%)	NPV (US\$, million)
Base Case	21.7	94.6
- Component 2	47.8	73.7
- Component 3	12.8	20.9
20% increase in Component 3 capital cost	18.8	80.1
10% decrease in the cost of generation	20.8	85.6
50% less generation saving through RPP	14.8	40.6



Utility Financial Analysis: Impact of the Project on Financial Performance of JIRAMA

12. An analysis of expected impacts of implementation of ESOGIP on the financial performance of JIRAMA was carried out to show how the project can potentially contribute to the financial turnaround of the utility. For many years, JIRAMA’s financial performance has been very poor. JIRAMA has been unable to recover its operation cost from its revenue; between 2015–2017, JIRAMA’s operating cost has averaged approximately 50 percent higher than its revenue. Consequently, JIRAMA did not record any positive gross profit. In fact, the operational deficit, represented by negative earnings before interest, taxes, depreciation, and amortization (EBITDA), has widened by 170 percent in the past few years. The summary of JIRAMA’s income statement is provided in Table 2.5.

Table 2.5. Summary of JIRAMA’s Income Statement

	MGA billion			US\$ million		
	2015	2016	2017 ⁹	2015	2016	2017
Operational revenue	465.7	556.3	630.5	150.9	180.3	204.4
Operational cost	-605.1	-850.6	-1,115.9	196.1	275.7	361.7
Fuel cost	-346.1	-480.1	-578.0	-112.2	-155.6	-187.4
IPP cost	-159.6	-241.4	-408.1	-51.7	-78.3	-132.3
Other cost	-99.5	-129.1	-129.8	-32.2	-41.8	-42.1
Gross profit	-139.5	-294.4	-485.4	-45.2	-95.4	-157.4
Subsidy	0.0	233.0	435.9	0.0	75.5	141.3
Staff cost	-73.7	-84.6	-78.1	-23.9	-27.4	-25.3
Amortization and depreciation	-107.1	-102.4	-114.8	-34.7	-33.2	-37.2
Other income and cost	46.5	50.2	31.3	15.1	16.3	10.1
Earning before tax and interest	-273.7	-198.2	-211.1	-88.7	-64.2	-68.4
Interest income	0.2	2.9	2.3	0.1	1.0	0.7
Interest charges	-22.3	-13.9	-4.4	-7.2	-4.5	-1.4
Earning before tax	-295.9	-209.1	-213.2	-95.9	-67.8	-69.1
Tax	-2.2	-5.6	-3.0	-0.7	-1.8	-1.0
Net income	-298.1	-214.7	-216.2	-96.6	-69.6	-70.1

Note: US\$1=MGA 3,080 assumed. Some items have been aggregated for simplicity.

13. JIRAMA’s deteriorating financial performance is largely driven by increased cost of fuel as well as IPP. These costs in 2017 accounted for approximately 90 percent of JIRAMA’s operational cost, with JIRAMA paying US\$187 million for fuel cost, an increase of 67 percent over 2015. A contributing factor to this increasing fuel cost is that many Heavy Fuel Oil (HFO) thermal plants are operating with more costly diesel fuel. Furthermore, JIRAMA procures its fuel from local fuel companies, which further adds to the cost as compared to direct import.

14. The strongest driver of JIRAMA’s operational cost increase is the cost of energy purchase from IPPs, including emergency rentals. The cost of energy purchase increased by 156 percent between 2015 and 2017. At the beginning of 2016, JIRAMA had contracts with 102 IPPs, of which 96 were under rental contracts with energy charges ranging between US\$20–30/KWh, some of them reaching US\$50/KWh.

⁹ 2017 figure is an unaudited and provisional.



JIRAMA recently made efforts to terminate or re-negotiate the most expensive contracts, but the total cost of energy purchase continues to increase.

15. JIRAMA’s revenue also increased, but at a much slower pace than its operational cost. In 2017, JIRAMA has recorded a provisional revenue of US\$204.4 million, a 35 percent increase from 2015. The revenue benefited from a recent retail tariff increase in 2017 and subsequently in 2018. Nonetheless, the tariff has not reached the cost-reflective level; in 2017, JIRAMA’s average tariff is estimated to be US\$14.8/KWh, whereas the cost of electricity service is estimated to be US\$29.9/KWh. Consequently, JIRAMA is able to recover only half of its cost of service from its tariff. Furthermore, JIRAMA’s revenue suffers from significant system loss, which is approximately 35 percent including both technical and non-technical losses. This means one-third of JIREMA’s potential revenue is lost.

16. To compensate for the operational deficit, JIRAMA has continuously received a subsidy from the GoM. In 2017, the subsidy amounted to approximately US\$141 million. Without a turnaround in JIRAMA’s financial performance, the required subsidy from GoM will keep increasing and will pose an additional challenge to GoM’s fiscal health.

17. JIRAMA’s projected financial performance for the period of 2018–2020 is provided in Table 2.6. It is assumed that the average tariff will be increased every two years by 7.5 percent (2017 tariff increase was at 7.5 percent). It is also assumed that the diesel generation that feed into the interconnected grid will be gradually switched into HFO generation by 2020 as a part of JIRAMAs’ ongoing efforts to reduce generation cost. The government subsidy is not taken into account in the projection.

18. Under these assumptions, JIRAMA’s financial performance is expected to continue deteriorating, recording losses of approximately US\$250 million per year. Despite JIRAMA’ efforts to reduce costly diesel generation, it will continue to depend on thermal generation from HFO. Therefore, the fuel and IPP cost from HFO will continue to increase, and revenue increases through tariff hikes will be insufficient to cover the increasing cost of generation. However, JIRAMA could take a range of measures to improve its financial health, including those supported by ESOGIP.

Table 2.6. Summary of JIRAMA’s Projected Income Statement (without government subsidy)

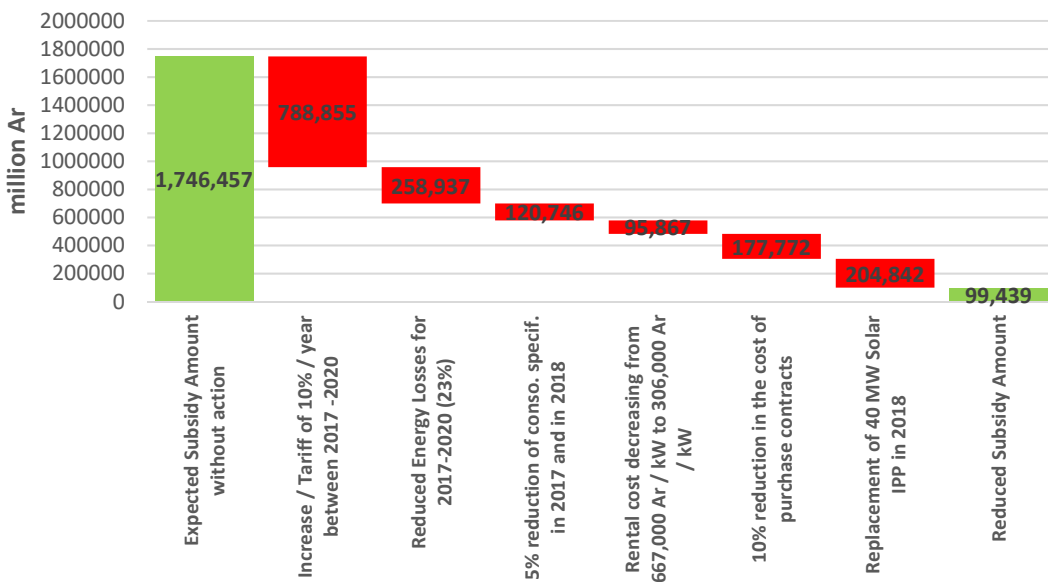
	MGA billion			US\$ million		
	2018	2019	2020	2018	2019	2020
Operational revenue	639.75	645.55	694.86	207.71	209.59	225.60
Operating cost	-1344.90	-1393.59	-1459.50	-436.66	-452.47	-473.86
Fuel cost	-558.59	-574.55	-610.90	-181.36	-186.54	-198.34
Fixed Op. cost	-72.16	-76.55	-84.91	-23.43	-24.85	-27.57
IPP cost	-624.35	-651.88	-665.36	-202.71	-211.65	-216.03
Other costs	-89.80	-90.61	-97.53	-29.16	-29.42	-31.67
EBITDA	-705.16	-748.05	-764.64	-228.95	-242.87	-248.26
Depreciation	-52.03	-48.51	-55.40	-16.89	-15.75	-17.99
EBIT	-757.18	-796.56	-820.04	-245.84	-258.62	-266.25
Interest expense	-6.78	-5.30	-5.77	-2.20	-1.72	-1.87
Net income	-763.97	-801.86	-825.81	-248.04	-260.34	-268.12



Note: US\$ 1=MGA 3080 assumed. Some items have been aggregated for simplicity. The items are not the same as the actual financial statements due to the model structure. As the model has been developed specifically for electricity function of JIRAMA, the figures may be different from the official financial figures which also includes water supply.

19. In the context of JIRAMA’s financial sustainability challenge, ESOGIP and the proposed AF play a critical role. These include: (a) LCPDP under Component 1 to identify optional generation mix to reduce the cost of fuel and power purchase; (b) tariff study under Component 1 to assess the optimal electricity tariff trajectory, which will increase JIRAMA’s revenue; (c) RPP under Component 2 to increase bill collection and reduce non-technical loss; (d) grid investment under Component 3 to reduce technical losses; and (e) new control center under Component 3 to increase JIRAMA’s capacity to integrate solar PV generation, thereby replacing costly thermal generation.

Figure 2.1. Potential Project Impact to Reduce JIRAMA’s Subsidy Requirements (2017–2021)



20. Figure 2.1 illustrates how ESOGIP can potentially contribute to the financial turnaround of JIRAMA. It represents the required GoM subsidy to make JIRAMA’s Earning Before (EBIT)/gross profit zero between 2017–2021. Five policy actions to reduce the subsidy requirement are considered: (a) 10 percent increase in tariff; (b) system loss reduction to 24 percent (consistent with the project result framework); (c) 5 percent reduction in specific consumption of generation plants, (d), reduced rental generation cost, and (e) integration of 40 MW solar IPPs. All of them are direct or indirect outcomes from the implementation of the ESOGIP project and its AF. The analysis demonstrates that, through implementing these actions, the subsidy requirement can be reduced by 94 percent (US\$534 million) over five years, contributing significantly to JIRAMA’s financial turnaround and consequently GoM’s fiscal health.



ANNEX 3: MAP



This map was produced by the InMap Design Unit of the World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of the World Bank Group, any judgment on the legal status of any territory or any endorsement or acceptance of such boundaries.