Closing Date: Tuesday, July 5, 2016 at 6 p.m.

FROM: Vice President and Corporate Secretary

São Tomé and Príncipe - Power Sector Recovery Project

Project Appraisal Document

Attached is the Project Appraisal Document regarding a proposed grant to São Tomé and Príncipe for a Power Sector Recovery Project (IDA/R2016-0150), which is being processed on an absence-of-objection basis.

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

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank Group authorization.

Document of
The World Bank

FOR OFFICIAL USE ONLY

Report No.: PAD1736

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT

IN THE AMOUNT OF SDR 11.3 MILLION

(US$16 MILLION EQUIVALENT)

TO THE

DEMOCRATIC REPUBLIC OF SÃO TOMÉ AND PRÍNCIPE

FOR A

POWER SECTOR RECOVERY PROJECT

JUNE 6, 2016

ENERGY AND EXTRACTIVES GLOBAL PRACTICE
AFRICA REGION

This document has a restricted distribution and may be used by recipients only in the performance of their official duties. Its contents may not otherwise be disclosed without World Bank authorization.

CURRENCY EQUIVALENTS

(Exchange Rate Effective as of April 30, 2016)

Currency Unit	=	EUR
EUR 1	=	US$1.139
US$1	=	SDR 0.705552

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AFAP	*Agência Fiduciária de Administração de Projeto* (Project Fiduciary Agency)
AGER	*Autoridade Geral de Regulação* (General Regulatory Authority)
AMI	Advanced Metering Infrastructure
BP	Bank Procedure
CMS	Commercial Management System
CPS	Country Partnership Strategy
CQS	Consultant Qualification Selection
DA	Designated Account
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
EMAE	*Empresa de Água e Electricidade* (National Water and Electricity Utility)
ENCO	*Empresa Nacional de Combustíveis e Óleos* (National Oil and Gas Utility)
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FIRR	Financial Internal Rate of Return
FM	Financial Management
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GRS	Grievance Redress Service
GWh	Gigawatt Hour
IBRD	International Bank for Reconstruction and Development
ICB	International Competitive Bidding
ICS	Individual Consultant Selection
IDA	International Development Association
IFAC	International Federation of Accountants
IFMIS	Integrated Financial Management Information System
IFR	Interim Financial Report
km	Kilometer
LCPDP	Least Cost Power Sector Development Plan
LCS	Least-Cost Selection

LV	Low Voltage
M&E	Monitoring and Evaluation
MCC	Metering Control Center
MINRA	Ministry of Infrastructure, Natural Resources, and Environment
MIP	Management Improvement Plan
MIS	Management Information System
MoEIC	Ministry of Economy and International Cooperation
MoFPA	Ministry of Finance and Public Administration
MV	Medium Voltage
MW	Megawatt
MWh	Megawatt Hour
NCB	National Competitive Bidding
NPV	Net Present Value
O&M	Operations and Maintenance
OP	Operational Policy
PFM	Public Financial Management
PPP	Purchasing Power Parity
QCBS	Quality- and Cost-based Selection
RPP	Revenue Protection Program
SSS	Single Source Selection
UNDP	United Nations Development Program

Regional Vice President:	Makhtar Diop
Country Director:	Elisabeth Huybens
Acting Senior Global Practice Director:	Anna Bjerde
Acting Practice Manager:	Sameer Shukla
Task Team Leaders:	Christopher Saunders and Nicolas Jean-Marie Sans

SÃO TOMÉ AND PRÍNCIPE

São Tomé and Príncipe Power Sector Recovery Project (P157096)

Table of Contents

Page

I. STRATEGIC CONTEXT 1

A. Country Context 1

B. Sectoral and Institutional Context 3

C. Higher Level Objectives to which the Project Contributes 7

II. PROJECT DEVELOPMENT OBJECTIVES 8

A. PDO 8

B. Project Beneficiaries 8

C. PDO Level Results Indicators 8

III. PROJECT DESCRIPTION 8

A. Project Components 9

B. Project Financing 13

C. Project Cost and Financing 13

D. Lessons Learned and Reflected in the Project Design 14

IV. IMPLEMENTATION 15

A. Institutional and Implementation Arrangements 15

B. Results Monitoring and Evaluation 16

C. Sustainability 16

D. Partnerships 18

V. KEY RISKS 18

A. Overall Risk Rating and Explanation of Key Risks 18

VI. APPRAISAL SUMMARY 20

A. Economic and Financial Analysis 20

B. Technical 21

C. Financial Management 22

D. Procurement 23

E. Social and Environmental (including Safeguards) 23

F. Gender 25
G. World Bank Grievance Redress 26
H. Citizen Engagement/Beneficiary Feedback 26

Annex 1: Results Framework and Monitoring 28

Annex 2: Detailed Project Description 32

Annex 3: Implementation Arrangements 37

Annex 4: Implementation Support Plan 52

Annex 5: Economic and Financial Analysis 55

Annex 6: Map 66

PAD DATA SHEET

São Tomé and Príncipe

São Tomé and Príncipe Power Sector Recovery Project (P157096)

PROJECT APPRAISAL DOCUMENT

AFRICA

Report No.: PAD1736

Basic Information		
Project ID P157096	EA Category B - Partial Assessment	Team Leader(s) Christopher Saunders, Nicolas Jean Marie Sans
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ] Financial Intermediaries [ ] Series of Projects [ ]	
Project Implementation Start Date 27-June-2016	Project Implementation End Date 30-June-2021	
Expected Effectiveness Date 31-October-2016	Expected Closing Date 30-June-2021	
Joint IFC No		

Acting Practice Manager/Manager	Acting Senior Global Practice Director	Country Director	Regional Vice President
Sameer Shukla	Anna Bjerde	Elisabeth Huybens	Makhtar Diop

.

Borrower: Ministry of Finance and Public Administration (MoFPA)			
Responsible Agency: *Agência Fiduciária de Administração de Projeto* (AFAP)			
Contact:	Alberto Leal	Title:	Coordinator of AFAP
Telephone No.:	2392225205	Email:	afap2@yahoo.com.br

.

Project Financing Data(in US$, millions)					
[ ]	Loan	[X]	IDA Grant	[ ]	Guarantee
[ ]	Credit	[ ]	Grant	[ ]	Other

Total Project Cost:	29.00	Total Bank Financing:	16.00
Financing Gap:	0.00		

.

Financing Source	Amount
BORROWER/RECIPIENT	0.00
IDA Grant	16.00
European Investment Bank	13.00
Total	29.00

.

Expected Disbursements (in US$, millions)

Fiscal Year	2017	2018	2019	2020	2021
Annual	1.00	4.00	6.00	4.00	1.00
Cumulative	1.00	5.00	11.00	15.00	16.00

.

Institutional Data

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

–

Cross Cutting Topics

[X] Climate Change

[ ] Fragile, Conflict & Violence

[X] Gender

[ ] Jobs

[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	General energy sector	20		
Energy and mining	Hydropower	40		40
Energy and mining	Transmission and Distribution of Electricity	40		20
Total		100		

☐ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Green House Gas Accounting

Net Emissions: 172,773 tons of CO_2	Gross Emissions:

.

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Urban development	City-wide Infrastructure and Service Delivery	50
Rural development	Rural services and infrastructure	25
Environment and natural resources management	Water resource management	25
Total		100

.

Proposed Development Objective(s)

The project development objectives are to (i) increase renewable energy generation and (ii) improve the reliability of the electricity supply.

.

Components

Component Name	**Cost (US$, millions)**
1. Support for electricity institutional reform and sector planning	1.2
2. Strengthening the operational performance and governance of EMAE	7.5
3. Investing in enhanced reliability of electricity generation, transmission, and distribution	18.4
4. Project implementation support	1.9

.

Systematic Operations Risk- Rating Tool (SORT)

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

9. Other	
OVERALL	Substantial

.

Compliance		
Policy		
Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]

.

Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

.

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

.

Legal Covenants

Name	**Recurrent**	**Due Date**	**Frequency**
Project Implementation Agency (AFAP) Financing Agreement – Schedule 2, Section I.A.3	X		

Description of Covenant

For purposes of facilitating the implementation of the Project, the Recipient shall maintain AFAP with staff in numbers and with responsibilities acceptable to the Association, as set forth in the Operational Manual.

Name	**Recurrent**	**Due Date**	**Frequency**
Co-financing Agreement Financing Agreement – Article IV,		March 31, 2017	

Paragraph 4.01			
Description of Covenant			
The Co-financing Deadline for the effectiveness of the Co-financing Agreement is March 31, 2017.			
Name	**Recurrent**	**Due Date**	**Frequency**
EMAE Ministerial Order Financing Agreement – Schedule 2, Section I.A.4	X		
Description of Covenant			
For purposes of ensuring technical coordination with EMAE for the implementation of Parts 2 and 3 of the Project, the Recipient shall maintain the EMAE Ministerial Order.			
Name	**Recurrent**	**Due Date**	**Frequency**
Steering Committee Financing Agreement – Schedule 2, Section I.A.1	X		
Description of Covenant			
For purposes of providing general Project oversight and coordination, the Recipient shall operate and maintain throughout the implementation of the Project, a Steering Committee, with functions, responsibilities and composition including representatives of MOFPA, MINRA, MOEIC, EMAE and AFAP, all acceptable to the Association and as set forth in the Operational Manual.			
Name	**Recurrent**	**Due Date**	**Frequency**
Working Group Financing Agreement – Schedule 2, Section I.A.2	X		
Description of Covenant			
For purposes of facilitating the implementation of the Project, the Recipient shall operate and maintain throughout the implementation of the Project, a Working Group, with functions, responsibilities and composition including representatives of MINRA, EMAE, AGER and AFAP, all acceptable to the Association, and as set forth in the Operational Manual.			
Name	**Recurrent**	**Due Date**	**Frequency**
Operational Manual Financing Agreement – Schedule 2, Section I.B.1		January 29, 2017	
Description of Covenant			
No later than ninety (90) days after the Effectiveness Date, the Recipient, through AFAP shall update, and thereafter maintain and carry out the Project, in accordance with the provisions of a manual (the Operational Manual) acceptable to the Association.			

.

Team Composition

Bank Staff

Name	**Role**	**Title**	**Specialization**	**Unit**

Christopher Saunders	Team Leader (ADM Responsible)	Energy Specialist	Renewable Energy	GEEDR
Nicolas Jean Marie Sans	Team Leader	Hydropower Specialist	Hydropower	GEEDR
Nash Fiifi Eyison	Team Member	Energy Specialist	Transmission and Distribution	GEEDR
Antonio L. Chamuco	Procurement Specialist	Senior Procurement Specialist	Procurement	GGODR
Joao Tinga	Financial Management Specialist	Financial Management Specialist	Financial Management	GGODR
Aissatou Diallo	Team Member	Senior Finance Officer	Sr. Finance Officer	WFALA
Gabriela Grinsteins	Counsel	Counsel	Legal	LEGLE
Isabella Micali-Drossos	Counsel	Senior Counsel	Legal	LEGAM
Marie-Roger Augustin	Team Member	Legal Analyst	Legal	LEGAM
Alexandra Sperling	Team Member	Legal Analyst	Legal	LEGAM
George Ferreira Da Silva	Team Member	Finance Analyst	Finance Analyst	WFALA
Paivi Koskinen-Lewis	Social Safeguards Specialist	Social Development Specialist	Social Development Specialist	GSU01
Camilla Gandini	Team Member	Consultant	Gender Specialist	GSU04
Nuno Maria Brilha Vilela	Safeguards Specialist	Consultant	Environmental Specialist	GENDR
Fabrice Bertholet	Team Member	Senior Financial Analyst	Financial Analysis	GEE03
Thomas Flochel	Team Member	Energy Economist	Economic Analysis	GEEES
Thanh Lu Ha	Team Member	Senior Program Assistant	Administrative	GEEDR

Extended Team

Name	**Title**	**Office Phone**	**Location**
.			

Locations

Country	**First Administrative Division**	**Location**	**Planned**	**Actual**	**Comments**
São Tomé and Príncipe	São Tomé Island	São Tomé			

.
Consultants (Will be disclosed in the Monthly Operational Summary)
Consultants Required? Consultants will be required

I. STRATEGIC CONTEXT

A. Country Context

1. The Democratic Republic of São Tomé and Príncipe (São Tomé and Príncipe) is a small island state comprising two main volcanic islands and several islets located off the west coast of Central Africa in the Gulf of Guinea. São Tomé, the largest island, covers an area of 859 km² and has around 180,000 inhabitants. Príncipe Island, situated 150 km to the north, covers about 142 km² and has around 7,500 inhabitants. The country is divided into six districts (Agua Grande, Cantagalo, Caué, Lembá, Lobata, and Mé-Zóchi) plus the Autonomous Region of Príncipe, which has been self-governed since 1995.

Social Context

2. **São Tomé and Príncipe has recently made progress toward political stability.** While the country achieved independence in 1975, democratic reforms were not instituted until the late 1980s. The country held its first free elections in 1991, but it experienced repeated changes in leadership and two failed coup attempts in 1995 and 2003. More recently, a vote of no-confidence by major opposition political parties in 2012 resulted in the ousting of the minority Government. Parliamentary elections were successfully held in October 2014, yielding an absolute majority for the *Acção Democrática Independente* party, led by Prime Minister Patrice Trovoada. Since then, the country has seen a period of relative political stability, and there is growing confidence that the Government will finish its four-year term for the first time.

3. **The country has also made strides in human development.** In 2014, São Tomé and Príncipe ranked 143 out of 188 countries in the United Nations Development Program's (UNDP) Human Development Index, higher than the average in Sub-Saharan Africa. Primary school enrollment reached 96.7 percent in 2013. The prevalence of HIV and AIDS remains low at 0.4 percent for men and 0.3 percent for women, compared with a national average of 0.9 percent in 2000. Infant mortality, maternal mortality, and child malnutrition also declined over the 2000–2013 period. The improvement in these indicators is the result of numerous social reforms instituted by the Government, including support to families in extreme poverty, school feeding programs, a nationwide vaccination campaign, and a reproductive health program.

4. **São Tomé and Príncipe nevertheless remains fragile.** It is the latest African country to become a signatory of the 'New Deal for Engagement in Fragile States' and join the g7+, a voluntary group of countries affected by fragility, in May 2014. The country's heavy dependence on import of essential goods will leave it vulnerable to bouts of rapid consumer price inflation in the event of supply shocks. Ongoing power cuts, poor provision of basic social services, and recurrent allegations of financial irregularities in the public sector all risk undermining the support for the Government.

5. **The country has a high poverty rate.** One-third of the population lives on less than US$1.90 per day in Purchase Power Parity (PPP) terms and more than two-thirds of the population are poor using a poverty line of US$3 PPP per day. Based on the 2010 Household Budget Survey, poverty particularly affects women (with a poverty rate of 71.3 percent compared to 63.4 percent among males) and is more prevalent in rural areas, resulting in the

significant migration of the rural labor force to urban areas. Unemployment stands at 13.6 percent overall and affects young people and women disproportionately, with unemployment rates of 22.6 percent and 19.6 percent, respectively.

6. **Gender issues are often given prominence in policy documents, but corresponding concrete policy actions are still lacking.** Current legislation promotes equal rights for both men and women such as in property law, judicial recognition, marriage, and access to economic activity and opportunity. In practice, however, discriminatory social norms based on gender identity still prevail and more work is required to further reduce gender disparities, especially with regard to women's economic empowerment and access to the labor market. According to the 2012 National Housing and Population Census, women's rate of unemployment is twice that of men (19.7 percent of women and 9.3 percent of men are unemployed), and women usually work in informal and/or precarious sectors. Moreover, single female-headed households, which account for 38 percent of all households, have lower incomes than male-headed households. More promising development is occurring in education and governance as the country is close to achieving gender parity at the primary level, and women's representation in parliament recently doubled to 10 seats.

Economic Context

7. **São Tomé and Príncipe is a lower-middle-income country.** Gross national income per capita is estimated at US$1,200 in PPP terms; whereas, gross domestic product (GDP) per capita is US$1,692. São Tomé and Príncipe's primary sector is services, with an almost nonexistent industrial sector. The main economic activities involve tourism, retail, transport, communication, and construction. Agriculture and fishing are mainstays for the majority of the population despite the modest contribution of these activities to the GDP.

8. **São Tomé and Príncipe faces the usual hardships associated with small island states with no natural resources.** Domestic production is small, with almost all consumer goods being imported. The main agricultural product is cocoa, whose production is largely exported, although export volumes have declined in the last couple of years due to weather-related problems. Capital goods and fuels are also imported. Tourism is a relevant economic activity—generating more foreign currency inflow than cocoa—but the country is still far from its potential with regard to exports, GDP growth, and job creation.

9. **São Tomé and Príncipe records budget deficits regularly and is at high risk of debt distress.** Due to the lack of relevant economic activity and low administrative capacity, the Government resorts to external aid to compensate for budget gaps because expenditure needs, with regard to both current and capital expenditures, are high. Against this backdrop and factoring in the volatility of aid flows and the developing Public Financial Management (PFM) Framework, the country consistently records budget deficits. São Tomé and Príncipe has benefited from debt relief initiatives and has reduced its indebtedness; however, it is still a country at high risk of debt distress.

10. **Despite its challenging development and macroeconomic situation, the country has recently made progress on the economic front.** After pegging the local currency to the Euro, inflation was brought to an all-time low of 4 percent in 2015. The country successfully

implemented business environment reforms, bringing it to the top among African countries in some dimensions of the Doing Business survey. For 2016, GDP growth is projected to accelerate to 4.4 percent due to timely approval of the budget and increased political stability. Inflation is expected to remain under control (the Central Bank projects a 3 percent rate) and some fiscal consolidation is expected due to the International Monetary Fund program, which advises that the primary deficit be reduced.

11. **The Government is keen to attract foreign investment.** The Government's efforts to mobilize and attract foreign aid and private capital flows is opening up new possibilities for potential public and private sector investments in tourism, the primary sector, and logistics. Though there were prospects a few years ago, no oil production is expected in the medium term.

B. Sectoral and Institutional Context

12. **Electricity coverage in São Tomé and Príncipe extends to only about half the population.** Electricity access is more widespread among non-poor families (58.3 percent) than poorer families (47.5 percent). While there is no available data on the quantity or duration of power cuts, service quality is widely acknowledged as unreliable and extensive outages are frequent, especially during periods of peak demand. This limited supply, even to those connected to the grid, leaves only privately owned diesel or gasoline generators for reliable supply. It has also resulted in a costly and unsustainable proposition in the long term for household budgets and private sector growth. Kerosene is a frequent recourse for lighting in both poor households (42.1 percent) and in relatively non-poor households (31.8 percent). The use of other energy sources varies widely, with 73.9 percent of households in rural areas using firewood or charcoal for cooking, compared to 34.6 percent in urban areas.

13. **There has been chronic underinvestment in the energy sector.** São Tomé and Príncipe's energy sector is characterized by structural, financial, and technical difficulties, compounded by poor sector management, which threaten the sustainability of future power supply. Despite having one of the highest tariffs in the region, with an average retail tariff of US$0.21 per kWh, the national utility, *Empresa de Água e Electricidade*, the Water and Electricity National Utility (EMAE), is unable to recover costs due to a generation mix that is overwhelmingly reliant on inefficient thermal capacity and expensive fuel imports. In addition, years of underinvestment have left generating assets and the grid in poor condition and highly vulnerable to failure across the generation, transmission, and distribution segments. In response, the Government has recently begun a series of sector investments financed by development partners. These, however, remain short-term and partial solutions to the sector's challenges and do not contribute to the Government's long-term goal of an energy mix that is comprised of 40 percent renewables by 2020.

14. **Electricity supply is constrained.** In early 2016, EMAE interconnected generation assets on São Tomé Island, including four diesel thermal power plants (São Tomé, Santo Amaro, and Bobo-Forro 1 and 2) and two hydropower plants (Contador and Guégué). Most of the thermal generators have low efficiencies, leading to high fuel consumption. In addition, some old plants, such as São Tomé and Bobo-Forro 1, have low availability factors (for example, 43.7 percent for Bobo-Forro 1) and are highly unreliable. Several efforts to bolster supply have been implemented in recent years. At the end of 2010, a new 8.5 MW thermal power plant was built in

Santo Amaro. This plant provided some short-term relief to capacity constraints and allowed EMAE to meet increasing demand until December 2014, albeit with serious reliability problems. In September 2015, Bobo-Forro 2 brought a further 3 MW of capacity online and Santo Amaro 2, a new 6 MW thermal plant, is currently under construction. Despite this, the power system still has low capacity margins with 26 MW of installed capacity, of which 17 MW is available, compared to 14 MW of peak load.

15. **Hydropower production is severely limited.** With regard to hydropower on the island, Guégué has been out of service since 2011, making Contador the country's only current source of utility-scale renewable energy. In 2015, São Tomé relied on the Contador hydropower plant for about 6.6 percent of its power. The Contador plant was commissioned in 1967 and its equipment has never been replaced. Many of the mechanical components (electromechanical components, penstock, and so on) have reached the end of their normal service life and, therefore, present signs of mechanical fatigue and create frequent outages. Consequently, while Contador nominally has 1.9 MW of installed capacity, the plant was generating only about 6.6 MWh in 2015, down from 7.7 MWh in 2014. This is primarily due to a chronic lack of resources for maintenance. Between December 2015 and February 2016, one of the two turbines also stopped operating due to failure of an electrical component in the control system. The damaged device is no longer manufactured or available on the market, and EMAE does not have a replacement. As a result, the available capacity at Contador is now less than 1 MW and the remaining turbine could fail at any time.

16. **The country is currently heavily reliant on fuel imports.** The country's increasing reliance on thermal power means that the share of thermal production in São Tomé's energy mix now reaches 93.5 percent. This is diametrically opposed to the Government's stated objective of reaching 40 percent renewable energy penetration by 2020. In turn, it also increases EMAE's reliance on monthly fuel imports as it lacks storage capacity, further exposing it to oil price volatility. Fuel is purchased from *Empresa Nacional de Combustíveis e Óleos* (ENCO), the country's only fuel supplier, which is 75 percent owned by the Angolan oil company SONANGOL and 16 percent owned by the Government. For the imported fuel, EMAE is subject to an administrative price that is set by the Government to manage price volatility and benefits from an exemption from the fuel import duty. Another form of Government support is through the Government's guarantee of payment for the imported fuel. EMAE has been unable to pay for the vast majority of the imported fuel for the past decade, resulting in the accumulation of an estimated €37 million of debt by 2016, around a seventh of the country's GDP. Despite this large accumulated debt, EMAE is able to continue importing fuel on credit due to an agreement between ENCO and the Government.

17. **The transmission and distribution network in the Island of São Tomé is old and poorly maintained.** Technical losses are estimated at over 15 percent of power production. In addition, the island lacks a centralized control system, severely limiting EMAE's ability to locate problems and leading to lengthy blackouts and brownouts on a daily basis. It can take up to several hours for a fault to be located, and the scarcity of isolation points in the network means that many customers can remain cut-off from the grid before the power supply is restored. In addition, widespread power theft through illegal connections add unpredictable and highly inefficient load onto the network and can contribute to significantly reducing the reliability of the system. As a result, large clients, such as international hotels, have traditionally relied on their

own generators, depriving the utility of the most profitable parts of the customer base.

18. **Despite high technical losses, the vast majority of EMAE's losses are nontechnical.** With two-thirds of the 40 percent of total losses in 2015 being nontechnical (that is, commercial), these alone are estimated to increase the overall cost of production of electricity by over a third, independent of the energy source used. Nontechnical losses consist primarily of electricity theft, including illegal connection and meter tampering, non-payment by customers, and errors in accounting and record keeping. At the distribution level, for example, the poor state of the network facilitates electricity theft through illegal connections. Even among those with a legal connection, there exists a pervasive culture of nonpayment for electricity. This behavior is common across customer segments, including government offices, tribunals, the airport, and the residential segment.

19. **Metering equipment is inadequate.** Another major cause of commercial losses is the current metering system. Poor procurement practices and severe cash flow issues mean EMAE is often short of meters to equip new customers. As a result, 34 percent of customers are currently unmetered, and at least 10 percent of existing meters are more than 17 years old. Electricity consumption monitoring is highly unreliable and inconsistent, and incorrect or non-billing for electricity consumption is common. The age and poor quality of meters also make them more amenable to tampering. In addition, EMAE's client management information system (MIS) does not allow for cross-referencing customer bills with consumption information, which limits the utility's ability to identify areas of high commercial losses. The network is also not equipped with bulk meters, which would allow for load profiling in different customer zones to improve quality of service as well as facilitate the identification of problems. Finally, low capacity at EMAE in using the MIS leads to a proliferation of errors in billing and collection, further alienating the customer base.

20. **Other factors contributing to the culture of theft and nonpayment include the public's lack of trust, perceived lack of fairness, and limited transparency of EMAE.** The public perception is that many of the utility's core processes remain ad hoc, including tariff setting, customer billing, revenue collection, disconnections, or accounting methods, among others. For example, EMAE does not have a systematic rule to determine where new meters are to be installed. Because EMAE does not always have meters in stock, new customers may have their consumption estimated by an electrician's visit and will continue paying for the same estimated consumption for years. When new meters are purchased, some are installed on new connections, while others are installed on existing, previously unmetered customers. In addition, EMAE employees pay a tariff that is half the tariff paid by nonemployee residential customers.

21. **There is evidence, including testimonies from nongovernmental and local organizations, that women are highly affected by lack of energy in São Tomé and Príncipe.** Women are usually employed in precarious and/or labor-intensive productive activities, and also spend more time in household management where use of electricity is high. In addition, the transformation of agricultural products that require energy, such as cacao and coffee, is heavily dependent on the seasons. Specifically, the rainy season affects produce drying and requires the substitution of drying machinery, which in turn requires increased electricity consumption. These dynamics, combined with a high tariff and low service quality, result in higher negative impacts on women's income-generating activities and potential. Finally, the shortage of public lighting

also has adverse influences on girls and women's security and education; girls and women often do not attend classes held at night out of concern for their safety traveling to and from education centers in poorly lit streets.

22. **The power sector in São Tomé and Príncipe is small and the institutional actors are commensurately few.** Nonetheless, they have varying degrees of capacity and overlapping mandates at times. The Ministry of Finance and Public Administration (MoFPA) oversees EMAE's financial performance and is responsible for approving tariffs. Although EMAE's finances are consolidated and published in EMAE's Annual Report, these accounts are not audited by an independent body and accounting methods are opaque. The Ministry of Infrastructure, Natural Resources, and Environment (MINRA) oversees EMAE's technical performance but has few technical resources of its own. The *Autoridade Geral de Regulação* (AGER, the General Regulatory Authority) is the multisector regulatory agency with mandates in the telecommunications, water, and electricity sectors. In December 2014, it was mandated with regulating the energy sector, including tariff regulation, permitting, and overseeing long-term sector planning. A planning entity was also recently created under the MINRA.

23. **Regulatory and planning capacity is scarce.** AGER currently has no capacity to assume its role in the energy sector, and thus there is no agency monitoring service quality or auditing EMAE's accounts to assess revenue requirements and set tariffs. There is also currently no strategy in place for the development of the energy sector to address the aforementioned problems. This is partly due to a lack of sector data upon which to base a least-cost expansion plan. Specifically, the Government lacks credible information about the country's renewable energy potential, both for solar and hydro generation, making it nearly impossible for private investment to come in. Several of the sites with known hydro potential are tied up in concession agreements, which currently make their exploitation by EMAE legally challenging.

24. **Despite being high, tariffs are not likely at cost-recovery levels.** While EMAE lacks a proper accounting framework, a preliminary assessment suggests that the average electricity tariff of US$0.21 per kWh in São Tomé and Príncipe is set below cost-recovery level, despite being one of the highest in Sub-Saharan Africa. In particular, tariffs for the residential segment and EMAE are cross-subsidized by other segments, especially Government customers. There is no formula for tariff setting, nor has the revenue requirement for the utility been computed to provide the necessary data for analytical tariff setting. Tariffs have not changed since 2007, despite EMAE's demands, which has contributed to worsening the utility's financial situation and its ability to provide quality service. EMAE's accounting system does not allow for monitoring of the evolution of production costs or for the identification of necessary investments or changes. While a new 'analytic accounting' methodology is currently being developed with a planned rollout in 2016, this is unlikely to solve the issue of determining revenue requirements and appropriate cost allocations.

25. **The sector is not currently financially sustainable.** Burdened with high technical and nontechnical losses, rising generation costs, and decreasing revenue, EMAE is unable to make the necessary investments to maintain the sector's rapidly deteriorating capital assets, and is entirely reliant on external funding to maintain service and expand capacity to keep up with demand. This has in turn led to increasingly unreliable electricity supply, which customers are unwilling to pay for, turning instead to theft and/or nonpayment. The costly and unreliable

energy mix is heavily reliant on imported fuel, which EMAE is unable to afford as a result of highlighted cash flow issues. Recent investments in additional thermal capacity have only worsened this problem. In an effort to facilitate repayment of the debt, the Government has not lowered the administrative price of fuel since 2011 despite the sharp decline in international oil prices. The International Monetary Fund is also promoting debt repayment through an agreement under which the Government pays its electricity consumption debts to EMAE and these funds are automatically passed on to ENCO to pay off fuel debt.

26. **Strategic investments can and should be made to minimize mounting losses and create the foundation for sector recovery.** With such a vast debt load and persistent challenges, the sector's financial situation is unlikely to become sustainable in the near future. Putting the sector on a more sustainable path over the medium to long term requires investments in lower-cost generation as well as grid infrastructure to reduce technical and nontechnical losses, increase the utility's revenues, and strengthen sector management. Initiating this process is critical as it will put São Tomé and Príncipe on a path to reduce liabilities and improve the reliability of energy supply.

C. Higher Level Objectives to which the Project Contributes

27. The proposed Power Sector Recovery Project is firmly in line with São Tomé and Príncipe's 2012 Second Poverty Reduction Strategy Paper, which highlights the enormous energy problems hindering private sector development. Many businesses are required to use diesel power generators, with the additional economic costs this entails, thereby increasing their operating expenses. The proposed project also contributes to São Tomé and Príncipe's Intended Nationally Determined Contribution to address climate change. While the country has not presented any unconditional contributions, rehabilitation of the Contador hydropower plant supports the country's contribution with regard to climate change mitigation.

28. The project is aligned with the World Bank's twin goals of ending extreme poverty and boosting shared prosperity, and is consistent with the World Bank's Energy Sector Directions Paper. Low service quality and access to electricity tends to undermine poverty eradication efforts. Energy is a key driver of economic growth and an important means of improving equity and reducing poverty. The proposed project is an initial engagement in the sector by the World Bank after an absence of over a decade, which aims to help put the country on a more sustainable energy path going forward.

29. The proposed project is also anchored in the World Bank Group's São Tomé and Príncipe Country Partnership Strategy (CPS) FY2014–18.[1] The CPS emphasizes creating an environment that encourages private sector investment in the tourism, fisheries, and agribusiness sectors. The proposed project contributes to the CPS target of mitigating the risk of inadequate institutional and implementation capacity by building capacity to establish a more reliable investment climate in the energy sector. The project complements a development policy operation currently under preparation to support selected policy actions that contribute to reducing São Tomé and Príncipe's fiscal deficit and support the Government's efforts to implement reforms in the energy sector.

[1] Report No. 83144-ST, May 28, 2014.

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

30. The project development objectives (PDO) are to (i) increase renewable energy generation and (ii) improve the reliability of the electricity supply.

B. Project Beneficiaries

31. Direct beneficiaries of the project include 90,000 electricity consumers on the EMAE grid who will benefit from the increased power supply and reliability. Other immediate beneficiaries of the project include the Government, the utility, and national regulator personnel trained under the project. The project's immediate beneficiaries also include women who will be trained as outreach and feedback agents under the proposed community engagement and outreach campaign.

32. Indirect beneficiaries of the project include EMAE customers, as well as future EMAE customers, and all taxpayers in the country. The project will contribute to enhanced management, operation, and financial viability of the electricity sector. This in turn is expected to lead to greater investment in service expansion across São Tomé and Príncipe alike, while also reducing the utility's fiscal burden on the country.

C. PDO Level Results Indicators

33. The PDO level indicators are:

- Direct project beneficiaries (number), of which female beneficiaries (percentage);
- Generation capacity of hydropower rehabilitated under the project (MW);
- Electricity losses per year in the project area (percentage).

34. Annex 1 provides the full project results framework.

III. PROJECT DESCRIPTION

35. The project is the first World Bank lending operation in the energy sector in São Tomé and Príncipe in over a decade and is thus a first step for the World Bank to support the Government in improving and expanding affordable, reliable, and sustainable energy services. The project represents an initial intervention to support sector recovery by financing the most critical infrastructure investments and providing technical assistance for capacity-building and sector reforms. The project is funded jointly by the International Development Association (IDA) and the European Investment Bank (EIB) through parallel co-financing.

36. **Investments to be carried out under the project center on the island of São Tomé.** The proposed project aims to reduce the consumption of imported fossil fuels for power generation by increasing hydropower generation capacity and to reduce losses in the network. This will be done by rehabilitating an existing hydropower plant, upgrading the distribution network, and installing smart meters for consumers. This will contribute to improving the financial situation of EMAE and allow the Government to reduce reliance on thermal generation,

thereby reducing subsidies to purchase expensive fuel that disproportionally benefits higher-income groups.

A. Project Components

37. The project has four components as described below.

38. **Component 1: Support for electricity institutional reform and sector planning (IDA US$1.2 million equivalent).** This component will finance a combination of capacity building, action plans, road maps, and studies that will (a) strengthen the capacity of the regulatory agency, and (b) ensure planning of optimum investments needed to develop the power sector in São Tomé and Príncipe, from electricity generation to the effective connection of end users. Subcomponents include the following:

(a) ***Subcomponent 1.1: Reinforcement of the power sector regulatory agency (IDA US$0.5 million equivalent).*** This subcomponent will finance international expertise to strengthen AGER, the country's multisector regulator; organize the regulation function; train staff working on energy sector regulation; and prepare the procedures for interaction between the MINRA, EMAE, the regulator, and potential future private investors.

(b) ***Subcomponent 1.2: Development of an integrated Least Cost Power Development Plan (IDA US$0.4 million equivalent).*** The Government of São Tomé and Príncipe is in need of an updated road map for the development of the country's electricity sector over the next 20 years. To this end, this subcomponent will support consultancy services for the MINRA under the fiduciary responsibility of AFAP to carry out the preparation of a Least Cost Power Development Plan (LCPDP) to define the investments needed in all the segments of the electricity supply chain (from generation, transmission, and distribution to consumers' connection).

(c) ***Subcomponent 1.3: Electricity Demand Forecast for São Tomé and Príncipe (IDA US$0.1 million equivalent).*** This study will review and establish the annual load growth forecast for the EMAE power system. A model will be developed to analyze historic energy demand by major subsectors and tariff classes (e.g. agriculture, industry supplied at medium and low voltage) and to produce a range of load forecasts using an appropriate set of variables. The demand model will include a forecast of baseload, intermediate, and peak power demand with associated load shapes for 2016-2026 to drive the capacity expansion planning process.

(d) ***Subcomponent 1.4: Tariff Study (IDA US$0.2 million equivalent).*** This study will recommend a tariff structure and level for a five-year period that will enable EMAE, through its sales revenue collections, to: (i) restructure/rationalize consumer categories to better reflect the cost of supply and the Government's social objectives; (ii) move towards cost recovery of electricity service to its consumers; (iii) reach a reasonable rate of return on re-valued assets; and (iv) be protected from inflation and foreign exchange risks. The recommended tariff adjustment is expected to take in a stepped (annual) approach over the tariff adjustment period to achieve the objectives while managing the impacts and concerns on the consumer side.

39. **Component 2: Strengthening the operational performance and governance of EMAE (US$7.5 million, of which IDA US$2.3 million equivalent and EIB US$5.2 million).** This component will comprise the preparation and endorsement of a Management Improvement Plan (MIP) for EMAE for a three-year period, focused on improving efficiency, transparency, and accountability of EMAE's performance in the key operational areas of electricity supply, commercial functions, and management of corporate resources, with specific emphasis on better service quality and nontechnical loss reduction. Key activities under this component include the following:

(a) ***Subcomponent 2.1: Installation of a new Management Information System at EMAE (IDA US$1.0 million equivalent).*** In line with the MIP, this subcomponent will support the purchase and installation of a new MIS, which will include a commercial management system (CMS), an integrated distribution management system, and an enterprise resource planning system, to make the development of processes and activities in all business areas more efficient, transparent, and accountable. This subcomponent will include training of staff on the new MIS. In addition, in line with the proposed project's gender-sensitive approach, the MIS will have the functionality to collect selected sex-disaggregated customer profile information.

(b) ***Subcomponent 2.2: Preparation of a Management Improvement Plan for EMAE (IDA US$0.9 million equivalent).*** This subcomponent will comprise the preparation of an MIP for EMAE. The MIP, to be designed with project support and endorsed by the authorities, is meant to provide guidance for improving the management of the utility and enable the management team to lead EMAE in a sustainable direction. The MIP will focus on improving efficiency, transparency, and accountability of EMAE's performance in the key operations areas of electricity supply, commercial functions, and management of corporate resources, with specific emphasis on better service quality and nontechnical loss reduction.

(c) ***Subcomponent 2.3: First phase Revenue Protection Program - meters for large customers (EIB US$1.2 million).*** The subcomponent will support the implementation of a first phase Revenue Protection Program (RPP) for sustainable reduction of nontechnical losses in supply (unmetered consumption) through systematic remote recording and monitoring of consumption of large users (triphasic connection) by replacing old meters with new, smart, post-paid meters for about 3,000 large customers. The main objective of the first phase RPP is to protect EMAE's revenues from sales to its large customers, ensuring that all users in that 'high value' segment are permanently billed according to their accurately metered full consumption.

(d) ***Subcomponent 2.4: Installation of statistical meters (EIB US$0.3 million).*** This subcomponent will finance the installation of around 170 statistical meters. These meters can be remotely monitored on different feeders of the network to establish exact losses in different parts of the network. This will pave the way for implementation of selective and effective loss reduction programs and will help define the sequencing of intervention for Subcomponent 2.5 (see below).

(e) ***Subcomponent 2.5: Second phase RPP - replacement of all remaining meters (EIB***

US$3.7 million). The second phase RPP will consist of the installation of Advanced Metering Infrastructure (AMI), comprising consumption meters and devices for remote communication at the premises of around 16,000 users (single phase connection) with recorded monthly consumption and installation of another 2,000 meters for large customers (triphasic connection) not yet metered and not covered under the first phase RPP. Old meters will be replaced as part of this process.

(f) ***Subcomponent 2.6: Gender-sensitive community engagement and outreach campaign (IDA US$0.4 million equivalent).*** As part of a proposed approach to strengthen the relationship and accountability between the utility and customers, the project will develop a gender-sensitive community engagement and outreach campaign working to engage both men and women at the household level. Specifically, women's groups will be engaged in the first year of the project and trained as agents for community outreach. These women's groups will then (i) inform the community about ongoing utility activities and their progress; (ii) promote messages related to the benefits of having a safe and legal connection and positive attitudes toward bill payment; (iii) support customer complaint mechanisms; and (iv) gather feedback from the community on consumer satisfaction and perceptions. Through periodic focus groups and ongoing feedback, they also will provide qualitative monitoring of behaviors with respect to illegal connections, bill payment, and other consumer issues. Consumer feedback gathered by the community outreach agents will be compiled on a quarterly basis and a report will be provided to sector stakeholders to inform project implementation and improve utility accountability. Finally, the campaign will include utility-level interventions to promote a culture of transparency and trust among electricity customers, such as the public dissemination of the utility's monthly key performance indicators.

40. **Component 3: Investing in enhanced reliability of electricity generation, transmission, and distribution (US$18.4 million, of which IDA US$10.6 million equivalent and EIB US$7.8 million).** This component will finance priority investments in the rehabilitation and potential expansion of the Contador small hydropower plant, the rehabilitation of the Contador evacuation line and medium voltage (MV) network, and the upgrading of existing low voltage (LV) network in selected districts of the country. The detailed description of goods, works, and services in the scope of the component and related investment amounts is provided in Annex 3.

(a) ***Subcomponent 3.1: Rehabilitation of Contador hydropower plant and operations and maintenance support program (IDA US$9.1 million equivalent).*** This subcomponent will finance the works for the rehabilitation and potential expansion of the plant to an installed capacity of 2.2 MW. Optimization studies will also analyze potential expansion of the power plant under the project. A concurrent operations and maintenance (O&M) support program will ensure the technical sustainability of the rehabilitated hydropower plant by financing procurement and storage of spare parts as well as training of EMAE staff for O&M of the plant during the early stage of project implementation. This subcomponent will also cover engineering aspects (design and supervision of works) and preparation of related safeguards documents.

(b) ***Subcomponent 3.2: Rehabilitation of key components of Contador medium voltage***

evacuation line (IDA US$1.5 million equivalent). This subcomponent will finance priority investments on the electricity network to ensure increased reliability of the MV network for the evacuation line from Contador to São Tomé, as well as implementation of a network protection study. This component will also cover the engineering aspects (design and supervision of works) and preparation of safeguards documents.

(c) ***Subcomponent 3.3: Low voltage network rehabilitation (EIB US$7.8 million).*** This subcomponent will finance the rehabilitation of target areas of the LV network by replacing existing infrastructure, which is currently in very poor condition leading to unreliable distribution and allowing electricity theft, a large cause of nontechnical losses.

41. **Component 4: Project implementation support (IDA US$1.9 million equivalent).** This component will finance project implementation support, including training for staff in AFAP, the project implementing agency, on procurement and fiduciary duties. Technical training, in particular on O&M issues, will be provided to EMAE technical staff supervising project implementation.

B. Project Financing

42. The lending instrument for the proposed project is Investment Project Financing. The total project cost is estimated at US$29 million, of which IDA will be providing US$16 million equivalent in financing on grant terms.[2] The complementary EIB financing is a US$13 million concessional loan. Project cost estimates include a 15 percent contingency for equipment cost estimates and a 23 percent overall contingency for the hydropower plant rehabilitation (Subcomponent 3.1) given the limited recent experience with construction of hydropower schemes in São Tomé and Príncipe as well as the remoteness of the Island.

C. Project Cost and Financing

Table 1. Project Cost and Financing by Component

Project Components	Total Cost (US$, millions)	IDA Financing (US$, millions)	EIB Parallel Co-financing (US$, millions)	% IDA Financing
Component 1: Support for electricity institutional reform and sector planning	1.2	1.2	0.0	100
Component 2: Strengthening the operational performance and governance of EMAE	7.5	2.3	5.2	31
Component 3: Investing in enhanced reliability of electricity generation, transmission, and distribution	18.4	10.6	7.8	58
Component 4: Project implementation support	1.9	1.9	0.0	100
Total project costs	29.0	16.0	13.0	55

[2] Per the small island economy exception, small islands (with less than 1.5 million people, significant vulnerability due to size and geography, and very limited creditworthiness and financing options) have been granted an exception in maintaining IDA eligibility.

D. Lessons Learned and Reflected in the Project Design

43. Lessons from experiences with utility reforms across Sub-Saharan Africa (including Liberia, Kenya, Rwanda, and Tanzania) and emerging countries in other regions have informed the design of this project. Project design and preparation also build on recommendations drawn in the previous World Bank Group studies in São Tomé and Príncipe and dialogue with the Government of São Tomé and the public utility EMAE.

44. During the 1990s and first decade of the 21st century, many developing countries implementing reforms (Armenia, Brazil, Chile, Colombia, Georgia, Ghana, India, Kenya, Moldova, and Peru) incorporated incentive-based regimes for regulation of the electricity distribution segment, providing incentives for distribution utilities to deliver high-quality service to their customers and maximize their profits through efficiency in operations.

45. Under such a regulatory environment, several distribution companies successfully implemented MIPs aimed at improving their performance in all business areas, with particular focus on customer service in all dimensions. The design and implementation of MIPs were supported by two key premises. First, customer satisfaction and willingness to pay tariffs reflecting efficient total costs of service provision are essential prerequisites to achieve the financial sustainability of the company and require good service quality (in both technical and commercial aspects). Second, a company's management under incentive-based regulation calls for efficiency in operations in all business areas, with the support of information systems to provide reliable corporate information in their execution, which is critical to enhance transparency, accountability, and corporate governance, both internally and externally (regulators, Government, and civil society).

46. In most cases, the main components of the MIPs were (a) selecting and appointing a new management team (initially with some foreign members, but becoming fully local over time) with adequate technical skills and ethics; (b) incorporating an MIS to enable efficient, transparent, and accountable execution of operations; (c) implementing programs for sustainably reducing nontechnical losses in supply, focused initially on large users; and (d) executing urgent investments in the rehabilitation and upgrade of existing electricity distribution networks, which is critical to achieving an acceptable quality of service. The successful design and implementation of MIPs made it possible for the utilities to achieve and sustain significant improvements in their operational performance, as well as realize the financial sustainability of the companies and the power sectors in which they operate. To this effect, project investments reflect each of the above-referenced aspects and the planned MIP will further build on these.

47. Recent reviews of hydropower development in Sub-Saharan Africa and of infrastructure in the region more broadly, highlighted the endemic issue of technical sustainability of assets. Recent experiences of hydropower plant failures a few years after commissioning, due to weak technical and financial capacity of the owner of the plant to operate and maintain the assets, show the importance of ensuring long-term capacity building in O&M of the infrastructure. Lessons learned have been incorporated in the project design by supporting the establishment of a specific O&M team within EMAE and provision of capacity building in the form of direct training and ensuring that the equipment suppliers work in tandem with the O&M team during the construction and commissioning phases of the project. Ensuring that contractual obligations

of the suppliers are enforced and that an adequate number of spare parts and storage facilities are included in the project specifications is also of utmost importance. Technical consultants with international experience will be hired under the project to provide support to AFAP and EMAE to supervise as necessary the implementation of the works. Overall, the project design has been kept simple so as not to overtax the capacity of the Government institutions, particularly the implementing agencies.

48. Improving the sector's technical and financial planning and regulation requires ownership by competent Government agencies and resources for systematic development of the planning process and implementation of its outcomes. The studies to be prepared with project support will involve the relevant sector institutions through ad hoc implementation teams, to ensure technical quality, full consideration of the existing sector reality, and ownership. Specific implementation and coordination arrangements have already been put in place for the various studies, which have been launched under a project preparation advance. Specific focal points within each competent institution have been identified. Technical assistance funds are included in the project to support the Government in implementation of the recommendations coming out of the LCPDP.

49. Lessons from innovative approaches used to address nontechnical losses, such as in the Dominican Republic and India (Electricity Distribution and Rehabilitation Project; Tata Power Delhi Distribution Limited Project), showed the importance of integrating social components into project interventions to successfully tackle commercial losses. Engaging communities in proposed activities is critical for finding appropriate solutions to electricity theft and supporting interventions' sustainability and scalability. In addition, the projects demonstrated the effectiveness of working with women in community-based interventions to combat electricity theft and facilitate bill payment. While women are also involved in negative behaviors related to nontechnical losses, communities often perceive them as positive role models who are more reliable and transparent with regard to bill payment and accountability. Because of their position within the community, women can become valuable allies in carrying out outreach and awareness raising activities to promote responsible attitudes toward bill payment and safe and legal connections. The project thus proposes to use gender-sensitive and citizen engagement approaches to address the challenge of nontechnical losses. The project will explore the drivers and social norms that lead citizens to electricity theft and integrate community-centered interventions in the design and implementation of the proposed initiatives.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

50. The proposed implementing agency for the project is the AFAP, the fiduciary agency for project administration in São Tomé and Príncipe. AFAP has a track record in the implementation of World Bank-financed education, telecommunications, and social protection projects. Under this arrangement, AFAP will be the implementing agency for both IDA- and EIB-financed activities.

51. A project-specific Steering Committee is being established to provide guidance and direction during implementation. It will be chaired by the Minister of the MoFPA and include representatives of the MINRA, the Ministry of Economy and International Cooperation

(MoEIC), EMAE, and AFAP. The Steering Committee will meet at least once every quarter. AFAP's coordinator shall serve as the Steering Committee secretary.

52. AFAP will have responsibility for the day-to-day management of the project and coordination of project-related activities and report to the Steering Committee to ensure clear communication with all relevant ministries and obtain decisions on issues pertaining to multiple government stakeholders. In particular, for all technical issues related to project implementation, a project focal point at EMAE will be appointed and technical EMAE staff will lead technical oversight of certain activities under Components 2 and 3. This will include on-site supervision of works and approval of contract deliveries. Activities under Subcomponents 1.1 and 1.2 will be led by the main beneficiaries, AGER and the MINRA, respectively. An ad hoc technical Working Group will follow up on implementation of the project. The Working Group will report to the MINRA and submit regular reports on progress of the project developments. This group will be chaired by a representative of the MINRA and will have representatives from AFAP, the project's technical advisor from the AFAP permanent team, the project focal point from EMAE, a representative from AGER, and a representative each from the Directorate of Environment and the Directorate of Natural Resources from the MINRA. The group will meet quarterly or more frequently as needed.

B. Results Monitoring and Evaluation

53. The results framework, attached as Annex 1, identifies results indicators for the project as a whole as well as for each of its components. The project implementing agency, AFAP, will be responsible for collecting and verifying data and will consolidate the information and submit progress reports to the World Bank at a minimum on an annual basis for all indicators. Additional reporting will be provided as needed for supervision purposes.

54. AFAP will get its information from different project stakeholders, in particular EMAE, but also directly from other stakeholders when necessary. To ensure smooth and regular collection of information, AFAP will rely on counterparts from the technical Working Group to support data collection and provide necessary inputs.

55. AFAP will have overall responsibility for reporting to the Government, including the MoFPA and the MINRA. AFAP will put together a monitoring and evaluation (M&E) report on a semiannual basis that will include the updated results framework and an action table, listing any corrective actions to be implemented with deadlines and persons responsible clearly identified. The report will be sent to the World Bank for information (see Annex 3 for details related to project reporting). The evaluation of results indicators will be part of regular joint IDA/EIB supervision missions.

C. Sustainability

56. The sustainability of the São Tomé and Príncipe power sector and the investments financed under this project will depend upon (a) the financial health of EMAE and its ability to generate sufficient revenues to fully cover its expenditures; and (b) the Government's continued commitment to support a comprehensive power sector reform program to be undertaken in the coming years. Major actions for the power sector recovery program will be initiated by this

project. The project brings together two major donors who are willing to provide further resources to support the country's long-term sector recovery plan based on a strong track record of implementation under this project.

57. The sector recovery strategy supported under the project aims to put in place systems, processes, and incentives that will allow electricity services to be provided in a sustainable manner. The MIP to be designed is expected to provide guidance for putting in place a transparently recruited management team to lead EMAE in a sustainable direction and inform sector dialogue going forward. The RPP targets improved financial sustainability of EMAE in the medium term, while the LCPDP will provide a roadmap to further expand infrastructure investments over the long term. Finally, by focusing on improvements in the reliability of electricity service, the project will also contribute to socioeconomic development and firm competitiveness over the long term.

58. Efficient, transparent, and accountable performance of EMAE in all business areas requires the incorporation of state-of-the-art supporting tools. The modern, integrated MIS will help improve (a) the quality of electricity service by reducing network downtimes and technical losses; (b) the financial performance of the utility by improving billing and revenue collection; (c) the management of corporate resources (accounting, procurement, human resources, and facilities management); and (d) accountability by providing the management with key information to allow more effective decision making. Increased efficiency, transparency, and accountability of operations will not only improve the sector's performance, but also enhance its image and credibility with private sector partners and electricity customers alike, gaining support for sustained good performance.

59. Adequate O&M of the sector assets rehabilitated or created is the linchpin to ensuring long-term technical sustainability of the project. The project will support adequate training and capacity building on O&M issues and ensure that a team of specialists is set up in EMAE to take over the O&M of the assets. This is key in the São Tomé and Principe context where recent experience shows the performance of hydropower plants dropping after a few years due to inadequate O&M. This was the case of the Guégué hydropower plant, which recently ceased operating. The Contador power plant is also suffering from the lack of O&M procedures and qualified staff to operate the plant, as well as lack of available spare parts. Best practice with regard to training is to ensure that the team is formed at the early stage of project implementation and follows, in tandem with the contractors, construction and commissioning of the equipment. Provisions will be made in the design, supply, and installation contracts to ensure training and transfer of knowledge by the equipment suppliers. Fundamental contractor obligations to provide spare parts, adequate storage facilities, and a complete O&M manual will be strictly enforced to ensure that when the hand over is made, EMAE has the full capacity to operate and maintain the assets in the long term.

60. Ultimately, EMAE's financial and operational performance will ensure the long-term sustainability of the electricity sector. The utility has to be managed and operated by experienced and professional staff with an incentive to maintain, upgrade, and keep infrastructure/systems running smoothly. The project includes activities to support EMAE in this direction and to put the utility on a path toward financial sustainability.

D. Partnerships

61. As mentioned, the project is supported jointly by the World Bank and the EIB, and there has been and continues to be close dialogue and coordination among the institutions, together with the Government, to ensure smooth preparation and implementation of the project. The project will also support broader sector dialogue among development partners. Specifically, UNDP and the African Development Bank have previously provided assistance to São Tomé and Príncipe for renewable energy investments, while bilateral development partners have provided investment in thermal generation and the grid network. In addition, the International Finance Corporation carried out an institutional review of EMAE in 2013, and other multilateral donors, such as the Organization of Petroleum Exporting Countries Fund for International Development, have expressed a strong interest in the development of the energy sector in the country going forward. By laying the foundation for sector recovery, including key studies such as the LCPDP, the project will provide a basis for the Government to direct sector dialogue and donor investment, ensuring transparent and synergistic sector support going forward.

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

Systematic Operations Risk- Rating Tool (SORT)	
Risk Category	**Rating**
1. Political and Governance	Substantial
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
4. Technical Design of Project or Program	Moderate
5. Institutional Capacity for Implementation and Sustainability	High
6. Fiduciary	Moderate
7. Environment and Social	High
8. Stakeholders	Substantial
9. Other	
OVERALL	Substantial

62. The overall risk rating of the project is Substantial. The key risks and, wherever relevant, mitigation measures are summarized below.

63. **Political and Governance.** This risk is rated Substantial. While São Tomé and Príncipe has demonstrated relative stability in recent years with a widespread expectation that the Government will finish the first full term since free elections were first held in 1991, the country has a history of political turmoil and changes in leadership. Within a small country such as São Tomé and Príncipe, changes in Government could have significant ramifications on the various stakeholders of the project, including the implementing agency, AFAP, and could interfere in the successful implementation of all components of the project. The World Bank will maintain a

strong sector dialogue to mitigate, to the extent possible, impacts of any political changes should they occur.

64. **Sector Strategies and Policies.** This risk is rated Substantial. The Government seeks a phased approach to sector engagement with the World Bank, with an immediate focus on rehabilitation and transmission and distribution enhancement as a means to build confidence for longer-term engagement in sector reform. To revive the electricity sector in São Tomé and Príncipe from its current poor operational and commercial conditions, it is critical that the Government remains committed to a long-term reform vision with a coherent sector wide strategy. Preparation of the MIP and LCPDP are two key steps to support the Government in this regard. Adoption of the MIP, in particular, will require strong commitment and leadership from Government stakeholders to overcome internal resistance to the reform of a poorly performing utility. This could otherwise preclude improvement in the reliability of electricity supply. The World Bank will continue a strong sector dialogue in this regard.

65. **Institutional Capacity for Implementation and Sustainability.** This risk is rated High. While the EMAE team shows technical capacity, technically qualified specialists are overstretched given the immense challenges facing the sector and the amount of work being carried out under the supervision of EMAE in São Tomé. Recent experience shows a lack of capacity in operating and maintaining the existing assets due to a lack of human and financial resources allocated to the task. This could challenge the technical sustainability of the assets proposed to be created or rehabilitated under the project and jeopardize the long-term increase in installed capacity and reliability of supply. Mitigation measures include (a) financing adequate supervision of project activities (Owner's Engineer) and capacity building among AFAP and EMAE with respect to the rehabilitation works and construction works; (b) support for capacity building, workshops, and technical assistance for the final beneficiaries, public institutions, and the O&M staff to ensure long-term technical sustainability of the proposed works; and (c) provision of assistance to EMAE in finding sustainable solutions to operate and maintain the energy-generating assets on the island. The proposed investments also support system monitoring O&M automation to help address human resource constraints.

66. In addition, the proposed project faces the risk of delays in implementation due to potential difficulties in getting contractors on the ground in São Tomé and/or increase in costs because of lack of bidders as a result of the remoteness of the island. These risks are mitigated by (a) adopting a simple project design; (b) launching the procurement process for works as early as possible during implementation based on sound design carried out by a qualified consulting firm; and (c) adopting a conservative budget and including an adequate level of price contingencies.

67. **Environment and Social Risk.** While the environment risk is considered limited, the social risk is considered High. The project includes a number of technical assistance and infrastructure measures designed to affect consumer behavior with the objective of improving the utility's financial position through increased billing and collections. These include the installation of modern meters for all consumers, the removal of illegal connections, and a community outreach campaign designed to promote bill payment (among other issues). Inadequate implementation or communication around these activities could result in negative social impacts and/or consumer backlash. Mitigation measures include the community outreach campaign, which is designed to ensure community understanding of the project activities and the

reasons behind them. It will also provide an ongoing feedback loop for authorities and the utility to monitor consumer perceptions and adjust implementation as required.

68. **Stakeholders.** This risk is considered Substantial in light of the reliance on the EIB parallel co-financing for the achievement of project objectives. There is a risk that the effectiveness of the EIB parallel co-financing, expected by the end of March 2017, could be delayed. Should effectiveness not be declared as expected, achievement of the project objectives could be delayed or jeopardized. This risk has been mitigated through joint appraisal of the project, during which the EIB expressed its strong commitment to the project. Joint project supervision is also planned. Effectiveness of the EIB parallel co-financing will be monitored closely by the World Bank.

69. **Climate and Disaster Risks.** A climate and disaster-related risk screening was carried out for the proposed project. The screening identified current and future key drivers of risks in this area as extreme precipitation flooding and temperature increase. The team will ensure that the technical specifications for equipment and works will take into consideration these risks and that focused training on extreme events and preventive maintenance (for example, cleaning of drainage infrastructure before rainy season) will be provided within the project scope.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

70. The rationale for public sector financing under the project is that the likelihood of obtaining private financing for the proposed investments is low. This low likelihood is caused by the low income levels of the target population, the high capital costs of hydropower, and the lack of creditworthiness of EMAE. Low income and electricity consumption levels in rural areas and small towns create conditions that are not, at this stage, attractive to the private sector. Renewable energy technologies, even if limited to rehabilitation, have relatively high capital costs, which makes it difficult to attract commercial financing given the current tariff structure, high technical and nontechnical losses, and absence of creditworthiness of EMAE, which would not be a credible off-taker.

71. The World Bank brings value added to the project based on extensive experience in the sector around the world, including in Sub-Saharan Africa. Drawing on this expertise and the experience, this project incorporates best practices in design, execution, and operation of the refurbished generation and distribution system. In the context of this project, the World Bank also provides significant value added and convening power by coordinating the contribution of other donors, allowing IDA to leverage considerably the resources provided to the Government with parallel co-financing.

72. This section provides a summary of the economic and financial analyses for the investments under the proposed project. Certain benefits are not captured in the analyses. For instance, additional economic benefits would arise from the implementation of the RPP, such as a reduction in consumption from improved metering, incentivizing users to better monitor and adjust their consumption. However, the lack of detailed information or adequate MIS data prevents a reliable estimation of these benefits at this time. Additionally, the analysis uses

conservative assumptions for the base case: a cost overrun of 10 percent for overall project costs is assumed, reasonably modest improvements in losses from the program interventions and, for Contador, the low hydrology scenario is retained, and the fact that the plant currently operates with only one of its two turbines has not been reflected in the analysis.

73. Activities under Component 1 of the proposed project are technical assistance to strengthen planning and build capacity. While these are expected to generate significant economic and financial benefits by improving the management of EMAE and the sector over a medium- to long-term horizon, these benefits are not considered in the economic and financial analysis. The analysis thus provides a very conservative estimate of the net benefits of the project.

74. The results of the economic analysis show that the overall project is economically viable with a net present value (NPV) of US$13 million (at a 6 percent discount rate) and an economic internal rate of return (EIRR) of 11.9 percent. Economic benefits were estimated conservatively based on avoided costs. When associated greenhouse gas (GHG) emissions reductions from thermal generation are taken into account, the EIRR increases to 13 percent with an NPV of US$15.3 million. Over 90 percent of São Tomé and Principe's electricity is generated by diesel power plants, which is considered the alternative supply source in the analysis. In addition, reliability improvements for the Contador line will reduce power outages, a benefit for electricity users quantified in the economic analysis on the basis of a value of non-distributed energy of US$0.5 per kWh, based on local comparators. Details, including a sensitivity analysis, are provided in Annex 5. A scenario analysis shows that the economic viability of the overall project is robust due to sizeable changes in the value of key underlying parameters.

75. The implementation of the project will result in an estimated reduction of 172,773 CO_2 tons during the period of the analysis due to lower electricity thermal generation compared to the 'business as usual' scenario, with a marginal impact on the EIRR. The economic benefits have been computed assuming a cost of carbon of US$30 per ton.

76. The financial analysis of the project shows a financial internal rate of return (FIRR) of 9.6 percent and an NPV of US$7.2 million (at a 6 percent discount rate). The lower FIRR compared to the EIRR primarily reflects the benefits captured by electricity users rather than EMAE (reliability) and effective revenue per unit (after distribution losses) lower than the cost of avoided power generation. The financial results show that the project is resilient to large cost overruns, modest performance in the reduction of nontechnical losses, and to different future tariff scenarios. See Annex 5 for additional details and assumptions considered.

B. Technical

77. The rehabilitation of the existing Contador hydropower plant has been identified as a priority as the plant is facing the risk of ceasing to operate in the near future as a result of lack of O&M (lack of spare parts) and aging of the facilities (mechanical parts, penstock, and so on). During the time span of project preparation, one of the two Pelton units failed due to the breakage of the control system, leading to the loss of 1 MW of available hydropower capacity in the system. Spare parts for repairs are no longer available on the market. Several options were considered for the rehabilitation and potential expansion works to increase the nominal peaking

capacity of the power plant. The project will finance a consulting firm to prepare the detailed design of the optimum option, technical specifications, and tender documents for civil works and supply of new equipment to replace the original machinery and mechanical parts. The technologies to be used are commercially available and correspond to standard practice in small hydropower development. Conservative contingencies have been accounted for in the budgetary estimate.

78. The rehabilitation of the Contador evacuation line and MV network is not technically complex. The main activities are expected to include the installation of new equipment within the existing facilities and refurbishment of two switching stations, which will not change the initial overall design of the line. The equipment to be supplied is globally proven and the project will use standard technical specifications as much as possible to achieve maximum cost efficiency. Similar contracts are being implemented currently on the island and EMAE has the capacity to supervise procurement and implementation on these activities by qualified contractors.

79. The rehabilitation of LV network by replacing existing outdated infrastructure does not pose any major design or implementation issue as the technologies used are robust and EMAE has experience in supervising the implementation of similar programs on the island. Past experience in other countries in Sub-Saharan Africa has also demonstrated that rehabilitation and construction of similar transmission and distribution systems with regard to technology is well proven. The technical aspects and specifications of AMI for large and medium consumption customers and network feeders are relatively straightforward and have been successfully implemented in other utilities in the Africa region. The advanced meters will enable the systematic recording and monitoring of consumption of EMAE's largest users to protect revenues from sales to this class of customers. The total duration of the rehabilitation and construction works is estimated at 36 months, subject to the finalization of the detailed design and scope.

C. Financial Management

80. The residual financial management (FM) risk rating is assessed to be Moderate. AFAP, established under the MoFPA, will have fiduciary responsibility for implementation of this proposed project. AFAP has a satisfactory track record in the implementation of the World Bank-financed education, telecommunications, and social protection projects. The AFAP financial manager reports to the agency coordinator and will have responsibility for project FM matters. The project funds, expenditures, and resources will be accounted for using the existing automated accounting software and the basis of accounting will be cash basis. The proposed project will make use of advances and direct payment methods for disbursements. Special commitments and reimbursements will also be available for the project. The implementing agency will prepare a single quarterly unaudited interim financial reports (IFRs) covering all project funds and expenditures and provide such reports to the World Bank within 45 days of the end of each calendar quarter. The project's single set of financial statements (covering all project funds and expenditures) will be audited by the independent auditor in accordance with International Standards on Auditing, as promulgated by the International Federation of Accountants (IFAC).

D. Procurement

81. Procurement for the proposed project will be carried out in accordance with the World Bank's 'Guidelines: Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers' dated January 2011, revised July 2014; 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers' dated January 2011, revised July 2014; and the provisions stipulated in the Legal Agreement. Anticorruption guidelines which apply to this project are 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', dated October 15, 2006 and revised in January 2011.

82. The arrangements in AFAP for the implementation of the proposed project were reviewed and found to be acceptable. Based on the capacity assessment of AFAP, the procurement risk associated with the implementation of the project is rated as Moderate. The agency has been satisfactorily implementing several World Bank-financed projects, including projects in education, telecommunications, and social protection. However, to successfully implement the project, AFAP will need to retain the current personnel as they are proficient in World Bank fiduciary procedures.

E. Social and Environmental (including Safeguards)

83. Social issues that arise in the context of electricity provision include a culture of nonpayment of bills as well as energy theft, among others. To address these issues, the project is developing a community engagement and outreach campaign to raise awareness about project activities among the population and monitor consumer perceptions. This aims to create a culture of transparency and trust among the Government, EMAE, and citizens as well as improve the relationship between these three actors. The campaign will aim to both keep consumers informed about utility activities and keep the utility informed about consumer issues and perceptions through support to customer complaint mechanisms and a feedback loop comprising qualitative data. The campaign will also include utility-level interventions to promote a culture of transparency among electricity customers, such as the public dissemination of the utility's monthly key performance indicators.

84. Large-scale behavioral change required to change practices such as nonpayment of bills will be challenging to achieve. However, the project will work with citizens through community engagement and mobilization to find appropriate solutions and alternatives to electricity theft, giving ownership to the community and promoting transparency and accountability in the relationship between the utility and the citizens. Beneficiary feedback will be recorded periodically during project implementation and findings will provide authorities with a better understanding of beneficiaries' profiles and their energy needs. This information will be used to inform the project's implementation and the iterative development of outreach activities to improve the relationship between the utility and its customers.

85. The project is classified as Category B in the World Bank's Environmental Assessment classification due to the small size and site-specific nature of its anticipated social and environmental risks and impacts. Potential negative impacts likely to be caused by the project are

site-specific, limited, and mostly temporary. They are all manageable through an Environmental and Social Management Framework (ESMF), an Environmental and Social Impact Assessment (ESIA) based on the design to be prepared for the works during implementation, and an Environmental and Social Management Plan (ESMP) should it be needed. The environmental and social safeguard policies triggered by this operation are OP/BP 4.01 (Environmental Assessment) and OP/BP 4.04 (Natural Habitats). OP 4.37 (Safety of Dams) is not triggered for the project as the hydropower scheme proposed to be rehabilitated does not comprise any dam structure, the water storage required for peaking capacity being ensured by a small storage tank along the waterway.

86. The project triggers the policy on Environmental Assessment (OP/BP 4.01) because it involves the rehabilitation of existing infrastructure, requiring the identification, mitigation, and monitoring of potential adverse environmental and social impacts. The potential adverse impacts are associated with implementation of Component 3, which includes new construction, rehabilitation, and potential expansion of generation, transmission, and distribution infrastructures.

87. The potential negative environmental impacts during site preparation and rehabilitation/upgrading of the existing hydropower plant, substations, and distribution lines mainly include (a) increased levels of dust, noise, and other emissions from excavation activities, land clearing activities, material stockpiles, operation of heavy equipment, and transportation of construction materials and electrical equipment; (b) construction site and waste generation; (c) traffic disturbance and road damage due to the transportation of building materials and equipment; (d) health and safety issues for workers and community; (e) any machinery accidental risks; (f) hazard solid waste from the old equipment replaced; and (g) harm to potential chance finds of physical cultural resources during the civil works on the hydropower scheme. The potential negative environmental impacts during operation would be the effects associated with exposure to public safety risks, noise, and electric and magnetic fields from power lines and substations. However, these potential impacts are expected to be small to moderate, temporary, site-specific, and mostly reversible. Mitigation measures can readily be designed. The proposed project requires no exceptions to the World Bank's policies on environmental and social safeguards.

88. This project triggers the policy on Natural Habitats (OP/BP 4.04) as part of Subcomponent 3.1 of the project covering the rehabilitation of the Contador hydropower scheme and, particularly, the intakes and part of the canal works, which will take place inside Ôbo National Park, an area of secondary forest and not of high ecological value. The ecological impacts on biodiversity are expected to be minor and of low significance according to the National Park of Ôbo staff. The ESMF will have guidelines to satisfy the basic requirements for OP/BP 4.04.

89. It should be noted that Subcomponent 3.1 will not require any land acquisition that would lead to involuntary resettlement or losses of assets. The land area where rehabilitation and expansion works will take place is owned by the utility and there are no people (including squatters) living in that area.

90. **Environmental and Social Management Framework.** The detailed locations of the

works proposed for the rehabilitation of the hydropower plant (potential additional load chamber) and for upgrading of existing assets are not known currently as they will only be confirmed once the final, detailed designs have been carried out. An ESMF has therefore been prepared to ensure that activities to be financed under the project would not create adverse impacts on the local environment and local communities and that the residual and/or unavoidable impacts will be adequately mitigated. The ESMF has taken into account the environmental and social profiles in the project areas on the potential activities to be supported by the project. The ESMF assesses at this first stage the environmental and social impacts of the project components to ensure that they are environmentally and socially sound and sustainably implementable, in line with Government and World Bank policies and guidelines on environmental and social impact management. The second stage of the environmental and social impact assessment will be undertaken when the detailed technical design of Component 3 activities will be finalized and for which an ESIA will be prepared to assess in detail the project's environmental and social impacts, and a freestanding ESMP will be prepared as needed. The final ESMF was disclosed in-country and at the World Bank's InfoShop on April 25, 2016.

91. **Safeguards implementation, monitoring, and training.** The screening of the subcomponents will be done by the Environmental Department of the MINRA as a support to AFAP; the department is an active member of the Steering Committee. With the support of the Environmental Department of the MINRA, AFAP will be responsible for the procurement of consultants to prepare and supervise the consultants that will be responsible for the monitoring of the implementation of the ESMPs in the project areas if required. It will ensure that all contractor contracts include environmental and social clauses to ensure adequate environmental and social management practices during project implementation phase. Monitoring checklists will be prepared on the basis of the mitigation plans for this purpose. Progress reports shall document the progress of project implementation, including on environmental social aspects. Finally, the project will engage specialists/firms to conduct detailed environmental and social studies (ESIA/ESMP). AFAP and the Environmental Department of the MINRA will receive training on the safeguards instruments to be applied to the project by the World Bank's safeguards team at the project launching.

92. **Public consultation and information disclosure.** The affected people and communities and other relevant stakeholders were consulted during the elaboration of the ESMF in February 2016. The feedback from the consultations has been incorporated into the project design and in the final ESMF. Likewise, during project implementation, AFAP is expected to consult project-affected groups, local governmental and nongovernmental organizations on all environmental and social aspects of the project, including utility performance and investments, and take their views into account accordingly. Public consultations will be carried out as early as possible and all relevant material will be provided, on time, before consultation, in the form and language(s) needed to be understandable and accessible to the groups being consulted. Preparation of stand-alone environmental and social safeguards instruments of relevant components (ESMP), when needed, will also be prepared through a consultative and participatory process involving all stakeholders at the regional and national levels.

F. Gender

93. In the last decade, São Tomé and Príncipe saw critical advances in meeting the third

Millennium Development Goal of promoting gender equality and empowering women. Commitments have been taken at the international and national levels ratifying conventions and promoting the country's Gender National Strategy. With regard to educational indicators, gender parity is almost achieved, and in recent years, representation of women in public positions has also gained relevance with proportion of seats held by women in the national parliament doubling from 9 percent in 2012 to 18 percent in 2014. Given this context and in line with national efforts to promote equitable and inclusive development, the project will adopt a gender-sensitive approach in the development of selected interventions, such as a community engagement and outreach campaign, to combat electricity theft that will focus on women's groups and cooperatives to leverage their role in the home and in society and facilitate information dissemination. In addition, the MIS at the utility level will incorporate sex-disaggregated indicators to support data-driven interventions in the future.

G. World Bank Grievance Redress

94. 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 World 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/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

H. Citizen Engagement/Beneficiary Feedback

95. Beneficiary feedback specific to Component 3 will be recorded and monitored through the project's grievance redress mechanism as described in the ESMF. During implementation, AFAP will gather information about Component 3 activities where complaints have been brought forward, including information on how they were resolved and relevant follow-ups. This information will be included in an annual project progress report and taken into account under the project, as relevant, during implementation to adequately address issues that cause complaints.

96. As described above, the project also proposes to utilize behavioral change and citizen engagement approaches to address the challenge of nontechnical losses. Through community engagement and mobilization, the project aims to work with citizens in finding solutions to electricity theft, giving ownership to the community, and promoting transparency and accountability to citizens. To this end, beneficiary feedback will be recorded during consultations and focus groups conducted throughout project implementation. The findings of the energy household survey will constitute an instructive picture of beneficiaries' profiles and their energy needs. This information will then be used to inform further iterations of outreach activities and implementation of ongoing project activities at the utility level, with the objective of improving

the relationship between the utility and its customers. A quarterly report on feedback received as part of the outreach activities will be produced and shared with sector stakeholders (for example, relevant ministries, AGER, EMAE, AFAP, and so on) to inform project implementation.

Annex 1: Results Framework and Monitoring

Country: Democratic Republic of São Tomé and Príncipe

Project Name: Power Sector Recovery Project (P157096)

Results Framework

Project Development Objectives

PDO Statement

The project development objectives are to (i) increase renewable energy generation and (ii) improve the reliability of the electricity supply.

These results are at	Project Level

Project Development Objective Indicators

Indicator Name	Baseline	Cumulative Target Values					
		2017	2018	2019	2020	2021	End Target
Direct project beneficiaries (Number) - (Core)	0	0	90,000	90,000	90,000	90,000	90,000
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	0	0	51	51	51	51	51
Generation capacity of hydropower rehabilitated under the project (MW) – (Core)	0	0	0	2.2	2.2	2.2	2.2
Electricity losses per year in the project area (Percentage)	40	40	38	36	34	33	33

Intermediate Results Indicators

Indicator Name	Baseline	Cumulative Target Values					
		2017	2018	2019	2020	2021	End Target
Least Cost Power Development Plan prepared and adopted by the MINRA	No	No	Prepared	Adopted by the MINRA, MoFPA, and EMAE	Implementation under way	Implementation under way	Implementation under way
Management information system installed, populated, in use	No	No	MIS installed	MIS populated with data	In use for sector monitoring and reporting	In use for sector monitoring and reporting	In use for sector monitoring and reporting
Management improvement plan prepared and adopted by the MINRA.	No	No	No	Prepared	Adopted by the MINRA and MoFPA	Under implementation	Under implementation
Meters installed under the project (Number)	0	0	3,000	10,000	15,000	21,000	21,000
Women's group(s) trained as community outreach and consumer feedback agents	No	No	Yes	Yes	Yes	Yes	Yes
Gender-sensitive community outreach and communication campaign prepared and implemented, with regular feedback mechanism to sector stakeholders (for example, EMAE, relevant ministries, AGER, AFAP)	No	Campaign prepared	Quarterly report prepared and feedback provided to sector stakeholders	Quarterly report prepared and feedback provided to sector stakeholders	Quarterly report prepared and feedback provided to sector stakeholders	Quarterly report prepared and feedback provided to sector stakeholders	Quarterly report prepared and feedback provided to sector stakeholders
Distribution lines rehabilitated under the project (Kilometers) – (Core)	0	0	25	50	100	100	100

.cd

Indicator Description

Project Development Objective Indicators

Indicator Name	Description (indicator definition, and so on)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Direct project beneficiaries (Number) - (Core)	Number of consumers in São Tomé and Príncipe who will benefit from added generation capacity and increased service quality. Calculated by the number of EMAE customers (that is, connections), assuming four people per connection	Annual	EMAE reporting	EMAE/AFAP
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	Based on census data, percentage of female in the population	Annual	National Institute of Statistics	EMAE/AFAP
Generation capacity of hydropower rehabilitated under the project (MW) – (Core)	This indicator measures the capacity of hydropower rehabilitation under the project (mechanical power). The baseline value is zero.	Annual	EMAE reporting	EMAE/AFAP
Electricity losses per year in the project area (Percentage) -	This indicator is calculated by dividing total electricity losses at the point of sale (that is, the sum of technical and nontechnical losses at the point of sale: total GWh dispatched to the system minus total GWh billed to customers) by the total net dispatched generation. The baseline is the actual total electricity losses on the island of São Tomé at the beginning of the project. Technical and nontechnical losses cannot be disaggregated given an insufficiency of utility data.	Annual	EMAE reporting	EMAE/AFAP

Intermediate Results Indicators

Indicator Name	Description (indicator definition, and so on)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Least Cost Power Development Plan prepared and adopted by the MINRA	This indicator measures whether a LCPDP has been prepared and adopted by the MINRA, MoFPA, and EMAE.	Annual	Annual report	EMAE/AFAP
Management information system installed, populated, and in use	This indicator measures whether a modern MIS has been installed and integrated into EMAE's day-to-day operations.	Annual	EMAE reporting/EIB	EMAE/AFAP
Management improvement plan prepared and adopted by the	This indicator measures whether an MIP for EMAE has been prepared and adopted by the Government.	Annual	Annual report	EMAE/AFAP

MINRA.				
Meters installed under the project (Number)	This indicator measures the number of meters installed under the project's RPP.	Annual	EMAE reporting/EIB	EMAE/AFAP
Women's groups trained as community outreach and consumer feedback agents	This indicator measures whether women's groups have been trained as community outreach and consumer feedback agents.	Annual	AFAP reporting	EMAE/AFAP
Gender-sensitive community outreach campaign prepared and implemented, with regular feedback mechanism to sector stakeholders (for example, EMAE, relevant ministries, AGER, AFAP)	This indicator measures whether a gender-sensitive communication campaign has been implemented under the project and if formal feedback has been gathered during consultation process under the form of a quarterly report being fed back to sector stakeholders.	Annual	AFAP reporting	EMAE/AFAP
Distribution lines rehabilitated under the project (Kilometers) – (Core)	This indicator measures the number of kilometers of distribution lines rehabilitated under the project.	Annual	EMAE reporting	EMAE/AFAP

Annex 2: Detailed Project Description

DEMOCRATIC REPUBLIC OF SÃO TOMÉ AND PRÍNCIPE: Power Sector Recovery Project

1. The project is the first World Bank lending operation in the energy sector in São Tomé and Príncipe in over a decade and is thus a first step for the World Bank to support the Government in improving and expanding affordable, reliable, and sustainable energy services. The project represents an initial intervention to support sector recovery by financing the most critical infrastructure investments and providing technical assistance for capacity building and sector reforms. The project is complemented by parallel co-financing from the EIB.

2. Investments to be carried out under the project center on the Island of São Tomé. The proposed project aims to reduce the consumption of imported fossil fuels for power generation by increasing hydropower generation capacity and reducing losses in the network. This will be done by rehabilitating an existing hydropower plant, upgrading the distribution network, and installing smart meters for consumers. This will contribute to improving the financial situation of EMAE and allow the Government to reduce reliance on thermal generation, thereby reducing subsidies to purchase expensive fuel that disproportionally benefits higher-income groups.

3. The project's four components are described in the following paragraphs.

4. **Component 1: Support for electricity institutional reform and sector planning (IDA US$1.2 million equivalent).** This component will finance a combination of capacity building, action plans, road maps, and studies that will (a) strengthen the capacity of the regulatory agency in a sustainable manner, and (b) ensure planning of the optimum investments needed to develop the power sector in São Tomé and Príncipe, from electricity generation to the effective connection of end users. Subcomponents include the following:

(a) ***Subcomponent 1.1: Reinforcement of the power sector regulatory agency (IDA US$0.5 million equivalent).*** This subcomponent will finance international expertise to strengthen AGER, the multi-sector regulator; organize the regulation function; train the newly appointed staff; and prepare the procedures for interaction between the MINRA, EMAE, the regulator, and potential future private investors.

(b) ***Subcomponent 1.2: Development of an integrated Least Cost Power Development Plan (IDA US$0.4 million equivalent).*** This LCPDP will consist of the identification of the optimum set of ongoing and future projects and related time schedule to increase the installed generation capacity and expand transmission and distribution facilities over a 20-year period. Basic criterion for optimization is minimum NPV of investment, operating costs, and cost of unserved energy over the period from a country's perspective. The LCPDP must be defined taking into consideration (a) conditions set by the Government concerning security of supply (level of dependence on imported energy primary resources and diversification); (b) applicable rules and standards on environmental protection; (c) availability and policies on the use of land; (d) standards on quality and reliability of electricity supply; and (e) current infrastructure, in particular the existing grid. The analysis will review previous EMAE grid integration work and, when

applicable, include its main conclusions in the long-term planning exercise. The preparation of the LCPDP will also include sensitivity analyses to changes in (a) fuel costs; (b) discount rate; (c) generation investment costs (including diesel, heavy fuel oil, hydro, and solar); (d) demand forecast; and (e) standards on reliability of supply/cost of unserved energy.

(c) ***Subcomponent 1.3: Electricity Demand Forecast for São Tomé and Príncipe (IDA US$0.1 million equivalent).*** This study will review and establish the annual load growth forecast for the EMAE power system. A model will be developed to analyze historic energy demand by major subsectors and tariff classes (e.g. agriculture, industry supplied at MV and LV) and to produce a range of load forecasts using an appropriate set of variables. These variables may be based on a set of consistent assumptions with respect to medium to long-term socioeconomic, technological, and demographic developments in São Tomé and Príncipe, and take into consideration existing suppressed demand. This work would build upon existing data and recent reports and analysis of the country's power sector, but may need to be supplemented by additional research, analysis and consultations with key Government and industry players and other major stakeholders. The demand model will include a forecast of baseload, intermediate and peak power demand, with associated load shapes, for 2016-2026 to drive the capacity expansion planning process. To the extent possible, it will also calculate firm requirements by adding forecasted demand to a planning contingency to account for unforeseen events, inaccuracies or unplanned unit outages, and other resource limitations

(d) ***Subcomponent 1.4: Tariff Study (IDA US$0.2 million equivalent).*** This study will recommend a tariff structure and level for a five-year period that will enable EMAE, through its sales revenue collections, to: (i) restructure/rationalize the consumer categories to better reflect the cost of supply and Government of São Tomé and Príncipe social objectives; (ii) move towards cost recovery of electricity service to its consumers; (iii) reach a reasonable rate of return on re-valued assets; and (iv) be protected from inflation and foreign exchange risks. The recommended tariff adjustment is expected to take in a stepped (annual) approach over the tariff adjustment period to achieve the objectives while managing the impacts and concerns on the consumer side.

5. **Component 2: Strengthening the operational performance and governance of EMAE (US$7.5 million, of which IDA US$2.3 million equivalent and EIB US$5.2 million)**

(a) ***Subcomponent 2.1: Installation of a new Management Information System at EMAE (IDA US$1.0 million equivalent).*** In line with the MIP, this subcomponent will support the purchase and installation of the MIS, which will include a CMS, an integrated distribution management system, and an enterprise resource planning system, to make the development of processes and activities in all business areas more efficient, transparent, and accountable. This includes O&M of assets for electricity supply, attention to customer claims, commercial functions, and management of corporate resources. The installation and use of the MIS must be complemented with the update of the respective databases (customers, assets, and so on) supported by a geographic information system. In addition, in line with the proposed project's gender-sensitive approach, the MIS will help in collecting selected sex-disaggregated customer profile information to (i)

investigate whether female- and male-headed households and businesses are connected at the same proportion; (ii) identify connected female-headed households; and (iii) track how many women owned businesses are connected.

(b) ***Subcomponent 2.2: Preparation of a Management Improvement Plan for EMAE (IDA US$0.9 million equivalent).*** This subcomponent will comprise the preparation of an MIP for EMAE. The MIP, which is to be designed with project support and implemented within a three-year period, is meant to provide guidance for putting in place a transparently recruited management team to lead EMAE in a sustainable direction. The MIP will focus on improving efficiency, transparency, and accountability of EMAE's performance in the key operations areas of electricity supply, commercial functions, and management of corporate resources in a sustainable manner, with specific emphasis on better service quality and nontechnical loss reduction. The MIP will also include the incorporation of a modern, integrated MIS at EMAE to provide the tools for management and staff to better run the company and the sector.

(c) ***Subcomponent 2.3: First phase Revenue Protection Program - meters for large customers (EIB US$1.2 million).*** This subcomponent will support the implementation of a first phase RPP for sustainable reduction of nontechnical losses in supply (unmetered consumption) through systematic remote recording and monitoring of consumption of large users (triphasic connection) by replacing old meters with new, smart, post-paid meters. The main objective of the first phase RPP is to protect EMAE's revenues from sales to its large customers, ensuring that all users in that 'high value' segment are permanently billed according to their accurately metered full consumption. The initial phase of the RPP will target 3,000 large customers (6 percent of total users) who represent around 40 percent of total physical sales (kWh) in 2014.

The installation of consumption metering systems at each customer's premises will include communication devices that make it possible to periodically transmit their records to remote points where they are systematically analyzed, processed, and monitored by staff of organizational units, known as Metering Control Centers (MCCs), created for that specific purpose, with the support of software packages, that is, Meter Data Management included in the MIS and designed to monitor, timely detect, and correct any eventual irregular condition in electricity use. This will also require creation of the MCC as a new organizational unit within the company and training of the operators of the MCC in the systematic use of the Meter Data Management for monitoring consumption of all large customers targeted by the first phase RPP.

This first phase program is expected to have a significant impact on the sustainable reduction of the company's total commercial losses. Lower commercial losses imply a combined increase in energy sales and reduction in electricity generation from expensive sources, both contributing to significantly improve EMAE's financial performance. The RPP will also enable the load profiling of electricity consumers, which is a key input to improve both service quality (outages and other problems in supply are immediately detected) and accuracy of load forecasting for planning purposes.

(d) ***Subcomponent 2.4: Installation of statistical meters (EIB US$0.3 million).*** This

subcomponent will finance the installation of around 170 statistical meters. These meters can be remotely monitored on different feeders of the network to establish exact losses in different parts of the network. The processing and analysis of the data installation of these smart feeder meters and also information from the billing system will inform the technical and commercials losses in the network. This will pave the way for implementation of selective and effective loss reduction programs and will help define the sequencing of intervention for Subcomponent 2.5.

(e) ***Subcomponent 2.5: Second phase Revenue Protection Program – replacement of all remaining meters (EIB US$3.7 million).*** The second phase RPP to be implemented will comprise installation/replacement of AMI infrastructure (consumption metering systems and devices for remote communication) at the premises of around 16,000 customers (single phase connection) with recorded monthly consumption and installation of an additional 2,000 meters for large customers (triphasic connection) not yet metered and not covered under the first phase RPP. The same philosophy as in the first phase RPP will be applied to this phase of the program, ensuring a comprehensive collection of data and its use to better planning, service delivery, and financial recovery of the energy generated.

(f) ***Subcomponent 2.6: Gender-sensitive community engagement and outreach campaign (IDA US$0.4 million equivalent).*** As part of a proposed 'soft approach' to address nontechnical losses, the project will develop a gender-sensitive community engagement and outreach campaign working to engage both men and women at the household level. Specifically, women's groups will be engaged in the first year of the project and trained as agents for community outreach. These agents will then (i) inform the community about ongoing utility activities and their progress; (ii) promote messages related to the benefits of having a safe and legal connection and positive attitudes toward bill payment; (iii) support customer complaint mechanisms; and (iv) gather feedback from the community on consumer satisfaction and perceptions. Through periodic focus groups and ongoing feedback, they also will provide qualitative monitoring of behaviors with respect to illegal connections, bill payment, and other consumer issues. Consumer feedback gathered by the community outreach agents will be compiled on a quarterly basis and a report will be provided to sector stakeholders to inform project implementation and improve utility accountability. Finally, the campaign will include utility-level interventions to promote a culture of transparency and trust among electricity customers, such as the public dissemination of the utility's monthly key performance indicators.

6. **Component 3: Investing in enhanced reliability of electricity generation, transmission, and distribution (US$18.4 million, of which IDA US$10.6 million equivalent and EIB US$7.8 million).**

(a) ***Subcomponent 3.1: Rehabilitation of Contador hydropower plant and operations and maintenance support program. (IDA US$9.1 million equivalent).*** This subcomponent will finance the works for the rehabilitation of the plant to an installed capacity of 2.2 MW. Optimization studies will analyze the potential for expansion of the power plant's installed capacity of up to 4 MW. Civil works will comprise rehabilitation works on the load chamber, channel, and tunnel portions and mechanical and electrical equipment will

be replaced to reach the final optimum installed capacity. The system will be designed to operate as a peaking plant, with the creation of an additional daily storage capacity in the form of a concrete water tank, if found required. The O&M support program will ensure the technical sustainability of the rehabilitated hydropower plant by financing procurement and storage of spare parts as well as training of EMAE staff for O&M of the plant at a very early stage of the project implementation. This component will also cover the engineering aspects (design and supervision of works) and preparation of safeguards documents.

(b) ***Subcomponent 3.2: Rehabilitation of key components of Contador medium voltage evacuation line (IDA US$1.5 million equivalent).*** This subcomponent will finance priority investment in the electricity network to ensure increased reliability of the MV network for the evacuation line from Contador to São Tomé. This will include installation of around 19 MV isolators/auto-reclosers and refurbishment of two switching stations. Every fault that occurs on any section of the transmission/distribution line causes the complete outage of supply from Contador. The outage duration is high due to the inability to easily isolate the faulty section of the line within reasonable operation time. The use of auto-reclosers is to ensure that transient faults that form 80 percent of faults on high voltage overhead lines are cleared and power is restored immediately. In instances where the faults are permanent, the reclosers will be remotely opened to ensure that the faulty section is properly isolated and thus ensure the reliability of the evacuation line from Contador to São Tomé. This component will also cover the engineering (design and supervision of works) and preparation of safeguards documents as well as additional studies for the selectivity and protection of the network and technical assistance to implement the operational recommendations of these studies.

(c) ***Subcomponent 3.3: Low voltage network rehabilitation (EIB US$7.8 million).*** This subcomponent will finance the rehabilitation of the LV network by replacing existing infrastructure, which is in very poor condition leading to unreliability in distribution and allowing electricity theft, a large cause of nontechnical losses. This will comprise the replacement of 2,200 poles and the installation of ABC cables for about 100 km and installation of about 50 200 kVA 30-6/0.4 KV pole-mounted transformer substations, including distribution panels and MV load isolators with communication equipment/accessories.

7. **Component 4: Project implementation support (IDA US$1.9 million equivalent).** This component will finance project implementation support, including training for staff of the implementing agency, AFAP, on procurement and fiduciary duties. Technical training, in particular on O&M issues, will be provided to EMAE technical staff supervising project implementation.

Annex 3: Implementation Arrangements

DEMOCRATIC REPUBLIC OF SÃO TOMÉ AND PRÍNCIPE: Power Sector Recovery Project

Project Institutional and Implementation Arrangements

1. The proposed implementing agency is the AFAP, the fiduciary agency established by the Government under the MoFPA. AFAP has a track record in the implementation of World Bank-financed education, telecommunications, and social protection projects. AFAP is composed of six permanent staff members, including the director, procurement officer, and financial manager. The project implementation strategy includes hiring a specialized technical adviser to ensure coordination between the relevant government institutions. Environmental and social safeguard aspects will be overseen by the Directorate of Environment of the MINRA, with additional support at AFAP to be procured, if necessary.

2. Oversight for the project will be carried out by a Steering Committee, which is being established to provide guidance and direction during implementation. It will be chaired by the Minister of the MoFPA and include representatives of MINRA, MoEIC, EMAE, and AFAP. The Steering Committee will meet at least once every quarter. AFAP's coordinator shall serve as the Steering Committee secretary.

3. AFAP will have responsibility for the day-to-day management of the project and coordination of project-related activities, including (a) ensuring the timely implementation of the project in accordance with the Project Implementation Manual; (b) preparing annual work plans and budgets and annual procurement plans; and (c) assuming overall responsibility for, among others, fiduciary tasks such as procurement, FM, M&E (for example, developing and maintaining a system for monitoring the project's key performance indicators), communications, and environmental and social safeguards (ensuring adherence to the safeguard documents of all entities involved in the project's implementation). AFAP will report to the Steering Committee to ensure clear communication with all relevant ministries and obtain decisions on issues pertaining to multiple government stakeholders. In particular, for all technical issues related to project implementation, a full-time project focal point at EMAE will be appointed, and technical EMAE staff tasked to the project will take the lead in implementing some activities under Components 2 and 3 and in reporting to the project coordinator in AFAP. Activities under Subcomponents 1.1 and 1.2 will be led by the main beneficiaries, AGER and the MINRA respectively, under the overall fiduciary responsibility of AFAP.

4. An ad hoc technical Working Group will follow up on implementation of the project and will be responsible for accompanying project implementation in detail and troubleshooting any potential issues, to ensure smooth implementation and timely delivery of activities. The Working Group will report to the MINRA and submit regular reports on progress of the project developments. This group will be chaired by a representative of the MINRA and will have representatives from AFAP, the project's advisor, the project focal point from EMAE, a representative from AGER, a representative from the Directorate of Environment from the MINRA, and a representative from the Directorate of Natural Resources and Energy of the MINRA. The group will meet quarterly and more frequently, if required.

Financial Management, Disbursements and Procurement

5. A Financial Management Assessment was carried out in accordance with OP/BP 10.00, Investment Project Financing, and the Financial Management Manual for World Bank's Investment Project Financing Operations issued by the FM Sector Board on March 1, 2010 and retrofitted on February 4, 2015. The objective of this assessment was to determine whether the proposed implementing agency, AFAP, has acceptable FM arrangements for the implementation of the proposed Power Sector Recovery Project. The arrangements are considered acceptable if the entity's planning, budgeting, accounting, internal controls, funds flow, financial reporting, and auditing arrangements (a) are capable of correctly and completely recording all transactions and balances related to the project; (b) facilitate the preparation of regular, timely, and reliable financial statements; (c) safeguard the project's assets; and (d) are subject to auditing arrangements acceptable to the World Bank.

6. AFAP, established under the MoFPA, will have overall fiduciary responsibility for implementation of this proposed project. AFAP has a track record in the implementation of the World Bank-financed education, telecommunications, and social protection projects. The recent review of FM arrangements at AFAP concluded that this agency continues to maintain acceptable FM arrangements for the implementation of the ongoing projects. AFAP's financial manager reporting to the agency coordinator, will have overall responsibility for project FM matters. The project funds, expenditures, and resources will be accounted for using the existing automated accounting software and the basis of accounting will be cash basis. The proposed project will make use of advances and direct payment methods for disbursements. However, special commitments and reimbursement will also be available for the project. The implementing agency will prepare single quarterly IFRs covering all project funds and expenditures and provide such reports to the World Bank within 45 days of the end of each calendar quarter. The project's single set of financial statements (covering all project funds and expenditures) will be audited by the independent auditor in accordance with International Standards on Auditing, as promulgated by the IFAC. The overall conclusion of the Financial Management Assessment is that the project's FM arrangements have an overall residual FM risk rating of Moderate, and satisfy the World Bank's minimum requirements under FM policy and procedures for World Bank investment project financing operations.

Budgeting

7. The annual project budget will be prepared based on Government policy guidelines and regulations. The procedures for preparation of annual budgets are documented in the FM Procedures Manual in use for the implementation of the ongoing projects. The project's annual work plans will be prepared by AFAP with input from beneficiaries and the procurement plan will provide relevant information for it.

Staffing

8. AFAP will be responsible for fiduciary aspects of the project. The overall responsibility of project FM matters rests with the AFAP financial manager reporting to the coordinator. He has relevant qualifications and appropriate experience with regard to FM procedures and requirements of World Bank-financed projects. He is currently handling the FM matters of the

ongoing São Tomé and Principe Quality Education for All Project.

Accounting

9. AFAP will account for the project funds, expenditures, and resources using an existing automated accounting software and the basis of accounting will be cash basis. This accounting package is a sound accounting software that enables key controls and is capable of producing timely and reliable financial information. The proposed project accounting system is adequate as the implementing agency will be capable of producing, in a timely manner, necessary financial reports to monitor and effectively manage the project.

Internal Controls

10. The General Inspectorate of Finance ('IGF-Inspeção Geral das Finanças') may conduct internal audit reviews of the operations as its mandate is to carry out internal audit reviews of the entire Government entities. However, this will depend on their work plans. For the purpose of this project, regular supervision through desk reviews and field visits will be carried out by the World Bank to ensure that the implementing agency is maintaining adequate systems of internal controls and key procedures are complied with. The finance and administrative procedures to be employed by the agency in the implementation of the project are documented in the existing FM Procedures Manual currently in use by AFAP. This manual will be reviewed to incorporate specific aspects of the activities of the proposed Power Sector Recovery Project and this will be completed within three months after the project effectiveness.

Financial Reporting

11. AFAP is producing regular quarterly progress reports for the ongoing Quality Education for All Project and these includes financial reports. These reports provide financial information required to monitor and manage effectively the project. For the proposed project, this agency will produce and submit to the World Bank a single IFR covering all project funds and expenditures within 45 days after the end of the calendar quarter. The contents of these reports should consist of financial reports, including all sources and uses of funds reports by project components and categories, uses of funds by project components and activities (comparing budget and actual expenditures).

12. The implementing agency will also produce annual project financial statements, which will comprise the following:

(a) A Statement of Sources and Uses of Funds/Cash Receipts and Payments which recognizes all cash receipts, cash payments, and cash balances controlled by the entity for this project and separately identifies all payments by third parties on behalf of the agency.

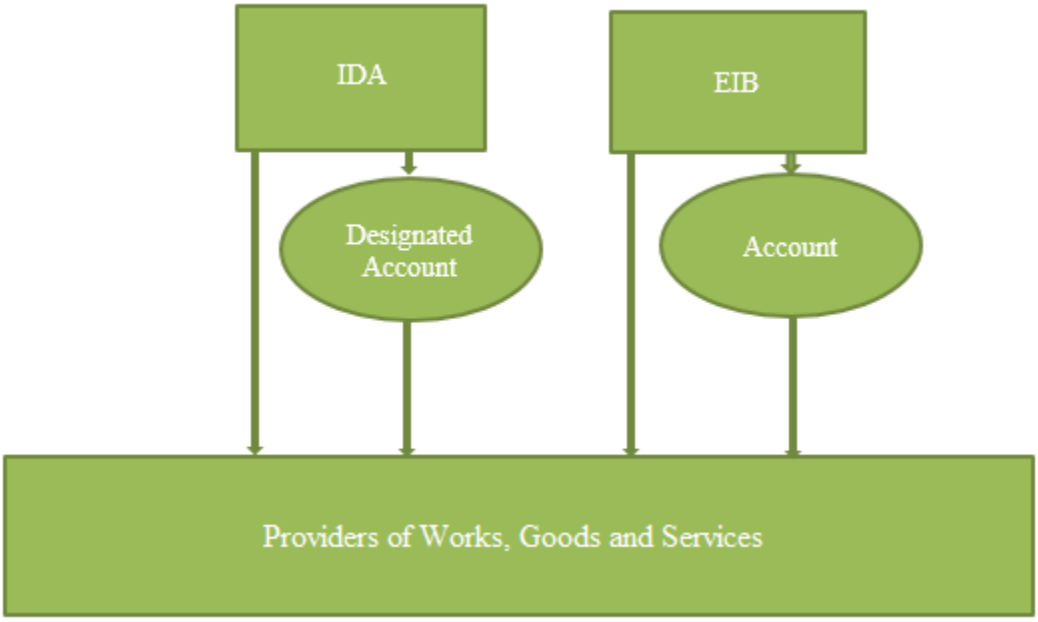
(b) The accounting policies adopted and explanatory notes. The explanatory notes should be presented in a systematic manner with items on Statement of Cash Receipts and Payments being cross referenced to any related information in the notes. Examples of this information include a summary of fixed assets by category of assets.

(c) A Management Assertion that IDA funds have been expended in accordance with the intended purposes as specified in the relevant World Bank Legal Agreement.

Funds Flow and Disbursement Arrangements

13. To facilitate the implementation of the project activities, AFAP will establish and maintain a segregated Designated Account (DA), for deposit of funds from IDA, in U.S. dollars at commercial bank under terms and conditions acceptable to the World Bank. Funds in the DA will be used to finance the activities of projects in accordance with Financing Agreement and the Disbursement Letter. From the DA, AFAP will make payments to providers of works, goods, and services. AFAP will also maintain a separate account for deposit of funds from the EIB under terms and conditions of these agency.

Figure 3.1. Illustration of the Funds Flow



14. Disbursement of IDA funds will be done on a transaction basis. The project will have the option to move to report-based disbursement once the FM system and the project's forecasting capacity have been assessed as satisfactory for that mode of disbursement. Once in report-based disbursement mode, quarterly IFRs will be acceptable as the basis for disbursements. These reports will include information under three main categories: (a) project financial statement, which includes a summary of sources and uses of funds, an updated six-month forecast, DA activity, reconciliation statements, and statements of eligible expenditures by disbursement category for contacts/other expenditures above/below the procurement prior review thresholds; (b) a project progress report explaining variances between actual physical and financial progress versus forecasts; and (c) a procurement management report showing procurement status and contract commitments.

15. At the inception of the project, an advance will be made into a project DA to be

maintained by the AFAP. The advances will be used for eligible project expenditures financed by IDA in sufficient amount to execute project activities. Subsequent advances will be made upon receiving applications supported with statements of expenditures reporting on the use of previous advances for eligible expenditures. The option of disbursing the funds through direct payments from IDA for payments above the threshold indicated in the Disbursement Letter will be available. Withdrawal applications for such payments will be accompanied by relevant supporting documents such as copies of the contract, contractors' invoices, and appropriate certifications. Options for the use of special commitments and reimbursements will also be available. The Disbursement Guidelines for World Bank Projects issued in May 2006 provides guidance on disbursement arrangements for financing provided or administered by the World Bank. The World Bank will issue the Disbursement Letter that will specify additional instructions for withdrawal of the proceeds of the Grant.

16. The EIB funds will be used to pay for expenditures under contracts not financed from IDA funds. The procurement plan will indicate which contracts will be financed from the EIB funds.

Table 3.1. Disbursement Table

Category	Amount of the Grant Allocated (expressed in US$)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, consultants' services, Training and Operating Costs for Parts 1, 2.1, 2.2, 2.6, 3.1, 3.2, and 4 of the project	15,300,000	100
(2) Refund of Preparation Advance	700,000	Amount payable pursuant to Section 2.07 of the General Conditions
TOTAL AMOUNT	16,000,000	

Auditing

17. The project will be audited annually by independent auditors acceptable to the World Bank. The project's single set of financial statements (covering all project funds and expenditures) will be audited in accordance with International Standards on Auditing as promulgated by the IFAC and the audit report together with Management Letter will be submitted to IDA within six months after the financial year-end; that is June 30 of each following year. The costs incurred for the audit will be financed under the project. The auditors will be required to express a single opinion on the project's single set of financial statements. In addition, a detailed Management Letter containing the auditor's assessment of the internal controls, accounting system, and compliance with financial covenants in the Financing Agreement, suggestions for improvement, and management's response to the auditor's Management Letter will be prepared and submitted to the management for follow-up actions. The arrangements for the appointment of the external auditors of the project financial statements have been communicated to IDA through agreed terms of reference.

Financial Management Action Plan

18. To establish an acceptable control environment and to mitigate FM, risks the following measures should be taken by the due dates as indicated in the Financial Management Action Plan in Table 3.2.

Table 3.2. Financial Management Action Plan Due Dates

Number	Action	Responsibility	Completion Date
1	Updated the FM procedures manual acceptable in form and substance to the World Bank	AFAP	Within 3 months after effectiveness
2	Updated the accounting system to reflect specifics of the project activities of the project	AFAP	Within 3 months after effectiveness
3	Appointment of the project external auditor	AFAP	Within 4 months after effectiveness

FM Risk Assessment and Mitigation

19. The World Bank's principal concern is to ensure that project funds are used economically and efficiently for the intended purpose. Assessment of the risks that the project funds will not be appropriately used is an important part of the Financial Management Assessment work. The risk features comprise two elements (a) the risk associated with the project as a whole (inherent risk), and (b) the risk linked to a weak control environment with regard to the project implementation (control risk). The content of these risks is described in Table 3.3.

Table 3.3. Risks and Mitigating Measures

Risk factors/Description of Risk	Risk Rating	Risk Mitigating Measures Incorporated into the Project Design	Conditions of Negotiations, Board or Effectiveness (Yes or No)	Residual Risk Rating
Inherent Risk:				
Country level: The country faces human resource constraints; outdated legal framework on budgeting, internal and external auditing functions; limited coverage of IFMIS and Single Treasury Account.	S	The São Tomé and Príncipe Government is committed to implement reforms of the country's PFM with support of the development partners. These include: implementation of IFMIS, Single Treasury Account, and capacity building to key PFM institutions. The ring-fencing of the project under AFAP will mitigate these weaknesses.	No	S

Risk factors/Description of Risk	Risk Rating	Risk Mitigating Measures Incorporated into the Project Design	Conditions of Negotiations, Board or Effectiveness (Yes or No)	Residual Risk Rating
Entity level: The implementing agency may not be able to meet the FM requirement due to limited qualified accounting staff in the country.	L	The project implementing agency, AFAP, has a track record in the implementation of the World Bank-financed education, telecommunications, and social protection projects, and will have overall responsibility of the project FM.	No	L
Project level: The resources of the project may not be used for the purpose intended.	M	This is a simple project with only one spending unit and the project implementing agency will comply with key internal controls as set out in the FM Procedures Manual. The World Bank will provide necessary implementation support on project FM matters.	No	M
Control Risk:				
Budgeting: Weak budgetary execution and control leading to budgetary overrun or inappropriate use of project funds.	M	The FM Procedures Manual will spell out the budgeting and budgetary control arrangements to ensure appropriate budgetary oversight. The IFRs will include comparison of planned and actual project expenditures.	No	M
Accounting: Project funds, expenditures, and resources are not properly recorded	M	AFAP will make use of the automated accounting package to account for project funds, expenditures and resources, which is currently in use by the ongoing operation.	No	M
Internal control: Noncompliance with key internal control procedures due to weak internal control environment and oversight mechanisms in the country.	M	Financial and administrative procedures to be employed by AFAP in project implementation are documented in the existing FM Procedures Manual. The manual currently in use will be reviewed to ensure that specific aspects of the project activities are appropriately addressed by it.	No	M

Risk factors/Description of Risk	Risk Rating	Risk Mitigating Measures Incorporated into the Project Design	Conditions of Negotiations, Board or Effectiveness (Yes or No)	Residual Risk Rating
		The World Bank's regular FM implementation support through desk reviews and field visits will make appropriate recommendations to improve the project's FM environment.		
Funds flow: Delay in implementation of project activities due to lack of knowledge of World Bank's disbursements procedures.	L	Project disbursements will be handled by the AFAP financial manager who is capable of performing his duties well. The project finance staff are familiar with the World Bank's disbursement procedures.	No	L
Financial reporting: The implementing agency may not be able to produce the financial reports in a timely manner as required to monitor and effectively manage the project.	M	The implementing agency is producing financial reports required to monitor and effectively manage the progress of ongoing World Bank-financed operations and a similar financial reporting system will be in place for the proposed operation. AFAP will use the automated accounting package that will enable the efficient and timely generation of financial information.	No	M
Auditing: Delays in submission of audit reports or delays in implementing the recommendations of the Management Letter.	M	An independent external audit firm will be hired by the project to ensure compliance with the audit submission timelines set out in the financing agreement. The World Bank will monitor audit submission compliance and ensure implementation of Management Letter recommendations.	No	M
Governance and Accountability: Possibility of corrupt practices including bribes, abuse of administrative and political positions, mis-procurement and misuse of funds and so on, are critical issues.	S	Robust FM arrangements (including a comprehensive annual audit of project accounts, World Bank FM supervision including review of transactions and asset verification) designed to mitigate the fiduciary risks in addition to AFAP's overall internal control systems.	No	M

Risk factors/Description of Risk	Risk Rating	Risk Mitigating Measures Incorporated into the Project Design	Conditions of Negotiations, Board or Effectiveness (Yes or No)	Residual Risk Rating
OVERALL FM RISK	M			M

Note: IFMIS = Integrated Financial Management System; S = Substantial; M = Moderate; L = Low.

Procurement

20. Procurement activities for the proposed project will be carried out in accordance with the World Bank's 'Guidelines: Procurement of Goods, Works, and Non-consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers' dated January 2011, revised July 2014 and 'Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers' dated January 2011, revised July 2014 and the provisions stipulated in the Financing Agreement for the project.

21. Further, the 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants' dated October 15, 2006 and revised in January 2011 will apply.

22. The following activities form part of the project and are subject to World Bank's procurement procedures:

(a) **Works.** Works contracts procurement under the project may include the works for upgrade and expansion of the water load chamber, channel and tunnel portions, mechanical and electrical equipment of the hydropower plant, installation of MV isolators/auto-reclosers, rehabilitation of switching stations, and upgrade of existing access roads, among others;

(b) **Goods.** Goods procurement under the project may include provision of sourcing and installation of the MIS/CMS; installation of electricity meters, including statistical meters, transformers, among others;

(c) **Consulting services.** Consulting services selection may include the necessary engineering design, design checks, supervision for implementation of infrastructure works, design of regulatory provisions and training of regulator's personnel, power sector studies, future energy generations expansions, and training of EMAE staff.

23. To simplify the procurement procedures for the recipient, the donors agreed to ensure the preparation of a common implementation manual for the project.

Particular Methods of Procurement of Goods, Works, and Non-consulting Services

24. **International competitive bidding.** Except as otherwise provided below, goods, works, and non-consulting services shall be procured under contracts awarded on the basis of International Competitive Bidding (ICB).

25. **Other methods of procurement of goods, works, and non-consulting services.** The

following methods, other than ICB, may be used for procurement of goods, works, and non-consulting services for those contracts specified in the Procurement Plan:

(a) National Competitive Bidding (NCB)
(b) Shopping
(c) Direct Contracting

Particular Methods of Procurement of Consultants' Services

26. **Quality- and Cost-based Selection.** Except as otherwise provided in the paragraph below, consultants' services shall be procured under contracts awarded on the basis of Quality and Cost-based Selection (QCBS).

27. **Other methods of procurement of consultants' services.** The following methods, other than QCBS, may be used for procurement of consultants' services for those contracts which are specified in the Procurement Plan:

(a) Least Cost Selection (LCS)
(b) Selection Based on Consultants' Qualifications
(c) Selection under a Fixed Budget
(d) Single-source Selection of Consulting Firms
(e) Individual Consultants' Selection (ICS)
(f) Single-source procedures for the ICS

Review by the World Bank of Procurement Decisions

28. The review thresholds are shown in Table 3.4. The Procurement Plan shall set forth those contracts which shall be subject to prior review by the World Bank. All other contracts shall be subject to post review by the World Bank. The World Bank may, at its own discretion, require that a sample of contracts below the threshold be subject to prior review, at any time or when the Procurement Plan is updated.

Table 3.4. Provisional Thresholds for Procurement and Review Methods[3]

Expenditure Category	Contract Value Threshold (US$)	Procurement/ Selection Method	Contracts Subject to Prior Review
Works	≥3,000,000	ICB	All
	< 3,000,000	NCB	None
	< 200,000	Shopping	None
	–	Direct Contracting	All
Goods	≥500,000	ICB	All
	< 500,000	NCB	None
	<100,000	Shopping	None
	-	Direct Contracting	All
Consulting Services - Firms[4]	≥ 300,000	QCBS	All
	< 300,000	CQS/Other (QCBS/LCS/FBS)	None

[3] The thresholds may be revised from time to time, upward or downward, based on the continued assessment of the performance of AFAP.
[4] All Terms of Reference should be submitted for Bank prior review.

Expenditure Category	Contract Value Threshold (US$)	Procurement/ Selection Method	Contracts Subject to Prior Review
	-	SSS	All
Consulting Services - Individuals (IC) [5]	≥ 100,000	ICS	All
	< 100,000	ICS	None
	–	SSS	All

Note: CQS = Consultant Qualification Selection; SSS = Single Source Selection.

Procurement Plan

29. The recipient has developed a Procurement Plan for the first 18 months of project implementation. This plan was agreed between the recipient and the World Bank during negotiations. The plan will be made available on the project database, and on the World Bank's external website after Board approval. The Procurement Plan will be updated annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

30. The initial Procurement Plan contains the activities listed in Tables 3.5 and 3.6.

Table 3.5. Activities for Goods and Works

1	2	3	4	5	6	7
Ord. No.	**Ref. No.**	**Contract (Description)**	**Estimated Cost**	**Procurement Method**	**Review by World Bank (Prior/Post)**	**Expected Bid-Opening Date**

[5] All Terms of Reference should be submitted for Bank prior review.

1	2	3	4	5	6	7
Ord. No.	**Ref. No.**	**Contract (Description)**	**Estimated Cost**	**Procurement Method**	**Review by World Bank (Prior/Post)**	**Expected Bid-Opening Date**
	01/W/PSR/2016	Rehabilitation of the Contador hydroelectric power plant	7,000,000	ICB	Prior	February 28, 2017
2	02/W/PSR/2016	Rehabilitation and extension of LV network	6,500,000	ICB	By EIB	July 20, 2017
3	03/W/PSR/2016	Rehabilitation and expansion of the access roads in Ponta Figo	480,000	NCB	Post	December 09, 2016
4	01/G/PSR/2016	Purchase of three double cabin 4WD pickups	99,000	Shopping	Post	November 30, 2016
5	01/S/PSR/2016	Purchase, installation and configuration of the MIS within EMAE	600,000	ICB	Prior	May 18, 2017
6	02/S/PSR/2016	Purchase and installation of 3,000 electricity meters for large customers	1,200,000	ICB	Prior	August 25, 2017
7	03/S/PSR/2016	Purchase and installation of 170 statistical meters for large customers	300,000	NCB	Post	October 18, 2017
8	04/S/PSR/2016	Purchase and installation of 2,000 diphasic electricity meters and 16,000 monophasic electricity meters	3,700,000	ICB	Prior	March 18, 2018
9	05/S/PSR/2016	Rehabilitation of a key components of Contador evacuation line and MV network	900,000	NCB	Post	October 18, 2017
10	06/S/PSR/2016	Update of the existing AFAP's management software	30,000	DC	Prior	November 18, 2016

Table 3.6. Activities for Selection of Consultants Services

1	2	3	4	5	6	7
Ord. No.	**Ref. No.**	**Description of Assignment**	**Estimated Cost**	**Selection Method**	**Review by World Bank (Prior / Post)**	**Expected Proposals Submission Date**
1	01/C/PSR/16	Project Audit	80,000	LCS	Prior	November 24, 2016
2	02/C/PSR/16	Development of integrated Least Cost Power Development Plan for Sao Tome and Principe	400,000	QCBS	Prior	December 02, 2016
3	03/C/PSR/16	Project planning and work supervision for rehabilitation and construction work of access roads to Contador Facility	80,000	CQS	Post	December 16, 2016
4	04/C/PSR/17	Technical Assistance to modernize and harmonize legal and regulatory framework of the Energy Sector	250,000	QCBS	Prior	January 20, 2017
5	05/C/PSR/17	Preparation of Management Improvement Plan for EMAE	400,000	QCBS	Prior	February 20, 2017
6	06/C/PSR/17	Consultation and Communication Strategy to end users	400,000	QCBS	Prior	July 20, 2017
7	07/C/PSR/17	Demand Forecast Study	95,000	IC	Post	January 6, 2017
8	08/C/PSR/17	Tariff Study	200,000	CQS	Prior	December 7, 2017
9	09/C/PSR/17	Technical Assistance to prepare the network protection	600,000	QCBS	Prior	December 7, 2017
10	09/C/PSR/17	Technical Assistance to structure the Public Private Partnership strategy for AGER	70,000	IC	Post	December 7, 2017

31. The frequency of procurement supervision missions will be once every six months. Special procurement supervision for post procurement reviews will be carried out at least once every 12 months.

Monitoring and Evaluation

32. The results framework, attached as Annex 1, identifies results indicators for the project as a whole as well as for each of its components. The project implementing agency, AFAP, will be responsible for collecting and verifying data, and will consolidate the information and submit progress reports to the World Bank on a semiannual basis for the PDO indicators and for the intermediate indicators at component level.

33. AFAP will get its information from the different project stakeholders, in particular EMAE, but also directly from other stakeholders when necessary. To ensure a smooth and regular collection of information, AFAP will rely on the EMAE focal point in charge of technical support and collection of information available in EMAE's databases, who will pass on the information to AFAP for consolidated reporting to the World Bank. AFAP will also rely on counterparts from the Technical Working Group for M&E.

34. AFAP will have overall responsibility for reporting to the Government, including the Ministry of Finance and Ministry of Natural Resources. AFAP will put together the M&E report on an annual basis that will include updates on targets captured in the results framework and an action table in case achievement of indicators is delayed, listing the corrective actions to be implemented with deadlines and persons responsible clearly identified. The report will be sent to the World Bank for information. The evaluation of results indicators will be part of regular joint IDA/EIB supervision missions.

35. **EMAE key performance indicators.** To enable tracking of improved performance as a result of an improved MIS and staff capacity building activities under Component 2 of the project, during the third year of project implementation and following the commissioning of the MIS, EMAE shall prepare a set of key performance indicators covering the key business functions. The key performance indicators shall include both medium-term performance improvement targets and annual work plan targets. In addition, the annual targets will be used to develop and implement a performance dashboard that will be used to track and measure performance on a real time basis. AGER, the regulator, would be involved in the development of EMAE's key performance indicators.

Environmental and Social (including safeguards)

36. The implementing agency, AFAP, is under the MoFPA and has long experience in implementation of World Bank-financed projects. One of the reference projects that was recently implemented by AFAP is the Central African Backbone Project, a category B project which triggered two safeguards policies (OP/BP 4.01 and OP/BP 4.12). In the case of the Central Africa Backbone Project, the implementation of safeguards instruments was done through the Directorate of Environment of the MINRA, which was part of the Steering Committee established to follow-up and monitor the project. The model used for the Central Africa Backbone Project will be replicated to implement safeguards in the proposed Power Sector Recovery Project. Should the scope of the interventions recommended under the site-specific environmental and social management plans require it, AFAP will recruit additional environmental and social safeguards capacity to support their implementation.

37. The detailed locations of the works proposed for the rehabilitation of the hydropower plant (potential additional load chamber) and for upgrading of existing assets are not known currently as they will only be confirmed once the final, detailed designs have been carried out. An ESMF has therefore been prepared to ensure that activities to be financed under the project would not create adverse impacts on the local environment and local communities and that the residual and/or unavoidable impacts will be adequately mitigated. The ESMF has taken into account the environmental and social profiles in the project areas on the potential activities to be supported by the project. The ESMF assesses at this first stage the environmental and social impacts of the project components to ensure that they are environmentally and socially sound and sustainably implementable, in line with Government and World Bank policies and guidelines on environmental and social impact management. The second stage of the environmental and social impact assessment will be undertaken when the detailed technical design of Component 3 activities will be finalized and for which an ESIA will be prepared to assess in detail the project's environmental and social impacts, and a freestanding ESMP will be prepared as needed. The final ESMF was disclosed in-country and at the World Bank's InfoShop on April 25, 2016.

Annex 4: Implementation Support Plan

DEMOCRATIC REPUBLIC OF SÃO TOMÉ AND PRÍNCIPE:
Power Sector Recovery Project

Strategy and Approach for Implementation Support

1. The project will involve the procurement of goods and works contracts through International Competitive Bidding and service contracts through QCBS.

2. Most of the procurement activities and contracting for the project will be carried out early in the project implementation period. Implementation support will therefore take place in two phases, with the first 18 months of project implementation expected to emphasize the review of technical and procurement documents and subsequent supervision expected to emphasize supervision of works, and advisory and planning that builds on technical assistance activities financed under the project.

3. **First phase (18 months).** Technical implementation support will focus on ensuring adequate capacity of the project implementation unit, AFAP; appropriate technical design of the infrastructure investments; and carrying out the majority of the project's procurement. Early World Bank support under this phase will specifically focus on concluding the optimization study for the Contador hydropower plant and the recruitment of a technical advisor launched under the Project Preparation Advance. Support will also focus on the tenders for the rehabilitation and expansion contract, rehabilitation of the key grid components contract, and various technical assistance activities and studies such as the LCPDP. In this regard, bidding documents and terms of reference prepared by the client will be reviewed by the World Bank to ensure that tasks were appropriately defined and qualifications and experience are adequate to perform the key functions required for successful implementation. The World Bank team will include staff and consultants, complemented with specialized expertise as required.

4. **Second phase (years two through five).** Upon conclusion of the procurement for key activities, the World Bank support will focus on monitoring the construction process, safeguards, contracts management, disbursements, and effectiveness of capacity building and technical assistance activities. Specifically, the World Bank will ensure that safeguards are implemented for all project components and client instruments are prepared such as the ESMF in line with the World Bank's policies. The World Bank team will include staff as well as consultants with specialized expertise in relevant subject areas such as hydropower, gender or energy.

5. To create synergies and reduce the administrative burden to the client, supervision teams from the World Bank and the EIB plan to conduct joint supervision missions. All efforts by the World Bank and the EIB will be made to harmonize processes (Implementation Manual) and minimize duplication of administrative/reporting procedures on AFAP.

Implementation Support Plan

6. The detailed support from the World Bank team during project supervision is outlined in the following paragraphs.

7. **Environmental and social safeguards.** The World Bank's safeguards team will support (a) implementation of safeguards requirements through regular implementation support missions, including visits to the project sites; (b) review of environmental monitoring reports and following up on any safeguards issues that may arise during to project implementation with AFAP, EMAE, and relevant government authorities; and (c) provide training on safeguards to AFAP and EMAE staff.

8. **Procurement and technical.** The World Bank team will (a) review procurement documents including technical specifications and provide timely feedback and no objection; (b) monitor procurement progress against the Procurement Plan developed by AFAP; and (c) provide just-in-time procurement training on World Bank guidelines to AFAP and EMAE as needed.

9. **Financial management.** The World Bank team will provide implementation support to review the project's FM system, including but not limited to accounting, reporting, and internal controls. The objective of the FM implementation support plan is to ensure that the project maintains a satisfactory FM system throughout its life. The project will be supervised on a risk-based approach. The FM supervision will be carried out by the World Bank's financial management specialist. Supervision will focus on the status of the FM system to verify whether AFAP continues to maintain acceptable project FM arrangements and provides support wherever needed. It will include a review of quarterly progress reports and audit reports and follow-up on material accountability issues by engaging with the task team leader, client, and/or auditors. Based on the current FM risk assessment of moderate, field visit supervision will be at least once during the fiscal year and adjusted as the need arises.

10. **Implementation progress.** The World Bank will closely monitor the overall progress of project implementation, including the rehabilitation and potential expansion of the Contador hydropower plant.

11. The proposed implementation support requirements are given in Table 4.1.

Table 4.1. Implementation Support Requirements to be provided by the World Bank

Time	Focus	Skills Needed	Resource Estimate	Estimated Cost (US$)
Years 1 to 5	Monitor and assist in the procurement of main contracts	Procurement specialist	1	250,000
		Hydropower engineer	1	
		Transmission and distribution engineer	1	
	Monitor FM implementation and disbursement	Financial management specialist	1	80,000
	Supervise safeguards implementation	Environmental and social safeguards specialists	1+1	80,000
	Supervise project implementation progress and achievement of PDO	Team leader	1	190,000

Table 4.2. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Team leader (including hydropower expertise)	16	4	HQ
Power engineer	2	2	Based in region
Procurement specialist	4	2	Based in region
Financial management specialist	4	2	Based in region
Environmental specialist	4	2	HQ
Social specialist	4	2	HQ
TOTAL	34	14	

Annex 5: Economic and Financial Analysis

DEMOCRATIC REPUBLIC OF SÃO TOMÉ AND PRÍNCIPE: Power Sector Recovery Project

Project's Development Impact with regard to Expected Benefits and Costs

1. This annex provides an economic and financial analysis of the proposed project, in particular, Components 2 and 3 for which the benefits are estimated. The specific activities under Component 2 include the two phases of the RPP, namely, the purchase and installation of over 20,000 meters to reduce unmetered consumption, and under Component 3, the rehabilitation of the water load chamber, channel, and tunnel portions, mechanical, and electrical equipment for the 2.2 MW Contador hydropower plant. Activities under Component 1 are standalone technical assistance to strengthen planning and build capacity. While these are expected to generate significant economic and financial benefits by improving the management of the utility and of the sector, these benefits are not considered in the economic and financial analysis.

2. The analysis thus provides a conservative estimate of the net benefits of the project. The investment costs of all components are taken into account, (apart from activities under Component 1 as explained above) but certain benefits are not captured. For instance, additional economic benefits would arise from the implementation of the RPP, such as a reduction in consumption from improved metering, allowing users to better monitor and adjust their consumption. However, the lack of detailed information or adequate MIS data prevents a reasonable estimation of these benefits. Additionally, the analysis uses very conservative assumptions for the base case: a cost overrun of 10 percent for overall project costs; reasonably low improvements in losses from the program interventions; and for Contador, retention of the low hydrology scenario. The fact that the plant currently operates with only one of its two turbines has not been reflected in the analysis.

Rationale for Public Sector Provision/Financing

3. The rationale for public sector financing is that the likelihood of obtaining private financing for the proposed investments is low. This low likelihood is caused by the low-income levels of the target population, the high capital costs of hydropower, and the lack of creditworthiness of EMAE. Low income and electricity consumption levels in rural areas and small towns create conditions that are not, at this stage, attractive to the private sector. Renewable energy technologies, even if limited to rehabilitation, have relatively high capital costs, which makes it difficult to attract commercial financing given the current tariff structure, high technical and nontechnical losses, and absence of creditworthiness of EMAE, which would not be a credible off-taker.

Value Added of World Bank's Support

4. The proposed project builds on the previous engagements of the World Bank in the sector. Drawing on the expertise and experience from work in different regions of the world, this project incorporates best practices in design execution and operation of the refurbished generation and distribution system. In the context of this project, the World Bank also provides

significant value added and convening power by leading donor partners and allowing IDA to leverage considerably the resources provided to the Government with parallel co-financing.

Economic Analysis

5. The economic analysis shows that the project is economically viable with an EIRR of 11.9 percent and NPV of US$13 million at a 6 percent discount rate. If GHG accounting is taken into account, the EIRR rises to 13 percent with a NPV of US$15.3 million. There are three main channels for economic benefits: the expanded electricity generation from the Contador power plant, reduced technical losses through the rehabilitation of the LV network, and improved reliability of supply through the installation of the isolators on the evacuation line from the Contador plant. Table 5.1 presents a summary of the analysis results and Table 5.2 presents the macroeconomic assumptions used in the economic and financial models.

Table 5.1. Summary of Economic and Financial Analysis

Economic Analysis	
EIRR	11.9%
NPV	US$13 million
EIRR (including GHG accounting)	13%
NPV (including GHG accounting)	US$15 million
Levelized benefit	US$0.32/kWh

Financial Analysis	
FIRR	9.6%
NPV	US$7.2 million

Table 5.2. Main Macroeconomic Assumptions (First 10 years)

	SÃO TOMÉ and PRINCIPE										
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Domestic deflator	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
US$ deflator	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Exchange rate	20,230	20,329	20,428	20,529	20,629.6	20,730.7	20,832.3	20,934.5	21,037.1	21,140.2	21,243.8
World oil price, 2015 US$	30.0	33.2	36.8	40.8	45.1	50.0	50.3	50.5	50.8	51.0	51.3
Carbon price	30	30	30	30	30	30	30	30	30	30	30

6. The investment costs of all project components excluding Component 1 are retained in the economic analysis, and an additional 10 percent cost overrun is assumed in the baseline analysis. The main investment costs of the Contador rehabilitation (Subcomponent 3.1) include the capital investments in the plant and network, and costs for O&M activities of the power plant of 2 percent investment costs have been added. All costs exclude the impact of any tax or subsidy for the purposes of the economic analysis. Project costs (excluding the cost overrun) are summarized in Table 5.3.

Table 5.3. Project Costs

	2016	2017	2018	2019	2020	2021	*Total*
	0	1	2	3	4	5	
Financial costs							
Component 1	0.00	1.20	0.00	0.00	0.00	0.00	*1.20*
Component 2	0.00	0.10	3.50	1.95	1.95	0.00	*7.50*
Component 3: Contador	0.00	0	5.30	5.30	0.00	0.00	*10.60*
Component 3: Low voltage	0.00	0.00	1.95	1.95	1.95	1.95	*7.80*
Component 4	0.00	0.38	0.38	0.38	0.38	0.38	*1.90*
Total yearly costs included	0.00	0.48	11.13	9.58	4.28	2.33	*27.80*

7. The economic benefits of the project flow from an increase in the power delivered to the grid from the Contador hydropower plant, a reduction in technical losses on the grid, and from the improved reliability of supply from the Contador power plant.

8. The economic analysis takes into account a capacity of 2.2 MW on the basis of discounted cash flow in real 2015 U.S. dollars over a 20-year period. The increased generation of the Contador hydropower plant after rehabilitation are measured from a baseline of current generation. It is assumed that the plant would be decommissioned in 2026 without this rehabilitation, and that it would continue to produce at its current low available capacity of 7,696 MWh until then (note that the recent failure of one of the turbines has not been taken into account). The increase in available generation capacity is due to the installation of new mechanical and electrical equipment bringing back the nominal capacity to 2.2 MW and generating 15,300 MWh by 2019 under a conservative low hydrology assumption, according to the technical evaluation (see Table 5.4).

9. Grid technical losses will be reduced through the rehabilitation of the LV network. The estimated reduction from a baseline estimated at 14 percent in 2016 (one-third of total losses) to 10 percent in 2020 further contributes to reducing generation needs. The economic value of the additional Contador power and power saved through this reduction in technical losses is estimated at around US$0.19 per kWh in 2015, based on avoided costs of diesel electricity generation (see Table 5.5). The economic analysis assumes that the electricity is generated from diesel, the fuel source for over 90 percent of electricity production in São Tomé and Principe. The price of fuel is assumed to follow the world oil prices projected at US$50 per barrel by 2020, a conservative estimate based on several projection sources, including the International Energy Agency's 2015 World Economic Outlook (which projects a price of US$80 per barrel by 2020). The carbon price is assumed at US$30 per ton of CO_2, leading to an emission factor of thermal generation of 676 g per kWh (see Table 5.6).

10. Additionally, the installation of isolators on the evacuation line from Contador means a fault area can be remotely and immediately isolated and power supply restored to the other areas. An average of two hourly outages per week on this line is taken for the analysis. It is estimated that these isolators will result in a 90 percent reduction in the time of these outages. Based on regional comparators, the energy saved through the reduction in outages is valued at US$0.50 per kWh.

Table 5.4. Total Energy Generated and Distributed (First 5 Years)

Item		Unit	2016	2017	2018	2019	2020	2021
No project								
Energy produced (no Contador rehab.)		[MWh]	86027.0	86027.0	86027.0	86027.0	86027.0	86027.0
technical losses	14%	[%]	14%	14%	14%	14%	14%	14%
technical losses (excl. blackouts)		[MWh]	11655.2	11655.2	11655.2	11655.2	11655.2	11655.2
of which outage from Contador line		*[mins per week]*	*120*	*120*	*120*	*120*	*120*	*120*
of which outage from Contador line		*[MWh]*	*89.7*	*89.7*	*89.7*	*89.7*	*89.7*	*89.7*
commercial losses	*27%*	*[%]*	*27%*	*27%*	*27%*	*27%*	*27%*	*27%*
commercial losses		*[MWh]*	*23310.4982*	*23310.4982*	*23310.4982*	*23310.4982*	*23310.4982*	*23310.4982*
total losses	*41%*	*[%]*	*41%*	*41%*	*41%*	*41%*	*41%*	*41%*
total losses		[MWh]	34965.7	34965.7	34965.7	34965.7	34965.7	34965.7
Energy delivered to customers		[MWh]	74371.8	74371.8	74371.8	74371.8	74371.8	74371.8
With project								
Energy produced (incl. Contador)			86027.0	86027.0	86027.0	93468.2	93468.2	93468.2
technical losses	14%	[%]	14%	14%	12%	11%	10%	10%
technical losses (excl. blackouts)		[MWh]	11655.2	11655.2	9934.7	9859.4	8924.7	8924.7
of which outage from Contador line		*[mins per week]*	*120.0*	*120.0*	*12.0*	*12.0*	*12.0*	*12.0*
of which outage from Contador line		*[MWh]*	*91.6*	*91.6*	*9.2*	*18.2*	*18.2*	*18.2*
commercial losses	*27%*	*[%]*	*27%*	*26%*	*24%*	*23%*	*22%*	*22%*
commercial losses		*[MWh]*	*23310.4982*	*22450.2279*	*20729.6873*	*21588.0759*	*20653.3942*	*20653.3942*
total losses		*[%]*	***41%***	***40%***	***36%***	***34%***	***32%***	***32%***
total losses		[MWh]	34965.7	34105.5	30664.4	31447.4	29578.1	29578.1
Energy delivered to customers		[MWh]	74371.8	74371.8	76092.3	83608.8	84543.5	84543.5
Increased energy delivered		[MWh]	0.0	0.0	1720.5	9237.0	10171.7	10171.7
of which avoided blackout		[MWh]	0.0	0.0	80.5	71.5	71.5	71.5

Table 5.5. Total Cost of Thermal Generation

Avoided Cost of Thermal Generation	Unit	2017	2018	2019	2020	2021
		1	2	3	4	5
World oil price	[US$/bbl]	36.8	40.8	45.1	50.0	50.3
	[US$/litre]	0.83	0.92	1.02	1.13	1.14
Unit fuel consumption	[gr per KWh]	215.00	215.00	215.00	215.00	215.00
Fuel density	[gr/L]	850.00	850.00	850.00	850.00	850.00
	[L/kWh]	0.25	0.25	0.25	0.25	0.25
Auxiliaries consumption	['%]	0.03	0.03	0.03	0.03	0.03
Fuel cost of generation (excluding O&M)	[US$/kWh]	0.21	0.24	0.26	0.29	0.29
Lubricants consumption/fuel consumption	[US$/kWh]	0.01	0.01	0.01	0.01	0.01
Other variable O&M	[US$/kWh]	0.01	0.01	0.01	0.011	0.01
Total cost of thermal generation	US$/kWh	0.23	0.25	0.28	0.31	0.31

Table 5.6. Fuel Cost and GHG Emissions of Thermal Generation

Fuel Cost (Diesel)	**2014**	**Unit**
Thermal generation	73,191,885	kWh
Volume	20,831,539	Liters
Cost	310,079,069	kSTD
Cost	14885.07	STD/Liter
Exchange rate	21947.3	STD/US$
Cost per Liter	**0.67**	US$/Liter
GHG Emissions		
Diesel fuel CO2 emission	10.12	Kg Co2/gallon diesel
Conversion	3.78	Liter per gallon
Diesel fuel CO2 emission	**2.67**	Kg Co2/Liter diesel
Unit fuel consumption	215	gr per KWh
Fuel density	850	gr/L
Diesel consumption per kWh	0.25	L per kWh
Emission factor of thermal generation	**0.67**	Kg CO_2 per kWh

Source: World Bank calculation, based on EMAE Annual Report 2014, http://www.epa.gov/climateleadership/documents/emission-factors.pdf.

11. The total economic value of the project is then computed as the sum of the economic benefits of increased energy delivered to the grid, and improved reliability of supply from Contador, amounting to total economic benefits of US$39 million in NPV and net of the sum of project costs, which amount to US$24 million in NPV, including a 10 percent cost overrun. The NPV of the project net benefits is computed using a 6 percent hurdle rate, based on a social discount rate formula assuming an economic growth of 3 percent per capita, and an absolute rate of time preference of zero (in line with the latest World Bank guidelines). The NPV of the net project benefits is estimated at US$13 million, for an EIRR of 11.9 percent. Net emissions for the project total 172,773 tons of CO2. Gross emissions are estimated to be negligible. Once the economic benefits from reduced CO_2 emissions are accounted for, the NPV increases to US$15.3 million and the EIRR to 13 percent (see Table 5.7).

Table 5.7. Economic Analysis Results

	Economic analysis														
				NPV	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
	operating year				0	1	2	3	4	5	6	7	8	9	10
1	**Economic costs**														
2	Local		[$USm]	**24**	**0.00**	**0.53**	**12.24**	**10.54**	**4.71**	**2.56**					
3															
4	Inrceased energy (replacing thermal - excl. outages)		[MWh]	*108447*	0.0	0.0	1720.5	9237.0	10171.7	10171.7	10171.7	10171.7	10171.7	10171.7	16682.9
5	**benefits**														
6	thermal production cost	**1.00**	[$/kWh]		0.21	0.23	0.26	0.28	0.31	0.32	0.32	0.32	0.32	0.32	0.32
7	avoided cost of thermal generation		[$USm]		0.0	0.0	0.4	2.6	3.2	3.2	3.2	3.2	3.3	3.3	5.4
8	total benefits from increased energy		[$USm]	*35*	0.0	0.0	0.0	2.6	3.2	3.2	3.2	3.2	3.3	3.3	5.4
9	Inrceased energy from reduced outages		[MWh]		0.0	0.0	80.5	71.5	71.5	71.5	71.5	71.5	71.5	71.5	71.5
10	value of reduced energy outages	0.50	[$/kWh]		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
11	total benefit avoided outages		[$USm]		0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
12	total benefits of project		[$USm]	**39**	0.00	0.00	0.04	2.66	3.22	3.24	3.26	3.27	3.29	3.30	5.42
13	levelized benefit		[$US/kWh]	*0.319*			0.023	0.288	0.317	0.319	0.320	0.322	0.323	0.325	0.325
14	incremental O&M	0.02	[$USm]		0.00	0.00	0.00	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21	-0.21
15	**total economic flows**		[$USm]	13	**0.0**	**-0.5**	**-12.2**	**-8.1**	**-1.7**	**0.5**	**3.0**	**3.1**	**3.1**	**3.1**	**5.2**
16	**ERR**		[ ]	**11.9%**											
17	**GHG benefits**														
18	*avoided diesel emissions*														
19	diesel generation	0			0.0	0.0	1720.5	9237.0	10171.7	10171.7	10171.7	10171.7	10171.7	10171.7	16682.9
20	emission factor	**0.68**	[kg/kWh]												
21	CO2		[ton]	172,773	0	0	1163	6246	6878	6878	6878	6878	6878	6878	11281
22	CO2 value	30	[$/ton]												
23	emission benefit		[$USm]	2.5	0	0	0	0	0	0	0	0	0	0	0
24	total ec. incl.GHG benefit		[$USm]	15.3	0	-1	-12	-8	-1	1	3	3	3	3	6
25	ERR		[ ]	**13.0%**											

12. **Sensitivity analysis.** A sensitivity analysis shows that the economic viability of the project remains resilient to changes in the key parameters (see Table 5.8). For every scenario, the parameter was tested to a reasonable extent to study the impact on the NPV of the project (using a 6 percent discount rate). Variations in the following parameters were analyzed: plant decommissioning date, investment cost increase, plant capacity, hydrology, oil price fluctuations, and economic growth rate in São Tomé and Principe affecting the discount rate used.

Table 5.8. Results of the Sensitivity Analysis of El Contador Hydropower Plant Rehabilitation

Sensitivity	Description	Impact on Project NPV (%)	Comment
Decommissioning of plant	The power plant continues operating for another 30 years in the absence of project.	-65	NPV would be reduced by 65 percent, if the power plant is assumed to continue operating for 30 years without rehabilitation (with no assumed depreciation).
Construction cost increase	A doubling of the expected cost during Contador rehabilitation process.	-64	A doubling of the Contador construction cost would reduce the NPV by 64 percent and the internal rate of return by 38 percent. Note that the base case already assumes a cost overrun of 10% for total project costs.
Plant capacity	The capacity of the hydro power plant is increased to 4 MW.	+62	The EIRR of the project rises to 17.2 percent, and the NPV rises by 62 Percent to US$25 million.
Hydrology	A base case hydrology is taken rather than the conservative dry scenario.	+55	The EIRR would rise to 16.7 percent if the 'base' hydrology scenarios were used, and the NPV would rise to US$24 million.
Oil price	The world oil price rises to US$80 per barrel in 2020, rather than the conservative estimate of US$50.	+145	A rise in the oil price to US$80/barrel by 2020 would lead to a 145 percent rise in the NPV of the project and an EIRR of 21.3 percent.
Growth in São Tomé and Principe	Growth in São Tomé and Principe is 5 percent per capita, implying a hurdle rate of 10 rather than 6 percent.	-71	The per capita growth rate assumed for the base case is a generous 3 percent. If this turned out to be 5 percent per capita, the hurdle rate used would rise to 10 percent, causing the NPV to decrease to US$4 million.

Financial Analysis

13. The financial analysis shows that the FIRR for the project is 9.6 percent with an NPV of US$7.2 million in real terms. All costs are taken into account excluding Component 1, as in the economic analysis. Financial flows emanate from the sale of the additional power produced by the Contador plant and the additional power delivered to the grid due to reduction in technical losses. The main additional channel for financial benefits is the reduction of commercial losses brought about by the RPP and tariff adjustment resulting from capacity building and the tariff study. Baseline commercial losses are estimated at approximately 27 percent, or two-thirds of total losses. It is conservatively assumed that the installation of meters for large customers in a first phase in 2017, followed by the replacement of existing meters over the next three years will lead to a progressive reduction in commercial losses of 4 percent from 2017.

14. The project will improve EMAE's financial standing by reducing its dependence on imported fuel, which is by far the largest cost item for the utility. Financial flows to the utility come from the sale of the increased power and increase in the share of power that is paid for by customers. All additional kWh of electricity is valued at an average retail tariff of US$0.21 calculated as the weighted average of tariffs reported by EMAE, adjusted for inflation, and assumed to rise in real terms over the period of analysis at an annual rate of 1.5 percent. This is a reasonable assumption considering that tariffs are currently estimated to be far below recovery, and a new tariff study commissioned under Component 1 will determine the pace of increases required to cover costs. Note that this valuation method, valuing the energy at the tariff rather than at the cost of avoided generation as in the economic analysis, explains the majority of the difference between financial and economic returns of the project.

15. The project financial returns are robust to greater cost overruns: a 40 percent cost overrun of total project costs would yield an NPV of US$508,000 and an FIRR of 6.2 percent. Additionally, if commercial losses only reduced by half of what is assumed in the base case, the FIRR would be 7.6 percent, and NPV US$3.2 million. Finally, if tariffs remain at their current level in real terms throughout the period of analysis the NPV would be US$1.5 million and the FIRR 6.8 percent.

Financial Analysis of EMAE

16. EMAE is the power and water utility of São Tomé and Príncipe, with the power side being the major driver of the financial situation of the utility (electricity makes up 85 percent of sales and more than 90 percent of operating costs).

17. While no audited financial statements are available for EMAE, the annual report produced by the utility provides fairly detailed accounting and financial information in addition to technical and commercial statistics (most recent available for calendar year 2014). While not audited, the information provided by EMAE appears internally consistent over time, and can be considered as broadly reflective of the situation of the utility.

18. The financial situation of the utility is characterized by a large operating deficit. EMAE power and water sales (US$12.6 million in 2014) are insufficient to cover the direct costs of electricity and water supply (US$18.2 million in 2014), which are composed of about 90 percent by purchase of fuel for power generation and purchase of electricity from small generators. Taking into consideration other current operating expenditures (mostly personnel costs), the current operating deficit in 2014 was US$8.2 million.

19. This imbalance between operating revenues and costs is structural (results for calendar year 2013 or 2012 are similar) and has resulted in the accumulation of substantial short-term debt (totaling approximately US$40 million at the end of 2014) corresponding almost solely to arrears with suppliers (fuel suppliers mostly). As a result of this situation, EMAE does not generate free cash flow to finance investments and does not have access to credit. EMAE investments are financed by the Government budget and donors.

20. The proposed project will contribute positively to EMAE operating profitably in the following ways:

- It will increase significantly the hydropower share of the generation mix and reduce fuel costs.
- It will support activities (network investments, metering, information systems) designed to reduce distribution losses (technical and nontechnical).

21. There is significant scope for improving EMAE commercial performance. To illustrate this point, starting from 2014 cost and operating parameters, the World Bank has simulated a scenario combining the following:

- A reduction of total distribution losses from 41 percent currently to 25 percent (approximately 10 percent technical and 15 percent nontechnical).
- A reduction of fuel and electricity purchase costs by 40 percent (the Contador rehabilitation under the project would mechanically reduce the volume of thermal generation by about 20 percent; because oil prices are significantly lower than in 2014, this level of reduction is not implausible).

22. In this scenario, which is representative of reasonable medium- to long-term performance objectives, EMAE would be able to achieve a positive current operating income and generate positive free cash flow covering a portion of its investments.

23. **Conclusion.** The project will support activities with a significant positive impact on EMAE cash flow and constitutes an important first step toward putting the operator in a sustainable financial position. Once on this path, consideration can be given to addressing the balance sheet imbalance (short-term debt representing about three years of turnover).

Table 5.9. EMAE Key Financial Indicators

US$ Millions	2014	2013	Performance Improvement Scenario	Comments regarding improvement scenario
Power	10.8	9.9	13.7	Total distribution loss reduction from
Water	1.9	2.0	2.4	current level (41%) to 25%
Total sales Power/Water	**12.6**	**11.9**	**16.1**	
Total direct variable costs of electricity supply	-17.9	-16.1	-11.5	Reduced cost of energy (Fuel and power) of 40%
Total direct variable costs water supply	-0.3	-0.3	-0.3	unchanged
Total direct variable costs of sales	**-18.2**	**-16.4**	**-11.7**	
as a % of sales	*144%*	*137 %*	*73%*	
Sales of other services and other gains	**0.9**	**0.6**	**0.9**	unchanged
Other operating expenses and supplies	**-1.0**	**-0.9**	**-1.0**	unchanged
Personnel costs	**-2.5**	**-2.1**	**-2.5**	unchanged
as a % of sales	*20%*	*18%*	*16%*	
Current Operating Income (Loss)	**-8.2**	**-6.9**	**1.7**	
as a % of sales	*-65%*	*-58%*	*11%*	
Depreciation and Provisions	**-3.0**	**-2.7**	**-3.0**	unchanged
Net income (loss) before exceptional	**-11.2**	**-9.6**	**-1.3**	
as a % of sales	*-88%*	*-80%*	*-8%*	

Annex 6: Map

DEMOCRATIC REPUBLIC OF SÃO TOMÉ AND PRÍNCIPE:
Power Sector Recovery Project