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The World Bank

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Report No: PAD2530

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT

IN THE AMOUNT OF SDR 28.4 MILLION
(US$41 MILLION EQUIVALENT)

TO THE

REPUBLIC OF THE GAMBIA

FOR THE

GAMBIA ELECTRICITY RESTORATION AND MODERNIZATION PROJECT

May 2, 2018

Energy and Extractives Global Practice
Africa Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective February 28, 2018)

Currency Unit =	Gambian Dalasi (GMD)
US$1 =	GMD 47.39
US$1 =	SDR 1.44589

FISCAL YEAR
January 1 - December 31

ABBREVIATIONS AND ACRONYMS

AWPB	Annual Work Plan and Budget
BADEA	*Banque Arabe pour le Développement Economique en Afrique* (Arab Bank for Economic Development in Africa)
BESS	Battery Electricity Storage System
CAPEX	Capital Expenditure
CIF	Climate Investment Funds
CPI	Climate Policy Initiative
DA	Designated Account
DPO	Development Policy Operation
DSCR	Debt Service Coverage Ratio
DSM	Demand-Side Management
EBITDA	Earnings Before Interest, Tax, Depreciation, and Amortization
EIB	European Investment Bank
EMS	Energy Management System
EPC	Engineering, Procurement, and Construction
ERR	Economic Rate of Return
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EU	European Union
FIMIS	Financial Management Information System
FIRR	Financial Internal Rate of Return
FM	Financial Management
FMA	Financial Management Assessment
GBA	Greater Banjul Area
GDP	Gross Domestic Product
GERMP	Gambia Electricity Restoration and Modernization Project
GESP	Gambia Electricity Support Project
GHG	Greenhouse Gas
GMD	Gambian Dalasi
GoTG	Government of The Gambia
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service

GWh	Gigawatt Hours
HFO	Heavy Fuel Oil
HV	High Voltage
IC	Individual Consultant
IFI	International Financial Institution
IFMIS	Integrated Financial Management Information Systems
IFR	Interim Financial Report
IMF	International Monetary Fund
IMS	Information Management System
IPF	Investment Project Financing
IPP	Independent Power Producer
IT	Information Technology
KPI	Key Performance Indicator
kWh	Kilowatt Hour
LCPDP	Least Cost Power Development Plan
LED	Light-Emitting Diode
LFO	Light Fuel Oil
M&E	Monitoring and Evaluation
MIS	Management Information System
MoFEA	Ministry of Finance and Economic Affairs
MoPE	Ministry of Petroleum and Energy
MoU	Memorandum of Understanding
MV	Medium Voltage
MVA	Megavolt Amper
MW	Megawatt
MWp	Megawatt Peak
NAWEC	National Water and Electricity Company
NDP	National Development Plan
NEA	National Environment Agency
NGO	Nongovernmental Organization
NPV	Net Present Value
O&M	Operations and Maintenance
OE	Owner's Engineer
OMVG	*Organisation pour la Mise en Valeur du Fleuve Gambie* (Gambian River Basin Organization)
OPEC	Organization of the Petroleum Exporting Countries
PAP	Project-Affected Person
PDO	Project Development Objective
PEFA	Public Expenditure and Financial Accountability
PFM	Public Financial Management
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PPA	Power Purchase Agreement
PPF	Project Preparation Fund
PPSD	Project Procurement Strategy for Development
PSP	Private Sector Participation

PURA	Public Utilities Regulatory Authority
PV	Photovoltaic
QCBS	Quality- and Cost-Based Selection
RAP	Resettlement Action Plan
RFB	Request for Bid
RFP	Request for Proposal
RFQ	Request for Quotation
RPF	Resettlement Policy Framework
SC	Steering Committee
SCADA	Supervisory Control and Data Acquisition
SDR	Special Drawing Rights
SE4ALL	Sustainable Energy for All
SENELEC	*Société Nationale d'Éléctricité du Sénégal* (National Electricity Utility of Senegal)
SOE	State-owned Enterprise
SPD	Standard Procurement Document
SVC	Social Value of Carbon
STC	Standard Testing Condition
T&D	Transmission and Distribution
ToR	Terms of Reference
VAWG	Violence Against Women and Girls
VRE	Variable Renewable Energy
WAPP	West African Power Pool
WTP	Willingness to Pay

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THE GAMBIA
GAMBIA ELECTRICITY RESTORATION AND MODERNIZATION PROJECT

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BASIC INFORMATION

Country(ies)	Project Name		
Gambia, The	Gambia Electricity Restoration and Modernization Project		
Project ID	**Financing Instrument**	**Environmental Assessment Category**	**Process**
P163568	Investment Project Financing	B - Partial Assessment	Urgent Need or Capacity Constraints (FCC)

Financing & Implementation Modalities

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

Expected Approval Date	Expected Closing Date
15-May-2018	31-Dec-2023

Bank/IFC Collaboration

No

Proposed Development Objective(s)

The Project Development Objectives are to (i) improve the operational performance of the Project Implementing Entity; and (ii) improve the capacity of the Project Implementing Entity to dispatch variable renewable electricity.

Components

Component Name	Cost (US$, millions)
On-grid solar PV with storage	28.40
Transmission and distribution (T&D) restoration and modernization	77.30
Urgent institutional support for sector turnaround	15.80

Organizations

Borrower:	Ministry of Finance and Economic Affairs
Implementing Agency:	National Water and Electricity Company NAWEC

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	121.50
Total Financing	121.50
of which IBRD/IDA	41.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Development Association (IDA)	41.00
IDA Grant	41.00

Non-World Bank Group Financing

Counterpart Funding	1.50
Borrower	1.50
Other Sources	79.00
EC: European Commission	17.00
EC: European Investment Bank	62.00

IDA Resources (in US$, Millions)

	Credit Amount	Grant Amount	Total Amount
National PBA	0.00	41.00	41.00
Total	**0.00**	**41.00**	**41.00**

Expected Disbursements (in US$, Millions)

WB Fiscal Year	2018	2019	2020	2021	2022	2023	2024
Annual	0.15	2.25	3.72	6.40	9.45	9.61	9.42
Cumulative	0.15	2.40	6.12	12.52	21.97	31.58	41.00

INSTITUTIONAL DATA

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Climate Change and Disaster Screening

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

Gender Tag

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

SYSTEMATIC OPERATIONS RISK-RATING TOOL (SORT)

Risk Category	Rating
1. Political and Governance	High
2. Macroeconomic	High

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

COMPLIANCE

Policy

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

[ ] Yes [✓] No

Does the project require any waivers of Bank policies?

[ ] Yes [✓] No

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

Legal Covenants

Sections and Description
No later than three (3) months after the Effective Date, the Recipient shall cause its existing accounting software (FIMIS) to be customized by an expert firm engaged under terms of reference acceptable to the Association to take account of the Project's design and components, Schedule 2, Section IV.1 of Financing Agreement

Sections and Description
No later than six (6) months after the Effective Date, the Recipient shall recruit an external independent auditor for the Project with qualifications and experience, and under terms of reference, acceptable to the Association, Schedule 2, Section IV.2 of Financing Agreement

Sections and Description
The Recipient shall ensure that the Project Implementing Entity, at all times during the implementation of the Project, maintain a positive Debt Service Coverage Ratio, Schedule 2, Section IV.4. of Financing Agreement

Sections and Description
NAWEC is publicly disclosing on a quarterly basis, within 30 days of the end of each quarter, the balance of the escrow account established for the purposes of funding costs related to the Operations and Maintenance of the solar plant financed through the Project.

Sections and Description
No later than nine (9) months after the Effective Date, the Recipient shall recruit the Owner's Engineer with qualifications and experience, and under terms of reference, acceptable to the Association, Schedule 2, Section IV.3 of Financing Agreement

Sections and Description
No later than three (3) months after the effective date, the Recipient shall establish, and thereafter maintain throughout the implementation of the Project, a steering committee, with a composition, mandate, and resources satisfactory to the Association, Schedule 2, Section I.A.1.(a) of Financing Agreement

Sections and Description
The Recipient shall ensure that the Project Implementing Entity regularly collects, compiles and submits to the Association on a semester basis reports in form and substance satisfactory to the Association on the status of compliance with the Safeguards Instruments, Schedule 2, Section I.E.4 of Financing Agreement

Conditions

Type	Description
Effectiveness	The Subsidiary Agreement has been executed on behalf of the Recipient and the Project Implementing Entity.
Type	Description
Effectiveness	The Recipient has adopted a Project Implementation Manual acceptable to the Association.
Type	Description
Effectiveness	The Project Implementing Unit has been established within the Project Implementing Entity and staffed in accordance with Section I.A.2 of Schedule 2 of the Agreement.
Type	Description
Disbursement	Under Category 1, until the Co-financing Agreement has been executed and delivered, and all conditions precedent to its effectiveness or to the right of the Recipient to make withdrawals thereunder (other than the effectiveness of this Agreement) have been fulfilled.

I. STRATEGIC CONTEXT

A. Country Context

1. **The December 2016 presidential election marked a major political transition for The Gambia, ending 22 years of rule by the former President**. The inauguration of the new regime led by President Adama Barrow is the first democratic transfer of power since The Gambia achieved independence in 1965. It ends a period of diplomatic isolation and strained relations with The Gambia's sole neighbor, Senegal, and the reestablishment of strong diplomatic ties with regional and international trading partners is expected to accelerate economic growth. Furthermore, peaceful parliamentary elections on April 6, 2017, have led to an absolute majority for the new Government, providing a strong mandate for reforms. The Government prepared an Accelerated National Response Plan for July–December 2017 and a National Development Plan (NDP) for 2018–2020 ahead of a donor roundtable.

2. **The Gambia's gross domestic product (GDP) growth rate fell from 4.3 percent in 2015 to 2.2 percent in 2016, mainly driven by exogenous shocks caused by erratic rainfalls and the spillover effects of the regional Ebola crisis.** Given the economic importance of the rain-dependent agricultural sector, GDP growth is highly sensitive to climatic shocks. In 2016, an unusually short rainy season resulted in a sharp drop in agricultural production, boosting food price inflation and driving up the consumer price index. The political crisis in 2016 compounded these already difficult conditions, disrupting transit trade, manufacturing, and mining activities. In the tourism sector, which accounts for about a fifth of GDP, political uncertainty slowed tourist arrivals by 20 percent, and the total number of tourist arrivals remained below its pre-Ebola levels.

3. **Poverty has remained flat since 2010 and is associated with low endowment in human capital and assets**. Due to the poor macroeconomic performance and lack of growth in per capita incomes, the proportion of the population living in poverty—measured using the national poverty line—remained unchanged between 2010 and 2015, at about 48 percent. In absolute terms, however, the number of poor grew from 0.79 million in 2010 to 0.93 million in 2015. Inequality has improved however, with the Gini coefficient dropping from 0.56 in 2012 to 0.35 in 2015. Marked improvements have also been achieved in terms of literacy, especially among the youth (15–24 years) whose literacy rates doubled from 31.8 percent in 2010 to 67.2 percent in 2015. The quality and availability of basic health services is a concern especially in poor and hard-to-reach rural areas, partly driven by the lack of electricity, which limits the services that can be offered.

4. **The new administration is confronting the legacy of unsustainable macro-fiscal policies, weak governance, and inefficiencies in public sector management**. The new Government inherited large fiscal and external imbalances, a massive public debt stock, and costly domestic debt service obligations, compounded by high contingent liabilities stemming primarily from the National Water and Electricity Company (NAWEC) and several loss-making state-owned enterprises (SOEs). Analyses by the Government of The Gambia (GoTG) and the World Bank have revealed weaknesses in the financial and operational performance of The Gambia's 13 commercial SOEs, which suffer from poor internal governance, inadequate external oversight, and a dysfunctional financial relationship with the broader public sector. The new administration has uncovered evidence that the previous regime illegally diverted SOE funds from their intended purposes, undermining SOE finances and weakening public revenue collection.

5. **Contingent liabilities generated by SOE-related external borrowing and government guarantees to SOEs have increased significantly in recent years**. NAWEC is the most highly indebted SOE, with a stock of over US$220 million debt taken out by or on behalf of NAWEC, some with local banks at a very high debt service cost. At end-2016, external borrowing on behalf of SOEs, driven by the disbursement of existing loans, reached GMD 5.7 billion, or 13.5 percent of GDP. NAWEC accounted for 51 percent of the SOE sector's total outstanding external debt. A combination of on- and off-budget support to NAWEC represents a substantial fiscal drain on public resources. In 2015 and 2016, government fuel purchases on behalf of NAWEC cost US$20 million per year. The Government is also currently servicing about one-third of NAWEC's debt contracted. Nevertheless, NAWEC is defaulting on its debt service obligations, including a bond consolidating its liabilities to commercial banks (the 'NAWEC bond'), which has weakened the banking sector, and led the Government to include in the revised 2017 budget the payment of these debt service arrears at end-2016.

6. **The new administration is committed to strengthening fiscal and debt sustainability, reforming its public sector, and boosting inclusive growth, with the support of its development partners**. It has started implementing critical structural reforms with financial and technical support by the World Bank, the International Monetary Fund (IMF), and other development partners.[1] This support will provide fiscal space to the authorities to strengthen the country's budgetary and fiscal position and help address underlying debt vulnerabilities, including high debt service costs and contingent liabilities from SOEs.

7. **Following the change in Government, there are high expectations among the population for rapidly improved energy services, leading to demonstrations in response to increasing power cuts.** The Gambia's inadequate energy supply is a binding constraint on inclusive growth and competitiveness, and businesses in general often report unreliable and expensive electricity as one of the major constraints of growth, especially hotels, who are forced to depend on expensive backup generators. Though reform of the energy sector is a key priority for the authorities, the new Government inherited a grid with limited installed capacity, which suffered from years of underinvestment in maintenance. The installed capacity of the grid is 99 MW (of which 88 MW is in Greater Banjul Area [GBA]), which relies on heavy fuel oil (HFO). However, available capacity in the GBA deteriorated to 44 MW in November 2017, against a demand of 70 MW (not counting suppressed demand), leading to widespread blackouts, with some parts of the GBA reporting only two to three hours of power per day. NAWEC is not financially viable, driven to a large extent by significant debt service costs that account for approximately 25 percent of revenues.[2] This means NAWEC is not able to perform basic maintenance activities let alone make the investments required to upgrade and expand the electricity system. As a result, the electricity infrastructure is aging and breaks down frequently, further exacerbating the sector's financial issues. Within the power sector, there is an urgent need to significantly reduce power cuts and meet the expectation of the population that a change in Government would lead to improved service delivery in the short term.

[1] Following the transition, The Gambia's development partners responded swiftly to the country's urgent financing needs. In June 2017, the World Bank approved a US$56 million Emergency Development Policy Operation (DPO, P163285) which aimed to support the strengthening of the fiscal position of the Government of The Gambia (GoTG) while restoring the provision of essential public services. This was the first in a series of DPOs. The European Union (EU) also approved a Budget Support Program of €25 million, and the IMF disbursed US$16.1 million under its Rapid Credit Facility.

[2] For the debt being serviced, if the total accrued debt were being serviced, the debt service costs would be substantially higher.

8. **This project is being processed under Paragraph 12 of World Bank Policy on Investment Project Financing (IPF), which allows condensed procedures to be applied in cases where there are capacity constraints because of fragility or specific vulnerabilities (including for small states).** The proposed Gambia Electricity Restoration and Modernization Project (GERMP) is designed to support the implementation of immediate priority investments to restore the delivery of electricity services in targeted municipal and regional areas and complement fiscal stabilization efforts. The operation will also support the turnaround of NAWEC. In addition to the power crisis mentioned above, The Gambia experiences capacity constraints because of country-level fragility, and country-level governance constraints. The Gambia's Country Policy and Institutional Assessment rating of 2.9 classifies it as fragile (as it is below the 3.2 threshold), and as noted in the recent 2017 Fragility Risk and Resilience Assessment for The Gambia, there is some evidence that fragility indicators are worsening.

B. Sectoral and Institutional Context

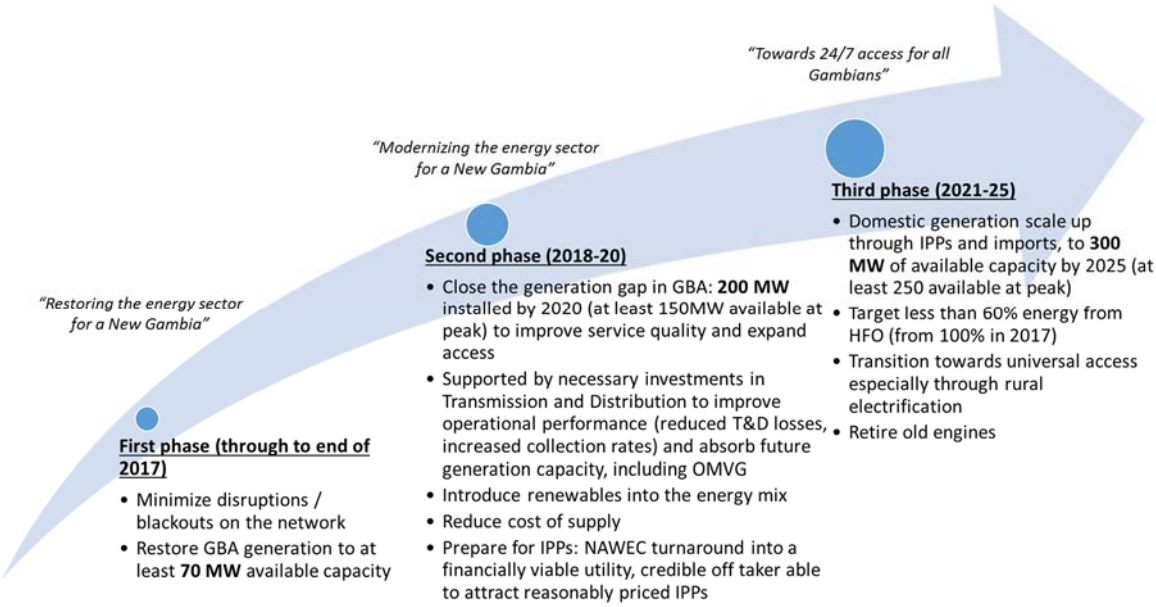
9. **The key stakeholders of the Gambian electricity sector are NAWEC, the Ministry of Petroleum and Energy (MoPE), the Ministry of Finance and Economic Affairs (MoFEA), and the Public Utilities Regulatory Authority (PURA).** Electricity, water, and sewerage services in The Gambia are provided by NAWEC, a vertically integrated electricity public utility that handles generation, transmission, and distribution of electricity and the distribution of water. The MoPE is responsible for the implementation of Government policy in relation to electricity supply and distribution and renewable energy. PURA was established in 2001 and conducts tariff reviews and recommends tariff adjustments to the MoFEA, which evaluates the financial implications and provides advice to the President for final decision.

10. **The 2014 National Energy Policy and the Electricity Act provide the legal context for the development of the Gambian electricity sector**. The Electricity Act was enacted to promote cost-effective generation, transmission, and distribution of electricity, set standards for electricity services, determine appropriate tariffs, and enable a transition to a private investor controlled and operated electricity sector. The decision on when this transition should take place is at the discretion of the Cabinet. The role of the private sector in the electricity sector has so far been limited, with the first Independent Power Producer (IPP) failing.[3]

11. **The Energy Sector Road Map, approved by the Cabinet in October 2017, casts a vision to modernize the energy sector for a new Gambia, and move toward 24/7 access for all Gambians**. It identifies around US$600 million of short- and medium-term investments (over nine years) needed to modernize the energy system. A Least Cost Power Development Plan (LCPDP) is at the heart of the road map, in addition to a review of required investments in transmission and distribution (T&D), as well as institutional changes required to attract reasonably priced IPPs to the sector. The road map objectives are presented in three phases, outlined in Figure 1. The priority is to restore generation in the GBA as quickly as possible. The second phase (2018–2020) includes closing the generation gap and investments in T&D. The third phase aims to scale generation to 300 MW of available capacity by 2025 including capacity through the interconnection with the West African Power Pool (WAPP) regional grid and transition toward universal access.

[3] In 2006, NAWEC entered into a power purchase agreement (PPA) with the Global Electrical Group Ltd. for the 26 MW HFO Brikama power plant. In 2013, the PPA was terminated and assets were transferred to NAWEC due to structural issues with the financial and fuel supply arrangements. The sovereign guarantees have not been called.

Figure 1. Energy Sector Road Map Objectives



12. **The first phase of the road map implementation is under way with generation capacity in the GBA expected to double from 44 MW in November 2017 to 87 MW by April 2018, medium voltage (MV) interconnection with Senegal in border towns, and a communication campaign with customers.** NAWEC has signed a PPA to import up to 10 MW from the national electricity utility in Senegal, *Société Nationale d'Éléctricité du Sénégal* (National Electricity Utility of Senegal, SENELEC). New cross-border MV lines are enabling the first power imports from Senegal. One line has already been constructed enabling some border towns such as Farafenni now getting 24/7 power for the first time. Other lines are under construction with support from the Gambia Electricity Support Project (GESP, P152659). These imports will benefit isolated centers in the Northern Bank region of The Gambia, which are not yet connected to the grid in the GBA. The World Bank is also supporting other measures in the GBA including the replacement of all street lights with light-emitting diode (LED) bulbs to reduce demand in the GBA and an emergency communications plan to communicate with customers on the power outages and plans to address the crisis. NAWEC has also started to engage customers through social media for the first time with high levels of engagement and has plans to scale up communication activities further.

13. **Two major disruptions will help the GoTG scale up generation capacity over the medium to long term and introduce renewable energy**.

    - **Imports from the WAPP.** Regional power trade represents a significant opportunity for The Gambia to import low-cost and renewable power from its neighbors in the WAPP. With financing from the World Bank and other donors, the *Organisation pour la Mise en Valeur du fleuve Gambie* (Gambian River Basin Organization, OMVG) interconnection is expected to be commissioned in 2020, which will immediately give The Gambia the ability to import hydroelectricity from Guinea.[4] Imports into

[4] Initially, 14 MW is expected to come from the Guinea Kaleta Hydropower Plant (commissioned in 2015), and an additional 45

The Gambia will initially be based on long-term power purchases contracts, but the World Bank is also supporting the establishment of a power market in the WAPP, similar to day-ahead markets that have been established in other power pools.5 The GoTG has expressed a preference for imported electricity if it is the lowest cost, so long as it has the capacity to generate up to 50 percent of energy needs domestically due to national energy security concerns.

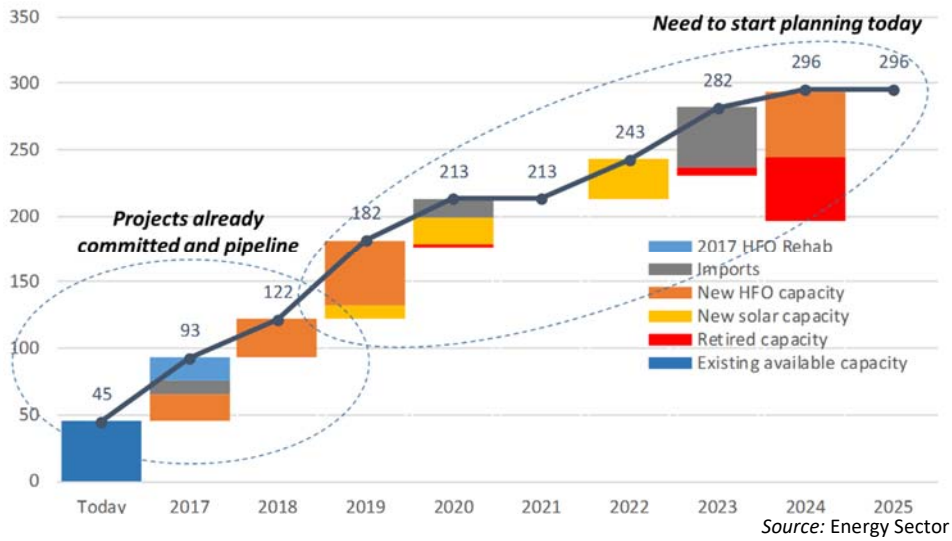
- **Solar photovoltaic (PV) and storage.** Global solar prices declined by approximately 50 percent between 2011 and 2016 and continue to fall considerably. The cost of battery storage is also falling dramatically (approximately 50 percent between 2016 and 2018), which could be important for The Gambia to help with grid integration in the short term. The average annual solar global horizontal irradiation is approximately 2,100 kWh per square meter, which is comparable to areas such as southern France. Solar is the least cost form of renewable energy in The Gambia and is therefore the focus of domestic renewable energy in the road map. The provisional target is to reach 60 MW of solar power by 2025. Additional studies are needed to determine the optimal amount of storage, given land and network absorption constraints. The integration of solar PV into the grid will be eased through its combination with battery storage, although despite the downward trend, battery storage costs remain prohibitively high for solar to be considered for baseload energy.

14. **The LCPDP identified a path to scale up generation capacity to 300 MW by 2025 taking these factors into account**. All the existing generation assets are aged second-hand HFO/diesel engines that have been installed for an extended life. Moreover, the scarcity of utility resources has not allowed for proper maintenance of the existing assets. Combined, these issues mean that the generation efficiency is very low, with high specific consumption and very frequent breakdowns. The installation of new generation assets to provide baseload to the system, with high efficiency and reliability, is a priority to secure the future of the power sector in the country. The primary sources of new generation are HFO and imports for baseload and solar for providing lowest cost electricity during the day. The next plant for baseload generation in the least cost option is an HFO plant, but the GoTG is considering substituting that with a solar plant with storage/hybrid solution, provided the incremental costs are covered with concessional funds such as the Green Climate Fund. Gas-to-power was also explored as a potential source of baseload energy, but more work needs to be done to confirm the viability and timing of potential opportunities. In February 2018, a two-year contract was signed for the purchase of 30 MW of HFO rental power. The potential path to 300 MW can be found in Figure 2.

MW is expected from the Guinea Souapiti Hydropower Plant as soon as 2022. Other countries such as Côte d'Ivoire and Nigeria are already entering into long-term export contracts where interconnectors exist, and Ghana may also be willing to sell electricity given its oversupply.

[5] A key factor for imports will be the import price and the ability of countries in the region to build regional capacity. At global oil prices in summer 2017, the cutoff for imports to be financially competitive with HFO is approximately US$0.12–0.13 per kWh.

Figure 2. Potential Power Generation Expansion through to 2025 in The Gambia



Source: Energy Sector Roadmap, 2017.

15. **In parallel, substantial investments in T&D infrastructure will be necessary to absorb new energy, reduce T&D losses, and extend the distribution network throughout the country**. The Gambian distribution system (below 66 kV) is plagued with inefficiencies at the distribution level while the transmission system (66 kV and above) is nonexistent. These factors lead to high technical losses and unfeasible electricity transport over long distances. The rehabilitation of the existing distribution network and the creation of a transmission backbone (supported by the forthcoming OMVG 225 kV line from Soma to Brikama) will allow the reduction of losses and the unification of the country power system under a unique interconnected grid. Scaling T&D infrastructure to meet growth projections is estimated to require US$133 million by 2025, which will come through public finance. Currently, several transmission projects are under way, which will improve the performance of the grid.

16. **An extension of the distribution network in the provinces (outside the GBA) will enable expanded access and improved electricity services.** The creation of a single more reliable network which can be supplied from different sources will help expand access to quality electricity services. In addition, a local MV cross-border connection, initially with a volume of imports up to 10 MW from Senegal will facilitate the supply from the Senegalese grid owing to a PPA between NAWEC and SENELEC.

17. **With only 47 percent of Gambians having an electricity connection, increasing energy access is an important objective**. Given the size of the country, it is likely that the majority of the population could eventually be electrified through grid connections, which remains the least cost means to provide tier 4 level of service [6] and is the focus of the regional access project under preparation (P164044) expected in FY2019, in which The Gambia is eligible to participate. This regional access will also be supported by the investments in distribution under this project.

[6] Defined as more than 1250 kWh per year. For more information, see https://openknowledge.worldbank.org/bitstream/handle/10986/24368/Beyond0connect0d000technical0report.pdf?sequence=1&isAllowed=y

18. **Cost recovery is estimated to be approximately 80 percent**. As mentioned in Table 1, the cost of electricity supply in The Gambia is estimated at approximately US$0.32 per kWh in 2017 on a cash-needs basis (that is, cash needed to cover immediate operating costs and debt servicing of the utility), one of the highest in Sub-Saharan Africa. Total cost of supply is estimated to be as high as US$0.39 per kWh in 2017 including operating costs and all capital expenditure (CAPEX) obligations (many of which are serviced by the GoTG, not NAWEC). These estimates compared to average tariffs were US$0.26 per kWh. The cost recovery ratio has recently gone up due to decreases in oil prices and improvements in the fuel supply contracts to NAWEC. However, this effect has been partially offset by a 40 percent depreciation of the GMD against the U.S. dollar since early 2012. As a result, NAWEC accrues losses of GMD 50–80 million per month, or approximately US$15–25 million per year. Fully paying its fuel bills and meeting its debt service obligations alone would entirely absorb its GMD 200 million in monthly revenue (of which, approximately one-third would be debt servicing), leaving no resources for other basic operating costs (personnel, maintenance, and so on).

Table 1. Snapshot of Electricity Sector Performance

Parameter	Value
Electricity Access rate	47% (2014) [7]
Number of electricity customers	187,000 (Nov 2017)
Installed capacity	Country: 99MW of which 54MW is available (November 2017) Banjul: 88MW of which 44 MW available (November 2017)
Peak Demand	Approximately 70MW, but generation requirement for up to 150MW given suppressed demand (2017)
Energy mix	100% HFO (2017)
Share of private sector in generation	0% (2017)
Average cost of service (cash needs)	$0.32 / kWh (2017 estimate)
Average tariff	$0.22 / kWh (2014), $0.26 / kWh (2017)
Average T&D losses	22% (2017)
Electricity bill collection rate	88% (2016)
Utility debt (electricity water and sewerage)	Stock of debt is is approximately GMD 10 billion (approximately US$220 million), or 4 × annual turnover

19. **Cost and revenue data from NAWEC are rough estimates, as the utility does not have separated accounts for its electricity, water, and sewage activities**. The separation of accounts, to be implemented by the Service Contractor and expected to be initiated during 2018, will ensure more accurate figures on cost recovery and increase transparency on costs and cross-subsidies. A review of the tariff structure is planned with support of the World Bank-funded Integrated Financial Management Information Systems Project (IFMIS, P132881). The review will also assess, among other issues, the potential for an automatic pass through mechanism for fuel prices and exchange rates and the allowed T&D losses.

20. **The turnaround of NAWEC into an efficient, creditworthy, financially viable utility is a critical success factor in achieving the road map objectives.** To attract reasonably priced IPPs, and maximize finance for development, the turnaround of NAWEC is critical to manage high levels of risk presented by the current lack of financial viability. Likewise, to avoid the risk of interruptions in the supply of electricity through imports due to nonpayment, NAWEC needs to be able to meet any contractual commitments in relation to import purchase agreements and have sufficient resources to adequately maintain its assets and

[7] *Source:* Sustainable Energy for All (SE4ALL) Global Tracking Framework.

implement much-needed investment projects. Through the support of a debt sustainability consultant financed through the GESP, a financial recovery plan has been developed and agreed with the MoFEA in a Memorandum of Understanding (MoU) signed in March 2018. The main elements of the plan to achieve NAWEC solvency include the following:

- **Debt restructuring**. It is estimated that over US$220 million (GMD 10 billion equivalent) debt has been taken out by or on behalf of NAWEC, equal to four times the utility's revenue. The actions identified in the MoU will convert the debt to the GoTG to equity and will remove many of the key loans from NAWEC's balance sheet so that the MoFEA will service the debts on NAWEC's behalf. With respect to future debt, under the IMF debt sustainability framework, SOEs including NAWEC are prevented from taking any non-concessional debt. Therefore, any funding for NAWEC will have to be a grant or highly concessional fund.
- **Competitive fuel supply**. If NAWEC continues to operate HFO plants, fuel cost is the most critical operating expense. Under the former Government, excessive fuel costs were a major burden to NAWEC, based on excessive premiums and global oil price reductions not being be passed onto NAWEC. Since the establishment of the new Government, NAWEC has issued its first short-term competitively tendered fuel contract that helped reduce the suppliers' premium for shipping, storage, and delivery from US$150 to US$90 or below per metric ton, contributing to a saving of approximately US$1.5 million per year (approximately 3–4 percent of annual revenues). The MoU commits NAWEC to procure the most competitive price possible on its fuel purchases.[8]
- **Reduced technical and commercial losses.** Network distribution losses have reduced in recent years from 27 percent to 22 percent. It is estimated that of the 22 percent losses, 14 percent are technical and 8 percent are commercial. Bill collection losses represent additional commercial losses. Technical and commercial losses therefore remain well above international norms, especially for such a small system. NAWEC's target is to reduce T&D network losses to 15 percent by 2025, or an approximately 1 percentage point reduction per year. This target will be challenging to achieve in parallel to the substantial grid expansion plans. Key issues to be addressed, include
    - **Reduced technical losses.** World Bank financing through the ongoing GESP will help reduce T&D technical losses through investments in substations for technical losses reduction. However, additional investments will be required to reach the 15 percent target. Part of the scope of the Service Contractor is to develop a T&D loss reduction plan for NAWEC, identifying investments and systems needed to manage losses effectively.
    - **Reduced commercial losses.** There are several activities planned or under way to reduce commercial losses.
        1. Addressing poor bill collection rates from public sector entities: As of end-2016, total receivables stood at GMD 1.2 billion, of which approximately 50 percent was held by the central government, street lighting, and various municipalities (about US$12 million). As part of the World Bank's second DPO (P164545), the GoTG has agreed that electricity consumption for critical public facilities such as hospitals, security (military, police, prisons, and so on), and public street lighting will remain on credit meters and invoices will be settled directly at regular intervals and government

[8] A new competitive fuel contract was signed in December 2017, supported through a US$45 million credit facility offered by the Islamic Development Bank which became effective in December 2017.

arrears will be cleared. It is expected that all other public sector entities will transition to prepayment meters if they have not done so already.

2. Installation of new prepayment meters for residential customers and smart meters for large customers (whose voltage level does not permit the use of prepaid meters): These meters will replace old credit meters which have lost calibration and are easily tampered.
3. The Service Contractor will develop a revenue protection program to identify other areas of commercial losses and associated mitigation methods.

21. **Beyond these short to medium-term measures, diversification of the energy mix is also important.** The Gambia remains 100 percent dependent on HFO which has a substantial impact on NAWEC's financial position. Generation depends on imported liquid fuel and with no automatic pass through mechanism, which is difficult to implement given already cost-prohibitive tariffs. As a result, NAWEC remains vulnerable to price and exchange rate shocks. The transition to imports and renewable energy outlined in the road map will help reduce this risk exposure over the medium term.

22. **Implementation of the abovementioned measures will be supported through the proposed project, but substantial risks remain to the goal of achieving financial viability.** Taking the measures outlined earlier into account, the updated financial model for NAWEC indicates that a positive Debt Service Coverage Ratio (DSCR)[9] could be achieved in 2018 (see Annex 4 for more details). There are, however, substantial risks to this being achieved. In particular, it is critical for the GoTG to remain committed to the LCPDP and in particular to the opportunity presented by the OMVG interconnection which will allow a fundamental shift in the landscape of The Gambia's power sector to lower cost of baseload energy.

23. **Finally, NAWEC and the Government are expected to sign a performance contract, which is in addition to the NAWEC service contract**. To underpin the turnaround described earlier, a performance contract is expected to be signed between the MoFEA and the NAWEC Board of Directors. The MoFEA expects to sign a performance contract with all SOEs, and NAWEC is expected to be the first. A precise timeline has not been set, but it is likely to be in place for 2018–2019. This performance contract will define clear targets for indicators such as plant availability, technical losses, bill collection rates, and fuel efficiency of generation, with appropriate incentives to meet those targets. Such incentives are currently lacking. For example, NAWEC's current tariff structure allows for T&D losses of 20 percent, while actual losses total approximately 22 percent, and it provides no incentives for NAWEC's management to meet targets. The international experience underscores the importance of using incentives in performance contracts, including executive bonuses for achieving targets and salary reductions or other sanctions for failing to achieve targets. The contract would also include commitments from the GoTG, such as an agreement for the settlement of government arrears to NAWEC, which is expected to be part of the DPO under preparation (P164545).

[9] DSCR is the ratio of Cash Available for Debt Service to Debt Service for a fiscal year, where 'Cash Available for Debt Service' is calculated as Earnings Before Interest, Tax, Depreciation, and Amortization (EBITDA) +/− Changes in Working Capital +/− Corporate Tax +/− CAPEX +/− Dividends, and 'Debt Service' is calculated as principal repayments and interest due on financial obligations for the calculation period.

Box 1. Related projects

The proposed project is well aligned with existing and pipeline projects financed by the World Bank as follows.

1. **Gambia Electricity Support Project (P152659, US$18.5 million, approved April 2016).** The project is well advanced, providing basic investment support to NAWEC, including new generators, emergency fuel purchases, reinforcement in distribution substations, and prepayment meters.
2. **OMVG Interconnection Project (P146830, IDA US$47 million, approved April 2015).** The project will connect The Gambia to the WAPP, enabling HV imports, and provide the Western Transmission Backbone from Soma to Brikama.
3. **ECOWAS Regional Electricity Access Project (Phase 1) (P164044, pipeline, budget to be confirmed, expected FY19).** The project will build on the OMVG project to enable low-cost access through grid densification. The project is expected to enable The Gambia to achieve 80 percent to 100 percent access rates.
4. **Regional Off Grid Electrification Project (P160708, pipeline, budget to be confirmed, expected FY19).** This project for West Africa and Sahel countries is expected to accelerate the deployment of stand-alone PV systems for households, public services such as schools and health clinics, and productive uses.

The proposed project is also well aligned and coordinated with, and draws lessons from, the broader World Bank portfolio, in particular the DPO under preparation:

5. **DPO series.** The Gambia Emergency DPO closed on December 31, 2017 (P163285, US$56 million) focused on NAWEC's competitive fuel contract. The FY2018–2019 Gambia DPO series under preparation **(P164545, US$20 million for FY18; a total of US$50 million is expected in the series)** focuses on energy as one of the key sectors. As discussed earlier, the series will support increased bill collection from public entities and the NAWEC performance contract.
6. **Integrated Financial Management and Information System Project Additional financing (P132881, US$5 million, approved in September 2013)** which among other activities is financing audits of five key SOEs including NAWEC. This will inform the strategic priorities for NAWEC, and will support technical assistance to PURA to update the tariff methodology and tariff model.

Finally, the project is well aligned with the active pipeline projects from other donors. Table 3 outlines ongoing projects from other donors. There is effective coordination between donors active in the energy sector, achieved through regular donor meetings. The strategic road map was also developed through a consultative process involving all donors engaged in the sector.

C. Higher Level Objectives to which the Project Contributes

24. **The project will contribute to the World Bank Group's twin goals to end poverty and boost shared prosperity.** 'Directions for the World Bank Group's Energy Sector' (Report No. 79597, 2013), describes how energy is an important engine of economic growth, on which both poverty reduction and shared prosperity depend. Inclusive economic growth is the single most effective means of reducing poverty and boosting prosperity. Most economic activity would be challenging without energy. The proposed project will support The Gambia in reaching its goals of increasing access to reliable and competitively priced electricity, which is essential for business development, job creation, income generation, and international competitiveness. The proposed project will also help improve the financial position of NAWEC through reduced dependence on expensive HFO-based generation.

25. **The project will directly maximize finance for development by contributing to an enabling environment for competitiveness and sustainability** through development of power infrastructure needed to expand electricity access for households and supply of reliable and efficient power supply, all of which are vital for promoting and sustaining economic growth and reducing poverty. By expanding the capacity of the generation, transmission, and distribution network, the project will contribute to enhancing energy services which is the key objective of the Government's development agenda. As described earlier, the proposed project directly contributes to achieving the GoTG energy sector road map and the NDP.

26. **The proposed project is aligned with the DPO series, which aims to support the restoration of macroeconomic stability and key enablers of inclusive growth.** The DPO series (P164545) is structured around two pillars. Pillar I focuses on enhanced debt and public sector management. It consists of measures to strengthen debt management, address the debt overhang, and support fiscal consolidation through improved human resource management and enhanced SOE regulation and monitoring, primarily NAWEC. Pillar II seeks to reinvigorate key enablers of economic growth in critical sectors, particularly in energy, information and communication technology, and possibly transport and agriculture.

27. **This operation is also fully consistent with the high-level objectives of the African Development Bank and the World Bank Group.** The African Development Bank's 2013–2016 Second Joint Program Framework for The Gambia (JPF-2) (Report No. 72140-GM) was approved by the World Bank Board in March 2013. Pillar I in the JPF-2, in particular, includes a focus on developing key supporting infrastructure, such as the energy and water sectors. Moreover, the World Bank's Country Engagement Note FY2018-2020 (under preparation), includes the "strengthen access to lower-cost sustainable energy, including renewables" in its Objective 1, Pillar (ii).

II. PROJECT DEVELOPMENT OBJECTIVES

A. PDO

28. The Project Development Objectives (PDO) are to (i) improve the operational performance of the Project Implementing Entity; and (ii) improve the capacity of the Project Implementing Entity to dispatch variable renewable electricity.

B. Project Beneficiaries

29. The project beneficiaries are current and future electricity consumers, including grid-connected households as well as businesses which will benefit through improved electricity service. Beneficiaries include both men and women in grid-connected households equally. Additional generation and transmission capacity developed under the proposed project will help increase productivity, spur economic growth, and contribute to The Gambia's effort to reach universal access to electricity.

C. PDO-Level Results Indicators

30. The PDO level indicators are the following (section VII presents the full Results Framework):

1. Improve operational performance:
   - Distribution losses in the Greater Banjul Area (percentage)

- Power outages in the Greater Banjul Area (number per month)

2. Dispatch variable renewable electricity:
   - Generation dispatched from variable renewable generation (solar) (GWh)
   - Installation of a supervisory control and data acquisition (SCADA) system (Yes/No)

III. PROJECT DESCRIPTION

A. Project Components

31. The project will support the country's first utility-scale solar PV plant, upgrades to the T&D infrastructure needed to absorb variable energy and imports, and extension of the distribution backbone throughout the country. Despite the strong potential of solar power described earlier, there is no utility-scale solar PV in The Gambia. The GERMP will finance a 10–20 MWp plant, upgrade the transmission backbone from Brikama including a new dispatch center, which will increase the ability for the GBA network to absorb intermittent energy from solar and imports from the OMVG interconnector. The T&D component will also extend the distribution network to integrate the MV system into one for the country. The project components are described in the following paragraphs, with a summary of project costs provided in Table 2. Technical design details can be found in Annex 1.

Component 1: On-grid solar PV with storage (component cost US$28.4 million equivalent; IDA grant US$1.7 million, EIB credit US$26.7 million)

32. This component will finance a greenfield 10–20 MWp solar PV plant, potentially including a battery electricity storage system (BESS) to adapt output to demand profile and minimize grid absorption concerns (see Annex 1 for details). The utility-scale solar PV plant proposed under this project will consist of preparation, financing, construction, and 20 years of operation of PV greenfield solar power generation of between 10 and 20 MWp in the GBA. The economic analysis is prepared based on the assumption of 16 MWp. The total actual electricity output capacity will be between 8 MVA and 16 MVA and an aggregated active output between 7.5 MW and 15 MW. According to the first theoretical assessment, the solar generation project plant will generate between 14 GWh and 28 GWh in the first year of operation, with slight reduction in the following years during the 20 years of expected operation due to the degradation of solar panels (about 0.3 percent per year).

33. The options for PV generation will be selected between two configurations: (a) option A: one single plant, likely to be connected in Brikama area or (b) option B: a series of three–five smaller plants scattered through the GBA with same total capacity. For option A (a single plant for the whole capacity) the proposed site is in Brikama, located 20 km from Banjul city. The GoTG would facilitate the area for the plant installation, with a surface of between 30 ha and 60 ha, allowing available space for future expansion. The terrain has been defined and its topography is appropriate for a PV plant, being flat and with proper road accesses. For option B (several smaller plants with the same total capacity) the proposed sites will be in the GBA. The GoTG would facilitate the areas for the plant installation, with appropriate surfaces according to the sizes of the plants. The terrains will have to be identified during investment development. In principle, this second option might finance generation that would be located closer to

demand centers meaning reduced losses and reduced impact of grid absorption issues. However, it would increase the number of sites and operation and maintenance (O&M) requirements.

34. A solar feasibility study is being carried out by an experienced consulting firm, which will provide a comparative analysis for both options. The study is expected to be finished by the end of 2018, by which point the GoTG will have selected the preferred option, and then the design and procurement process will be carried out for that option. The size of storage to be installed in capacity and volume (MW/MWh) will also be defined by the feasibility analysis that will consider the existing situation of the GBA system including the optimization of the demand-supply balance.

35. Existing studies include an EU-financed grid stability analysis that assesses the capacity of the grid to absorb solar intermittent generation. This analysis concludes that a hybrid system (PV+storage) with an adequate smart control (SCADA) can allow a relatively important amount of variable renewable energy (VRE) into the Gambian grid. Incorporating smart elements for the coordination of the total generation of the system provides a qualitative improvement in the operation of the system as a whole as well as on the margin for integration of PV into the system. Main conclusions of the study are described in Annex 1.

36. The solar facilities will also be provided with energy storage for several different purposes:

- Provide stability to the GBA grid by smoothing solar generation;
- Protect the solar generation from grid fluctuations;
- Allow that part of the solar generation during daylight to be used in peak times (normally in evenings in the GBA); and
- Provide additional ancillary services to the weak GBA system, mainly in voltage and frequency regulation.

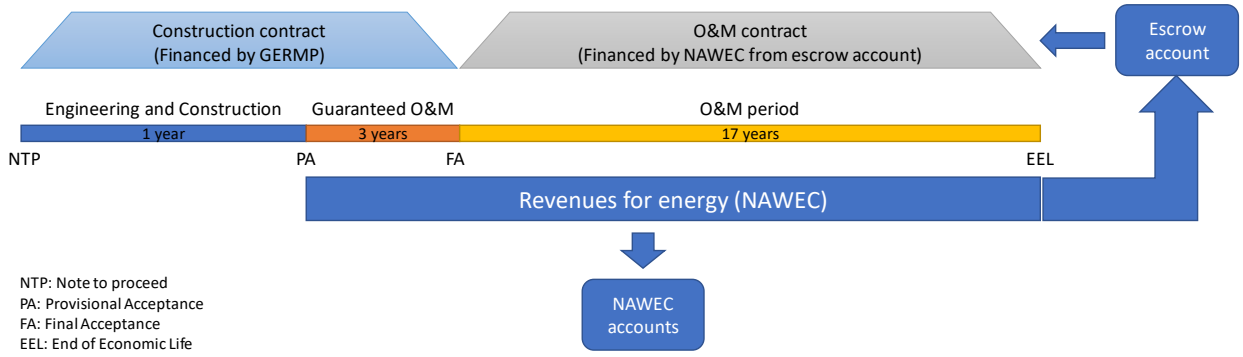
37. The project/s will likely include some minimal associated infrastructures (minor access roads, and interconnection lines to connect the solar plant to the grid). The plant will comprise a series of polycrystalline or monocrystalline PV modules installed on fixed steel structures. Modules will be connected in strings, and the strings will be connected to the inverters. In any option, the sites will be protected from intrusion by a fence. Considering the geographical situation of the GBA, logistics will not be complicated. All the equipment can be delivered by road on truck containers from the port of Banjul (25 km) or Dakar (300 km).

Contractual structure for Component 1

38. The plant financed under this component (PV+storage) will be developed through a supply and installation contract with an international contractor. The component will also include a period of 20 years of O&M to be split in two phases (Figure 4). The first phase of the O&M contract (three years) will be financed by the project under this component, with a full warranty for the plant provided by the same contractor and securing adequate performance and O&M through Engineering, Procurement, and Construction (EPC) payments retention. During this first phase, NAWEC will establish an escrow account and will use the revenues collected from sales from the solar plant to build reserves within the escrow account to ensure the availability of resources for proper O&M and replacement of equipment to maintain

the performance of the plant and help ensure sustainability. As part of the citizens engagement efforts, the balance of the escrow account will be published quarterly on the NAWEC website. NAWEC will have flexibility on the downstream O&M before project closure. One option is for the second phase of the O&M contract (17 years) to be financed by NAWEC through the escrow account, perhaps complemented by NAWEC's own staff. The project will support the Borrower to understand what models and approaches have been used in other parts of the world, potentially through learning trips financed through Component 3.

Figure 4. Proposed Contractual Scheme for the Solar Plant EPC+O&M



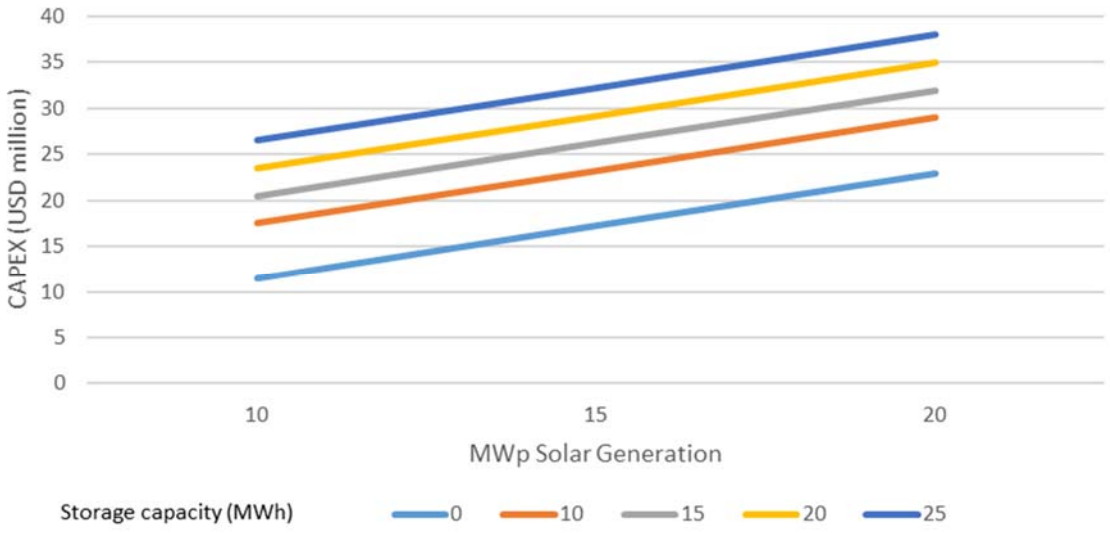
39. O&M costs are expected to include all required items: spare parts, PV operation cost, battery operation cost, insurance, and battery replacement every 5–7 years. According to international benchmarks, the annual O&M costs is estimated at 1 percent of the total CAPEX, without including batteries replacement. This periodic cost, every 5–7 years, is estimated at around 8 percent of the total CAPEX. However, due to market and technology evolution, battery costs are expected to decline drastically in the coming years. Annual O&M cost for the plant lifetime (20–30 years) factoring the periodic battery replacement cost is estimated, conservatively, at around 3 percent of total CAPEX.

40. The final structure of the EPC+O&M contract and the escrow account mechanism will be designed and agreed with the GoTG and NAWEC before the plant procurement process. The structure should be clearly specified within the bidding documents for bidders to assess the whole and definitive concept of the contracts. The EPC+O&M contract will incorporate performance guarantees to optimize the quality of the equipment and works during installation and a bonus scheme to enforce rigorous O&M execution by the contractor. During the O&M period, the contractor will be required to train NAWEC staff on O&M of this type of plant, including energy storage. This capacity building along with the accompanying infrastructure investment will pave the way for the future development of renewable energy. In effect, it will allow NAWEC to eventually develop future plants by themselves or to better assess future contracts under private sector participation (PSP).

41. **Expected generation cost.** The mentioned feasibility study will provide an accurate study of plant cost based on international benchmarks and Gambian market assessment. However, from recent estimation and international information the estimated cost can be assessed at a high level. Figure 5 shows a preliminary estimation depending on generation size (MWp) and storage size (MWh). The basis

for that calculation is US$1.15 million per MWp for the solar generation and US$0.6 million per MWh for the storage.

Figure 5. Preliminary CAPEX Estimation Depending on Generation Size (MWp) and Storage Size (MWh)



Source: WB estimates from latest benckmark prices for solar and storage.

42. **Connection to the Gambian grid.** In option A, the plant will be connected to the existing grid (33 kV) or the future line that will be also financed by this project (132 kV). The ongoing feasibility study will define the exact characteristics of the grid connection. In option B, the ongoing feasibility study will provide the details once the locations are defined in coordination with the GoTG. The feasibility study will also recommend the appropriate measures for plant grid integration. Those measures will be implemented in the plant design.

Component 2: Transmission and distribution (T&D) restoration and modernization (component cost US$77.3 million equivalent: of which IDA grant US$25.1 million, EIB credit US$33.6 million, and EU grant US$18.6 million)

43. This component will finance T&D upgrades necessary to (a) absorb the additional generation capacity; (b) prepare for future capacity expansion including the OMVG and other pipeline projects;(c) help reduce T&D losses and power cuts; (d) extend the distribution network throughout the country; and (e) enable future grid extension. The investment under this component will be analyzed in detail through a feasibility study being financed under the GERMP project preparation fund (PPF).

44. The most important transmission system is in the GBA with 330 km of 33 kV transmission lines and five 33/11 kV substations, supplied by two large power stations in Kotu and Brikama. The provincial

mini-grids are each limited to a main growth center and its surroundings. This type of grid with its 33/11/0.4 kV voltage levels is classified as the T&D system. The small size and the limited area of these mini-systems results in constraints that affect the reliability and supply security for the customers. The expansion of these systems is not obvious as the limited size of the power stations poses some constraint to the development of the systems, while the management and maintenance of the facilities is a challenge which affects both the operation of the system and the control of the losses.

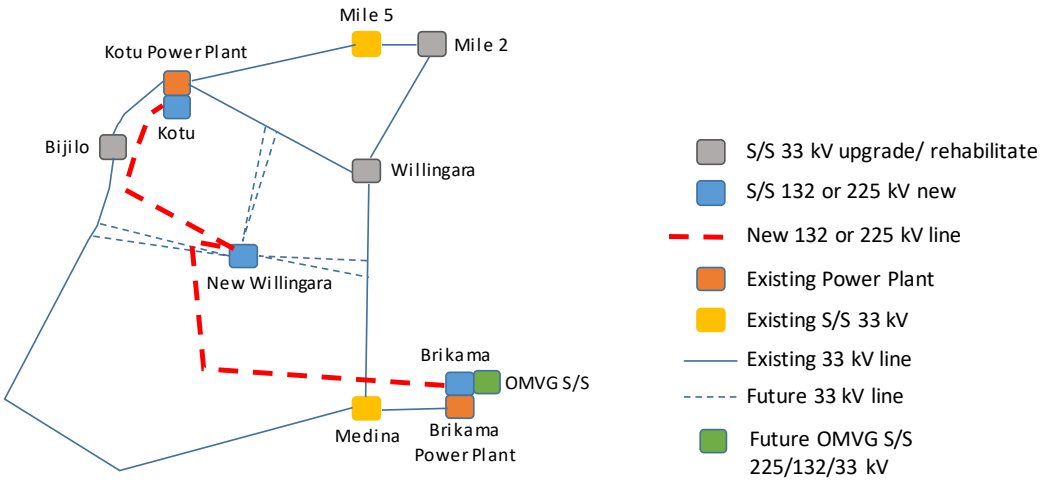
45. Following recent studies,[10] there have been several recommendations to solve the challenges by downgrading the 33 kV and subsequent voltages to a distribution voltage and introducing a higher voltage with new HV/MV substations which would serve as injection points on the distribution grid. Further investments are required to complement the existing network and to reinforce the grid to cope with the additional generation identified in the Energy Sector Road Map with the view to strengthen and prepare the network for future development and absorption of renewable energy as well as to reduce T&D losses. Details about the T&D pipeline and the financing is included in Annex 1.[11] Component 2 will support various elements in the road map through the following subcomponents.

46. **Subcomponent 2.1: New Kotu-Brikama line (subcomponent cost US$11.6 million: of which IDA grant US$11.6 million).** This subcomponent will finance a new HV transmission line between the two main power plants in the GBA. This will likely be a 132 kV line around 30 km, prepared for double circuit. Brikama is expected to become the main hub for power supply in the country, with existing generation, proposed new developments, and the connection to the 225 kV transmission network from the OMVG. The major demand center of the country is around Kotu. The Kotu-Brikama connection is therefore critical. However, the current connection between these two centers (supply and demand) is very weak and only supported by 33 kV lines. This link therefore poses a risk to the development of the main economic area of the country and future developments of power generation in Brikama, expected to be under PSP schemes. The upgrade of the Kotu-Brikama line is therefore a critical short-term investment needed to enable access, improve service quality for the GBA customers, expand the ability of the network to absorb VRE, and reduce T&D losses by transferring the supply from existing HFO plants to the HV lines instead of the existing 33 kV lines.

[10] AEC Kuwait. 2015. “Feasibility Study for National Transmission Line and Dispatch Center of The Gambia.” Government of The Gambia. 2017. “The Gambia Electricity Sector Roadmap – High Level Update.”

[11] Various projects are being undertaken on the interconnected grid and in the provinces. These will improve the performance of the grid and are expected to be completed in the period through to 2020 including: (i) GESP investments - completion expected in 2018; (ii) India distribution in the GBA - completion expected in 2019; and (iii) OMVG 225 kV, which will provide a ‘Western’ backbone for the country - completion expected as soon as 2020; this interconnection with Senegal and the WAPP countries will create new substations in Soma and Brikama and will introduce a new voltage in the country (225 kV).

Figure 6. Projected Network to Link Kotu with Brikama in the GBA, 2025



47. **Transmission lines.** The project will finance two transmission lines that will be defined by the feasibility study. The study will propose the optimal technical design of the conductors (for example, assess 225 kV instead of 132 kV or if a double circuit is necessary) and ground wire. Optical fiber will be included in the line for telecommunication. It is expected that these lines will be above ground aerial lines, but some sections may need to be underground to mitigate social and environmental impacts. As illustrated in Figure 6, this subcomponent is expected to include the following: (i) 18 km 225 kV or 132 kV single or double circuit transmission line from Brikama power station to the Jabang substation; and (ii) 11.5 km 225 kV or 132 kV single or double circuit transmission line from the Jabang substation to Kotu power station.

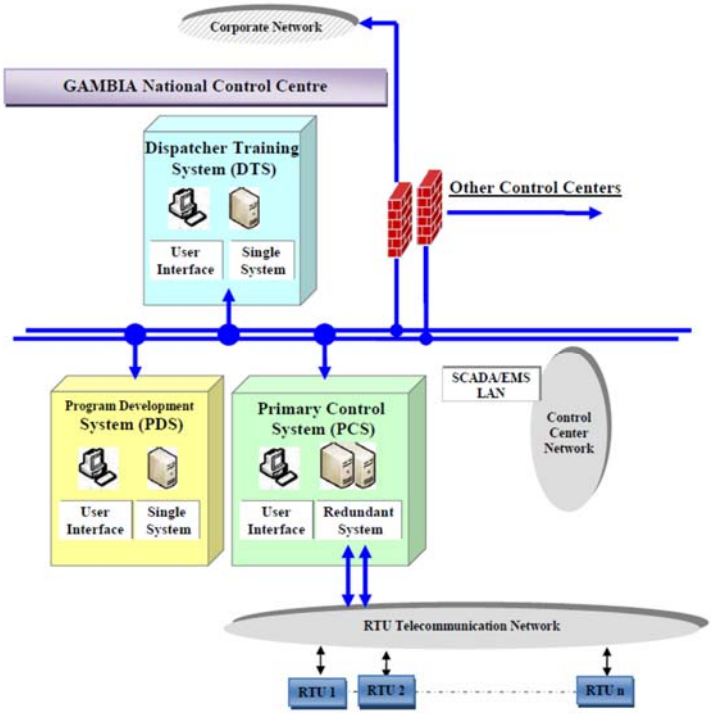
48. **Substations.** The project will finance the construction of three new substations that will serve the new lines to be constructed: (a) a new 132 kV Jabang substation; (b) a new 132 kV Brikama substation; and (c) a new 132 kV Kotu substation. The substation capacities will be defined through the feasibility study, but will have the following indicative features: (i) Voltage class: 132/33 kV; (ii) 132 kV outgoing line: To be defined by study in coordination with NAWEC. Preliminarily, two outgoing lines, one in the current stage and the other in the future stage, which apply sectionalized single bus connection; (iii) 33 kV outgoing line: To be defined by study in coordination with NAWEC Preliminarily, 10 outgoing lines in the future stage and six outgoing lines in the current stage, which apply sectionalized single bus connection; and (iv) Reactive compensation: To be defined by the study in coordination with NAWEC.

49. **Subcomponent 2.2: Improved service quality (subcomponent cost US$13.7 million: of which IDA grant US$8.7, EIB credit US$4.9 million).** This subcomponent will finance a new integrated dispatch center with SCADA (controlling generation and transmission), including training on SCADA, and switch gear; and upgrades to existing primary and secondary substations, and switchgear. Together, these investments will help NAWEC track and improve the overall quality of supply in the GBA as well as the provinces when they are connected. The SCADA system is essential to facilitate integration of renewable energy (both from

domestic solar and imported hydro), without which there is a high risk of stranded assets. If the instability cannot be managed, the operator will have recourse to HFO-peaking plants to make up the shortfall.

50. The feasibility study will analyze and propose an optimal configuration for the new National Control Center of The Gambia, which will consist primarily of two components: (a) the computer system providing the SCADA/Energy Management System (EMS) functionalities and its necessary auxiliary (that is: uninterruptible power supply, standby generator). The system is open, efficient, and highly secured with modern management tools for power generation and transmission systems and is using state-of-the-art techniques in the field; and (b) modern buildings secured and adapted to a modern control center in real time. The Gambia National Control Center will comprise three main systems, which are illustrated in Figure 7: (a) Primary Control System; (b) Program Development System; and (c) Dispatcher Training System.

Figure 7. Preliminary Scheme for the SCADA/EMS System



Source: Study financed by Arab Bank for Economic Development in Africa (BADEA).

51. The feasibility study will also propose the rehabilitation and upgrades needed on the existing primary distribution substations (up to six) and assess the need to upgrade the 425 secondary substations in the GBA, including necessary measures for rehabilitating the ones that are not fully operational. These activities will then be financed through the project, which will further help improve reliability and reduce distribution losses.

52. **Subcomponent 2.3: Distribution backbone in the provinces (subcomponent cost US$48.5 million: of which IDA grant US$1.2 million, EIB credit US$28.7 million, EU grant 18.6 million).** This subcomponent will finance the interconnection of the existing isolated MV networks scattered throughout the country, including a submarine cable in the Greater Banjul Area. The extension of the distribution network in the provinces (outside the GBA) will enable extended access and improved electricity services. Currently, the distribution network in the provinces consists of a series of isolated grids supplied by small diesel groups.

53. The connection of the different isolated grids will allow the creation of a single more reliable network (Figure 3) that can be supplied from different sources, either national generation, MV local imports from Senegal, or HV imports from the regional pool, most of which is expected to come from hydropower. The submarine cable will help increase overall stability of the grid through the creation of an MV loop. The substations will need to handle the change in capacity between the distribution network in the GBA (33 kV) and the provinces (30 kV). In addition, a local MV cross-border connection with Senegal will facilitate the supply from the Senegalese grid owing to specific PPAs between NAWEC and SENELEC. Some low voltage lines may also be financed if there is a need and budget available.

54. This interconnection will consist of up to 400 km of MV lines and approximately 10 primary substations. The potential beneficiaries of this interconnection would be the population of all provinces outside the GBA, equivalent to approximately 37 percent of the population (around 690,000 inhabitants and 59,000 households). A specific feasibility study will be conducted to identify the exact scope of the different interconnection projects.

55. **Subcomponent 2.4: Customer connections, demand-side management (DSM), and loss reduction activities (subcomponent cost US$3.6 million: of which IDA grant US$3.6 million).** This subcomponent will finance investments to enable NAWEC to connect new customers through the provision of at least 31,000 prepayment meters (sufficient to provide a stock of meters for 2019 and 2020), a meter testing lab, and DSM activities such as the supply and installation of LED bulbs to replace incandescent bulbs in government offices and street lights in the GBA and provinces as well as DSM equipment. This subcomponent will also finance equipment needed to identify and reduce T&D losses at NAWEC, such as Advanced Metering Infrastructure.

Component 3: Urgent institutional support for sector turnaround (component cost US$15.8 million equivalent: of which IDA grant US$14.3 million, counterpart funds US$1.5 million)

56. This component will finance key activities related to urgent activities to restore the sector, improve operational performance of NAWEC, and support project implementation.

57. **Subcomponent 3.1: NAWEC turnaround (subcomponent cost US$7.4 million: of which IDA grant US$7.4 million).** The GERMP will finance various activities designed to support the turnaround of NAWEC's operational performance, such as the following:

- **A NAWEC Service Contractor (contract activated in November 2017).** The GERMP will finance a three-year service contract which will be a critical support to strengthen NAWEC's technical, financial, and managerial capacity. This activity was originally expected under the GESP but following a project restructuring will now be financed through the GERMP. Among other things, the Service Contractor activities include:
    1. Preparation of an organization audit and proposals for restructuring of NAWEC;
    2. Preparation of a business plan for NAWEC, including performance targets, which will form the basis of the NAWEC performance contract;
    3. Design and installation of a new information technology (IT) system to integrate accounting, billing, payroll, stock, and other accounting functions;
    4. Separation of financial and commercial accounts (electricity from water and sewerage);
    5. Creation of a customer call center to take citizen feedback and respond to questions/concerns;
    6. Preparation of a revenue protection program; and
    7. Preparation of a T&D loss reduction program.

- **New IT system for NAWEC.** A separate contract will be issued for the installation of the new IT system. The IT system will streamline NAWEC's operations, integrating all the processes into one single system. It will also improve the internal and external reporting for NAWEC management and decision making and enable the process of separation of electricity, water, and sewerage accounts. This activity was originally expected under the GESP but following a project restructuring will now be financed through the GERMP.

- **Communication and citizen engagement campaigns** regarding the power crisis in The Gambia to engage with customers on the reasons for the crisis and efforts being taken to address it and to encourage citizen's awareness and support for residential conservation measures. Some activities will be financed through the GERMP PPF. The emergency communications campaign forms a critical part of NAWEC's citizen engagement activities. The PPF has enabled NAWEC's first use of social media including the creation of a NAWEC Facebook page which has had very high levels of engagement, especially from the youth. The activity will also support the establishment of regular press briefings and the creation of a TV campaign to maintain an open channel for dialogue between customers and NAWEC.

- **Capacity-building activities** for NAWEC technical management and staff. Training activities will include, but not be limited to, technical areas such as:
    1. Procurement, project management, and contract management of renewable plants;
    2. O&M of solar plants potentially through learning trips and south-south exchange;
    3. Operations of HV lines;
    4. Grid management and SCADA in a diversified generation pool with VREs and reduced T&D losses;

5. Citizen engagement and community outreach;
6. Preparation of IPPs and PPA negotiations; and
7. Energy sector planning including planning software.

58. **Subcomponent 3.2: Strategic support for the energy sector (subcomponent cost US$2.6 million: of which IDA grant US$2.6 million).** The activities under this subcomponent include the following:

- **Strategic studies for the sector** including a new master plan which will form the basis of the next iteration of the strategic road map expected in 2019 (see Box 2) and others such as the preparation of a formal grid code for the Gambian electricity sector.
- **Technical assistance to the MoPE, MoFEA, and Office of the President**, including activities such as the provision of energy advisers, support for the institutional reorganization of MoPE, and preparation for IPPs.
- **Auditor for the MoFEA-NAWEC performance contract.** As discussed earlier, the MoFEA is expected to sign a performance contract with NAWEC. The GERMP will finance an independent third-party consultant to validate the key performance indicators (KPIs). The GERMP will also support, as needed, technical assistance to the sector to develop the capacity to effectively monitor the performance contract, likely within the MoFEA.

Box 2. Preliminary Scope of Activities in the Proposed Power Sector Master Plan

1. A detailed **demand forecast** based on a geographic information system**.**
2. A **solar optimization** study to map solar sites, start the process of land banking, and assess the optimal expansion of solar, given grid and space constraints, and identify any institutional, regulatory, or legal updates that might be necessary.
3. A **gas-to-power options** study with an assessment of options including developing a gas-to-power regional project with Senegal, importing gas from Senegal such as through a gas pipeline, and developing the possibility of domestic gas and therefore the option of a bridge solution in The Gambia.
4. An update to the **LCPDP**, which incorporates output from the previously mentioned components.
5. A **T&D master plan.**
6. **Synthesis paper** summarizing all the findings (and which would become the new road map).

59. **Subcomponent 3.3: Project preparation and implementation support (subcomponent cost: US$5.7 million; IDA grant US$4.2 million, counterpart funds US$1.5 million).** The activities in this subcomponent include the following:

- **Owner's Engineer (OE) to assist NAWEC in project implementation.** The project will finance an OE to supervise the execution of Components 1 and 2. The OE will also provide procurement assistance to the Project Implementation Unit (PIU).

- **PIU costs** including additional capacity-building activities such as intensive training courses and south-south learning on safeguards and procurement, consultants to assist at critical parts of project implementation, a project vehicle, and IT equipment for the PIU.
- **Key studies for project preparation** including preparation of feasibility studies and tendering documents.
- **Preparation of safeguards instruments** such as the Environmental and Social Management Framework (ESMF) and the Resettlement Policy Framework (RPF) financed through the GERMP PPF, as well as any Environmental and Social Management Plan (ESMP) documents, and Resettlement Action Plan (RAP) documents that are subsequently required.
- **Implementation of safeguards instruments**, including the actions identified in the ESMF and RPF. The estimated cost of compensation is US$1.5 million (to be confirmed during the preparation of the RAPs) and will be financed through counterpart financing. This component will also support the creation of a functional Grievance Redress Mechanism (GRM).

B. Project Cost and Financing

60. **European Investment Bank (EIB)/EU cofinancing.** The GERMP leverages US$60 million financing from the EU and the EIB as joint cofinancers. In the case of the cofinancing, the EU is expected to on-grant US$17 million to the EIB, and the EIB will then supervise project implementation on behalf of the EU. In the spirit of donor cooperation, it is expected that the World Bank will handle procurement supervision on the EIB's behalf for activities cofinanced between IDA and the EIB.

61. **PPF.** Preparation of GERMP benefits from a PPF of US$3.65 million which financed several critical activities including feasibility studies, safeguards studies, and emergency communication activities.

Table 2. Summary of Project Costs and Financing

Project Components	Total Cost (US$, millions)	IDA Financing (US$, millions)	EIB financing (US$, millions)	EU financing (US$, millions)	Counter-part Funding (US$, millions)	% IDA Financing
1. On-grid solar PV with storage	28.40	1.70	26.70	0.00	0.00	6
2. Transmission and Distribution (T&D) restoration and modernization	77.30	25.00	33.7	18.6	0.00	32
3. Urgent institutional support for sector turnaround	15.80	14.30	0.00	0.00	1.50	100
Total	**121.50**	**41.00**	**60.40**	**18.60**	**1.50**	34

Note: All cost estimates include a contingency of 4.4 percent.

C. Lessons Learned and Reflected in the Project Design

62. The project design has drawn lessons from the ongoing GESP (P152659). The implementation of the GESP is progressing well, with disbursements ahead of schedule in the first year of effectiveness. The

GESP, approved on May 10, 2016, was the World Bank's first energy IPF project in The Gambia and the first project with NAWEC. It has provided several lessons for the design of the GERMP, including the following:

- **The need to have a dedicated PIU.** The GESP PIU comprises NAWEC staff who have other roles within NAWEC. This sometimes led to implementation delays. To avoid this issue with the GERMP, which is a much larger project, one of the proposed effectiveness conditions is that NAWEC should have all PIU staff dedicated to the project full time before project effectiveness to ensure successful implementation.

- **Procurement capacity.** The procurement process will be critical in this project with complex procedures and contracts to be negotiated. The project will provide reinforced assistance to the Project Management Team to carry out these activities. During GESP implementation the support of experienced individual consultants (ICs) has provided a significant boost to procurement activities, and it has been one of the key elements contributing to the good implementation pace of that project. The same approach will be adopted for the GERMP.

63. O&M contract combined with the EPC contract for Component 1. There are two lessons that motivate combining an O&M contract with the EPC contract for Component 1.

- **Incentive for quality design.** The EPC contractor will be responsible for the detailed engineering design of the system and procurement of the materials. The global solar PV market has expanded rapidly in recent years, with many panels being of an inferior quality and not designed to function in an intense environment like The Gambia which is subject to high humidity in the rainy season and frequent dust storms from the Sahara Desert. Having a long-term O&M contract will align incentives for the EPC contractor to procure high-quality equipment which minimizes the risk of failure during the operations phase. The proposed structure considers a two-phase approach for the O&M, one for three years in which the contractor should fully guarantee the equipment and a second phase of 17 years in which the subsequently selected contractor will have a fixed fee plus a performance bonus. This structure will ensure the accountability of the contractor during the first phase and will incentivize proper O&M during the whole economic life of the plant. Throughout all this period, the contractor will be required to provide a fair and properly sized performance bond.

- **Utility-scale solar PV will be a new technology for NAWEC.** Experience from other countries illustrates the risks of introducing a new technology to a system where the utility does not have experience. For example, the World Bank financed two new HFO engines in Guinea Bissau in 2012 (Guinea-Bissau: Emergency Electricity and Water Rehabilitation Project P120910). The electricity utility had previously used diesel-fired engines. Without adequate experience, the engines were broken beyond repair within two years instead of the typical economic life of 25–30 years. The contract for the installation of the solar PV plant will therefore be accompanied by an O&M contract for the whole life of the plant (20 years). During this period, the contractor would be required to train NAWEC staff on O&M for this type of plants.

64. The project has been designed in accordance with other planned investments to maximize its impact. Component 2 will support the preparation of The Gambia power system to connect with the OMVG system, expected as soon as 2020, and to increase access pursuant to the regional access project**.**

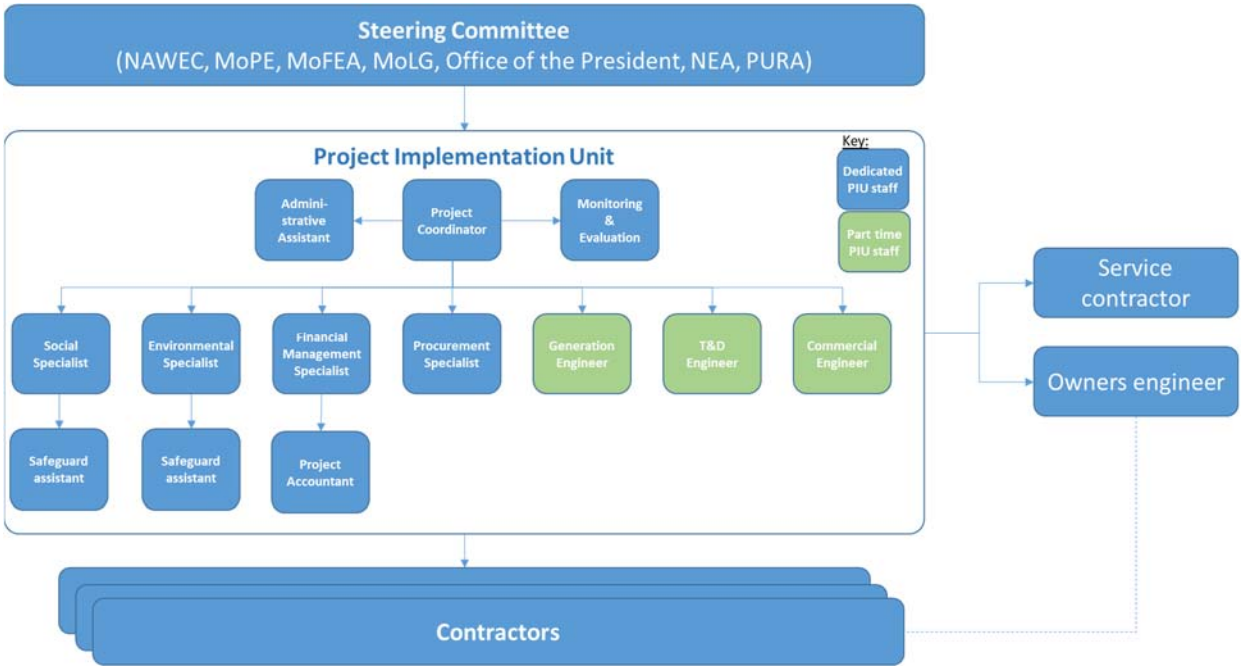
65. Project design also considers broad lessons from the World Bank's experiences in the energy sector in Sub-Saharan Africa, particularly small countries facing a power crisis. For example, given limited implementation capacity, procurement contracts for generation expansion activities will be structured as turnkey contracts (design and installation).

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

66. **Implementation arrangements are summarized in Figure 8.** NAWEC will be the implementing agency of the GERMP, assuming all fiduciary responsibilities and responsibilities for reporting to the World Bank. A GESP PIU is established within NAWEC, including the key functions of project coordinator and procurement specialist, as well as financial management (FM) officer, a generation engineer, a transmission and distribution engineer, two safeguards specialists, project accountant, and a monitoring and evaluation (M&E) specialist. NAWEC has experience in hosting an implementation unit with the GESP and the PIU has received specific training in World Bank fiduciary rules and guidelines.

Figure 8. Implementation Arrangements



67. **The OE financed under Component 3 will provide support to the implementation of GERMP** in the form of highly qualified power engineers to assist in matters and ensure that the project meets the World Bank requirements on procurement and social and environmental safeguards, occupational health

and safety issues and conduct the supervision of investments under Components 1 and 2. The OE will therefore help avoid design errors and keep the project on schedule. However, the ultimate responsibility for project management will lie with the PIU.

68. The Steering Committee (SC) established under the GESP will be expanded for the GERMP given the scale-up in the scope and complexity of activities. The new SC is expected to include representation of various ministries at the Permanent Secretary level. The SC will include the MoPE, MoFEA, Ministry of Local Government, Office of the President, PURA, National Environmental Agency, and NAWEC. it will advise on strategic questions related to the GERMP's implementation. The SC will meet at least quarterly and will monitor project progress and planning for subsequent periods.

69. **The roles and responsibilities of the GERMP PIU will be spelled out**, including that of the OE, and implemented in accordance with the Project Implementation Manual (PIM), which will be completed by NAWEC before effectiveness. The Service Contractor will also provide inputs on technical, financial, and commercial aspects to complement the monitoring of the project outcomes.

B. Results Monitoring and Evaluation

70. **Data for monitoring project outcomes and results indicators (see Section VII) will be generated by the implementing agency (NAWEC),** with the support of the OE. Updates on progress on results indicators will be reported through biannual progress reports. The PIU will include an M&E specialist to track the indicators and provide support for data collection. Most of the main indicators are aligned with key specific parameters of the sector that are generated and monitored monthly. For other indicators, such as power outages, NAWEC does not have a measurement procedure. For these cases, the PIU will work with the Service Contractor to define a suitable procedure and to periodically measure progress on those indicators.

C. Sustainability

71. **The sustainability of the Gambian power sector, including the investments under the GERMP, will depend upon** (a) the financial health of NAWEC and its ability to generate sufficient revenues to fully cover its expenditures and (b) the GoTG's continued commitment to support a comprehensive power sector reform program to be undertaken in the coming years. The actions for this power sector reform were initiated by the GESP and DPO series and will be continued through this project.

72. **Cost recovery in the electricity sector will be essential for sustainability and the phasing out of financial support from the GoTG**. Investments in the power sector under the GERMP are designed to promote cost recovery through cheaper generation capacity and increased efficiency (improved transmission capacity) and to promote public access.

73. **NAWEC's financial and operational performance will ensure the long-term sustainability of the electricity sector**. This utility should be managed and operated by experienced and professional operators with an incentive to maintain, upgrade, and keep infrastructure/systems running smoothly. Component 3 intends to promote the appropriate managerial and organizational changes within the company through private sector expert assistance.

D. Role of Partners

74. **Components 1 and 2 of the project will be jointly cofinanced with the EIB and the EU**. Procurement supervision of activities jointly cofinanced with the EIB will likely be delegated to the World Bank through a Principle of Collaboration Agreement similar to that used in other cofinanced projects. World Bank safeguards policies will apply to such activities. For other activities cofinanced by the EIB and the EU (namely the distribution lines in Component 2), the EIB procurement policies will apply.

75. **The World Bank has coordinated with other donors to ensure complementarity in interventions.** Specifically, the update of the power sector road map, supported by the World Bank and approved by the Cabinet in October 2017, has been a key document to define a clear path for the power sector in The Gambia, where all the actors can team up to coordinate and collaborate in restoring the sustainability of the sector. Table 3 summarizes the various interventions of each donor (ongoing and pipeline).

Table 3. Donor Activity in the Gambian Energy Sector (ongoing and planned)

Donor	Activities
African Development Bank	• Exploring physical investments in mini-grids and grid extension, and institutional support • Legal advisory service to develop standard PPA documents, and so on
BADEA and the Organization of the Petroleum Exporting Countries (OPEC) Fund for International Development	• US$21 million cofinancing by BADEA (US$12 million) and OPEC (US$9 million) for expansion of the Kotu power plant. • 11 MW HFO engine, on track to be commissioned in early 2018
ECOWAS Bank for Investment and Development	• US$30 million line of credit. Financing for a rural electrification extension project, including a 5 MW HFO engine plus access connecting 36 villages
EU and EIB	• GERMP cofinanciers • Preparing off-grid solar PV project for schools and health clinics
Islamic Development Bank	• US$25 million. Financing a new 20 MW HFO plant at Brikama, expected to be commissioned in early 2019 • US$25 million. Credit Facility for HFO purchase by NAWEC
India Exim Bank	• US$22.5 million. Financing T&D expansion and rehabilitation project in the GBA
Kuwaiti Fund	• US$25 million. Financing the two substations in The Gambia for the OMVG interconnection project
United Nations Development Programme	• Financed a feasibility study on rural hybrid systems (solar/diesel)

V. KEY RISKS

A. Overall Risk Rating and Explanation of Key Risks

76. The overall project risk rating is High. There remain several challenges, such as the overall governance risk in The Gambia; capacity of the public utility, NAWEC, to manage transactions; and

technical risks, such as generation and transmission capacity bottlenecks. The key risks and proposed mitigation measures are discussed below.

77. Political and governance risks: High. As a state- owned company, NAWEC is exposed to political and governance risks which could affect the project. While political and governance risks in The Gambia remain elevated, the new Government has made progress with the introduction of a fiscal stabilization program and reform measures to define institutional arrangements that enhance transparency and accountability in public sector procedures and promote PSP. **Mitigation**: This risk is being closely monitored by the World Bank in coordination with the IMF and the wider donor community. The governance risk is partly mitigated through the introduction of a competitive HFO fuel supply, supported through the GESP and the first DPO, and the updated Energy Sector Road Map. The high-level commitment of the GoTG to the energy sector, and the new NAWEC Board appointed in May 2017, will also mitigate the risk on political and governance.

78. Macroeconomic risks: High. Downside risks remain high at this critical moment of The Gambia's transition. Enormous investments in infrastructure and human capital are needed to unleash the growth potential, but may lead to unsustainable debt levels if they do not yield expected returns. **Mitigation**: The GoTG is committed to proactive debt restructuring with the support of development partners, fiscal discipline, reducing the reliance on domestic financing, and maintaining a flexible exchange rate regime. They intend to implement reforms of the public sector, rationalize agencies, and pursue ongoing reforms of SOEs, which are a key source of fiscal risks, and further streamline the civil service and security forces based on the recently completed audits. They aim to rebuild private sector confidence by signaling a return to consistent and predictable fiscal and monetary policies. This risk is being closely monitored by the World Bank in coordination with the IMF and the wider donor community.

79. Sector strategies and policies risk: Substantial. The GERMP is built on the confidence created by the GESP. The project will deepen confidence for longer-term engagement for sector reform. To revive the electricity sector in The Gambia from its presently poor operational and commercial conditions, it is critical that the GoTG remains politically committed to a long-term reform vision with a coherent sector wide strategy, as articulated in the Energy Sector Road Map. The success of this project depends on continued commitment from the political leadership in The Gambia and the support of NAWEC's management, as well as their willingness to consider lessons learned at the sectoral level. **Mitigation**: This risk will be supported through the second DPO, which will have as one of its triggers the creation and effectiveness of the Energy Sector Road Map taskforce. The project also includes a Legal Covenant related to NAWEC sustaining a DSCR of more than one, which is a key element to ensure NAWECs financial health.

80. Technical design of project risk: Substantial. Although the project will use well-established technologies and presents no unusual construction or operational challenges, the variety of technologies and the physical dispersion of investments may create challenges during implementation: (a) solar PV and batteries systems have never been implemented by NAWEC at utility scale (and this will be one of the first such projects in the Africa region); (b) specific sites will be identified during project implementation and securing land for construction of solar plants can often create delays; (c) the new line will imply a new voltage level in the country (132 kV), whose maximum current level is 33 kV; and (d) there is little global experience in deploying solar technology in emergency situations. **Mitigation**: The PIU will ensure continued coordination with the OE for Components 1 and 2. Component 3 will finance a feasibility study

whose scope will include the identification of land options for the site of the solar plant. It will also support technical training and capacity building for NAWEC and PURA on installation and O&M of these systems.

81. Institutional capacity for implementation and sustainability risk: High. The project presents complex and diverse types of components that will require extensive efforts in the implementation by the existing NAWEC PIU. While NAWEC has some experience with the GESP and multilateral donors, it does not have experience handling procurement of such large-scale projects or experience in the implementation of RAPs, whose implementation will be necessary before construction can start. This poses a high risk for Subcomponent 2.1 in particular—the new Kotu-Brikama transmission line—as a 30-meter right-of-way will have to be cleared which at times runs through densely populated areas. **Mitigation**: (a) requirement of dedicated staff in the key PIU functions (procurement, safeguards, and FM); (b) appointment of the Service Contractor providing support in fiduciary aspects of project implementation; (c) prioritization of procurement activities to ensure the most urgent activities happen first (especially the Kotu-Brikama line, followed by the solar plant to address generation shortages); (d) recruitment of an OE, assisting in the supervision of works and also providing support in strengthening occupational health and safety practices; (e) retention of the option to construct some sections of the line underground to mitigate the social and environmental impacts; and (f) implementation of a strong capacity-building program for the PIU and NAWEC staff in procurement and safeguards and close supervision of safeguard aspects.

82. Fiduciary risk: Substantial. Although NAWEC has been implementing the GESP, and other projects financed by other bilateral and multilateral donors, there is still a need for building a fully experienced implementing agency for IDA-financed projects. **Mitigation**: The PIU will be staffed with additional and dedicated procurement and FM staff. During implementation, the PIU will be also supported by World Bank staff and individual consultants with expertise in different fiduciary responsibilities (procurement, FM, social and environmental safeguard).

83. Environment and social risks: Moderate. As described above, the project is being prepared under Condensed Procedures, including the deferral of safeguards requirements to project implementation. This increases the safeguards risks on the project, although the project is categorized as a Category B project, meaning the social and environmental impacts are not expected to be large. **Mitigation**: (i) framework documents have been prepared and disclosed; (ii) PIU will have two dedicated environmental and social safeguard specialists; and (iii) a Safeguards Action Plan has been agreed (see Table 4).

84. Climate and disaster risks (Other): Moderate. The project has been screened for risks related to climate change and disaster risk management. There is a moderate potential impact of climate-related disasters on the plant site and network upgrade activities. The GBA is subject to strong winds and heavy precipitation, particularly in the rainy season (approximately July–September each year), which could delay construction or affect the operations of the network upgrades. These aspects will be monitored during project implementation and works planned accordingly. The project implementation area is also coastal and so vulnerable to rising sea levels.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

Rationale for public sector provision/financing

85. As discussed earlier, given the urgency, Component 1 is being implemented through a publicly funded EPC contract at the request of the GoTG. While an IPP process was considered for capacity addition, and is the direction that the GoTG would like to go, the sector does not have any experience in launching competitively procured IPPs or with VRE. The public financing approach was therefore preferred for several reasons: (a) the urgency of the power crisis demands that additional capacity be added as quickly as possible and (b) the need for the public sector to support the first investment into VRE for demonstration effect. In particular, this component seeks to build global experience in deploying solar energy in emergency situations. So far, the solar industry does not have a strong track record to deploy in emergency situations, although there is one good recent example in Yemen. In parallel, the World Bank Group will work with development partners to build the capacity of the Gambian institutions to launch competitive IPPs and to improve the financial health of NAWEC as the offtaker.

86. The World Bank's financing will leverage significant additional donor funds. Externalities and some benefits from developing renewable energy sources are often difficult to reflect in tariffs compared to those of thermal power and this results in undervaluation and discouragement in capital-intensive low-carbon technology investment with ripple effects. As a result, public action is warranted to correct for market failures or incorporate externalities and spillover effects whether linked to financing or not.

87. Research undertaken by the Climate Policy Initiative (CPI) for the Climate Investment Funds (CIF) shows that public financing is instrumental in the early stage of solar PV scale-up and could result in substantial cost reductions in the early stages of the technology's adoption. Governments have a key role to play in ensuring initial support, with gradual phase out of incentives as costs fall, and properly remunerating the flexibility of the solar PV technology.

Value added of World Bank's support

88. The World Bank's support is essential in lowering financing cost and reducing risk perception by investors. According to the World Bank's Energy Directions Paper (2013), the World Bank support to high-cost low-emission projects is justified when "client countries may be willing to pay the incremental costs of cleaner energy if other significant developmental co-benefits exist" and if the project offers a 'strategic potential for the future … to pilot and scale up technologies that are relatively new in their markets'. Moreover, World Bank support is useful to enhance the interest for these projects from other international financial institutions (IFIs) by sharing the benefit of its thorough due diligence process.

89. The World Bank Group has a key role to play in supporting the country in transitioning from pure public sector to private sector financing as the program scales up and the technology matures. According to the World Bank Group Climate Change Action Plan (April 2016), crowding in private funding to expand access to renewables requires a significant volume of concessional finance. The action plan indicates that the World Bank Group will focus on crowding in private sector funding for clean energy and on de-risking renewable energy investments. The World Bank Group can help The Gambia access innovative financing

mechanisms that will leverage public support to obtain more financing from the private sector, particularly on the debt side, without unduly increasing the financing cost.

Summary of economic and financial analysis

90. **The project is economically viable.** The economic rate of return (ERR) obtained for the GERMP is 16.1 percent with a net present value (NPV) of US$178.6 million. The ERR increases to 18.7 percent and 19.3 percent respectively once local environmental impacts and greenhouse gas (GHG) impacts are taken into account. The corresponding increased NPVs are US$208 million and US$216 million.

91. The main costs are the respective investment in each component. The main benefits of the investments are as follows:

- For Component 1, utility-scale solar PV, the main benefits are the avoided cost of HFO-based generation and the associated GHG emissions. The investment in the solar PV will help reduce the average cost of supply, but the impact is relatively minor given the relatively small contribution to the overall energy mix.

- For Component 2, T&D upgrades, the main benefits of the investments in rehabilitation of the T&D network is an expansion in the capacity of the GBA network to absorb VRE and imports from the OMVG interconnectors, a lower level of transmission losses to transmit this energy to load centers, and improved service quality (avoided cost of unserved energy).

92. A sensitivity analysis is conducted on each subcomponent to identify the switching value of key input variables at which the NPV of the subcomponent becomes zero. The analysis confirms that the investments are robust even under extreme assumptions. Further details are presented in Annex 4.

93. **The project is also financially viable.** The financial internal rate of return (FIRR) obtained for the GERMP is 10.2 percent, with an NPV of US$71.8 million.

94. **NAWEC itself has a path to financial viability.** The results from the financial model forecast indicate that while NAWEC's situation will continue to be fragile in 2018–2020, it will start improving considerably in 2021 when the current ratio turns positive. However, this depends on successful implementation of the measures outlined above to turn around the performance of NAWEC.

95. From 2018 to 2021, the operating margins are positive with the positive impact of the financial leverage coming from the profitability of the investments. The profit margins, the return on assets and on equity, are negative from 2015 to 2019, becoming positive in 2020. Afterwards, these ratios rise, showing that the profitability of NAWEC and its financial viability substantially improve. From 2015 to 2019, NAWEC revenues cannot cover the expenses. This deficit is principally due to the cost of the sales as HFO and light fuel oil (LFO) baseload plants have poor specific consumption and low availability. However, from 2018 to 2020 the financial viability of NAWEC is expected to improve significantly due to the commissioning of the OMVG and the impact of the GERMP. As noted earlier, there remain substantial risks to NAWEC's path to financial viability, in particular to the ability of the GoTG to implement the LCPDP, and the outcome of negotiations between NAWEC and the MoFEA on the proposed debt restructuring.

96. GHG accounting was conducted for this project as part of the economic analysis. Overall, Component 1 will lead to a net emissions reduction of 337,981 tCO_2 over the economic lifetime of 25 years. Component 2 will lead to a net emissions reduction of 24,259 tCO_2 over the economic lifetime of 40 years. The assumptions behind this analysis are detailed in Annex 4.

B. Technical

97. The project will use well-established technologies but they may present some construction and operational challenges for NAWEC. Being new technologies in The Gambia, these challenges may create difficulties during implementation. The project has foreseen specific activities to minimize the challenges and to provide the implementing entities with all the required training and capacity building, in particular:

- **Component 1.** The plant definition and bidding process will be supported by a specialized feasibility study done by an expert firm financed under Component 3. Construction will be supervised by the OE. The contract for the plant construction will include an O&M contract for at least 20 years. An appropriate payment and performance scheme will be defined before the procurement process to ensure an optimal design, installation and O&M by the contractor, and timely and fair payments from NAWEC.

- **Component 2.** The new 132 kV line and associated substations will be defined with the support of a specialized feasibility study completed by an expert firm financed under Component 3. Line and substations construction will be supervised by the OE. In parallel, Component 3 will support capacity-building activities for NAWEC staff on operating and maintaining 132 kV lines and substations.

98. As part of the project's implementation arrangements, and as is common for these types of projects, an OE firm will be contracted. This firm will help ensure that execution is carried out in accordance with the applicable terms of reference (TOR) and international best practices.

C. Financial Management

99. A financial management assessment (FMA) of NAWEC was carried out in November 2017. The objective of the assessment was to determine whether NAWEC has acceptable FM arrangements in place to ensure that the project funds will be used only for intended purposes, with due attention to considerations of economy and efficiency. The assessment complied with the Financial Management Manual for World Bank-financed investment operations effective March 1, 2010 and revised on February 10, 2017.

100. The PIU of the ongoing GESP (P152659) established within NAWEC will handle the fiduciary tasks of the GERMP. The FM arrangements for this project will be based on the existing arrangements in place under the GESP. The overall performance of the GESP's FM is Satisfactory. Staffing has remained adequate and proper books of accounts and supporting documents have been kept with respect to all expenditures. NAWEC is familiar with the World Bank FM requirements. The unaudited IFRs for the ongoing project are also submitted on time and acceptable to IDA.

101. The FM risk for the GERMP is rated Substantial. It is considered that the FM satisfies the World Bank's minimum requirements under the World Bank Policy and Directive on IPF effective in 2017. To

accommodate the project within the existing FM system, the following measures should be taken: (a) update of the existing PIM including FM procedures before effectiveness; (b) appointment of a dedicated FM officer before effectiveness; (c) customization of accounting software Financial Management Information System (FIMIS) to take account of new project design and components by three months after effectiveness; and (d) recruitment of an external auditor by six months after effectiveness. See Annex 2 for full details on FM.

D. Procurement

102. The Borrower will carry out procurement for the proposed project in accordance with the World Bank's Procurement Regulations for IPF Borrowers 'Procurement in IPF, Goods, Works, Non-Consulting, and Consulting Services' (Procurement Regulations) dated July 2016, revised November 2017, under the 'New Procurement Framework (NPF)'; 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 on July 1, 2016; and other provisions stipulated in the Financing Agreements.

103. As part of the preparation of the project, the Borrower (with technical assistance from the World Bank) prepared a Project Procurement Strategy for Development (PPSD), which described how procurement activities will support project operations for the achievement of PDOs and deliver value for money (VfM). The main procurement activities as defined in the PPSD under this project would include (a) design, supply, installation, and O&M of PV power plant(s); (b) design, supply, and installation of equipment and materials for the upgrade of HV transmission line; (c) design, supply, and installation of equipment and SCADA; (d) supply and installation of equipment for upgrade of primary and secondary substations; (e) procurement and deployment of Management Information System (MIS) integrated system for NAWEC; (f) supply and replacement of approximately 2,500 light bulbs and 31,000 meters; and (g) selection of firms for technical assistance and ICs to support NAWEC to implement the projects.

104. The PPSD considered institutional arrangements for procurement; roles and responsibilities; thresholds, procurement methods, and prior review; and the requirements for carrying out procurement. It also includes a detailed assessment and description of NAWEC capacity for carrying out procurement and managing contract implementation, within an acceptable governance structure and accountability framework. Other issues considered include the behaviors, trends, and capabilities of the market (that is, market analysis) to respond to the Procurement Plan.

105. NAWEC will be the implementing agency of the GERMP, assuming all fiduciary (FM and procurement) responsibilities and responsibilities for reporting to the World Bank. The GESP PIU established within NAWEC will carry out the project activities. The procurement manager of NAWEC is in charge of procurement for the GESP and will play the same role in the GERMP. NAWEC has experience in hosting the implementation unit of the GESP and the PIU has received specific training in World Bank fiduciary rules and guidelines. However, the assessment identified weaknesses, in particular, the lack of procurement capacity and the lack of a dedicated procurement specialist to the team. To mitigate this risk, the project will finance procurement technical assistance to the project (which was a success factor within the GESP) and provide additional procurement training. In addition, the project will require a dedicated procurement specialist within the PIU.

106. It is expected that the World Bank will handle procurement supervision on the EIB's behalf for activities cofinanced between IDA and the EIB (the solar plant in Component 1 and T&D activities in

Subcomponents 2.2 and 2.3). This will be enabled through the signature of a Principles of Collaboration agreement, which will authorize the EIB to delegate procurement supervision to IDA. A similar agreement has been established for a jointly co-financed energy project in Senegal, so it is expected that the agreement for the GERMP could be quickly signed.

107. See Annex 2 for full details on procurement.

E. Social (including Safeguards)

108. The project is classified as Category B (partial assessment) as per the World Bank's operational policy on Environmental Assessment (OP/BP 4.01) and has triggered OP/BP 4.12 (involuntary resettlement) to address the potential social impacts of this project.

109. Since the project sites for establishment of the solar PV plant and the T&D line routing are yet to be finalized, the project has prepared framework documents (RPF and ESMF), consulted upon and cleared by the World Bank. The RPF was necessary because there is a high probability of some economic displacement due to the land required for the solar plant and the right-of-way to be established for the HV transmission line. The RPF was published on the World Bank website and the NAWEC website on January 9, 2018. The ESMF was published on the World Bank and NAWEC websites on February 12, 2018.

110. The RPF will guide future development of RAPs, which will be prepared once the project sites are known and finalized. The RAPs will be prepared in accordance with the social safeguards requirements of the cofinanciers as well as The Gambia's relevant laws.

111. With respect to the solar plant, economic displacement is likely to be at the Jambur site, one of the sites being considered as a potential site for the PV plant. The main negative social impacts are on livelihoods and income—employment, crop losses, tree losses, building losses, minor land take (solar site, partial impact on housing plots), loss of revenue, and loss of community and individual equipment. With respect to the HV transmission line, the layout of the proposed line (length, map, and range) will need to be defined while minimizing the impacts on communities' assets and livelihoods. Land acquisition will have to comply with national and World Bank social safeguard policies and must be documented.

112. NAWEC will initiate consultations with communities and establish appropriate stakeholder participation and document disclosure during the preparation and implementation of the RAPs. According to World Bank safeguards policies, the RAPs will need to be implemented before the start of civil works

F. Gender

113. The GoTG recognizes gender equality and women empowerment as a key factor for the attainment of social and economic development. As a result, a number of measures were taken to mainstream women in the development process: a significant development is the 1997 Constitution, which seeks to promote equality between women and men. It provides for the rights of women and equal treatment with men including equal opportunities in political, economic, and social activities. The new National Gender Policy which updates the National Policy for the Advancement of Women (1999–2009) marks the beginning of a new policy implementation period from 2010 to 2020. The country gender profile was initiated at the request of the GoTG as part of a wider effort to promote gender-responsive policies/programs.

114. Despite efforts to move the national gender agenda forward, gender-based inequalities persist in many areas in The Gambia. In 2010, The Gambia was ranked 151 out of 169 countries in the Human Development Index and 151 on the Gender Inequality Index.12 Women make up the majority of the poor/extremely poor as they occupy a low socioeconomic status.13 Poverty discrepancies among men and women are largely the result of women's limited access to productive resources such as land, technologies and innovations, and energy. According to the 2008 Light Poverty Report, 93 percent of urban and 99 percent of rural households use firewood or charcoal as fuel for cooking, and only 2.9 percent of the rural population possesses a modern stove. The national energy policy does not explicitly address gender considerations in its design, planning, and interventions.

115. Evidence shows that access to electricity for socially marginalized groups such as women and youth, especially widows and those with no formal education, presents opportunities for income-generating activities that can help empower them economically. Providing affordable access may require addressing these groups' ability to pay for the installation costs and tariffs. The project will explore specific ways in which the proposed components can reduce the identified gender gaps in the energy sector in The Gambia. The project plans to address the gender gaps identified above through interventions such as: (a) organizing gender-sensitive communications campaigns and outreach activities targeted to women and other vulnerable groups about the services provided by the project and consultations with women to promote their involvement in project design and interventions particularly related to the pricing system; (b) providing women technical skills training, for example, in SCADA, to facilitate their employment in the energy sector; (c) facilitating the recruitment of female staff in electricity restoration and modernization activities, as frontline service providers for the customer call center or as promoters and sales agents for off-grid products; and (d) collecting sex-disaggregated data through the customer service satisfaction survey and adopting gender-sensitive and sex-disaggregated indicators to monitor progress and assess the impact of the gender-targeted interventions. These indicators will be included in the Results Framework and the PIM will set up mechanisms and measures to collect and report sex-disaggregated and gender-relevant data and results.

116. The project will also set in place mechanisms to prevent potential exacerbation of sexual exploitation and abuse, a type of gender-based violence which may increase when outside workers are brought to work in the restoration and modernization process. This influx of male workers may increase the demand for sex work and increased use of drugs and alcohol, which are known drivers for violence against women and girls (VAWG). As a result, women in the project community may be subject to higher rates of VAWG with possible increases in the prevalence of sex trafficking, disease transmission, and sexual, physical, or verbal violence. The influx of workers may also lead to increase in violence that women in the communities face within the households. Men suspicious of women speaking to other men, jealously, and increased perceptions of risk and insecurity may lead to women experiencing violence from their partners and women and girls experience limitation in their mobility. The project will emphasize the importance of having internal prevention and response systems and policies (sexual harassment policies, anonymous reporting mechanisms, and code of conduct for the contractor for example) in place and building staff capacity to recognize and address these issues at the project level during implementation. The project will also explore the option of mapping key health, justice, psychosocial, and safety service

[12] United Nations Development Programme's 2010 Global Human Development Report 2010.
[13] *http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and Operations/GAMBIA%20Gender%20Profil%20final%20(2).pdf*

providers to be able to refer women reporting violence to the complete range of services needed to heal them from their experiences. The project will identify young women and girls and provide livelihood activities coupled with safe spaces to prevent violence and create safe places for reporting violence related to the project. Implementing the gender-targeted interventions may require appointing a gender focal point in NAWEC and facilitating training on gender and energy for MoPE and NAWEC staff to provide them with skills to analyze and respond to the gender dynamics that influence the access, use, and impacts of energy services.

G. Citizen Engagement

117. The project has included the principles of citizen engagement from the preparation stage, in particular through the development and implementation of an emergency communications campaign supported through the PPF. Multiple channels for citizen feedback and inquiry were opened during preparation, have become quite popular with customers, and will continue to be operational throughout the project. The project will further support citizen engagement through the creation of an effective call center, quarterly publication of the solar plant O&M escrow balance and utility KPIs which form part of the performance contract, and the GRM described later. Citizen engagement indicators are included in the results matrix.

118. Citizen engagement will be facilitated by clearly identifying beneficiaries (men and women, communities, nongovernmental organizations (NGOs), small and medium enterprises, and local and central administration) during preparation, implementation, and evaluation. Throughout the project, citizens will be consulted and opportunities will be provided to collaborate with the project and participate in the sustainability of the investments.

119. The GRM is a critical part of the project's citizen engagement efforts. During preparation and implementation, complaints may arise with respect to breach of laws, project-affected persons (PAPs) on landownership and land use issues, pollution nuisance, and choice of beneficiaries among others. A project-level GRM is outlined in the RPF and the ESMF. It is designed to be a mechanism that is trusted by all relevant partners including the PAPs. It will facilitate the redress of any grievance and conflict that may arise from the project and will be supported by the NAWEC social and environmental specialists. The grievance mechanism process should complement and facilitate access to independent judicial or administrative remedies outside the specific context of the GERMP and will resolve grievances immediately using traditional and administrative mechanisms or the law courts at national, regional, and community levels. The PIU will be notified of any disputes in the project zone. Project field staff should work closely with the communities and the community leaders to clarify and resolve any misunderstanding that could give rise to conflicts. Where the dispute cannot be resolved at the community level, the affected persons or party shall be advised to lodge a complaint with the GRM committee. The PIU will develop a clear plan and procedures for the GRM, including complaint collection and processing procedures, reporting formats, database/records specifications, and committee membership using guidelines provided in Chapter 7 of the RPF and the ESMF. Public participation and consultation will be a key part of the process at all times to promote understanding and prevent unnecessary complaints and disputes. Component 3 includes technical assistance to NAWEC to establish the GRM, which is expected before project effectiveness.

120. In addition, a combination of social consultations, public hearings, satisfaction surveys, social audits, community organization and empowerment, and additional capacity building for citizen

engagement for the client will be developed and delivered during the project to foster a participatory and inclusive national dialogue on energy issues and service delivery.

H. Environment (including Safeguards)

121. The project is expected to have substantial positive benefits such as improved standard of living and higher possibility of income-generating activities due to consistent and reliable electricity supply. The use of renewable energy will contribute to the reduction of GHG emissions and other air pollutants. The main environmental aspects under this project are related to the setting up of solar PV plants and construction and improvement of T&D lines.

122. The most critical risk associated with setting up solar PV plants is the land siting. Final sites will be determined per the results of the solar feasibility study. Current land use and ownership of these sites will need to be managed as per the social safeguards requirements. During construction of the plant, the main risks will be associated with health and safety of workers and of the community. In the long term, there will be environmental issues related to the maintenance and management of waste from these plants, especially when the panels reach the end of productive life.

123. The route of the transmission line will be determined during project implementation. There is a risk that it could come close to some designated forests (Bijilo Kabafita, Bamba, and Salagi forest parks) and therefore will have an impact on these forests, either due to clearance of trees or disturbances to the wildlife and the rich avifauna, if not properly managed. The forest parks have diverse birds, including resident and migratory inter-African and Palearctic species. Mitigation measures could include appropriate routing and wiring of the transmission lines and design of poles. When selecting the final route, the Borrower will therefore make every effort to avoid routing through forested areas, provided the proposed routing would not significantly increase the number of PAPs.

124. Other generic impacts of upgrading and construction of T&D lines are related to excavations and earthworks, vegetation clearance of localized grass and trees, location of transmission poles and risk of erosion based on the site-specific topography, and sourcing of construction materials and waste generation. This activity can also have potential social impacts during works, including risk to public and community health and safety, inconveniences such as disruption of services, pollution due to emissions to air, water, and land, and noise of works. Labor influx can have potential risk to local communities and will need to be well managed. Such a linear project can have possible impacts on local cultural property (places of worship, spiritual or culturally sensitive sites, graves, chance archaeological finds, and so on).

125. The Kotu and Brikama III power plants are not considered to be associated facilities as they have three existing transmission lines and do not need the new line being financed under this project to evacuate their power.

126. The project is classified as Category B (partial assessment) as per the World Bank's operational policy on Environmental Assessment (OP/BP 4.01). The World Bank Group's Environmental, Health and Safety guidelines and electric power transmission distribution guidelines will also apply. Two operational policies related to environment have been triggered for this project—OP/BP 4.01 (Environmental Assessment) and OP/BP 4.36 (Forests) to address the potential environmental impacts of this project and the proximity of the routing near designated forest parks.

127. The ESMF outlines potential impacts and requirements that may lead to alternatives being considered and best options chosen shall eventually be fully addressed in Environmental and Social Impact Assessment (ESIA) studies once the site-specific subprojects are known. The ESIAs shall include an ESMP that will specifically identify all potential impacts and mitigation measures, costs, responsibilities for mitigation and monitoring. Consultations with the various stakeholders along the routing of the transmission lines have been adequately conducted and documented. A mechanism for setting up a Grievance Redressal Mechanism has been detailed along with guidance for preparing and monitoring ESMPs. The ESMF builds in a requirement for capacity building and an independent environmental audit to be undertaken during project implementation.

I. Safeguard Implementation Arrangements

125. Preparation of site-specific safeguards instruments will be deferred to during project implementation, according to the Safeguards Action Plan summarized in Table 4. This is permitted as the project is being prepared under Paragraph 12 under World Bank Policy for IPF. For the activities that require an ESIA, bidding documents will not be advertised until the ESIA has been completed.

126. Institutional capacity to handle environmental and social safeguards is inadequate in the PIU of the existing project. The GERMP PIU will designate two full-time specialists in the PIU, who will be provided with intensive training and learning through study tours and abridged training courses. Added support will be provided by the OE, while the project will consider twinning arrangements with national universities. The World Bank team will continue to provide ongoing safeguards training to the PIU team and the engineers associated at the regional and local levels.

127. Implementation and monitoring of safeguards also needs to be strengthened. In The Gambia, the National Environment Agency (NEA) is supported by focal points at the regional level to monitor the implementation of environmental and social safeguard measures. However, there are constraints in the practical implementation of environmental and social safeguard measures including (a) existence of administrative delays in the application of laws and regulations; (b) insufficient logistical resources and competent human resources for environmental and social monitoring; (c) lack of qualified human resources in the multisectoral working group on environmental impact assessment. The NEA will also be included in the capacity-building activities of this project, along with the other relevant stakeholders

Table 4. Safeguards Action Plan

Action	Responsible	Expected Delivery Date
ESIA for the solar plant		
ToRs drafted	NAWEC	Done
Consultant recruited	NAWEC	May 2018
First draft of ESIA/ESMP	NAWEC consultant	July 2018
Final draft of ESIA/ESMP (to be included in the bidding documents)	NAWEC consultant	August 2018
Implementation of the ESMP	Solar plant contractor	2019
RAP for the solar plant		
ToRs drafted	NAWEC	May 2018

Action	Responsible	Expected Delivery Date
Consultant recruited	NAWEC	July 2018
First draft of RAP	NAWEC consultant	September 2018
Final draft of RAP	NAWEC consultant	October 2018
ESIA for the Kotu-Brikama transmission line		
ToRs drafted	NAWEC	Done
Consultant recruited	NAWEC	Done
First draft of ESIA/ESMP	NAWEC consultant	June 2018
Final draft of ESIA/ESMP	NAWEC consultant	July 2018
Implementation of the ESMP	Transmission line contractor	2019
RAP for the Kotu-Brikama transmission line		
ToRs drafted	NAWEC	Done
Consultant recruited	NAWEC	Done
First draft of RAP	NAWEC consultant	June 2018
Final draft of RAP	NAWEC consultant	July 2018
Works will start after compensation has been completed	Transmission line contractor	2019
Implementation of RAP for the Kotu-Brikama transmission line and the solar plant		
Draft ToRs for RAP implementation support	NAWEC	May 2018
Recruit consultant (NGO or firm) to support with implementation of RAPs	NAWEC	July 2018
Allocation of RAP implementation funds into an escrow account	MOFEA	August 2018
Compensation of PAPs	NAWEC/NEA	January 2019
ESIA for the distribution lines to connect isolated centers		
ToRs drafted	NAWEC	January 2019
Consultant recruited	NAWEC	February 2019
First draft of ESIA	NAWEC consultant	May 2019
Final draft of ESIA	NAWEC consultant	June 2019
RAP for the distribution lines to connect isolated centers	NAWEC	2019
ToRs drafted	NAWEC	January 2019
Consultant recruited	NAWEC	February 2019
First draft of RAP	NAWEC consultant	May 2019
Final draft of RAP	NAWEC consultant	June 2019

Action	Responsible	Expected Delivery Date
Implementation of RAP for the distribution lines		
Recruit NGO to support with RAP implementation	NAWEC	June 2019
Allocation of RAP implementation funds into an escrow account	MOFEA	July 2019
Compensation of PAPs	NAWEC/NEA	December 2019
Capacity-building activities for the PIU and NAWEC staff		
Safeguards training for NAWEC PIU staff, technical staff, and directors and relevant stakeholders such as NEA and Department of Forestry by World Bank specialists	World Bank	May 2018
Twinning arrangements with the university of The Gambia to explore opportunities for cross-learning	NAWEC	May 2018
Environmental and social PIU team and engineers at the provincial power stations will undertake a study tour to see sound environmental and social management systems in a well-functioning power utility	NAWEC/World Bank	Q3 2018
PIU environmental and social team to attend a short regional/international course (2–3 weeks) on environmental and social management	World Bank	Q4 2018
Ongoing technical support from technical Service Contractor	NAWEC	Ongoing
GRM activation support	NAWEC / World Bank	Q2 2018

J. World Bank Grievance Redress

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

VII. RESULTS FRAMEWORK AND MONITORING

Results Framework

Project Development Objective(s)

The Project Development Objectives are to (i) improve the operational performance of the Project Implementing Entity; and (ii) improve the capacity of the Project Implementing Entity to dispatch variable renewable electricity.

PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	End Target
Improve the operational performance of the Project Implementing Entity					
Transmission and Distribution losses in the Greater Banjul Area			Percentage	22.00	20.50
Technical distribution losses			Percentage	14.00	13.00
Non-technical distribution losses			Percentage	8.00	7.50
Power outages in the GBA			Number	536.00	300.00
Improve the capacity of the Project Implementing Entiy to dispatch variable renewable electricity					
Generation dispatched from variable renewable generation (solar)			Gigawatt-hour (GWh)	0.00	20.00
Installation of a SCADA system			Yes/No	N	Y

Intermediate Results Indicators by Components	DLI	CRI	Unit of Measure	Baseline	End Target
On-grid Solar PV with storage					
Installed solar generation capacity			Megawatt	0.00	20.00
Transmission & Distribution (T&D) Restoration and Modernization					
Transmission lines constructed or rehabilitated			Kilometers	0.00	30.00
Transmission substations constructed or extended			Number	0.00	3.00
Distribution substations constructed or extended			Number	0.00	10.00
Increase in transmission capacity			Kilovolt-Amphere(KVA)	0.00	90,000.00
Urgent Institutional Support for Sector Turnaround					
Number of prepayment meters installed			Number	0.00	31,000.00
Effective customer call center established and producing gender disaggregated data			Yes/No	N	Y
Percentage of customer call center staff who are female			Percentage	0.00	50.00
Percentage of grievances processed from total grievance received on the project			Percentage	0.00	100.00
percentage of grievances submitted by female clients that were processed			Percentage	0.00	100.00
NAWEC have published reports on beneficiary feedback, including gender disaggregated data, and how it has been incorporated into the project			Yes/No	N	Y

Number of staff trained on SCADA disaggregated by gender			Number	0.00	40.00
Number of male			Number	0.00	28.00
Number of female			Number	0.00	12.00
Number of gender-sensitive communications campaigns and outreach activities conducted that target women and include separate consultations with women			Number	0.00	10.00
Training on gender and energy provided to staff of the ministry of energy and NAWEC			Yes/No	N	Y
People with new or improved access			Number (Thousand)	0.00	1,680.00
Separation of NAWEC accounts			Yes/No	N	Y

Monitoring & Evaluation Plan: PDO Indicators	
Indicator Name	Transmission and Distribution losses in the Greater Banjul Area
Definition/Description	Percentage of GWH lost between the point of dispatch onto the distribution grid (33 kV and below) and the point sold to end customers.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Collect generation and sales data from relevant NAWEC departments as inputs to calculate losses.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Technical distribution losses
Definition/Description	Proportion of total losses which are technical i.e. resulting from the technical condition of the NAWEC network.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Owners Engineer to estimate the breakdown of technical / non-technical losses based on available substation metering.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Non-technical distribution losses
Definition/Description	Proportion of total network losses which are non-technical, including electricity theft.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Owners Engineer to estimate the breakdown of technical / non-technical losses based on available substation metering.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Power outages in the GBA
Definition/Description	Average number of outages per month at the primary and secondary substation level in the GBA, which provides a measure of service quality.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU will collect service quality data from the NAWEC T&D team based on substation operational data.
Responsibility for Data Collection	NAWEC

Indicator Name	Generation dispatched from variable renewable generation (solar)
Definition/Description	Measures GWH dispatched from solar variable renewable generation i.e. not just generated.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Generation data collected from the solar plant operator.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Installation of a SCADA system
Definition/Description	SCADA system will be installed as part of the dispatch center and will allow NAWEC to control energy flows from different sources onto the transmission and distribution system.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	This is a yes / no indicator according to successful implementation of the contract to install the SCADA system.
Responsibility for Data Collection	Owner's Engineer

Monitoring & Evaluation Plan: Intermediate Results Indicators	
Indicator Name	Installed solar generation capacity
Definition/Description	Mega Watt peak of installed solar capacity
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Identify the MWp of solar PV installed through the project.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Transmission lines constructed or rehabilitated
Definition/Description	Measures the KM of High Voltage transmission lines constructed.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Collect data from the Owners Engineer status reports.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Transmission substations constructed or extended
Definition/Description	Number pf primary substations constructed as part of the new Kotu-Brimaka transmission line.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Collect data from the Owners Engineer status reports.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Distribution substations constructed or extended
Definition/Description	Number of distribution substations constructed in the provinces.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Collect data from Owners Engineer status reports.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Increase in transmission capacity
Definition/Description	Difference in transmission capacity within the NAWEC network compared to the baseline.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Collect data from Owners Engineer status reports.
Responsibility for Data Collection	Owner's Engineer

Indicator Name	Number of prepayment meters installed
Definition/Description	Number of prepayment meters purchased and installed for low voltage customers through the project.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Collect meter installation data from responsible unit within NAWEC.
Responsibility for Data Collection	NAWEC
Indicator Name	Effective customer call center established and producing gender disaggregated data
Definition/Description	Service Contractor will support the creation of a customer call center to handle customer enquiries and complaints. Effective means that the phone lines are functioning 24/7 and issues are dealt with on a timely basis.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	This is a yes / no indicator based on the existence of an effective customer call center within NAWEC.
Responsibility for Data Collection	NAWEC

Indicator Name	Percentage of customer call center staff who are female
Definition/Description	Proportion of total call center staff who are female.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to collect data from the NAWEC Human Resources Department.
Responsibility for Data Collection	NAWEC

Indicator Name	Percentage of grievances processed from total grievance received on the project
Definition/Description	Indicator will track the percentage of grievances addressed through the grievance redress mechanism established through the project.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Grievance data to be collected from the complaints registry maintained by the PIU.
Responsibility for Data Collection	NAWEC

Indicator Name	percentage of grievances submitted by female clients that were processed
Definition/Description	Proportion of grievances processed which are female. This indicator is designed to identify if there is equality in the treatment of grievances received between male and female.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to collect gender disaggregated grievance data.
Responsibility for Data Collection	NAWEC
Indicator Name	NAWEC have published reports on beneficiary feedback, including gender disaggregated data, and how it has been incorporated into the project
Definition/Description	NAWEC have published reports on beneficiary feedback, including gender disaggregated data, and how it has been incorporated into the project.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	Based on existence of reports published by NAWEC summarizing beneficiary feedback.
Responsibility for Data Collection	NAWEC

Indicator Name	Number of staff trained on SCADA disaggregated by gender
Definition/Description	Number of men and women trained to use the SCADA system in the lifetime of the project.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to track data on staff training on SCADA.
Responsibility for Data Collection	NAWEC

Indicator Name	Number of male
Definition/Description	Number of staff trained in SCADA which are male
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to track training data.
Responsibility for Data Collection	NAWEC

Indicator Name	Number of female
Definition/Description	Number of staff trained in SCADA which are female
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to track training data.
Responsibility for Data Collection	NAWEC
Indicator Name	Number of gender-sensitive communications campaigns and outreach activities conducted that target women and include separate consultations with women
Definition/Description	Number of communications campaign in total throughout the duration of the project.
Frequency	in Total
Data Source	NAWEC
Methodology for Data Collection	PIU to track of communications campaigns financed through the project.
Responsibility for Data Collection	NAWEC

Indicator Name	Training on gender and energy provided to staff of the ministry of energy and NAWEC
Definition/Description	Training on gender and energy provided to staff of the ministry of energy and NAWEC.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to track data on training provided through the project.
Responsibility for Data Collection	NAWEC

Indicator Name	People with new or improved access
Definition/Description	Number of people who have a new grid connection to electricity, or have an improved quality of service. Estimated by number of residential customers (baseline 160000) and assume that NAWEC meets its target of adding 10,000 customer per year, and an average of eight people per household.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	PIU to track number of people who get access through the lifetime of the project.
Responsibility for Data Collection	NAWEC

Indicator Name	Separation of NAWEC accounts
Definition/Description	Separation of financial accounts into business units of electricity, water and sewerage.
Frequency	Annual
Data Source	NAWEC
Methodology for Data Collection	This is a yes / no indicator based on the existence of separated financial accounting for NAWEC's different business units.
Responsibility for Data Collection	NAWEC

ANNEX 1: TECHNICAL DETAILS

Republic of The Gambia: Gambia Electricity Restoration and Modernization Project

This annex includes some additional technical details that are intended to clarify specific components and subcomponents:

- Component 1
  - Conclusions of the Gambian grid study for integrating solar generation
  - PV technology principles
  - Storage options for PV generation
- Component 2
  - T&D investments identified in the Energy Sector Road Map

Conclusions of the Gambian Grid Study for Integrating Solar Generation

1. The existing studies for installation of the solar PV plant include an EU-financed grid stability analysis that assesses the capacity of the grid to absorb solar intermittent generation.

2. The capacity of integration of VRE into the Gambian system will depend on both the requirements and capabilities of the PV plants to be installed and the improvements on the power system operation (methods and tools) and the transmission system (facilities, flexibility, and complementary devices). The higher the target of integration of VRE, the higher the requirements of improvements of each of the mentioned agents will be to make it feasible.

3. The analysis performed in the study describes four different configuration scenarios that result in different amounts of solar generation to be integrated in the grid.

4. **Scenario 1 - Basic connection of PV plant.** This scenario sets the lower level of integration of PV energy into the power system. This scenario analyzes the idea of the connection of PV plants without relevant changes or improvements on dispatching and network operation. The study recommends that the maximum PV capacity to be integrated into the system under this scenario is very minimal, limited to about 70 percent of the spinning reserve (1.3 MW for a spinning reserve provided by one 6 MW HFO engine).

5. **Scenario 2 - Conventional hybrid scheme (engines HFO/diesel+PV).** This scenario analyzes the integration of the PV plants as an equivalent conversion of the existing HFO/diesel generators into a scheme of a hybrid plant with a mix of PV generation. The study recommends that the maximum PV capacity to be installed by each generation node/station is as follows:
   - 25 percent of the capacity of the hybrid diesel plants
   - 1.3 MW additional capacity per the capacity of the generation node to regulate the intermittence of the hybrid plants in the generation node
   - Maximum of half of the HFO/diesel plants is recommended to be hybridized

- For example, for a total of 70 MW of diesel to be installed, the maximum amount of PV integration in this scheme is 11.35 MW (35 MW × 25% + 2 × 1.3 MW).

6. **Scenario 3 - Storage hybrid scheme (engines HFO/diesel+PV+energy storage).** This scenario analyzes the improvement of the scheme in scenario 2 by incorporating a storage device in the hybrid unit. The study recommends the following:

- The maximum PV capacity to be installed by each generation plant is 33 percent of the capacity of the hybrid diesel plants
- All the diesel plants are candidates to be hybridized
- Considering, for example, a total of 70 MW of HFO/diesel, the maximum amount of PV integration in this scheme is 23.1 MW (70 MW × 33 percent)
- The feasibility of the effective implementation of this scheme of integration depends on the accuracy and effective design of the online intelligence of integration of the three components of the hybrid plant (HFO/diesel-PV-battery);
- The existing diesel plants are old and most probably the automation of their control may demand a bigger effort for customization of the control to the actual technical constraints of the plants
- In any case, it is not a reason to discard this alternative of integration but a reason for taking care of the challenging process
- Clearly, this level of integration of the PV generation in the Gambian system is achieving the limits considering installations and modifications of individual plants
- This scenario can also be reproduced by providing the spinning reserve from HFO/diesel with energy storage

7. **Scenario 4 - Integral generation dispatch (storage hybrid+smart devices).** The incorporation of smart elements for the coordination of the total generation of the system provides a qualitative improvement in the operation of the system as a whole as well as in the margin for integration of PV into the system. The study recommends the following:

- The maximum PV capacity to be installed by each plant is 45 percent of the capacity of the hybrid group of diesel plants
- All the diesel plants are candidates to be hybridized
- Considering a total of 70 MW of HFO/diesel the maximum amount of PV integration in this scheme is 31.5 MW (70 MW × 45 percent)
- This scenario can be also reproduced by providing the spinning reserve from HFO/diesel with energy storage

PV Technology Principles

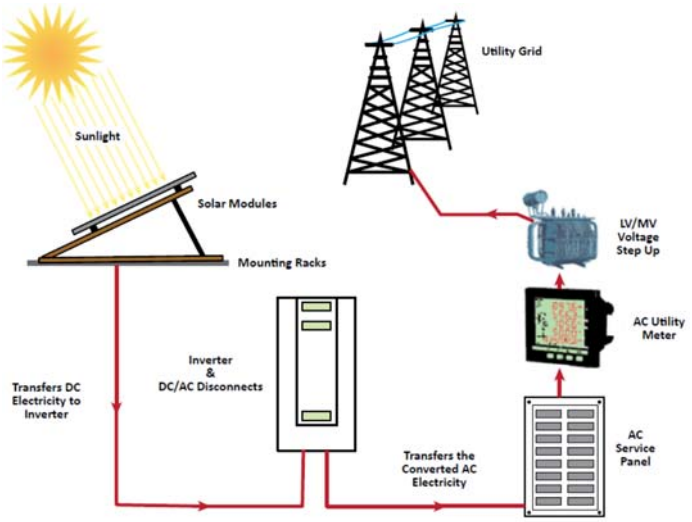
8. Solar PV absorbs direct normal irradiance, diffuse horizontal irradiance, and reflected components, all of which sum up making the global horizontal irradiance. PV cells directly convert this solar energy into electricity through the PV effect. When PV material receives a photon, it can be absorbed, reflected, or transmitted. In the case where it is absorbed, and if the energy of photon is greater

than the band gap of the semiconductor, an electron can be released and removed through the help of the p-n junction of the material. The electron is free to flow as current through the creation of an electric field between the n-type and p-type semiconductors. While there are many types of PV cells available today, the two main types are (a) crystalline silicon and (b) thin film. Crystalline silicon cells currently dominate the market with a share of approximately 90 percent, while thin film is represented by approximately a 10 percent share.

9. The performance of a PV cell, module, or array can be visualized with an I-V curve that describes the maximum power point for given weather conditions, that is, the PV panel's rated power under specified conditions, usually standard testing conditions (STCs). STC means that the solar panels are tested with an irradiance of 1,000 W/m^2 under cell temperature conditions of 25°C and assuming an airmass of 1.5. Airmass is the optical path length for light through the Earth's atmosphere with the airmass at the equator being 1. There are two main parameters that significantly affect the performance of a PV panel: (a) solar irradiance and (b) ambient temperature. It is very important that these two parameters are considered when designing a PV array.

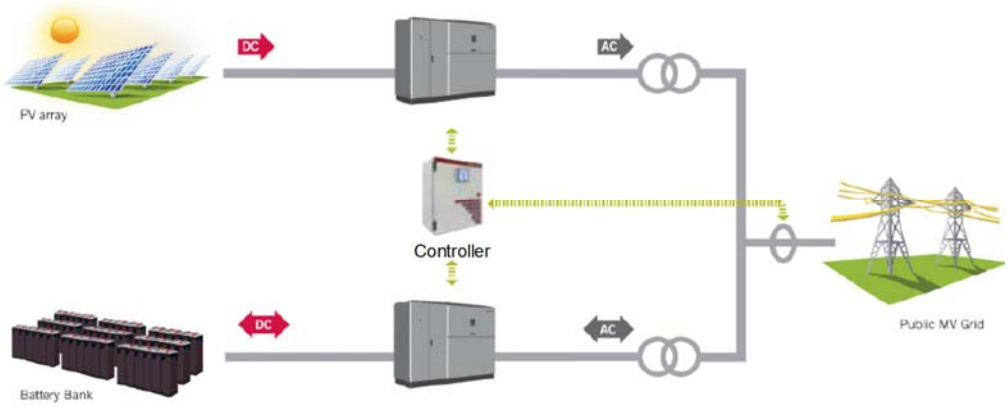
10. A PV plant consists of several PV strings connected in parallel to a centralized inverter (Figure 1.1). The inverter is necessary because the power output is direct current and must be converted to alternating current. Each PV string consists of a number of PV modules connected in series, each with a bypass diode. The bypass diode is included to protect the system from irregular irradiation or partial shading. Connecting PV modules in series increases the voltage of the system and connecting the PV strings in parallel increases the current of the system.

Figure 1.1. Simplified PV Plant Configuration



11. The PV plant can also include a BESS to compensate for the fluctuations of the solar resource and extend the operating hours of the system, resulting in improved capacity factor and flexibility (see Figure 1.2).

Figure 1.2. Simplified PV plant+BESS configuration



Storage Options for PV Technologies

12. Due to high capital and maintenance cost and current technical limitations, such as lifetime, capacity, and self-discharge rates, BESSs have not been used yet at a large scale in utility-scale applications. The successful implementation of a BESS at a large scale combined with PV might represent

a potential breakthrough for the future large-scale diffusion of solar electricity generation. However, so far, large-scale application of these batteries can be found only for grid ancillary services of frequency control and spinning reserve.

13. The main types of batteries available are the following: lead-acid, nickel cadmium, nickel metal hydride, lithium ion, sodium sulfur, and flow batteries. Lead-acid may represent the most mature technology and is currently being used in PV applications. Nickel cadmium is a mature technology at the appliance level, but its use for high-capacity applications is also being explored. Compared to lead-acid, nickel cadmium offers longer life cycles, higher energy densities, and lower maintenance requirements but its main drawbacks include the use of toxic heavy metals, its large dimensions, and high self-discharge rates. A utility-scale application of this technology is represented by the battery park deployed in Alaska, which is able to provide 27 MW for 15 minutes or 46 MW for 5 minutes for grid support services such as spinning reserve, frequency regulation, and reactive power support. Nickel metal hydride can be seen as an advancement of the nickel cadmium by being more environmentally friendly and presenting 25–30 percent higher energy densities. Its main drawbacks are high self-discharge rates and scarce availability of the battery materials. Sodium sulfur batteries are high temperature devices which operate in the 300–350°C range. They are mainly employed for stationary applications. The largest system to date is the newly built 350 MW battery park in the United Arab Emirates by the Amplex Group, used for grid stabilization and support purposes. Flow batteries are a modern concept currently under study. Unlike conventional batteries, flow batteries use electrolyte solutions stored in external tanks, making these batteries highly scalable according to the chosen dimensions of the tanks. They feature high efficiency, short response times, symmetrical charge and discharge, and quick cycle inversion. On the other hand, low energy densities, toxicity of the materials, and early stage of development make these batteries more likely to play a role in small-scale applications in the future.

14. Lithium ion batteries are the most promising technology for large-scale storage applications. Although usually confined to the portable electronics market, their characteristic makes them extremely attractive for renewable energy application in the medium term. In fact, their storage efficiency reaches almost 100 percent and they feature the highest energy density among all. The implementation at a very large scale is already a commercial reality with plenty of facilities around the globe. Recently, a 100 MW-4 hours lithium ion facility has been announced to be developed in California to provide peak load support in replacement of gas-fired power plants.

Required T&D investments in The Gambia

15. The T&D network should expand according to the growing demand and the increasing number of new customers that are connected to the grid. Table 1.1 outlines the projects that have been identified for growing the Gambian grid to reach near-universal access. A total of US$133.13 million in funding is required. US$57.65 million of this financing has been proposed, leaving a US$75.48 million funding gap. Projects that do not have a financier identified include the Soma-Bansang line and substations and distribution in the provinces. For stability reasons, appropriate design principles need to be technically implemented (n-1 principle) throughout, which is currently not the case.

Table 1.1. T&D Pipeline

Area	Investment Project	Characteristics	Estimated Cost (US$, millions)	Financing Status	Source of Financing	Notes
Backbone - east	Soma - Basseh	132 kV transmission line, approximately 175 km	19.25	Gap		Estimates done in BADEA study - need to be reviewed
Backbone - west	OMVG line	Transmission line, 225 kV, 145 km	25.00	Committed	World Bank/OMVG	Contract price
Backbone - west	Soma substation (OMVG)	225/33kV substation	8.65	Committed	Kuwait Fund/OMVG	Contract price
Backbone - west	Brikama substation (OMVG)	225/33kV substation	8.65	Committed	Kuwait Fund/OMVG	Contract price
Backbone - west	Kotu-Brikama	Transmission line, 132 kV double circuit, approximately 30 km with new substations in New Willingara	4.88	Proposed	World Bank/EIB/EU	Estimate
Total backbone			**66.43**			
Dispatch center			10.00	Proposed	World Bank/EIB/EU	Estimate
GBA	Kotu	Substation upgrade	3.00	Proposed	World Bank/EIB/EU	Estimate
GBA	GBA distribution network	33/11 kV lines, 33/0.4 kV pole mounted inline substation	14.20	Committed	India Exim	GBA expansion, 2014
Total GBA			**27.20**			
Cross-border	30 kV cross-border	Three transmission lines (cross-border), 30 km	1.10	Proposed	World Bank/GESP	SENELEC/NAWEC 2017
Provinces	Substations	Farafeni, Bansang, Bassee, and Soma	13.40	Gap		Estimates done in BADEA study - need to be reviewed
Provinces		33/11 kV lines, 33/0.4 kV pole mounted inline substation	25.00	Gap		Estimate for connecting north bank - study required
Total provinces			**39.50**			
Total T&D			**133.13**			
Committed or proposed			57.65			
Financing gap			75.48			

ANNEX 2: Fiduciary Arrangements

Republic of The Gambia: Gambia Electricity Restoration and Modernization Project

Financial Management

1. An FMA of NAWEC was carried out in November 2017. The objective of the assessment was to determine whether NAWEC has acceptable FM arrangements in place to ensure that the project funds will be used only for intended purposes, with due attention to considerations of economy and efficiency. The assessment complied with the Financial Management Manual for World Bank-financed investment operations effective March 1, 2010 and revised on February 10, 2017.

2. NAWEC will be the implementing agency of the GERMP, assuming all fiduciary responsibilities and responsibilities for reporting to the World Bank. NAWEC is characterized by poor FM performance identified on core aspects such as accounting and auditing (delay in auditing of 2015 and 2016 NAWEC financial statement).

3. The PIU of the ongoing GESP (P152659) has been established within NAWEC and will handle the fiduciary tasks of the GERMP. The FM arrangements for this project will be based on the existing arrangements in place under the GESP. The overall performance of the GESP's FM is Satisfactory. Staffing has remained adequate and proper books of accounts and supporting documents have been kept with respect to all expenditures. NAWEC is familiar with the World Bank FM requirements. The unaudited IFRs for the ongoing project are also submitted on time and acceptable to IDA.

4. The overall risk for the GERMP is rated Substantial. It is considered that the FM satisfies the World Bank's minimum requirements under the World Bank Policy and Directive on IPF effective in 2017. To accommodate the project in the existing FM system, the following measures should be taken: (a) update of the existing PIM including FM procedures before effectiveness; (b) appointment of a dedicated finance officer before effectiveness; (c) customization of the accounting software (FIMIS) to take account of new project design and components by three months after effectiveness; and (d) recruitment of an external auditor by six months after effectiveness.

Country Issues

5. Real GDP growth is estimated at 2.2 percent in 2016 and 3 percent in 2017, reflecting weak agricultural output, foreign exchange scarcity, and the impact of the political turmoil on tourism. The news authorities are focused on restoring macroeconomic stability and reducing the potential for fiscal shocks from domestic and external debt of SOEs. In the particular case of NAWEC (project implementing entity), it is highly indebted; for years, collected revenues have not covered accrued costs forcing the utility to expand its debt to cover short-term operating costs. In November 2016, the GoTG agreed on short-term measures to address NAWEC's financial viability challenges.

6. The GoTG, committed to improving its public financial management (PFM) system, used the findings of the 2010 country financial accountability assessment and 2014 Public Expenditure and

Financial Accountability (PEFA) report to put in place a comprehensive PFM reform program. The PFM Reform Strategy (2010–2014) helped streamline PFM reform activities and mobilize resources. Reforms to date have resulted in significant improvements in a number of areas including (a) implementation of an IFMIS; (b) clearance of a significant backlog of financial statements; (c) strengthening of the independence and supervision and control function of the Central Bank; and (d) improved information on public debt. Overall, the key PFM reforms have helped enhance accountability and transparency in the use and management of public resources and control of SOEs.

2. Risks and Mitigation Measures

Risk	Risk Rating	Risk Mitigation Measure	Residual Risk Rating
Country level 2014 PEFA identified some weaknesses in credibility of the budget, fiscal discipline, efficient service delivery, and strategic allocation resources	H	PFM reforms currently implemented will mitigate these risks. However, as the project is implemented by NAWEC, the country PFM issues will not directly impact project performance.	H
Entity level Poor FM performance of NAWEC; weaknesses identified on core aspects such as planning, budgeting. and audit (delay in the recruitment of external auditors)	S	The FM Procedures Manual will be updated and roles and responsibilities will be clearly defined. Dedicated FM specialist familiar with World Bank procedures will be appointed. Internal audit staff will be trained in World Bank FM and procurement policies, roles, and responsibilities.	M
Project level: Project resources may not be used for the intended purposes and weak coordination among all stakeholders	S	PIU is established within NAWEC, including the key functions of project coordinator and procurement specialist, as well as FM officer, technical specialists, environmental and social specialist, project accountant, and M&E specialist. NAWEC has experience in hosting the implementation unit of the GESP and the PIU has received specific training in World Bank fiduciary rules and guidelines. The SC will facilitate the coordination of the project.	M
Control risks	**S**		**M**
Budgeting Delay in preparing annual work plan and budget (AWPB) and lack of budget monitoring; unreliable budget forecast	S	The PIM will detail the budget preparation and execution including close monitoring of variances.	M

Risk	Risk Rating	Risk Mitigation Measure	Residual Risk Rating
Accounting Delay in recording project transactions; lack of an accounting software adequate for project FM	S	Accounting software use for ongoing project will be customized to cover the bookkeeping of the new project. A dedicated finance officer will be appointed.	M
Internal control Delay in the implementation of recommendations of the internal auditor and the external auditor	S	Rely on NAWEC internal control system and ensure that the project is under oversight of the SC. NAWEC's Internal Audit Department is well staffed and has an annual audit plan approved by the audit committee. The audit committee was set up in 2015 and meet on a quarterly basis.	M
Funds flow Difficulties in the timely submission of acceptable Withdrawal Applications may delay funds mobilization	M	Training will be provided if necessary on World Bank disbursement procedures after project effectiveness.	M
Reporting and monitoring Delays in the submission of agreed IFRs and annual financial statements	S	The accounting software will be customized to fit project needs and generate useful information and financial statements.	M
Auditing Delay in external auditor's recruitment and delay in submission of the audited financial statements	S	Recruitment of qualified, experienced, and independent external auditors with TOR acceptable to IDA under the oversight of the National Audit Office.	M
Overall Risk:	**H**		**S**

Note: H = High; S = Substantial; M = Moderate; L = Low.

7. The overall risk is High while the residual risk rating is Substantial.

8. The following actions need to be taken to enhance the FM arrangements for the project.

Table 2.2. FM Action Plan

Action	Responsible	Deadline and Conditionality
Update PIM to take account of new project	NAWEC	Before effectiveness
Customize accounting software (FIMIS) to take account of new project	NAWEC	Three months after effectiveness
Appoint a dedicated FM Specialist	NAWEC	Before effectiveness
Recruit an external independent auditor	NAWEC	Six months after effectiveness

Internal control system

9. The project will rely on the existing internal control system comprising an Accounting Policies and Procedures Manual, May 2012, an Internal Audit Department, and an Internal Audit Manual. These manuals were reviewed and are acceptable to the World Bank. The Accounting Policies and Procedures Manual, May 2012, defined the policy and procedures, among others, for the following domain: ethics, fixed asset, cash and bank accounting, financial reporting, and budgeting.

10. The project will follow FM procedures defined in the Accounting Policies and Procedures Manual, May 2012, and the Internal Audit Manual. It may develop specific procedures if needed.

11. The Internal Audit Department will oversee the internal control system and produce an internal control review report. The project will furnish to the World Bank, no later than 30 days following the end of each quarter, a copy of the internal control review report that summarizes the key findings of the reviews completed during the quarter.

12. The FM staff of the project comprises a finance officer, who is NAWEC's permanent staff, will be appointed in the PIU, and will be fully dedicated to project activities. According to the workload, additional staff can be acquired.

Planning and budgeting

13. The PIU will prepare a detailed AWPB, which should be approved by the project SC. The PIU will submit the approved AWPB to the World Bank, for no-objection, before the end of previous calendar year.

Accounting

14. **Accounting standards.** Project accounts will be maintained on a cash basis, supported with appropriate records and procedures to track commitments and to safeguard assets. Annual financial statements will be prepared by NAWEC in accordance with Gambia Accounting Standards. These standards are close to the Generally Accepted Accounting Principles.

Interim financial reporting

15. The unaudited IFRs are prepared every quarter and submitted to the World Bank regularly (for example, 45 days after the end of each quarter) on time. The frequency of IFR preparation as well as its format and content will remain unchanged.

Annual financial reporting

16. NAWEC will produce annual financial statements, and these statements will comply with the Gambian law and World Bank requirements. Financial statements may comprise

- Project presentation and project developments and progress during the year to provide context to (or other explanations of) financial information reported

- Statement of sources and uses of funds which recognizes all cash receipts, cash payments, and cash balances
- Statement of commitments
- Accounting policies adopted and explanatory notes
- A management assertion that project funds have been expended for the intended purposes as specified in the relevant Financing Agreements

Auditing

17. NAWEC will submit two reports: (a) audit report on NAWEC consolidated financial statements and (b) audit report on the World Bank-financed project accounts. Management Letters will also be issued and submitted together with the audit reports to IDA not later than six months after the end of each fiscal year. A single opinion on the audited project financial statements in compliance with the International Federation of Accountants will be required. In addition, a Management Letter will be required. The Management Letter will contain auditor observations and comments and recommendations for improvements in accounting records, systems, controls, and compliance with financial covenants in the Financial Agreement. NAWEC should recruit a technically competent and independent auditor by six months after the project effective date.

Table 2.3. Audit Report Requirements

Report	Deadline	Responsible
NAWEC audit report and the World Bank-financed project audit reports (two financial statement audit reports including Management Letter)	Six months after the end of the year	NAWEC

18. The project will comply with the World Bank disclosure policy of audit reports and place the information provided on the official website within one month of the report being accepted as final by the team.

Fund flow arrangements

19. Disbursements under the project will be carried out in accordance with the provisions of the Disbursement Guidelines for IPF dated February 2017, the Disbursement and Financial Information Letter, and the Financing Agreement (see table 2.4). The disbursement methods will be indicated in the Disbursement Letter. A Designated Account (DA) will be opened at the Central Bank of The Gambia and managed by NAWEC. The DA will be held in U.S. dollars. The DA ceiling is indicated in the Disbursement Letter. Disbursements for goods, works or non-consulting services and consulting services contracts procured in the international market through open competition, limited competition or through no competition, will be made only through Direct payment or Special Commitment disbursements method.

Table 2.4 Disbursement Table

Category	Amount of the Financing Allocated (expressed in SDR)	Percentage of Expenditures to be Financed (inclusive of Taxes)
(1) Goods, works, non-consulting services, and consulting services for Part 1, Part 2(b)(ii), and 2(c) of the Project	2,240,000	6%
(2) Goods, works, non-consulting services, consulting services, and Operating Costs for Part 2(a), 2(b)(i), 2(d), and Part 3 of the Project	23,620,000	100%
(3) Refund of Project Preparation Advance	2,540,000	Amount payable pursuant to Section 2.07(a) of the General Conditions
TOTAL AMOUNT	28,400,000	

20. The DA will be replenished through the submission of Withdrawal Applications on a quarterly basis by NAWEC. Replenishment (requests for reimbursement) and reporting on the use of advances will be accompanied by a Statement of Expenditure providing information on payments for eligible expenditures and records required by the World Bank for specific expenditures in the Disbursement Letter. All supporting documentation will be retained at NAWEC and must be made available for periodic review by World Bank' missions and external auditors.

21. Based on the outcome of the FM risk assessment, the following implementation support plan is proposed. The objective of this plan is to ensure that the project maintains a satisfactory FM system throughout its life.

Figure 2.1. Implementation Support and Supervision Plan

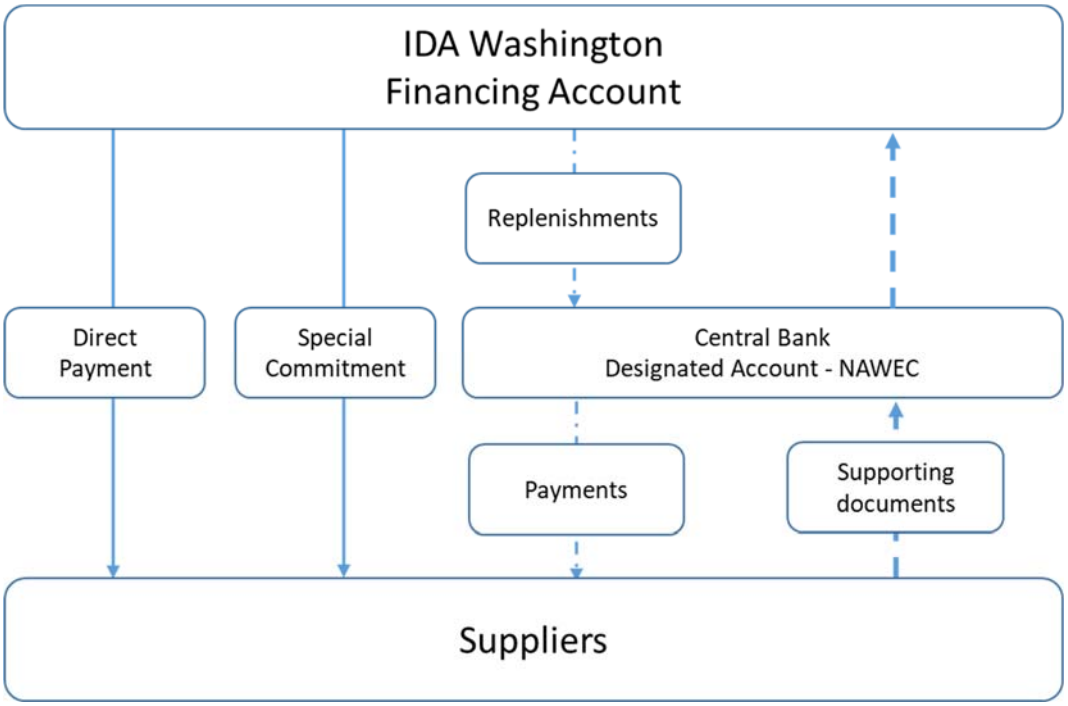


Table 2.5. FM Implementation Support Plan

FM Activity	Frequency
Desk reviews	
IFR review	Quarterly
Audit report review of the program	Annually
Review of other relevant information such as interim internal control systems reports	Continuous as they become available
On-site visits	
Review of overall operation of the FM system (implementation support mission)	Biyearly
Monitoring of actions taken on issues highlighted in audit reports, auditors' Management Letters, internal audits, and other reports	As needed
Transaction reviews	As needed
Capacity-building support	
FM training sessions	During implementation and as and when needed

1. Procurement

Applicable procurement regulations

22. Procurement under the proposed project will be carried out in accordance with the World Bank's Procurement Regulations, dated July 1, 2016, revised November 2017; 'Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants', revised as of July 1, 2016; and the provisions stipulated in the Financing Agreement.

23. As part of the preparation of the project, the Borrower (with support from the World Bank) prepared a PPSD which describes how fit-for-purpose procurement activities will support project operations for the achievement of project development objectives and deliver Value for Money. The procurement strategy is linked to the project implementation strategy at the country level ensuring proper sequencing of the activities. They consider institutional arrangements for procurement; roles and responsibilities; thresholds, procurement methods, and prior review, and the requirements for carrying out procurement. They also include a detailed assessment and description of state government capacity for carrying out procurement and managing contract implementation, within an acceptable governance structure and accountability framework. Other issues considered include the behaviors, trends and capabilities of the market (i.e. Market Analysis) to inform the procurement plan. The activities also require strong technical capability to prepare proper technical specifications to avert lack of, or inadequate, market response. This capability – or a plan to enhance is considered in the strategies. Also, special arrangements like direct contracting, Force Account, or civil servants needs, results based arrangements, need for prequalification, if any, are addressed. The strategy includes a summary on: Procurement Risk, Mitigation Action Plan, Procurement Implementation Support and Supervision plan.

24. The regulations are designed to support a modern, fit-for-purpose Procurement Framework. The regulations detail many options to tailor individual procurement processes to meet the operational needs under the project and to deliver the right results. The main procurement activities under this project would include (a) design, supply, installation, and O&M of PV power plant(s); (b) design, supply, and installation of equipment and materials for the upgrade of HV transmission line; (c) design, supply, and installation of equipment and SCADA; (d) supply and installation of equipment for upgrade of primary and secondary substations; (e) procurement and deployment of Management Information System (MIS) integrated system for NAWEC; (f) supply and replacement of approximately 2,500 light bulbs and 31,000 meters; and (g) selection of firms for technical assistance and ICs to support NAWEC to implement the projects. The procurement arrangements under the project are made in accordance with the provisions of the Procurement Regulations to ensure that the correct procurement approach is used to deliver the right results. By designing the right procurement approach, there is far more likelihood of the right bidders participating, better bids being received, and an overall increased chance of achieving VfM.

25. The regulations are guided by the core procurement principles of VfM, economy, integrity, fit for purpose, efficiency, transparency, and fairness. The regulations support these core procurement principles by providing many choices for the Borrower to design the right approach to market.

26. Standard Procurement Documents (SPDs) issued by the World Bank to be used by Borrowers for IPF-financed projects include the General Procurement Notice, Specific Procurement Notice, Request for Expression of Interest, Request for Proposals (RFPs), and Request for Bids (RFBs). These documents will be used for works, goods, consulting, and non-consulting services to be procured through international open competitive bids and for consulting services contracts. In addition, the implementing agencies will use Standard Bid Evaluation Forms for procurement of goods, works, and non-consulting contracts, and the Sample Form of Evaluation Report for selection of consultants. Procurement requirements should be simple, especially in a context of low government capacity.

National procurement procedures and legislative framework

27. When approaching the national market, as shall be agreed in the Procurement Plan, the country's own procurement procedures may be used. The World Bank has reviewed the SPDs for procurement of goods and works under national competitive bidding and has found them acceptable in terms of consistency with the World Bank's procurement principles. Hence, national open competitive bids shall follow the procedure set forth in the Public Procurement Directive, provided that such procedure shall be subject to the following requirements as provided in Section 5 Paragraph 5.4 of the Procurement Regulations:

- Open advertising of the procurement opportunity at the national level
- The procurement is open to eligible firms from any country
- The RFBs/RFPs document shall require bidders/proposers to submit bids/proposals to present a signed acceptance at the time of bidding, to be incorporated in any resulting contracts, confirming application of, and compliance with, the World Bank's Anticorruption Guidelines, including without limitation to the World Bank's right to sanction and the World Bank's inspection and audit rights

- Contracts with an appropriate allocation of responsibilities, risks, and liabilities
- Publication of contract award information
- Rights for the World Bank to review procurement documentation and activities
- An effective complaint handling mechanism
- Maintenance of records of the procurement process

28. Other national procurement arrangements (other than national open competitive procurement) that may be applied by the Borrower (such as Limited/Restricted Competitive Bidding, Request for Quotation [RFQ], Shopping, Local Bidding, and Direct Contracting), shall be consistent with the World Bank's core procurement principles and ensure that the World Bank's Anticorruption Guidelines and Sanctions Framework and contractual remedies set out in its Legal Agreement apply.

Procurement oversight and monitoring arrangements

29. Mandatory thresholds for prior review for the proposed project based on procurement risk levels of the project are provided in Table 2.6. Based on the risk level of the project, procurement above the applicable thresholds as provided in Table 2.5 shall be subject to prior review and shall be included in the Procurement Plan. Such procurement activities shall use the World Bank's SPDs. For contracts to be awarded using Direct Selection, the Borrower shall submit to IDA, for its review and 'no-objection', a sufficiently detailed justification, before inviting the firm to negotiations.

Table 2.6. Thresholds for Procurement Approaches and Methods (US$)

Category	Prior Review (US$ millions)	Open International	Open National	RFQ	Short List of National Consultants	
					Consulting Services	Engineering and Construction Supervision
Works	10,000,000	<3,000,000	<200,000	>200,000		
Goods, IT, and non-consulting services	2,000,000	<300,000	<100,000	>100,000		
Consultants (firms)	1,000,000				200,000	200,000
ICs	300,000					

Assessment of the agency' capacity to implement procurement

30. A simplified procurement capacity assessment of the implementing agencies was updated by the World Bank using the template attached to 'Situations of Urgent Need of Assistance or Capacity Constraints – Simplified Procurement Procedures'. Based on this assessment and the procurement environment of this project and other external factors such as political instability, the procurement risk factor is high. The assessment reviewed the organizational structure for implementing the proposed project and staff responsible for procurement in the PIU. The assessment also considered the legal aspects and procurement practices, procurement cycle management, organization and functions, record keeping,

planning, and the procurement environment. Procurement systems of the PIU were assessed to determine at what extent planning, bidding, evaluation, contract award, and contract administration arrangements and practices provide a reasonable assurance that the project will achieve intended results through its procurement processes and procedures. In addition, the fiduciary systems assessment also considers how project systems would handle the risks of fraud and corruption, including by providing a complaint mechanism, and how such risks are managed and/or mitigated.

31. NAWEC will be the implementing agency of the GERMP, assuming all fiduciary responsibilities and responsibilities for reporting to the World Bank. The GESP PIU established within NAWEC will be responsible for carrying out the project activities. The procurement manager of NAWEC is in charge of procurement for the GESP. NAWEC has experience in hosting the implementation unit of the GESP and the PIU has received specific training in World Bank fiduciary rules and guidelines.

32. While procurement under the GESP and the PPF are largely on track, there are certain areas of concern to be addressed in the course of preparation of the GERMP.

- A major concern is adequacy of organizational arrangements for project procurement work. Specifically, the PIU is not staffed with fully dedicated project personnel, which created significant implementation issues.
- There is already a pattern of delays related to untimely provision of information by technical teams. It seems that project procurement may not always be a high-priority activity for NAWEC technical departments, while input of these departments is on the critical path of the procurement process.
- Lack of prioritizing and organizational issues mentioned above result in, among other things, formal and hands-on procurement training not being sufficiently effective.
- There is no well-established system or clear track record of handling complaints by NAWEC.
- Considering complexity and the fact that it will be relatively new technologies for NAWEC (PV and 132 kV) to deal with under the GERMP, it seems necessary to enhance existing capacity.

33. **Need for hands-on support.** Provided that capacity deficiencies are addressed by adequate organizational measures and proper staffing of the PIU, the World Bank's support can be limited to standard supervision activities, including assistance in providing training for NAWEC procurement personnel.

Procurement risk analysis

34. The PPSD prepared for the project contains a risk analysis and the procurement risks were identified. Based on the identified risks, measures are proposed to be put in place to mitigate the risks associated. These are summarized in Table 2.7.

Procurement objective

35. The implementation of the listed measures will help reduce the risk substantially and reach the following identified objectives:

- Increased competition to achieve maximum reduction of the overall project cost. The objective is to obtain at least three bids from qualified contractors for each package/lot for PV, T&D, and IMS
- Cost overruns shall not be more than 15 percent of the initial cost estimate for each lot
- At least 80 percent of responses from technical teams are received within the maximum response time set by NAWEC management
- At least 80 percent of all contracts are awarded within the initial bid/proposal validity time (that is, without extending validity period)
- At least 80 percent of all contracts are completed within the initial time schedule

Table 2.7. Main Identified Risks and Mitigation Measures

Risk Description	Severity and Impact on the Project	Description of Mitigation	Risk Owner
	Market		
Lack of interest in participation in bidding among contractors for T&D/information management system (IMS) due to small size of the country market	Substantial	NAWEC (PIU and technical team), with the assistance of international consultants (T&D and Service Contractor), will prepare technical requirements/specifications attractive to sufficient number of qualified bidders, while ensuring quality of the final product. In addition, proper packaging will be used to increase attractiveness of the contracts.	Bidders
	NAWEC capacity		
Delays in obtaining input from technical teams	Substantial	NAWEC's top management will issue internal instructions setting the rules of information exchange, including standards for response time.	NAWEC
Delays/poor quality due to inadequate organizational arrangements of procurement function and procurement skills gap	Substantial	Project procurement function will be performed by fully dedicated procurement staff/consultants reporting directly to the PIU head.	NAWEC
Lack of experience in preparing PV and HV T&D specifications - risk of poor quality of bidding documents resulting in potential reduction of competition and/or delays at evaluation and contract negotiations stage	High	PV and T&D specifications and requirements will be prepared by international consultants (under solar feasibility study contract).	NAWEC
Inadequate requirements for IMS due to lack of experience of NAWEC with modern comprehensive IMS	High	IMS definition and technical requirements will be produced by international consultants (under Service Contractor contract).	NAWEC
Delays/problems in contract implementation of PV due to lack of experience with the technologies	Substantial	Specialized training will be provided to NAWEC technical personnel.	NAWEC

Procurement Plan

36. The Borrower has prepared the PPSD which formed the basis for a Procurement Plan for the first 18 months of the project life and which also provides the basis for the procurement methods. This plan was agreed between the Borrower and the project team and will be available at the PIU. It will also be available in the project's database and in the World Bank's external website. The Procurement Plan will be updated by the project team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

37. The procurement arrangements for the high or substantial risk contracts within the project are provided in Table 2.8.

Table 2.8. Procurement Arrangements for the High or Substantial Risk Contracts

Contract Title, Description, and Category	Estimated Cost (US$, millions)	World Bank Oversight	Procurement Approach/Competition	Selection Methods	Evaluation Method
On-grid PV solar plant(s) plus storage	28	Prior	International	RFB, post qualification	Lowest evaluated cost
T&D upgrades Lot 1: Construction of 132 KV transmission line from Brikama to Kotu and of three new primary substations Lot 2: National dispatch center/SCADA/EMS	19	Prior	International	RFB, post qualification	Lowest evaluated cost
Upgrade of primary and secondary substations	5	Post	International	RFB, post qualification	Lowest evaluated cost
IT system for NAWEC	3	Prior	International	RFB, post qualification	Combined technical and financial score
Meter laboratory	0.5	Post	International	RFB, post qualification	Lowest evaluated cost
Prepayment meters (31,000 meters)	0.95	Post	International	RFB, post qualification	Lowest evaluated cost
Feasibility study for solar PV plus storage plant	0.3	Prior	International	QCBS	Rated criteria+cost
Feasibility study for Kotu-Brikama T&D	0.55	Prior	International	QCBS	Rated criteria+cost
OE	1	Prior	International	QCBS	Rated criteria+cost
Service Contractor	2	Prior	International	QCBS	Rated criteria+cost

Note: QCBS = Quality- and Cost-Based Selection.

ANNEX 3: IMPLEMENTATION SUPPORT PLAN

Republic of The Gambia: Gambia Electricity Restoration and Modernization Project

Strategy and Approach for Implementation Support

1. The implementation support plan includes periodic missions with regular client interaction from both field-and-headquarters-based World Bank staff in between missions. During project supervision, the team will use the PDO and the Section VII results framework as primary lenses for monitoring progress, evaluating impact and effectiveness, and adjusting the project activities.

2. Implementation support will initially focus on advancing the preparation and implementation of the investment activities and NAWEC's improvement plans. Thus, the World Bank expects an intensive supervision agenda during the first two years. The World Bank team will include headquarters and country office-based staff, as well as consultants.

3. The detailed support from the World Bank team during project supervision is outlined below:

- **Environmental and social safeguards.** The World Bank safeguards team will provide implementation support for (i) implementation of safeguards requirements through regular supervision missions, including visits to the project sites; (ii) reviewing of environmental monitoring reports and following up on any safeguards issues that may arise during project implementation with NAWEC and relevant government authorities; and (iii) training on safeguards to NAWEC staff.
- **Procurement and technical.** The World Bank team will provide implementation support for: (i) reviewing procurement documents, including technical specifications, and providing timely feedback and 'no objection'; (ii) monitoring procurement progress against the Procurement Plan developed by NAWEC; and (iii) procurement training on World Bank guidelines to the PIU. The project will involve the procurement of goods and works contracts through international competitive bidding and service contracts through QCBS.
- **FM.** The World Bank team will provide implementation support for reviewing the project's FM system, including but not limited to accounting, reporting, and internal controls.
- **Implementation progress.** The World Bank will closely monitor the overall progress of project implementation, including the rehabilitation and major overhaul of identified thermal generation engines in Kotu and Brikama power stations.

Implementation Support Plan and Resource Requirements

4. The proposed implementation support requirements are listed in the tables below.

Table 3.1: Implementation Support Requirements to be Provided by the World Bank

Time	Focus	Skills Needed	Resource Estimate
Years 1 to 4	Monitor and assist in the procurement of main contracts	Procurement specialist	1
		Solar generation engineer	1
		T&D engineer	1
	Monitor FM implementation and disbursement	FM specialist	1
	Supervise safeguards implementation	Environmental and social safeguards specialists	1+1
	Monitor project management and supervise project implementation progress	Team leader	1
		Operations officer	0

Table 3.2. Skills Mix Required

Skills Needed	Number of Staff Weeks	Number of Trips	Comments
Team leader	10	4	Based in region
Power engineer	5	2	Washington, DC
Procurement specialist	4	2	Based in region
FM specialist	4	2	Based in region
Environmental specialist	4	2	Washington, DC
Social specialist	3	2	Based in region
Gender specialist	2	2	Based in region
Total	32	16	

ANNEX 4: ECONOMIC AND FINANCIAL ANALYSIS

REPUBLIC OF THE GAMBIA: Gambia Electricity Restoration and Modernization Project

Introduction

1. The economic and financial analysis is consistent with the revised 2016 GEEDR guidelines on economic analysis of power sector projects, the guidelines on Carbon accounting and the Social Value of Carbon in Project Appraisal, and World Bank guidelines for economic analysis of investment operations.

2. Economic and financial analysis is conducted on Components 1 and 2, the investment components of the project. Economic and financial analysis is not conducted on Component 3.

Rationale for Public Sector Provision/Financing

3. As discussed earlier, given the urgency, Component 1 is being implemented through a publicly funded EPC contract at the request of the GoTG. While an IPP process was considered for capacity addition, and is the direction that the GoTG would like to go, the sector does not have any experience in launching competitively procured IPPs or with VRE. The public financing approach was therefore preferred for several reasons: (a) the urgency of the power crisis demands that additional capacity be added as quickly as possible and (b) the need for the public sector to support the first investment into VRE for demonstration effect. In particular, this component seeks to build global experience in deploying solar energy in emergency situations. So far, the solar industry does not have a strong track record to deploy in emergency situations, although there is one good recent example in Yemen. In parallel, the World Bank Group will work with development partners to build the capacity of the Gambian institutions to launch competitive IPPs and to improve the financial health of NAWEC as the offtaker.

4. The World Bank's financing will leverage significant additional donor funds. Externalities and some benefits from developing renewable energy sources are often difficult to reflect in tariffs compared to those of thermal power and this results in undervaluation and discouragement in capital-intensive low-carbon technology investment with ripple effects. As a result, public action is warranted to correct for market failures or incorporate externalities and spillover effects whether linked to financing or not.

5. Research undertaken by the CPI for the CIF shows that public financing is instrumental in the early stage of solar PV scale-up and could result in substantial cost reductions in the early stages of the technology's adoption. Governments have a key role to play in ensuring initial support, with gradual phase out of incentives as costs fall, and properly remunerating the flexibility of the solar PV technology.

Value Added of World Bank's Support

6. The World Bank's support is essential in lowering the financing cost and reducing the risk perception by investors. According to the World Bank's Energy Directions Paper (2013), the World Bank support to high-cost low-emission projects is justified when "client countries may be willing to pay the

incremental costs of cleaner energy if other significant developmental co-benefits exist[.]" and if the project offers a "strategic potential for the future … to pilot and scale up technologies that are relatively new in their markets[.]". Moreover, World Bank support is useful to enhance the interest for these projects from other international financial institutions (IFIs) by sharing the benefit of its thorough due diligence process.

7. The World Bank Group has a key role to play in supporting the country in transitioning from pure public sector to private sector financing as the program scales up and the technology matures. According to the World Bank Group Climate Change Action Plan (April 2016), crowding in private funding to expand access to renewables requires a significant volume of concessional finance. The action plan indicates that the World Bank Group will focus on crowding in private sector funding for clean energy and on de-risking renewable energy investments. The World Bank Group can help The Gambia access innovative financing mechanisms that will leverage public support to obtain more financing from the private sector, particularly on the debt side, without unduly increasing the financing cost.

Summary of Economic and Financial Analysis

8. The project is economically viable. As summarized in Table 4.0 below, the ERR obtained for the GERMP is 16.1 percent with an NPV of US$178.6 million. The ERR increases to 18.7 percent and 19.3 percent once local environmental impacts and GHG impacts are taken into account, respectively. The corresponding increased NPVs are US$208 million and US$216 million.

Table 4.0 – summary of economic analysis

Component	ERR	NPV
Component 1	23.8%	
Sub-component 2.1	35.4%	
Sub-component 2.2	13.7%	
Sub-component 2.3	11.5%	
Sub-component 2.4	44.8%	
Total net economic benefits	**16.1%**	**US$178,572,140**
Total net economic benefits with local environment benefits	**18.7%**	**US$208,030,651**
Total net economic benefits with local environment benefits and GHG benefits	**19.3%**	**$215,990,944**

9. The main benefit of the investments is the utility-scale solar PV rehabilitation and the avoided cost of HFO-based generation. The main benefit of the investments in the rehabilitation of the T&D network is an expansion in the capacity of the GBA network to absorb VRE and imports from the OMVG interconnectors with a lower level of transmission losses to transmit this energy to load centers. The main costs are the respective investments in each component.

10. A sensitivity analysis is conducted on each subcomponent to identify the switching value of key input variables at which the NPV of the subcomponent becomes zero. The analysis confirms that the investments are robust even under extreme assumptions.

11. The project is also financially viable. The FIRR obtained for the GERMP is 10.2 percent, with an NPV of US$71.8 million.

12. NAWEC itself has a path to financial viability. Once under implementation, the results from the financial model forecast indicate that while NAWEC's situation will continue to be fragile in 2018–2020, it will start improving considerably in 2021 when the current ratio turns positive. However, this depends on successful implementation of the measures outlined earlier to turn around the performance of NAWEC.

13. From 2018 to 2021, the operating margins are positive with the positive impact of the financial leverage coming from the profitability of the investments. The profit margins, the return on assets and on equity, are negative from 2015 to 2019, becoming positive in 2020. Afterward, these ratios rise, showing that the profitability of NAWEC and its financial viability substantially improve. From 2015 to 2019, NAWEC revenues cannot cover the expenses. This deficit is principally due to the cost of the sales, because HFO and LFO baseload plants have poor specific consumption and low availability. However, from 2018 to 2020, the financial viability of NAWEC is expected to improve significantly due to the commissioning of the OMVG and the impact of the GERMP.

Discount Rate

14. There is much debate about the appropriate value of the discount rate. The World Bank has now issued new guidelines on the choice of discount rate, which is grounded in the principles of welfare economics (based on the Ramsey formula). This states that the discount rate may be taken as twice the expected long-term average growth rate in per capita income.

15. The Gambia's real GDP growth rates show high volatility, with sharp variations from year to year. The Gambia's GDP growth rate fell from 4.3 percent in 2015 to 2.2 percent in 2016 because of the difficult political transition and exogenous shocks. The most recent World Bank Global Economic Prospects expect mid-term growth at approximately 3 percent, while the latest IMF Forecast expected an average long-term growth rate of 4.8 percent

16. Population growth rate has averaged 3 percent and is expected to continue at this rate. In the absence of significant improvement in economic performance, a per capita GDP growth rate forecast of 3 percent would seem prudent, leading to a 6 percent discount rate under the default assumptions of the latest World Bank guidelines for the choice of discount rates.

17. The discount rate presently used by the LCPDP for power sector planning is 10 percent. The World Bank guidelines recommend that a sensitivity analysis be conducted over a range of discount rates, which is provided in the following paragraphs.

Economic Analysis for Component 1

18. The baseline assumptions for the economic analysis of Component 1 are summarized in Table 4.1:

Table 4.1. Technical Assumptions Used for the Economic Analysis of Component 1

Assumption	Unit	Value
Capacity factor	%	21
Economic life	Years	25
Average annual degradation	%	0.30
Performance ratio	%	80
Capacity	MW	10
Cost per installed MW solar	US$	1,300,000
Cost per MWh installed battery (lithium ion)	US$	400,000
Battery replacement cost (years 8 and 16)	US$	3,000,000
Hours of storage	Hours	1.5
Annual operating expenditure (OPEX) without battery replacement	% of CAPEX	1
CAPEX calculations		
Cost of solar PV plant	US$	16,250,000
Cost of solar PV for storage	US$	4,836,310
Cost of battery storage	US$	6,000,000
Total investment cost	**US$**	**27,086,310**
Contingency	*US$*	*1,354,315*
Total	US$	**28,440,625**
OPEX calculations		
Annual OPEX estimate	US$	270,863
Technical calculations		
Total solar PV capacity	MWp	16.22
Installed PV for storage	MW	3.0
Storage	MWh	15
Generation (year 1)	MWh	23,871
Total units generated over life of asset	MWh	575,777
Local environmental pollution assumptions		
Local environmental pollution parameters for HFO		
Particulate	kg/MWh	0.6
SOx	kg/MWh	8.6
NOx	kg/MWh	1.5
Social values of local environmental pollution		
Particulate	US$/kg	32.2
SOx	US$/kg	16.2
NOx	US$/kg	10.77

Economic Benefit - Avoided Cost of Unserved Energy (Willingness to Pay)

19. The main economic benefit considered before environmental benefits is the avoided cost of unserved energy, estimated by Willingness to Pay (WTP). As discussed in the main text, The Gambia is experiencing extreme power shortages with customers only having two-three hours of supply per day in October 2017. In this context, it is appropriate to estimate the economic benefits according to the avoided cost of unserved energy (as opposed to avoided cost of fossil fuel consumption, or some other approach to estimate economic benefits).

20. For the economic analysis, it would be ideal to estimate the WTP for kWh consumption using nonlinear demand curves. Indeed, the WTP in this context is likely to be extremely high, because customers are at the very low end of the demand curve. In the absence of a demand curve, the WTP is estimated by the cost of diesel self-generation, which can be considered as a revealed WTP because many of the customers who can afford a backup generator do indeed invest in one. Table 4.2 summarizes the calculations to estimate the cost of self-generation, which is US$0.36 per kWh. This is likely an underestimate of the true WTP.

Table 4.2. Self-generation Cost

	Assumption	Unit	Value
Diesel genset			
1	Peak load	kW	**3**
2	Overall efficiency	%	**80**
3	Unit size	kW	3.8
4	Installed engine cost (excluding taxes)	**US$/kW**	**100**
5	Installed capital cost	US$	375
6	Life of engine	Years	**15**
7	**Annualized capital cost**	US$	**49**
8	Annual O&M	%	5
9	Annual operating cost	US$	16.875
10	Rebuild cost	%	**10**
11	Rebuild cost	US$	37.50
12	Rebuild frequency	Years	**5.0**
13	**Annualized rebuild cost**	US$	**9.89**
14	Total annual O&M	US$	26.77
15	**Annualized total cost (excluding fuel)**	US$	76.07
Diesel fuel			
16	Daily use	Hours/day	**15**
17	Yearly use	Days/year	**350**
18	Heat rate	L/kWh	**0.36**
19	Fuel consumption	L/hour	1.08
20	Annual fuel use	L	5,670

	Assumption	Unit	Value
21	Financial cost of diesel	US$/L	**1.00**
22	**Annual fuel cost**	US$	5,670
23	Total annual cost	US$	5,746
24	Total equivalent energy	kWh	15,750
25	**Cost per KWh**	**US$/kWh**	**0.36**

The Counterfactual HFO Plant

21. The World Bank guidelines for economic analysis require that the economic benefits of a proposed project are to be compared against a set of mutually exclusive alternatives. In the case of power generation projects, this is difficult because the alternatives often have different technical characteristics. For example, while a HFO plant could be sized in such a way as to produce exactly the same hourly patterns of MW and GWh as a proposed solar PV plant, in practice, an HFO plant would never be operated in such a way, making an attempted direct comparison of levelized costs unreliable. Moreover, VRE options (such as wind and PV) may impose additional grid integration costs, and the capacity benefit of VRE may be limited.

22. It is customary in the case of power sector projects to establish economic benefits of a proposed project by using capacity expansion optimization models to identify the optimum sequence of sector expansion with and without the proposed project. A solar plant will have both capacity and energy benefits, particularly when the solar project is provided with storage, so as to better match its output to the daily and seasonal load curve. With the dramatic fall in PV and storage prices, a solar project that consists of a mix of PV and BESS offers new opportunities for design optimization that transforms a highly variable source (PV alone) into one that provides capacity as well as energy benefits.

23. The difficulty with such least-cost planning models of this kind is that they are not very well suited for risk assessment. The LCPDP is least cost only for the particular set of input assumptions provided, but a risk assessment needs to assess project performance under very wide ranges of uncertainties, for which simpler spreadsheet models are preferable. Nevertheless, the insights gained from The Gambia's LCPDP capacity expansion model runs establish a credible baseline for the usual economic and financial analysis and about which alternative scenarios are readily analyzed.

24. In any event, in the presence of a mix of different types of thermal generation, a solar project will displace a mix of liquid fossil fuels (HFO and diesel) of varying GHG emission intensity. The 10 MW solar PV plant will help avoid 24 GWh generation from HFO per year. The technical assumptions for a 3 MW HFO plant are shown in Table 4.3.

Table 4.3. Technical Assumptions for HFO Generation

Parameter	Unit	Value
Investment cost	US$ per installed MW	1,600,000
Construction time	Years	2
OPEX	% of CAPEX	2%
Specific consumption	Tons of HFO/MWh	0.3

Source: Gambia Electricity Sector Roadmap, October 2017.

Global Fuel Prices

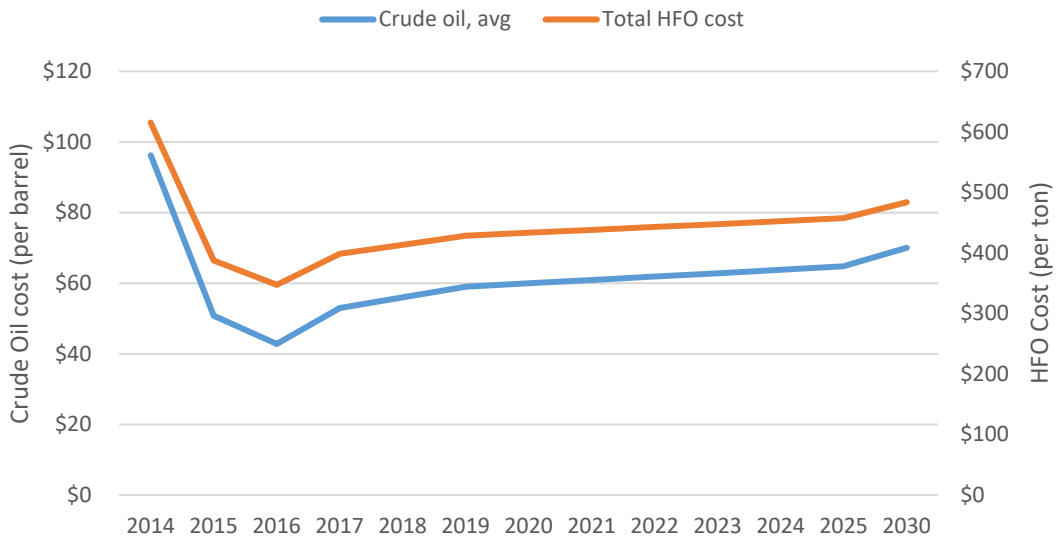
25. As shown in Figure 4.1, oil prices have dropped dramatically in 2014–2015, but are forecast to remain relatively stable through to 2030 around US$60 per barrel. Historical data show there is a close correlation between global crude oil prices and HFO prices (see Table 4.4 for regression results). This relationship is used to translate the World Bank crude oil price forecast into an HFO price forecast. A US$100 per ton shipping and transport cost is added to the global prices, which is equivalent to the price obtained by NAWEC in the most recent competitive fuel supply tender. Note the World Bank price forecast has a gap between 2025 and 2030, and does not go past 2030. A linear relationship is assumed between 2025 and 2030. Beyond 2030, prices are assumed to remain constant.

Table 4.4. Regression Results: 3.5% HFO on Brent

HFO	Coefficient	Standard Error	t	P > t	95% Confidence Interval	
Brent	5.012413	0.1575	31.82	0	4.697675	5.327152
_cons	32.87686	15.93282	2.06	0.043	1.037668	64.71605

Note: P = probability; t = students t distribution.

Figure 4.1. Fuel Price Forecast (Nominal U.S. Dollars)



Source: Crude oil forecast taken from World Bank Commodity Outlook, October 2017; HFO forecast calculated by task team.

26. At such low oil prices, it is more difficult for renewable energy projects to compete with thermal generation than just a few years ago. Fortunately, capital costs for PV and BESS have also fallen (and much faster than wind), as the learning curve benefits anticipated previously have in fact materialized. Moreover, solar projects serve as an excellent hedge against any future fossil fuel price increases—which many experts believe are inevitable once global economic growth resumes, or if international markets are disrupted by unfavorable geopolitical circumstances in the Middle East.

27. There are wide ranges of opinions about the future evolution of international fossil fuel prices. These are tested in the sensitivity analysis. However, for the baseline forecast, the World Bank's most recent forecast is used, because this reflects the institutional position.14

Carbon Accounting for Economic Analysis

28. The new Guidelines for Economic Analysis of power sector investment projects require the calculation of economic returns

- Before externalities;
- Including local externalities (in this case the benefit of avoided local air pollution from HFO-fired generation); and

14 These nominal price forecasts are used in the financial and distributional analysis. However, they are converted into constant 2017 prices for the economic analysis.

- Including local and global externalities (that is, taking into account the global social value of carbon (SVC), shown in Table 4.5).[15]

Table 4.5. SVC

	2015	2020	2030	2040	2050
Low	15	20	30	40	50
Base	30	35	50	65	80
High	50	60	90	120	150

Source: Social Value of Carbon in Project Appraisal, Guidance Note to World Bank Group Staff, September 2014.

29. The calculation of the avoided lifetime carbon emissions follows easily from the displaced thermal generation. For the carbon reporting requirements, the World Bank recommends the use of the so-called harmonized grid emission factors to comply with common reporting agreements among IFIs and donors. The value for The Gambia is 682 g/kWh (which applies just to combustion). This value is so obviously incorrect that it was not used for project appraisal, and it would grossly overstate the actual GHG emissions reduction performance of Component 1. Indeed, the technology-specific emission factor in the IFI-harmonized emission factor database is just 587 g/kWh for oil reciprocating engines.

30. The total emission factor for the HFO counterfactual is therefore 587 g/kWh. Using these emission factors and a 25-year life of Component 1, the avoided lifetime carbon emissions calculates to 337,981 tons of CO_2.

Local Environmental Impacts

31. HFO is the dirtiest of the fossil fuels, and its local environmental impact is large, having 0.6 g/kWh particulate and 8.6 g/kWh SOx emissions (based on the assumption of 2 percent Sulphur content), and NOx emissions may be based on an emission factor of 1.5 g/kWh. These assumptions lead to a total lifetime reduction of particulate of 345 tons, SOx of 2,475 tons and NOx of 864 tons.

Results

32. Table 4.6 shows the results of the calculations of economic returns:

- The expected ERR before consideration of environmental benefits is 23.8 percent, above the LCPDP hurdle rate of 10 percent (and the Ramsey formula discount rate of 6 percent).
- The value of the avoided local environmental pollution and GHG emissions against the HFO counterfactual, assessed at the World Bank's estimate of the SVC, increases the economic returns to 34.8 percent.

15 These are stated in constant 2014 U.S. dollars. They need to be adjusted to the price level of the economic analysis, namely 2017.

Table 4.6. Summary of Economic Analysis Results on Component 1

ERR summary	
ERR	23.8%
ERR with local environment benefits	32.9%
ERR with environment benefits	**34.8%**
NPV summary	
NPV	US$53,244,659
NPV with local environment benefits	US$82,703,171
NPV with environment benefits	**US$90,663,464**

Switching Values

33. The switching value of an input assumption is the value that brings the ERR to the hurdle rate (NPV to zero). The full set of calculated switching values are shown in Table 4.7. These illustrate that the results of the economic analysis for Component 1 are robust even under extreme conditions.

Table 4.7. Switching Values for the Economic Analysis of Component 1

		Baseline Assumption	**Switching Value**	**Assessment**
Component 1 construction cost - panels	US$, millions per MW	1.3	28.5	A cost overrun of this magnitude is extremely unlikely.
Component 1 construction cost - storage	US$, thousands per MWH	300	6,294	A cost overrun of this magnitude is extremely unlikely.
Annual energy generation from Component 1	GWh	23.9	9	While PV output may well vary by a few percentage, a reduction of this magnitude would imply a catastrophic failure rate of the project.
WTP	US$ per kWh	0.35	0.135	While it is likely that customer WTP will reduce over time as supply constraints are eased, it is highly unlikely that the WTP would be so low.

Financial Analysis of Component 1

34. The financial analysis uses the same baseline cost assumptions as the economic analysis. The benefits considered in the financial analysis are the avoided cost of generating the same MWh using the counterfactual, the 3 MW HFO plant.

Results

35. The results are summarized in Table 4.8. It reveals an FIRR of 10 percent, higher than the 6 percent hurdle rate, and an NPV of US$10.2 million.

Table 4.8. Summary of Financial Analysis Results on Component 1

FIRR	10.0%
NPV	US$10,186,126

Switching Values

36. The switching values are also tested for the financial analysis. The full set of calculated switching values are shown in Table 4.9. These illustrate that the results of the financial analysis for Component 1 are also robust even under extreme conditions.

Table 4.9. Switching Values for the Financial Analysis of Component 1

		Baseline Assumption	Switching Value	Assessment
Component 1 construction cost - panels	US$, millions per MW	1.3	6.5	A cost overrun of this magnitude is extremely unlikely.
Component 1 construction cost - storage	US$, thousands per MWH	300	1,415	A cost overrun of this magnitude is extremely unlikely.
Counterfactual construction cost - HFO plant	US$, millions per MW	1.6	n.a.	The sensitivity analysis illustrates that even if the HFO plant was free of charge, the NPV would remain positive. This is because the driving cost of the HFO plant is the fuel price, not the investment price. A similar result is achieved with the O&M cost assumption.
HFO fuel cost	% below baseline forecast	100	72	There is substantial uncertainty on global fuel price forecasts. The sensitivity analysis suggests that if fuel prices are more than 30percent below forecast, the NPV would be reduced to zero. While oil prices at these levels are possible, the current consensus is that oil prices are likely to rise, not fall, over the life of the project.

Economic Analysis of Component 2

37. As described in the project description, Component 2 included several subcomponents, with a range of economic benefits. Each subcomponent and the specific assumptions used in the economic analysis of each component are detailed in the following paragraphs. In all cases, the analysis assumes annual O&M costs equivalent to 1 percent of CAPEX costs.

Subcomponent 2.1: New Kotu-Brikama transmission line

38. The main benefit of the line is increased capacity to absorb energy being injected into the system, including new sources of renewable generation such as solar included in Component 1, as well as imports from the OMVG interconnection. The alternative to this line would be a series of lower-capacity lines, like the 33 kV lines currently being used. To have a similar transmission capacity, four 33 kV lines would be needed, which would have much larger transmission losses. The main economic benefit of this subcomponent, therefore, is the reduced transmission losses achieved through the higher voltage line. Additional benefits not included in the economic analysis include the benefit of securing one right of way instead of four.

39. The feasibility study will determine the load expected to be taken by the new line. In the absence of a detailed feasibility study, the following simplifying assumptions are taken. Energy transferred in the new line will be at least 259 GWh per year. This preliminary estimation is based on half of the expected generation and injection at Brikama in the future. This will be at least 50 MW, and assuming an average load of 50 percent for the line, it will make 259 GWh/year. Actual volumes will likely be substantially higher.

40. Specific assumptions applied to this subcomponent are detailed in Table 4.10.

Table 4.10. Assumptions on Subcomponent 2.1

Assumption	Unit	Value
T&D loss reduction	%	2.5
GWh through the new line	GWh/year	259.00
Unit cost of a 33 kV line	US$/km	25,000
km per line	km	35
Number of 33 kV lines needed	Number	4
Economic life	Years	40
Calculations for Subcomponent 2.1		
Cost of an equivalent 4×33 kV lines	US$	3,500,000
Substation cost	US$	2,166,667
Total cost of alternative	**US$**	**5,666,667**

Results - Economic Analysis of Subcomponent 2.1

41. The results are summarized in Table 4.11. The analysis indicates an ERR of 35 percent and an NPV of US$26 million.

Table 4.11. Summary of Economic Analysis Results on Subcomponent 2.1

ERR	35.4%
NPV	US$26,132,422

42. The assumptions for the GHG analysis on Subcomponent 2.1 are

- The climate type of land is assumed as subtropical/forest with an emission factor of 323 tCO_2/ha;
- Corridor width for a 132 kV line is 27 m and the length is 30 km;
- 5,000 m^2 land cleared for each substation; and
- There are three substations that will be constructed.

43. Applying these assumptions, Subcomponent 2.1 will lead to a net emissions reduction of 24,259 tCO_2 over the economic lifetime of 40 years.

Sensitivity - Economic Analysis of Subcomponent 2.1

44. The results are tested for sensitivity to input assumptions. The critical assumption is the transmission loss reductions that could be achieved through a HV line. The switching value indicates that transmission loss reductions compared to the alterative of using 33 kV lines would have to fall as low 0.52 percent, which is highly unlikely.

Table 4.12. Switching Values for Subcomponent 2.1

		Baseline Assumption	Switching Value	Assessment
Transmission loss reduction	%	2.5	0.52	A 2.5percent loss reduction is already conservative. Transmission loss reduction through higher voltage lines is a well-established fact from experience around the world. It would be highly unusual for loss reductions to fall as low as 0.5percent.
GWh through the new line	GWh	259	54	259 GWH is already a very conservative assumption for energy to be passed through the new line. With the pipeline of generation envisaged in the road map, as well as imports through the OMVG interconnection, it is highly unlikely that energy transmitted through the new line would be as low as 54 GWh per year.
Investment costs for alternative lines	US$/km	25,000	n.a.	The sensitivity analysis shows that even in the event that the alternative lines could be provided at zero cost, the higher voltage lines would still be a better option due to the reduced transmission losses.

Results - Financial Analysis of Subcomponent 2.1

45. The financial analysis uses the same baseline cost assumptions as the economic analysis. The benefits considered in the financial analysis are the increased tariff revenues for NAWEC. The results are summarized in Table 4.13. The analysis indicates an ERR of 25 percent and an NPV of US$16.5 million.

Table 4.13. Summary of Financial Analysis Results on Subcomponent 2.1

FIRR	25%
NPV	US$16,511,188

Subcomponent 2.2: Improved service quality

46. The new dispatch center with SCADA and upgrades to the primary and secondary substations will enable NAWEC to improve the quality of supply in the GBA. This will lead to reduced frequency and duration of outages. This would allow the economic benefit of avoiding the cost of unserved energy. However, there is no baseline data available for System Average Interruption Frequency Index (SAIFI) or System Average Interruption Duration Index (SAIDI) because NAWEC does not have the systems or technology in place to track these indicators, never mind a forecast of how these would be improved through the project investments. A conservative assumption therefore used is that the lines will help avoid 2 hours of blackouts per week in the electricity system, which is likely to be a very conservative assumption.

Table 4.14. Assumptions on Subcomponent 2.2

Assumption	Unit	Value
Reduction in outages per week	Hours	2
Economic life	Years	40
Average GWh dispatched to the system per hour	GWh/hour	0.06

Results - Economic Analysis of Subcomponent 2.2

47. The results are summarized in Table 4.15. The analysis indicates an ERR of 13.7 percent and an NPV of US$14.6 million.

Table 4.15. Summary of Economic Analysis Results on Subcomponent 2.2

ERR	13.7%
NPV	US$14,621,643

Sensitivity - Economic Analysis of Subcomponent 2.2

48. The sensitivity analysis to identify the switching values for key parameters in Subcomponent 2.2 indicates that the results are robust. Even when delivering modest results, the dispatch center and substation upgrades will be economically viable.

Table 4.16. Switching Values for Subcomponent 2.2

		Baseline Assumption	Switching Value	Assessment
Hours of reduced outages	Hours/week	2	1	While there is no baseline SAIFI and SAIDI data available, the analysis shows that even if the new dispatch center and substation upgrades could reduce system outages by at least 1 hour per week, it would be economically viable. In reality, it is likely to deliver much higher benefits once installed.
GWh delivered on the electricity system	GWh/hour	0.06	0.03	The results indicate that even if the system only delivers 30 MWh per hour, it would still be economically viable. The actual energy delivered through the system today is already higher than this, before considering system expansion plans.

Results - Financial Analysis of Subcomponent 2.2

49. Similar to Subcomponent 2.1, the base case cost assumptions for Subcomponent 2.2 are the same as the economic analysis. The financial benefits are estimated according to the additional tariff revenue to be collected by NAWEC through the reduction in unserved energy, which is assumed to be the energy sold. The results are summarized in Table 4.17. The analysis indicates an FIRR of 9 percent and an NPV of US$5.7 million.

Table 4.17. Summary of Financial Analysis Results on Subcomponent 2.2

FIRR	9%
NPV	US$5,770,141

Subcomponent 2.3: Distribution backbone in the provinces

50. The primary benefit of the MV backbone subcomponent is to reduce the cost of supply in the provinces. This would be achieved through connections to the national grid, which would allow currently isolated centers to access electricity either generated domestically at a larger scale/lower cost or through MV or HV imports. The LCPDP results suggest the cost of generation (including imports at the point of entry into the national grid) will be US$0.118 per kWh on average, compared with the estimated cost of generation in the provinces of US$0.25 per kWh.

51. The economic analysis of Subcomponent 2.3 highlights the importance of the regional access project under preparation. This project will enable the delivery of lower-cost electricity to households connected through that project.

Table 4.18. Assumptions on Subcomponent 2.3

Assumption	Unit	Value
Total consumption in the provinces	MWh	15,174
Cost of isolated generation (HFO+diesel)	US$/kWh	0.25
Cost of generation on interconnected grid	US$/kWh	0.12
Calculations on Subcomponent 2.3		
Total consumption per year for beneficiaries of Subcomponent 2.3 (2016)	MWh	10,622
Demand increase per year	%	10.0
Total consumption per year for beneficiaries of Subcomponent 2.3 (2021)	MWh	17,107
Assumed transmission losses on MV network	%	18
Cost of electricity delivered on interconnected grid	US$/kWh	0.14

Results - Economic Analysis of Subcomponent 2.3

52. The results are summarized in Table 4.19. The analysis indicates an ERR of 11.5 percent and an NPV of US$87.8 million.

Table 4.19. Summary of Economic Analysis Results on Subcomponent 2.3

ERR	11.5%
NPV	US$87,825,512

Sensitivity - Economic Analysis of Subcomponent 2.3

53. The sensitivity analysis tested various input parameters for Subcomponent 2.3. The results are summarized in Table 4.20, which show that the backbone investments are robust to various price points for generation on the interconnected and isolated systems.

Table 4.20. Switching Values for Subcomponent 2.3

		Baseline Assumption	Switching Value	Assessment
Cost of generation on the interconnected grid	US$/kWh	0.12	0.173	The sensitivity analysis suggests that if the cost of generation on the interconnected grid is above 17.3 U.S. cents per kWh, the backbone would not be economically viable. Given the existing PPAs signed for imports, and projects in the pipeline for imported hydro as well as the potential for gas to power, it is highly unlikely the cost of generation on the interconnected grid would reach this high price.
Average household consumption	US$/kWh	0.25	0.183	While the cost of generation in isolated centers could reduce over time as renewables are introduced, it is unlikely they would drop below $0.18 given the lack of economies of scale.

Results - Financial Analysis of Subcomponent 2.3

54. The base-case cost assumptions for Subcomponent 2.3 are the same as the economic analysis. The financial analysis of the subcomponent is conducted according to the impact on NAWEC financials, namely the revenues expected from sales using the MV backbone. The results are summarized in Table 4.21. The analysis indicates an FIRR of 9 percent and an NPV of US$34.7 million.

Table 4.21. Summary of Financial Analysis Results on Subcomponent 2.3

FIRR	9%
NPV	US$34,700,073

Subcomponent 2.4: Customer connections, demand-side management (DSM), and loss reduction activities

55. This subcomponent will finance 31,000 prepayment meters and a meter testing lab. This will help NAWEC protect its revenues compared to the alternative of using credit meters, where collection rates average 90 percent, plus the additional cost of additional staff required to service credit meters such as meter readers. The assumptions of the analysis are summarized in Table 4.22:

Table 4.22. Assumptions on Subcomponent 2.4

Assumption	Unit	Value
Number of meters financed through the project	Number	31,000
Cost per prepaid meter	US$	30
Cost per credit meter (that is, the counterfactual)	US$	20
O&M on credit meters	%	2

Assumption	Unit	Value
Meter lab cost	US$	645,000
Prepaid meter collections	%	100
Credit meter collections for residential households	%	90
Assumed meters in the GBA	%	50
Assumed meters in provinces	%	50
Average household consumption - urban 2015	kWh/month	108
Rural household consumption as a % of urban	%	60
Annual household consumption growth	%	5
Economic life	Years	20
Average tariff for residential customers	GMD/kWh	11.00
Exchange rate	GMD/US$	47.00
Calculations on Subcomponent 2.4		
Assumed consumption per household - urban (2020 base year)	kWh/month	138
Assumed consumption per household - rural (2020 base year)	kWh/month	83
Consumption per year for GBA households with new meters	MWh	2,143
Consumption per year for provincial households with new meters	MWh	1,286
Total consumption per year for households with new meters	**MWh**	**3,429**
Average tariff for prepaid customers	US$/kWh	0.23

Results - Economic Analysis of Subcomponent 2.4

56. The results are summarized in Table 4.23. The analysis indicates an ERR of 44.8 percent and an NPV of US$2.07 million.

Table 4.23. Summary of Economic Analysis Results on Subcomponent 2.4

ERR	44.8%
NPV	$2,069,016

Sensitivity - Economic Analysis of Subcomponent 2.4

Table 4.24. Switching Values for Subcomponent 2.4

		Baseline Assumption	Switching Value	Assessment
Baseline household consumption - urban	kWh/month	138	23	While the growth of efficient appliances will help limit household consumption, it is unlikely that urban households would consume less than 23 kWh/month on average. In 2015, the average urban residential NAWEC customer consumed 108 kWh per month on average.

		Baseline Assumption	Switching Value	Assessment
Baseline household consumption - rural	kWh/month	83	14	While the growth of efficient appliances will help limit household consumption, it is unlikely that rural households would consume less than 23 kWh/month on average. The SE4ALL estimates that subsistence consumption is 30 kWh.
Annual consumption growth	%	5	−10.5	Similarly, while efficient appliances will help limit the consumption growth, it is highly unlikely to fall by 10 percent per year.

Results - Financial Analysis of Subcomponent 2.4

57. The base-case cost assumptions for Subcomponent 2.4 are the same as the economic analysis. The financial analysis of the subcomponent is conducted according to the impact on NAWEC financials, namely the revenues expected from sales using the prepaid meters, against the cost of supplying that electricity. The results are summarized in Table 4.25. The analysis indicates an FIRR of 33 percent and an NPV of US$7.1 million.

Table 4.25. Summary of Financial Analysis Results on Subcomponent 2.4

FIRR	33%
NPV	US$7,072,616

Financial Analysis of NAWEC

NAWEC's Financial Situation in Recent Years

58. This financial analysis refers to the three-year period between FY2014 and FY2016. The assessment was performed on the basis of the following financial statements: FY2014 (final draft of audited report dated January 19, 2016), FY2015, and FY2016—draft unaudited financial statements. The company´s accounts provide consolidated results for all its activities with very limited information regarding each of the business segments (that is, electricity and water and sewerage). Consequently, this analysis is mostly performed at a consolidated level.

59. The financial analysis is organized following the structure of NAWEC's financial statements, commencing with the main accounts of the Income Statement, followed by Balance Sheet accounts, and ending with a Cash Flow analysis. The analysis and comments are mainly focused on issues that raise concern or accounts that display unusual behavior with the objective of leading the reader toward a critical assessment of the company's financial issues.

Table 4.26. Historical Financial Highlights

GMD, millions	2016	2015	2014
Revenues	2,716	2,685	2,127
Cost of sales	(1,526)	(1,955)	(2,044)
Gross profit	1,189	730	83
Gross margin	44%	27%	4%
Operating expenses	(505)	(736)	(867)
Interest expense	(297)	(264)	(194)
Foreign exchange losses	19	868	509
Net profit/(loss)	142	(668)	(986)
Trade receivables	1,187	1,037	614
Total assets	6,519	6,148	5,893
Total long-term debt	8,762	8,740	6,183
Bank overdraft	376	129	153
Total liabilities	10,658	10,482	8,959
Equity	(4,145)	(4,334)	(3,067)
EBITDA	736	792	45
Debt/EBITDA	12	11	142
EBITDA/interest expense	1%	(31%)	(29%)

Note: EBITDA = Earnings before interest, taxes, depreciation, and amortization.

1 Income Statement

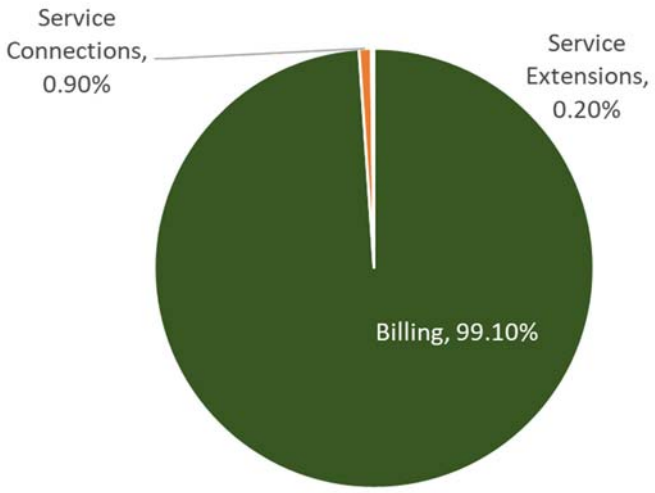
1.1 Revenues

60. NAWEC is the sole provider of electricity and water and sewerage services in The Gambia. The company does not have any investments or interests in any other activity within or outside the country. Consequently, NAWEC´s revenues depend fully on (a) the company´s technical and financial capacity to provide good quality electricity and water and sewerage services to the Gambian population; (b) its ability to charge appropriate tariffs for its services; and (c) its ability to collect its receivables as and when due.

1.1.1 Revenue Breakdown

61. NAWEC´s revenues are classified into three categories: billing, service connections, and service extensions. The company's financial statements do not provide a breakdown for electricity, water, and sewerage.

Figure 4.2. NAWEC Revenues (2016)



Source: NAWEC Historical Financial Analysis (2017)

62. Billing (that is, invoiced consumption) is the main source of revenue for NAWEC with a 99.1 percent share of total revenues, while service connections and extensions make a marginal contribution.

1.1.2 Other Income

63. NAWEC uses this account to register revenues from other operating activities such as reconnection fees, meter transfers, surcharges, and water in bulk, which together make a small contribution to the company's total revenues (1 percent in FY2016).

64. Notably, water in bulk contributed only GMD 117,000 (or US$2,700) in FY2016, the largest amount contributed during the period under review. This amount leads to the question of how NAWEC recovers some of the costs of the water business.

1.1.3 Electricity and Water Tariffs

65. The electricity and water tariffs set by the PURA of The Gambia are differentiated by the customer segment (domestic, commercial, hotel/club/industries, agriculture, area councils, and the Central Government).

66. NAWEC's revenues for FY2014 reflect the tariff regime prevailing for the period from 2012 to January of 2015, while the company's revenues for FY2015 and FY2016 reflect the current tariffs that were set in February of 2015. There are no tariffs and therefore no revenues associated with public lighting.

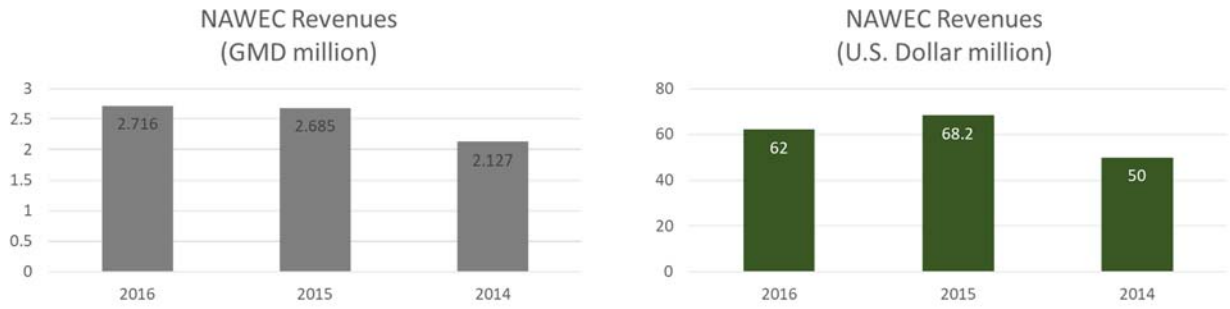
67. Tariffs are not subject to annual adjustment by inflation and are not structured to absorb neither the variation in fuel costs nor the impact of currency depreciation. The inflation rate increased by 14.54

percent between 2015 and 2017 (Central Bank of The Gambia, 2017). Further, there is no fixed term for tariff review.

1.1.4 Historical Performance of NAWEC's Revenues

68. Figure 4.3 illustrates the evolution of NAWEC's revenues for 2014–2016, expressed in GMD and in U.S. dollars. Figures expressed in U.S. dollars reflect the impact of currency depreciation, with the GMD oscillating between 39 and 43 per U.S. dollar during the period under analysis.

Figure 4.3. Historical Revenues



Source: NAWEC Historical Financial Analysis (2017)

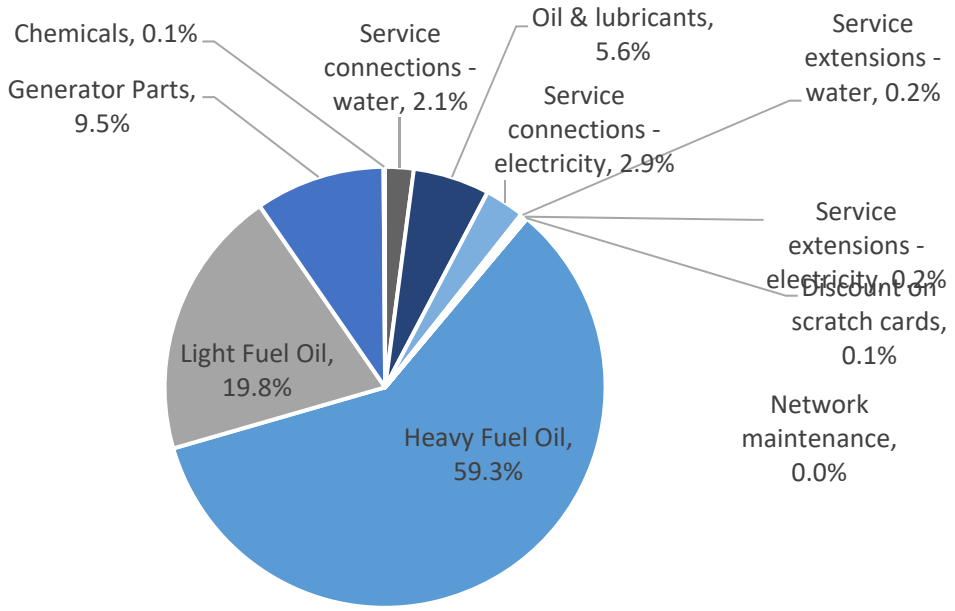
69. As observed in Figure 4.3, despite the structural issues with the tariffs, NAWEC's revenues display a positive growth trend. The 39 percent increase in revenues between FY2014 and FY2015 is explained by the conclusion of the repair works at Brikama II and the resulting increase in electricity production and delivery. The slight increase in revenues in FY2016 versus FY2015 is the result of a 64 percent increase in electricity production in the provinces and a 29 percent increase in production at Kotu, which was partially offset by a 52 percent reduction in production at Brikama II.

1.2 Cost of Sales

1.2.1 Breakdown

70. NAWEC's cost of sales includes all the costs and expenses that are directly associated with the provision of electricity, water, and sewerage services, including new or extended connections. Figure 4.4 illustrates the breakdown of NAWEC's cost of sales for FY2016.

Figure 4.4. NAWEC Cost of Sales (2016)



Source: NAWEC Historical Financial Analysis (2017)

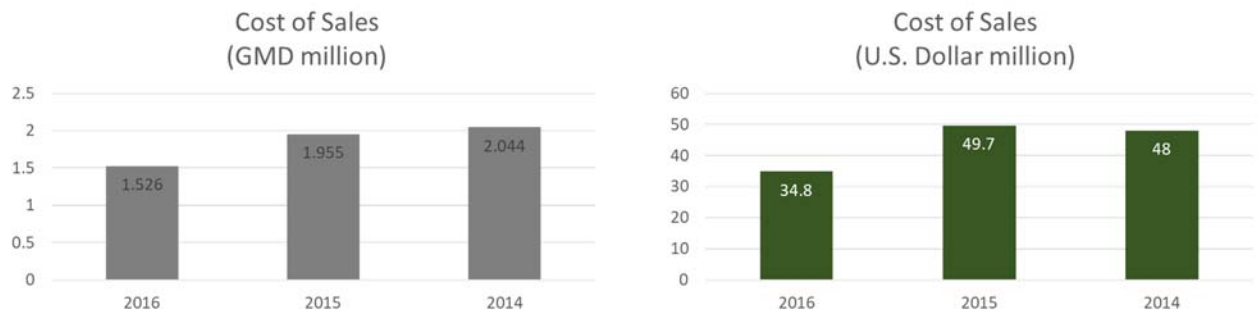
71. NAWEC's figures indicate that electricity generation and delivery require over 97 percent of the company's total cost of sales. The vast majority of the costs (79 percent) are allocated to fuel purchases while maintenance of power plants (that is, spare parts and lubricants) represent 15 percent. In contrast, water and sewerage take only 3 percent of the company's total cost of sales.

72. NAWEC's financials do not include a cost allocation for network maintenance, be it spares or services, for either electricity or water and sewerage although the line item is specifically included in the company's accounts.

1.2.2 Historical Performance

73. NAWEC's cost of sales for the period under review is illustrated in Figure 4.5:

Figure 4.5. Historical Cost of Sales



Source: NAWEC Historical Financial Analysis (2017)

74. Figure 4.5 indicates a positive trend of cost reductions during the period. The 25 percent decrease in cost of sales between FY2014 and FY2016 is mostly the result of an 18 percent reduction in cost of fuel combined with an 80 percent reduction in spares, which were partially offset by a 14 percent increase in oils and lubricants and a 105 percent increase in service extensions for electricity. Figure 4.4 shows a breakdown of most recent costs. All the above were despite the negative impact of currency depreciation.

1.3 Gross Margin

75. This ratio measures the share of revenues that is allocated to cover cost of sales and thus the percentage of revenues that remains available to cover all the other costs and expenses of a company. Table 4.27 indicates NAWEC's gross margin for the period under review.

Table 4.27. Gross Margin 2014–2016 (GMD, millions)

	FY2016	FY2015	FY2014
Revenues	2,716	2,685	2,127
Cost of sales	1,526	1,955	2,044
Gross margin	56%	73%	96%

76. NAWEC's positive gross margin evolution highlights the weight that fuel costs have in the company's cost structure and the importance of managing fuel purchases in an efficient manner to enable the company to cover all other costs and expenses, including financing costs.

1.4 Operating Expenses

77. NAWEC's Income Statement does not include this account which customarily includes line items such as general and administrative expenses, operation and maintenance, customer services, and other costs and expenses, which do not classify as cost of sales. Instead, NAWEC's Income Statement presents a single line item named administration costs under which a large variety of items are gathered, several

of which are not of an administrative nature, such as pipes and fitting, cement, timber, sand and gravel, and miscellaneous debtors write-off.

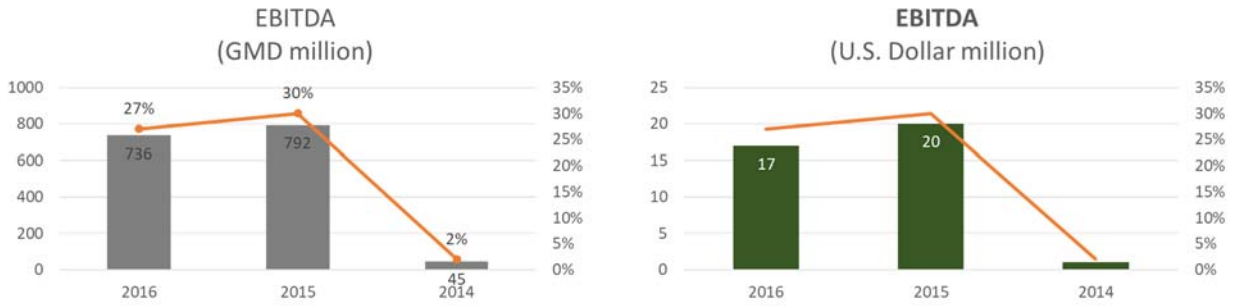
78. Total administration costs display an apparent trend of reduction with GMD 505 million in FY2016, GMD 736 million in FY2015, and GMD 867 million in FY2014. The most important components are personnel expenses, which account for 44 percent of the total amount, followed by O&M and general expenses, which account for 19 percent and 15 percent of the total, respectively.

79. The GMD 231.5 million reduction between FY2015 and FY2016 is mostly due to GMD 166.6 million of own consumption, which were classified under administrative costs in FY2015 but these were likely reclassified to cost of sales in FY2016, and a change in provisions for trade debtors, which amounted to GMD 61.3 million in FY2015 but amounted to zero in FY2016 and in FY2014. Once again, extraordinary items such as those just mentioned are included but not explained in the notes.

1.5 Earnings before Interest, Tax, Depreciation, and Amortization

80. EBITDA represents the operational cash flow of the company, because it eliminates accounting and financing effects that may distort financial results. The EBITDA margin is the ratio between EBITDA and revenue. It represents the percentage of revenue that becomes operational income. NAWEC's historical EBITDA and EBITDA margin are illustrated in Figure 4.6.

Figure 4.6. Historical EBITDA



Source: NAWEC Historical Financial Analysis (2017)

81. The sharp difference between the results for FY2014 and FY2015 reflects two main issues: (a) the GMD 558 million difference in revenues caused by lower levels of electricity production in FY2014 (approximately 10 percent lower production than in FY2015) and (b) the GMD 249 million reduction in fuel costs in FY2015 versus FY2014. The moderately lower EBITDA for FY2016 versus FY2015 despite the higher revenues and lower costs in FY2016 is mostly explained by the difference in the amount of the grants registered for each year: GMD 514 million in FY2015 versus GMD 22 million in FY2016. An EBITDA margin of 27 percent would be a healthy figure for a company with low CAPEX needs and minimal financial obligations. In the case of NAWEC, however, this figure is insufficient to satisfy the company's CAPEX needs and an oversized amount of financial obligations.

1.6 Interest Expense

82. This line item reflects the cost impact of NAWEC's interest payments associated with the company's financial indebtedness. The amounts for the period under review and its relation to EBITDA are indicated in Table 4.28:

Table 4.28. Historical Interest Expense (GMD, millions)

	FY2016	FY2015	FY2014
Interest expense	297	272	194
EBITDA	736	792	45
EBITDA/interest expense (x)	2.47	2.92	0.23

83. The ratio of EBITDA to interest expense gives an indication of a company's ability to pay its debt service obligations as and when due. A ratio of 5x indicates that a company has a significant level of leverage. The analysis of NAWEC's historical interest expense versus EBITDA clearly indicates that the company has a heavy interest expense burden and is aggressively leveraged.

84. In this context, it is important to keep in mind that (a) NAWEC is not current in its debt service obligations, including the NAWEC Bond; (b) the GoTG has forgone payment of debt service associated with NAWEC's debt with the Government; and (c) the GoTG has assumed direct payment of a significant amount of NAWEC's debt. Consequently, the figures in NAWEC's financial statements cannot be considered as fully reflective of the company's true situation in terms of debt service but are a mere indication of the trend, in the knowledge that the amount of interest expense should have been higher and therefore the ratio of EBITDA to interest expense is even lower.

1.7 Foreign Currency Impact

85. This line item, which is not customarily the focus of major analysis in other companies, is of particular importance for NAWEC given that the company's largest cost item (fuel) and the major components of its CAPEX are negotiated and paid in foreign currency. The size of the impact is self-explanatory with negatives of GMD 509 million in FY2014, GMD 867 million in FY2015, and GMD 18.5 million in FY2016, which had a significant adverse impact on the company's final results for each fiscal year with the exception of FY2016 when the reduced negative number was a major factor for NAWEC's positive results in that year.

1.8 Profit/Loss after Tax

86. During the period under review, NAWEC's Income Statement displays a turn to improvement with net profit of GMD 142 million in FY2016 after a loss of GMD 622 million in FY2015 and a loss of GMD 986 million in FY2014. These results, however, reflect the combined effect of several factors, which are not all intrinsic to the business, such as (a) incomplete payment of debt service obligations and exceptionally low negative impact of foreign exchange losses in FY2016; (b) GMD 285 million of other income in FY2015,

which is not fully explained; and (c) exceptionally low electricity production and revenues combined with exceptionally high fuel costs in FY2014.

87. In principle, net income is either reinvested in the company or paid out to shareholders as dividends. In NAWEC's case, the company, for several years, has not generated funds to reinvest or to pay out dividends to its shareholder, and instead, the accumulation of losses has eliminated the value of equity, as will be analyzed in the relevant section of this report.

2. Balance Sheet

2.1 Assets

2.1.1 Cash

88. NAWEC's financial statements indicate an improved cash position during the period under review. It should be noted, however, that concurrently and in contrast with the higher cash balances, the company displays high levels of bank overdrafts outstanding for each fiscal year, as summarized in Table 4.29.

Table 4.29. Historical Balance Sheet (GMD, millions)

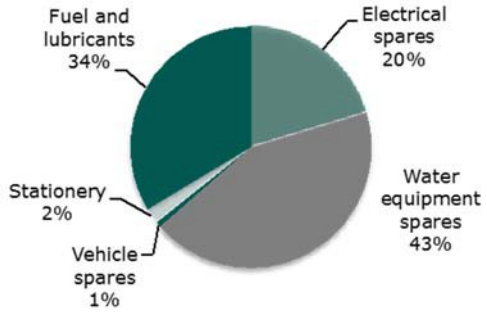
	FY2016	FY2015	FY2014
Cash in banks	65.9	95.7	196.5
Bank overdraft	153.3	128.2	376.3
Difference	87.4	32.5	179.8

89. The review of this information in conjunction with the company's Cash Flow Statement leads to the conclusion that NAWEC is financing its cash balances with bank overdrafts. These facilities are contracted at interest rates of 22 percent to 25 percent, resulting in unnecessary financing costs.

2.1.2 Inventory

90. NAWEC's inventory mostly comprises spares required for electrical and water equipment and fuel and lubricants. Figure4.7 illustrates NAWEC's inventory breakdown for FY2016.

Figure 4.7. Inventory breakdown (2016)



Source: NAWEC Historical Financial Analysis (2017)

91. Our analysis found that the amount related to water equipment spares, which is the largest component of inventory, increased from GMD 44 million in FY2014 to the current GMD 137 million in FY2015 and remained unchanged in FY2016. The same comment applies to fuel and lubricants, which is the second largest component of the inventory and remained unchanged at GMD 106.5 million between FY2015 and FY2016. The same behavior is observed for the line items vehicle spares, stationery, and provisions for obsolescence. In fact, the only line item that shows a year-on-year change between FY2015 and FY2016 is electrical spares, which increased from GMD 62.5 million to GMD 64.5 million.

92. For a company in NAWEC's situation, the funds applied to purchase inventory goods that are not being used within the year of acquisition are funds that could have been applied to satisfy other urgent payment needs of the company. An efficient use of cash for inventories would lead to a reduction of financing costs.

2.1.3 Trade and Other Receivables

93. The most significant item in this account is trade receivables, which amounted to GMD 1.187 million (approximately US$24 million) in FY2016. This account displays a significant increase between FY2014 and FY2015 from GMD 614 million to GMD 1,037 million, and a modest increase of GMD 150 million between FY2015 and 2016. The notes do not provide any explanation for the exceptional change in FY2015.

94. NAWEC's receivables are equivalent to 44 percent of the company's revenues for FY2016 and to 100 percent of the company's gross profit for the same year. This is equivalent to say that NAWEC has foregone the result of a full year of revenues net of cost of sales to customers that are unwilling to pay. The most recent information received from NAWEC indicates that GMD 641 million, equivalent to 54 percent of receivables, are past due accounts owed by Government entities, such as ministries, local councils, and other departments. The balance of GMD 546 million is yet to be supported.

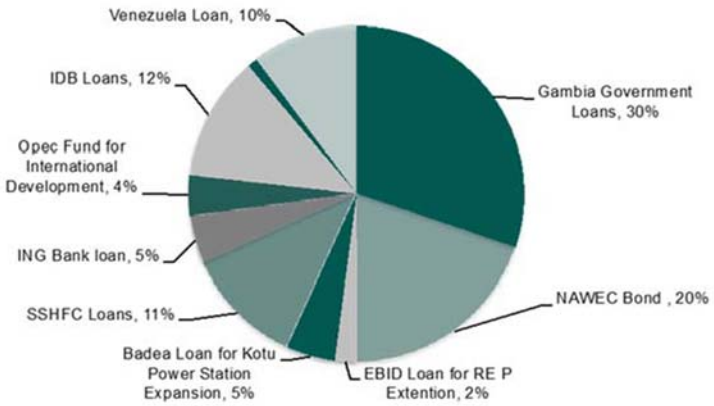
2.2 Liabilities

2.2.1 Debt

95. NAWEC registers, in its accounts, a total debt of GMD 9,138 million for FY2016, indicating an increasing trend from the GMD 8,867 million in FY2015 and the GMD 6,336 million in FY2014. According to NAWEC's financial statements in FY2015, the company increased its indebtedness with the GoTG by 52 percent or GMD 910 million. It also increased its indebtedness with BADEA and the OPEC Fund by GMD 252million.

96. Approximately 90 percent of the company's debt is long term, while the balance corresponds to the current portion of long-term debt (6 percent) and bank overdrafts (4 percent). The vast majority of NAWEC's debt is contracted on concessional terms with ample grace periods and low interest rates. In contrast, bank overdrafts are highly onerous with interest rates ranging between 22 percent and 24 percent, burdensome monthly amortization schedules, and collateral requirements. The breakdown of debt on NAWEC's books is illustrated in Figure 4.8.

Figure 4.8. Debt Breakdown (2016)



Source: NAWEC Historical Financial Analysis (2017)

97. NAWEC's financial indebtedness is mostly applied to finance CAPEX, with a smaller portion, represented in GoTG debt, being required to finance payments to other creditors. NAWEC's CAPEX includes water and sewerage projects as well as rural electrification investments. These are all projects that are essential for the community and reflect Government policy, but do not generate enough revenues to repay the debt contracted for them and, consequently, imply a permanent subsidy from NAWEC's own operation.

98. Based upon the company's financial statements for FY2016, NAWEC's debt/EBITDA ratio is summarized in Table 4.30.

Table 4.30. Historical Debt/EBITDA Ratio (GMD, thousands)

	2016	2015	2014
Total debt	9,138	8,867	6,336
EBITDA	736	792	46
Ratio (x)	12	11	138

99. This ratio is intended to illustrate the number of years that it would take for a company to pay its debt if all funds from operations are applied to pay it and no additional investments are made. A result higher than 5.5x indicates that a company is highly leveraged, while a ratio between 2.5x and 3.5x indicates an affordable level of indebtedness. As illustrated in Table 4.30, NAWEC's indebtedness level, according to the figures provided in FY2016, is twice as high as the 5.5x threshold that warns about high leverage levels.

2.3 Net Worth

100. This concept intends to determine whether a company's total assets are sufficient to pay the company's total liabilities and thus establish whether a company is solvent, or not. Table 4.31 illustrates NAWEC's net worth and solvency situation.

Table 4.31. Historical Net Worth (GMD, thousands)

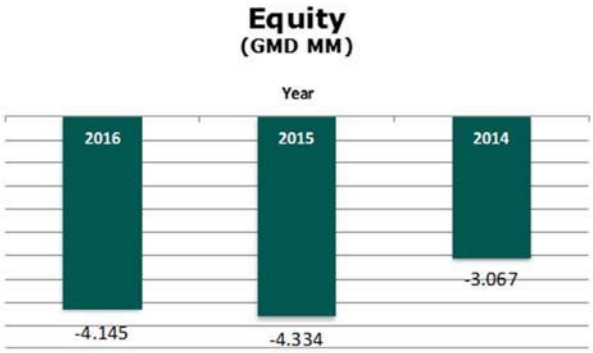
	2016	2015	2014
Total assets	6,519	6,147	5,893
Total liabilities	10,658	10,434	9,577
Difference	(4,139)	(4,287)	(3,684)

101. The figures 4.7 and 4.8 show NAWEC's inventory and debt breakdown and help illustrate the factors underlining NAWEC's situation of insolvency. This situation would be even deeper if the company's accounts would reflect the totality of the financial liabilities, which are currently attributed to the company in MoFEA's records. In the face of insolvency, it is indispensable to restructure NAWEC's balance sheet to reduce its liabilities to a manageable and affordable level.

2.4 Equity

102. NAWEC's equity amounts to GMD 68.5 million. No additional contributions were made during the period under review. As a consequence of the company's negative results during the past several years, NAWEC's equity account displays a negative value since 2011. The values for the period under review are illustrated in Figure 4.9.

Figure 4.9. Historical Equity



Source: NAWEC Historical Financial Analysis (2017)

103. According to Figure 4.9, as owner of NAWEC, the GoTG's investment has lost all value and, absent a substantial equity injection, the GoTG is not expected to recover the investment due to the size of the accumulated losses.

2.5 Cash Analysis

2.5.1 Working Capital

104. Working capital is a key principle of financial analysis because it gives an indication of the cash required to cover financing shortfalls of the day-to-day operation of a company. It is customarily calculated taking uses of funds (inventory and receivables) and deducting sources of funds (trade payables and tax payables). If the balance is positive, working capital needs to be financed.

3. Cash Flow Statement

105. A company's cash flow statement provides the information with respect to how the company obtains the cash it needs and how that cash is used.

106. Cash from operations. Historically NAWEC's cash from operations was negative, which is consistent with the losses registered in the company's Income Statement. However, in FY2016, this trend was reversed and, for the first time since FY2010, NAWEC posted a positive result in its Income Statement (which is analyzed in the relevant section) and also registered a positive amount of GMD 510 million in its cash from operations. This is the combined result of the year's net profit plus a lower impact of grants, a lower increase of receivables, a dramatic reduction of payables, and a lower increase in inventory.

107. Cash from (used in) investing activities. This account is intended to reflect the funds applied by a company in new investments or asset acquisitions. In NAWEC's case, it reflects the amounts invested in CAPEX during the period under review, which increased from GMD 293 million in FY2014 to GMD 368 million in FY2015 and GMD 390 million in FY2016.

108. Cash from financing (to) activities. This account is intended to reflect the loan disbursements and grants received during the year, as well as any amounts applied to repay debt. It is worth noting that in the case of NAWEC, this account displays drastic changes between fiscal years, particularly with respect to loans, with only GMD 23 million of disbursements in FY2016, which contrast with GMD 2,556 million in FY2015 and GMD 1,252 million in FY2014, years in which the company had extremely high operating losses.

109. Cash at the end of the year. This line item is intended to indicate the balance of the cash that was either not used by a company, or the amount of the shortfall to be covered with cash reserves from previous years. In the case of NAWEC, the company registers a negative cash balance at the end of the year since at least FY2009. The cumulative negative amount as of FY2016 is GMD 186.4 million.

NAWEC's Financial Recovery Plan

110. As discussed in the main text, the GESP has financed technical assistance for NAWEC to develop a financial recovery plan, which includes actions such as restructuring some key debts, and the improved operational performance of NAWEC. This resulted in the signing of an MoU between the MoFEA and NAWEC in March 2018. With the implementation of the actions identified in the MoU, NAWEC's financial debt will be reduced in an amount in excess of GMD 7.2 billion (over US$154 million). This could be achieved through, among others, conversion of GoTG debt to equity, and the transfer of key loans such as the NAWEC Bond from NAWEC's books to the MoFEA's books.

111. The technical assistance also allowed an update of the NAWEC financial model to identify the impacts of these measures, as well as other measures such as the impact of the GERMP investments, and others measures expected in the road map such as the diversification of the energy mix. The key assumptions used in the financial model are summarized in Table 4.32.

Table 4.32. Financial Model Key Assumptions

Assumption	Value
Demand growth	Low 1.5%; Base Case 3.5%; High 5%
GDP growth	3.5% average
Inflation	4.7% average
Generation installed capacity	2018: 102 MW
	2020: 203 MW
	2022: 225 MW
Electricity tariff adjustment index	Inflation
Water and sewerage tariff adjustment index	GDP growth
Revenue collection rate	90%
Current losses (technical and commercial)	Electricity: 22%
	Water: 39%
O&M - generation	Variable cost: US$5/MWh; Fixed cost: US$29/MWh
O&M - water	Variable cost: US$0.06/$m^3$; Fixed cost: US$757,306

Assumption	Value
O&M - sewerage	Variable cost: US$0.33/m^3; Fixed cost: US$112,404
Fuel cost basis	HFO: US$68.4/MWh; LFO: US$91.06/MWh
Power purchase prices	HFO IPPs: US$120/MWh OMVG: US$130/MWh
CAPEX - generation	Road Map 2017 – (Scenario 3A)
CAPEX - T&D	US$88 million (2018–2035)

112. The business-as-usual scenario illustrates that a positive DSCR is not expected until 2022. This is illustrated in Table 4.33.

Table 4.33. Debt Service Obligations Forecast (Business-as-Usual Scenario) (GMD, thousands)

NAWEC's Debt and Debt Service (2018–2022) - Business as Usual					
	2018 P	**2019 P**	**2020 P**	**2021 P**	**2022 P**
Debt outstanding at start of FY	8,962,417	9,646,630	10,955,840	11,428,712	10,767,544
Principal	919,593	914,957	817,673	884,673	955,609
Interest	283,711	281,160	277,474	256,890	224,766
Total debt service	**1,203,304**	**1,196,117**	**1,095,147**	**1,141,563**	**1,180,376**
Cash available for debt service	592,637	137,670	836,996	651,603	1,345,633
Balance/(shortfall)	**(610,667)**	**(1,058,447)**	**(258,151)**	**(489,960)**	**165,257**
DSCR (x)	**0.49**	**0.12**	**0.76**	**0.57**	**1.14**

113. In contrast, a positive DSCR could be achieved as soon as 2018, if all the measures identified in the MoU are put into action. The results of successful implementation of the financial recovery plan are presented in table below. The Company would have sufficient funds to pay its debt service obligations.

Table 4.34. Debt Service Obligations Forecast (Financial Recovery Scenario) (GMD, thousands)

NAWEC's Debt and Debt Service (2018–2022) - Financial Recovery Plan					
	2018 P	**2019 P**	**2020 P**	**2021 P**	**2022 P**
Debt outstanding at start of FY	2,734,331	3,405,401	5,207,405	5,958,407	5,940,813
Principal	132,845	168,688	154,647	159,522	222,535
Interest	39,680	59,687	81,981	89,024	87,984
Total debt service	**172,525**	**228,376**	**236,628**	**248,547**	**310,520**
Cash available for debt service	290,564	458,554	1,044,109	1,309,998	2,078,000
Balance/(shortfall)	**118,039**	**230,178**	**807,481**	**1,061,451**	**1,767,480**
DSCR (x)	**1.68**	**2.01**	**4.41**	**5.27**	**6.69**

114. However, there remain substantial risks to NAWECs path to financial viability. These include

- **Fuel cost risk.** it is important to notice that, despite the multiple actions taken to improve NAWEC's ability to service its financial debt, a negative variation in any of the most fundamental assumptions and, in particular, fuel costs (price and exchange rate) could have a negative impact on the company and thus result in a DSCR below 1.0x. Although the most common response to this type of risk would be to incorporate an automatic pass-through element into the tariff that would adjust revenues to reflect higher costs, in the case of The Gambia, considering the already high level of the tariffs and the poverty level of the vast majority of the population, a pass-through mechanism could be difficult to implement. This, therefore, underscores the importance of the GoTG to implement the LCPDP and continue to identify other options to reduce the cost of supply, such as through additional renewable energy and imports.

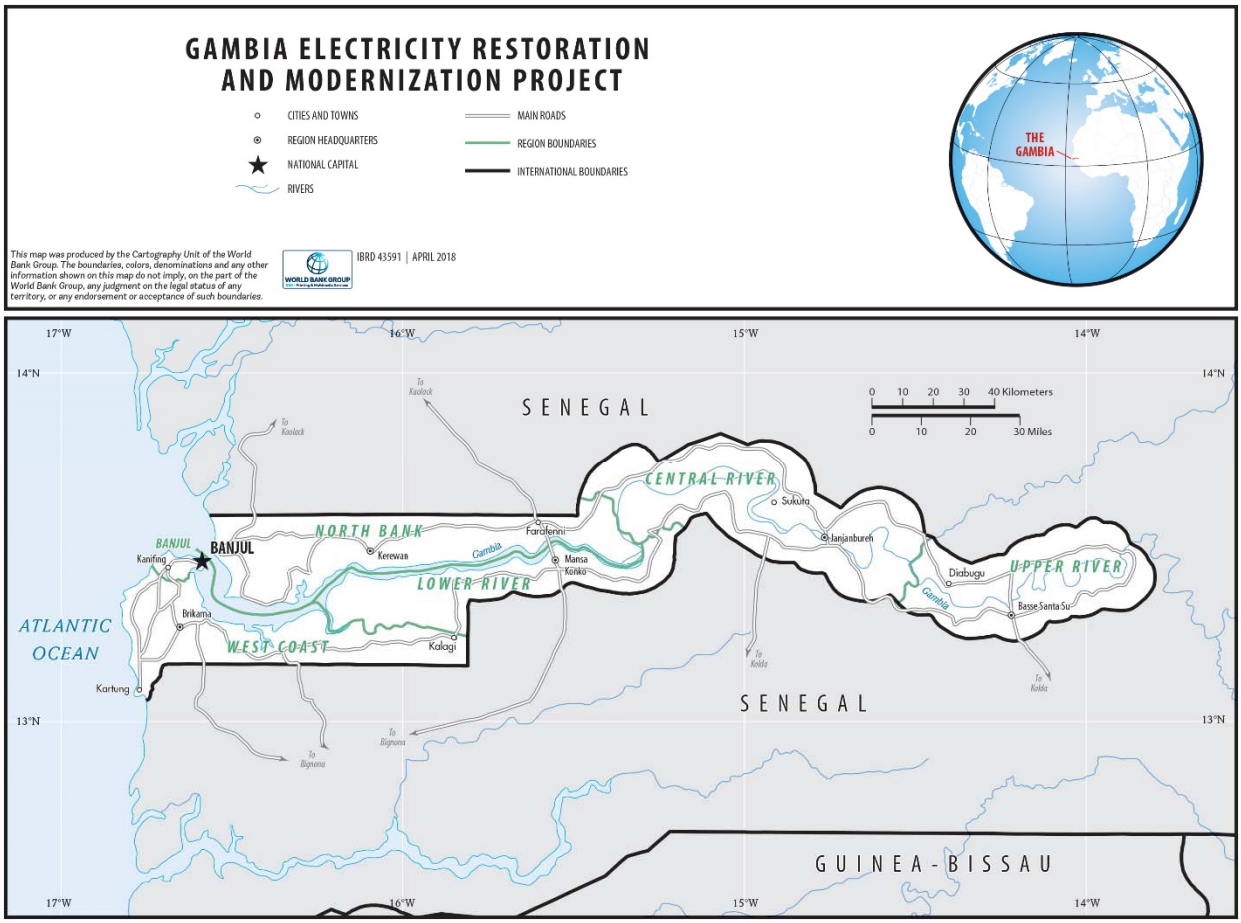
- **Revenue protection.** The sustainability of the company is at stake if revenues are not protected. A comprehensive Financial Recovery Strategy will not take NAWEC to a sustainable financial recovery if the company continues to lose 20 percent or more of its revenues each year due to losses, unpaid invoices, and unbilled services. Further, a tariff increase without a drastic reduction in losses would represent a penalization to customers. In particular, timely collection of payables from Government entities is critical, which is expected to be supported through the measures identified in the current DPO series.

- **NAWEC FM.** The actions required from NAWEC's management imply substantial changes to the way in which the company was managed in the past, including administrative, financial, technical, and commercial issues. Without these changes the company is not viable. This include

    - **Financial information.** Proper management requires timely and accurate information. It is essential for NAWEC to adopt international/industry practices to manage its financial accounts and day-to-day information. This will allow the company to make decisions on time and on the basis of accurate information. This is expected to be supported through the new MIS being financed through the GERMP; and
    - **Financial planning.** NAWEC's ongoing investment needs require careful financial planning and funding strategies. Further, the company must be cautious and not pursue investment plans that exceed its financial capacity. Paying debt service as and when due must always have priority over new investments. Projects should be financed with a combination of the cash generated by the company's operation and financing facilities that fit the project's repayment capacity. Conversely, projects should not be implemented if proper funding is not secured.

- **NAWEC performance.** It will be critical for NAWEC to achieve its operational performance targets. Achieving these targets will be supported through the Service Contractor and backed up by the performance contract expected to be signed between the MoFEA and NAWEC.

ANNEX 5: COUNTRY MAP



Source: World Bank