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Report No: PAD1302

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT PAPER

ON A

PROPOSED ADDITIONAL CREDIT

IN THE AMOUNT OF SDR 42.7 MILLION
(US$60 MILLION EQUIVALENT)

TO THE

REPUBLIC OF LIBERIA

FOR AN

ACCELERATED ELECTRICITY EXPANSION PROJECT

June 1, 2015

Energy and Extractives Global Practice
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective April 30, 2015)

Currency Unit	=	Liberian Dollars
US$1	=	LRD 84.50
US$1	=	SDR 0.71

FISCAL YEAR
January 1 - December 31

ABBREVIATIONS AND ACRONYMS

AFDB	African Development Bank
CEO	Chief Executive Officer
CESMP	Contractor Environmental and Social Management Plan
CPS	Country Partnership Strategy
EIRR	Economic internal rate of return
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EU	European Union
FIRR	Financial Internal Rate of return
GDP	Gross Domestic Product
GoL	Government of Liberia
GST	Goods and Services Tax
HFO	Heavy fuel oil
IDA	International Development Association
IFR	Interim Financial Report
IFMIS	Integrated Financial Management System
kWh	kilowatt-hour
LACEEP	Liberia Accelerated Electricity Expansion Project
LEC	Liberia Electricity Corporation
MHI	Manitoba Hydro International
MLME	Ministry of Lands, Mines and Energy
MW	Megawatt
MWh	Megawatt hours
NPV	Net Present Value
O&M	Operations and Maintenance
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework

SREP	Scaling Up Renewable Energy Program
T&D	Transmission and Distribution
WAPP	West African Power Pool
WTP	Willingness to Pay

Regional Vice President:	Makhtar Diop
Country Director:	Yusupha B. Crookes
Senior Global Practice Director:	Anita Marangoly George
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LIBERIA
ADDITIONAL FINANCING FOR
ACCELERATED ELECTRICITY EXPANSION PROJECT

CONTENTS

ADDITIONAL FINANCING DATA SHEET

Liberia

Liberia: LACEEP Additional Financing (P153124)

AFRICA

GEEDR

Basic Information – Parent			
Parent Project ID:	P133445	Original EA Category:	B - Partial Assessment
Current Closing Date:	30-Jun-2018		

Basic Information – Additional Financing (AF)			
Project ID:	P153124	Additional Financing Type (from AUS):	Scale Up
Regional Vice President:	Makhtar Diop	Proposed EA Category:	B - Partial Assessment
Country Director:	Yusupha B. Crookes	Expected Effectiveness Date:	28-Aug-2015
Senior Global Practice Director:	Anita Marangoly George	Expected Closing Date:	30-April-2020
Practice Manager/Manager:	Meike van Ginneken	Report No:	PAD1302
Team Leader(s):	Clemencia Torres de Mästle		

Borrower				
Organization Name	Contact	Title	Telephone	Email
Ministry of Lands, Mines and Energy	H.E. Patrick Sendolo	Minister of Lands, Mines, and Energy	2316243490	psendolo@emansion.gov.lr

Project Financing Data–Parent (Liberia Accelerated Electricity Expansion Project (LACEEP)-P133445)

Key Dates

Project	Ln/Cr/TF	Status	Approval Date	Signing Date	Effectiveness Date	Original Closing Date	Revised Closing Date
P133445	IDA-52520	Effective	30-May-2013	03-Jul-2013	25-Nov-2013	30-Jun-2018	30-Jun-2018

Disbursements

Project	Ln/Cr/TF	Status	Currency	Original	Revised	Cancelled	Disbursed	Undisbursed	% Disbursed
P133445	IDA-52520	Effective	XDR	23.40	23.40	0.00	0.46	22.94	1.99

Project Financing Data –Additional Financing Liberia: LACEEP Additional Financing (P153124)					
[ ] Loan [ ] Grant [ ] IDA Grant					
[X] Credit [ ] Guarantee [ ] Other					
Total Project Cost:	60.00		Total Bank Financing:	60.00	
Financing Gap:	0.00				

Financing Source – Additional Financing (AF)	Amount
BORROWER/RECIPIENT	0.00
International Development Association (IDA)	60.00
Total	60.00

Policy Waivers	
Does the project depart from the CAS in content or in other significant respects?	No
Explanation	
Does the project require any policy waiver(s)?	No
Explanation	

Team Composition

Bank Staff

Name	Role	Title	Specialization	Unit
Clemencia Torres de Mästle	Team Leader (ADM Responsible)	Senior Energy Economist	Senior Energy Economist	GEEDR
Pedro Antmann	Team Member	Lead Energy Specialist	Lead Energy Specialist	GEEDR
Joseph Tawiah Quayson	Team Member	Energy Specialist	Energy Specialist	GEEDR
Nikolay Petrov Nikolov	Team Member	Senior Energy Specialist	Economic and Financial Analysis	GEEDR
Richard Olowo	Procurement Specialist	Lead Procurement Specialist	Lead Procurement Specialist	GCFDR
Saidu Dani Goje	Financial Management Specialist	Financial Management Specialist	Financial Management Specialist	GGODR
Luis M. Schwarz	Team Member	Senior Finance Officer	Senior Finance Officer	WFALA

Paivi Koskinen-Lewis	Team Member	Social Development Specialist	Social Development Specialist	GSURR
Mei Wang	Counsel	Senior Counsel	Senior Counsel	LEGAM
Lemu Ella Makain	Team Member	Team Assistant	Team Assistant	AFMLR
Yeyea Gloria Kehleay Nasser	Team Member	Program Assistant	Program Assistant	AFMLR

Extended Team

Name	Title	Location
Charles Taylor	Procurement Specialist	Ghana
Felix Nii Tettey Oku	Environmental Specialist	Ghana
Nicole Andrea Maywah	Team Member	USA
Shingira Samantha Masanzu	Team Member	USA
Ines Perez Arroyo	Team Member	USA
Oluwafemi Faleye	Team Member	USA
Maria Luisa Ana Esteban Meer	Team Member	USA

Locations

Country	First Administrative Division	Location	Planned	Actual	Comments
Liberia		Monrovia			
		Grand Cape Mount County			
Liberia		Bomi County			
Liberia		Greater Monrovia			

Institutional Data

Parent (Liberia Accelerated Electricity Expansion Project (LACEEP)-P133445)

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Cross Cutting Areas

[ ] Climate Change

[X] Fragile, Conflict & Violence

[ ] Gender

[ ] Jobs

[ ] Public Private Partnership

Sectors / Climate Change				
Sector (Maximum 5 and total % must equal 100)				
Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	Transmission and Distribution of Electricity	50		
Energy and Mining	General Energy sector	25		
Energy and Mining	Thermal Power Generation	15		
Energy and Mining	Hydropower	10		
Total		100		

Themes		
Theme (Maximum 5 and total % must equal 100)		
Major theme	Theme	%
Financial and private sector development	Corporate Governance	30
Urban development	City-wide Infrastructure and Service Delivery	35
Financial and private sector development	Infrastructure services for private sector development	20
Financial and private sector development	Other Private Sector Development	15
Total		100

Additional Financing Liberia: LACEEP Additional Financing (P153124)

Practice Area (Lead)

Energy & Extractives

Contributing Practice Areas

Cross Cutting Areas

[ ] Climate Change

[X] Fragile, Conflict & Violence

[ ] Gender

[ ] Jobs

[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	Transmission and Distribution of Electricity	80		
Energy and mining	General energy sector	20		
Total		100		

Themes

Theme (Maximum 5 and total % must equal 100)

Major theme	Theme	%
Urban development	City-wide Infrastructure and Service Delivery	60
Public sector governance	Managing for development results	30
Financial and private sector development	Infrastructure services for private sector development	10
Total		100

I. Introduction

1. This Project Paper seeks the approval of the Executive Directors to provide an additional financing (AF) credit in the amount of US$60 million equivalent from IDA resources to the Republic of Liberia for the Accelerated Electricity Expansion Project (LACEEP, P133445).

2. The proposed AF would help finance the costs associated with scaled-up activities to enhance the impact of the project and to facilitate a rebound in economic activity following the disruption in the economy caused by the Ebola Virus Disease (EVD). The AF is requested by the Government of Liberia (GoL) to finance consulting services, works, goods, and operating costs to: (1) scale up the electrification component of the LACEEP by connecting new domestic, commercial and industrial consumers to the grid; and (2) strengthening the Liberia Electricity Corporation (LEC) to improve its operational and financial performance and long term sustainability.

3. The proposed changes for the purposes of the AF are: (i) addition of support to LACEEP components 1 and 3, on investment in transmission and distribution and strengthening of sector institutional capacity; (ii) an extension of the closing date by 22 months, from June 30, 2018 to April 30, 2020; (iii) an update of the results framework to reflect the AF and proposed new closing date; and (iv) a change in the implementation schedule to reflect the activities financed by the AF and the impact of the Ebola crisis on the implementation of the LACEEP.

II. Background and Rationale for Additional Financing

Sector Context

4. The Ebola crisis has caused substantial loss of lives and dampened economic activity in Liberia. Although Liberia was declared Ebola-free on May 9, 2015, it is not yet possible to fully assess the impact of the crisis. What is clear is that increasing the levels of access to electricity services in Liberia has increased in urgency because it is essential for the economic transformation of the country and for the improvement in the living standards of the population.

5. Expanding access to reliable and affordable electricity supply is a high priority of Liberia's *Agenda for Transformation FY12-17*. Better energy access will support the country's economic growth and social development. Liberia has a rate of electrification of less than two percent and one of the highest electricity tariffs in the world (US$0.52/kWh).

6. Following the end of the Liberian civil war, LEC resumed operations in 2010 and initially focused on re-establishing services in key areas of Monrovia. Donors financed emergency, diesel-based generation of 22.6 MW. Various donors, including the World Bank, also provided financing for the reconstruction of a basic distribution network and the connections for low income customers. The infrastructure investment was accompanied by a five-year management contract financed by the Government of Norway and signed in 2010 between LEC, the Ministry of Lands, Mines, and Energy (MLME), and Manitoba Hydro International (MHI).

The objectives of the management contract were to improve LEC's performance and to expand the customer base within a defined service area in the capital.

7. LEC's customer base increased from 2,469 customers in July 2010 to 29,900 customers in December 2014. Peak demand increased from 4 MW in 2010 to 9.7 MW in 2014. Measures to strengthen LEC's capacity in the technical and administrative areas included: (i) recruitment and training of local staff (on generation, transmission, and distribution); (ii) recruitment and training of staff to strengthen financial management and procurement units; and more recently (iii) launching the procurement for the incorporation of Enterprise Resources Planning (ERP) system to manage more efficiently LEC's corporate resources.

8. Having reestablished electricity services in key areas of the capital, GoL's objectives in the power sector have shifted since 2012 from managing an emergency situation to developing the sector on a sustainable basis by expanding and improving electricity services. The GoL has adopted an ambitious strategy to increase electricity coverage to 70 percent of the population in Monrovia and 35 percent nationwide by 2030.

9. The GoL has mobilized development partners and its own resources to develop power plants and to shift its energy mix from diesel-based generation to other less costly energy sources. It is expected that supply of electricity will increase and that the generation mix will change dramatically in the coming three years with the rehabilitation of the Mount Coffee hydropower plant (80 MW) and the commissioning of four thermal plants (48 MW) running on heavy fuel oil (HFO). In addition, Liberia is negotiating the purchase of about 27 MW of power from Côte d'Ivoire through the WAPP-CLSG Interconnector. Supply of electricity is forecasted to increase from 22.6 MW today to 80.6 MW in 2016, and 98 MW in 2020. This will allow LEC to connect about 114,000 new customers by 2020. The new energy mix is expected to lead to a significant reduction in generation costs, which would in turn enable more affordable electricity tariffs. However, the Ebola crisis affecting the country since March 2014 has interrupted the works and resulted in uncertainty about the schedule for the additional supply coming online. New work schedules will soon be agreed with the contractors now that they have started to return to the country.

10. With the new generation capacity expected to be in place in the coming years, two main bottlenecks to the efficient and sustainable development of a national electric system remain: (i) the lack of infrastructure to transmit and distribute electricity; and (ii) an electricity utility in a precarious financial and technical situation, serving only the capital, Monrovia.

11. LEC will need to expand its scope of services beyond the capital. It will need to improve significantly its operational and commercial performance to achieve financial sustainability in the longer term. Since financing from Norway for the current management contract is available until July 2015, achieving longer-term sustainability of LEC will require the GoL to implement a transition plan to new management arrangements that could effectively lead LEC to a more sustainable expansion path. Support for the preparation of the transition plan was included under LACEEP's component 1-C.

12. In March 2015, the GoL announced a three point action plan to introduce a new permanent management arrangement to move LEC towards steady-state and commercially sustainable operations. This plan aims to: (1) institute an effective transitional management arrangement at LEC; (2) hand over management of LEC to a new, permanent management arrangement; and (3) explore options for how to consolidate and optimize the new management arrangement at LEC through involving private participation in the provision of electricity services.

13. The GoL has initiated the implementation of the three point action plan. As a first step, the GoL has recruited a transitional management team composed of a Chief Executive Officer (CEO), deputy CEO and a Chief Financial Officer who will start working soon with the current MHI management team to assure a smooth transition. The Government is planning to carry out a transparent and organized transfer to ensure full accountability of the outgoing management contractor and the incoming transitional management team. MHI will continue to provide advisory services in selected key areas.

14. In parallel, the GoL has launched the recruitment of a permanent team of seasoned experts with managerial capabilities and experience in developing countries, with the support of a recruiting firm financed by LACEEP. The team would bring together expertise on utility management, financial and administrative management, commercial management, planning, engineering, and utility operations. They will constitute the permanent professional management team of LEC, and will be responsible, individually and collectively, to run the day-to-day management of LEC. It is expected that these experts would be on board by September 2015. The Bank and the other donors have expressed support for this approach and the GoL's action plan, and have also stressed the importance of sound governance as an essential element of the strategy for the longer term sustainability of LEC. Notably, to ensure proper accountability, the new management team would need autonomy to effectively manage LEC, including independence from the Board, which should revert to its statutory oversight role. In addition to recruiting a new management team, the GoL is acquiring and deploying modern management tools, and training local staff in the use of these tools with the support of the donors (notably Norway and the World Bank).

15. The proposed AF will support the GoL to operationalize the new permanent management arrangement to move LEC towards steady-state and commercially sustainable operations and finance selected investments in infrastructure.

Higher Level Objectives to which the Project Contributes

16. The proposed AF is fully aligned with the World Bank Group's Liberia Country Partnership Strategy (CPS) FY2013-17.[1] The CPS places a strong priority on expanding electricity services and making them more affordable to businesses and households in order to spur economic growth, job creation, and poverty reduction. Achieving such expansion of services at a more affordable cost also contributes to the Bank's twin goals of reducing extreme poverty and boosting shared prosperity.

[1] Report No. 74618-LR, July 1, 2013.

17. This AF is also aligned with the GoL's development strategy. Liberia's *Agenda for Transformation FY12-17* (the second Poverty Reduction Strategy) aims to achieve a more prosperous and inclusive society by 2030. Under pillar 2 of the *Agenda for Transformation* as also highlighted in *the 2015 Economic Stabilization and Recovery Plan*, the expansion of electricity services and the reduction of the cost of electricity are identified as essential conditions for achieving and sustaining economic transformation.

18. The proposed AF will contribute to the Government's efforts to stabilize and rebuild the economy in a post-Ebola situation. Expansion of access to electricity will be critical to address both short term needs of health and education centers, a water treatment plant, and other critical facilities, as well as to support the economic and social recovery of the country.

19. **Original Project.** The LACEEP, in the amount of SDR 23.4 million (US$35 million equivalent), was approved by the Bank's Board on May 30, 2013. The project development objective (PDO) is to increase access to electricity and strengthen institutional capacity in the electricity sector. The Financing Agreement (FA) was signed on July 3, 2013, and the project was declared effective on November 25, 2013. The project includes the following three components:

- **Component 1**. *Extension of electricity transmission and distribution systems and technical assistance to strengthen LEC,* giving access to electricity to around 10,300 new users both in Monrovia and along the corridor to the town of Kakata.

- **Component 2.** *Construction of off-loading, transport and storage facilities for HFO, and support for the optimization of HFO procurement,* underpinning the GoL's decision to replace expensive diesel-based generation with less costly thermal generation running on HFO.

- **Component 3.** *Support to MLME for the expansion of supply options, based on the Least Cost Power Development Plan, and strengthening of the sector's institutional capacity within the Government to lead the sector*.

20. **Performance of the Original Project.** Progress towards achievement of the development objectives and implementation progress for LACEEP are rated moderately satisfactory. In recent months, the impact of the Ebola crisis has slowed progress on the ground. MLME and LEC have complied with all of the legal covenants of the project. The disbursement condition related to the amended management contract with MHI in the original financing agreement was deleted as it was no longer relevant as discussed above. MLME and LEC have continued to advance procurement of goods, works and consultancies for their respective components. All bid evaluations for the infrastructure components have now been concluded. Works are likely to start by the end of 2015, and disbursement are expected to pick up in 2016 (to an estimated US$28.69 million). The Environmental and Social Impact Assessment (ESIA) for the extension of the network and the construction of the HFO transport and storage facilities is being finalized. A draft of the Resettlement Action Plan (RAP) for the Monrovia-Kakata corridor has been prepared and consultations with all stakeholders have taken place.

Rationale for Additional Financing

21. The proposed AF would enhance the impact of the LACEEP by scaling up the activities to connect new residential, commercial, and industrial users and strengthening the capacity of LEC. This will be done through the addition of activities under component 1 on transmission and distribution and component 3 on strengthening of sector institutional capacity. This will ensure that the increase in generation capacity that comes on line in the coming years will translate into increased and improved electricity services in Greater Monrovia and in the Bomi and Grand Cape Mount Counties. The expansion of the transmission and distribution networks also supports the GoL in dealing effectively with the aftermath of the Ebola crisis. With the proposed AF, total financing for LACEEP would amount to US$95 million equivalent.

Rationale for expanding further the electricity distribution and transmission system (additional activities under component 1)

22. The GoL has already started to address the urgent need to provide access to modern energy services in the country with the support of IDA and other donors. However, meeting the electrification needs of the country remains a daunting task. The GoL has undertaken a major effort to increase electricity supply and minimize the use of unsustainably expensive diesel based generation. This will enable the expansion of electricity services to new users, provided that the national transmission and distribution infrastructure develops consistently with the increase in generation capacity.

23. The AF will be complementary to the interventions by other development partners who are also supporting the expansion of electricity services in Greater Monrovia, notably the European Union (EU), the Government of Norway, and the African Development Bank (AFDB). LEC aims to connect another 10,300 users using LACEEP financing, and over 60,000 using funds from the EU and the AFDB. The proposed AF will connect another 36,800 households and businesses. Commercial and industrial customers account for around 16 percent of the total new connections under the AF.

24. The AF will support the expansion of the coverage area to major socio-economic zones within the Greater Monrovia North-West, and in the Bomi and Grand Cape Mount Counties. The AF will have a positive impact on the livelihood of the people of these communities by connecting households as well as key economic and social service facilities to the national electricity grid. The Greater Monrovia-North West, which will mostly be supplied from the Gardnerville and Stockton Creek Substations, will provide power to various commercial and industrial customers, as well as health centers and schools.[2] On the outskirts of Monrovia where the Virginia Substation will be located, the project will achieve the connections of AME Zion University, Stella Maris Polytechnic, and boarding schools such as Ricks Institute and Lott

[2] Industrial centers include several food processing areas (cold storages), Monrovia Club Breweries, and Iron Ore Loading Facilities. There are also several high schools, the White Plains Water Treatment Plant, and various health care facilities, including Redemption Hospital. Other industrial areas include LPRC, National Port Authority and the jetty for the reception of HFO to run the LEC HFO generation plants.

Carey. The Bomi-Grand Cape Mount Corridor covers areas of significant economic potential in two counties (Bomi and Grand Cape Mount Counties). Activities in these areas that will benefit from access to electricity include fishing, tourism, palm oil plantation, as well as education and health services.

Rationale for support to strengthening LEC's operational and commercial capacity (additional activities under component 3)

25. The AF will provide institutional capacity building support to LEC to complement the institutional support to MLME provided in the LACEEP. LEC has succeeded in re-establishing basic services in key areas of Monrovia after the civil war under a management contract with MHI. However, LEC is still financially and institutionally fragile and lacks commercial focus and services oriented towards customer satisfaction. It will require assistance to become a well-performing and self-sustained national utility. In order to improve and expand its services, LEC will have to: (i) strengthen its operational and commercial capacity to serve a larger and broader base of customers; and (ii) build local management capacity at the medium and top levels to ensure the sustainability of its operations once the management contract ends. The AF will support LEC to improve its commercial performance, a first step to strengthen the financial viability of the utility. It will do so through the financing of technical assistance to build local and regional capacity in the utility, and through the incorporation of modern management systems to improve efficiency, transparency, and accountability in all business areas.

Alternatives Considered

26. The option of preparing a new IDA project was considered. An AF was judged to be more efficient given the alignment of the proposed activities with the PDO of the LACEEP.

27. The team also considered the possibility of preparing a new project that would include IDA resources and Scaling Up Renewable Energy Program (SREP) financing. Proceeding with a single project is in principle more efficient since it avoids duplication throughout the preparation cycle. However, the preparation of the IDA credit and the SREP grant differ in their timelines, and the two projects have different safeguards requirements.

III. Proposed Changes

Summary of Proposed Changes

The proposed AF would help enhance the impact of the LACEEP by (1) scaling up the activities to connect new residential, commercial, and industrial users; and (2) strengthening LEC to improve its operational and financial performance and long term sustainability. The following changes are proposed: (i) an addition of activities to components 1 (transmission and distribution) and 3 (strengthening of sector institutional capacity); (ii) an extension of the closing date; (iii) an update of the results framework to reflect the AF and proposed new closing date; (iv) a change in the legal covenants to reflect LEC's management structure; and (v) a change in the implementation schedule to capture the AF and reflect the impact of the Ebola crisis on the LACEEP.

Change in Implementing Agency	Yes [ ] No [X]
Change in Project's Development Objectives	Yes [ ] No [X]
Change in Results Framework	Yes [X] No [ ]
Change in Safeguard Policies Triggered	Yes [ ] No [X]
Change of EA category	Yes [ ] No [X]
Other Changes to Safeguards	Yes [ ] No [X]
Change in Legal Covenants	Yes [X] No [ ]
Change in Loan Closing Date(s)	Yes [X] No [ ]
Cancellations Proposed	Yes [ ] No [X]
Change in Disbursement Arrangements	Yes [ ] No [X]
Reallocation between Disbursement Categories	Yes [ ] No [X]
Change in Disbursement Estimates	Yes [X] No [ ]
Change to Components and Cost	Yes [X] No [ ]
Change in Institutional Arrangements	Yes [ ] No [X]
Change in Financial Management	Yes [ ] No [X]
Change in Procurement	Yes [ ] No [X]
Change in Implementation Schedule	Yes [X] No [ ]
Other Change(s)	Yes [ ] No [X]

Development Objective/Results

Project's Development Objectives

Original PDO

The project development objectives are to increase access to electricity and strengthen institutional capacity in the electricity sector.

Change in Results Framework

Explanation:

An updated results framework is attached as Annex 1. The changes in the result framework include an update of the target values of indicators to reflect the outcomes of the new activities and an update of the timeline for achieving the targets agreed under the original LACEEP to reflect the extended closing date. In addition, the number of intermediate indicators has been reduced to simplify and better align to the current circumstances, while an additional intermediate indicator has been added to measure the increased operational and financial capacity of LEC as a result of the support provided under the AF. Lastly, an indicator on beneficiary feedback has been added.

Compliance		
Conditions (Liberia: LACEEP Additional Financing - P153124)		
Source of Funds	**Name**	**Type**
IDA	Execution of Subsidiary Agreement	Effectiveness
Description of Condition: The Subsidiary Agreement has been executed on behalf of the Recipient and the Project Implementing Entity, in accordance with the provisions of Section I.B of schedule 2 of the Financing Agreement.		

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

Finance	
Credit Closing Date - Additional Financing (Liberia: LACEEP Additional Financing - P153124)	
Source of Funds	**Proposed Additional Financing Closing Date**
IDA	30-April-2020

Credit Closing Date(s) - Parent (Liberia Accelerated Electricity Expansion Project (LACEEP) - P133445)

Explanation:

It is proposed to extend the project closing date from June 30, 2018 to April 30, 2020, in line with the estimated period for construction and commissioning of the distribution network in Greater Monrovia and transmission and distribution network to Bomi. It will also allow for the finalization of procurements under the original project, which experienced delays due to the impact of the Ebola crisis.

Ln/Cr/TF	Status	Original Closing Date	Current Closing Date	Proposed Closing Date	Previous Closing Date(s)
IDA-52520	Effective	30-Jun-2018	30-Jun-2018	30-April-2020	

Change in Disbursement Estimates (including all sources of Financing)

Explanation:

The disbursement estimates have been revised to reflect the impact of the Ebola crisis since the first quarter of FY15, the AF, and the proposed new closing date.

Expected Disbursements (in US$Million) (including all Sources of Financing)

Fiscal Year	2014	2015	2016	2017	2018	2019	2020
Annual	0.14	1.56	28.19	12.02	42.44	7.88	2.77
Cumulative	0.14	1.7	29.89	41.91	84.35	92.23	95

Allocations - Additional Financing (Liberia: LACEEP Additional Financing - P153124)

Source of Fund	Currency	Category of Expenditure	Allocation	Disbursement %
			Proposed	Proposed
IDA	US$	Goods, works, non-consultants' services, consultant services, training, workshops and Operating Costs under Component 1and 3 of the AF.	US$60.00	100.00

Components

Change to Components and Cost

Explanation:

The scope of component 1 (the expansion of access to electricity), and component 3 (the strengthening of the sector's institutions) will be expanded through the inclusion of additional activities. As a result, the cost of each of these components will increase. The activities under the AF include:

Component 1: Extension of electricity transmission and distribution systems and connection of new users (US$53 million equivalent, IDA Credit):

Financing will help to increase access to electricity in the North-West part of Greater Monrovia, as the capital has the highest density of population, and in the Bomi and in Grand Cape Mount Counties, two regions with important economic potential. Connecting large volume customers will improve LEC's billing and collection.

New activities to be added for each sub-component are described below.

Sub-component 1-A: Electrification of Greater Monrovia (North-West). The sub-component will finance the provision of electricity services to new users (including households, businesses, and industries) in various communities in the Greater Monrovia area. This will include the construction of new and rehabilitation of existing transmission and distribution networks (substations and lines), and construction of new connections. The financing will enable connecting 30,000 new customers in all categories, including 13 industrial plants in the areas served by the Gardnerville, Stockton Creek, and Virginia substations.

Sub-Component 1-B: Electrification of the Monrovia-Bomi-Grand Cape Mount Corridor. This sub-component will finance construction of the main electricity transmission and distribution infrastructure of the corridor, as well as connection of about 6,800 new users in the economic zones of Bomi County and Grand Cape Mount Counties. The AF will finance the construction of a transmission line at 66kV, distribution lines at 33kV and 22kV, upgrade of several substations, and construction of some new substations. Newly connected customers will include households, small businesses and several larger prospective users, such as large palm oil plantations and some mines. It will also include local health and education centers.[3] This sub-component will enable access to cheaper electricity for the large consumers in this corridor which currently rely on expensive self–generated diesel based electricity. LEC could therefore broaden its customer base by incorporating these medium and large users to its customers' portfolio.

Sub-Component 1-C: Project Management. This sub-component will cover the cost of preparing, managing, and auditing the component. It will include the financing of the necessary preparatory and safeguards studies and the costs of supervising the works. It will also provide the resources needed by LEC to manage implementation.

Component 3: Support for the strengthening of LEC's commercial capacity (US$7 million equivalent, IDA Credit):

New activities under this component support LEC to put in place a professional management team, strengthen commercial management, and build the local capacity within the utility to ensure sustainability of the results. Improving commercial performance of LEC is a necessary condition for the utility to become financially viable. It is not however sufficient, as it will need to be complemented by the commitment of the GoL to ensure the financial equilibrium of the Utility through cost recovery tariffs and/or government transfers.

New activities to be added for each sub-component are described below.

Sub-Component 3-A: Incorporation by LEC of modern management information systems. This sub-component will help LEC to improve its operational performance in the key areas of commercial management and attention and resolution of incidents in electricity supply to its customers. This will be achieved through the acquisition and incorporation of two state-of-art commercial information systems— a Commercial Management System (CMS) and an Incidents Management System (IMS)— which will help LEC to improve its operational performance in the key areas of commercial management and attention and resolution of incidents in electricity supply to its customers. This will contribute to strengthen the financial viability of LEC.

Sub-Component 3-B: Technical assistance to LEC. This technical assistance will be twofold:

It will help to build local management capacity within LEC at the mid and top levels to ensure the sustainability of its operations once the management contract ends. In particular, it will support the incorporation of five qualified experts with managerial experience who will constitute the new LEC management team that will run the utility with efficiency, transparency, and accountability, using modern management tools. Recruitment of these five managers is ongoing with the assistance of a professional

[3] The Ministry of Youth and Sports Vocational Training Center, the West African Examination Council (WAEC) headquarters, Sime Darby Palm Oil Processing Plantation, and various schools and health facilities will be supplied from the Kle Substation. From the Medina Substation, Robertsport Water Treatment Plant, Cape Mount Technical Community College, Oreus Mines, Medina Rock Crusher, Schools, Health Care Centers will be supplied by LEC power. Lake Piso in Robertsport is one of the major tourist attraction centers in the country.

recruitment agency financed under the LACEEP. The AF will finance this professional management team during the initial phase of its work (between three and five years), after which they will shift to be on the payroll of LEC.

It will also support LEC's efforts to recruit (with LEC's budget) and train Liberian professional in the use of modern management tools (CMS and IMS) to strengthen commercial department of LEC.

Current Component Name	Proposed Component Name	Current Cost (US$M)	Proposed Cost (US$M)	Action
Extension of Electricity Transmission and Distribution Systems	Extension of Electricity Transmission and Distribution Systems	20.00	73.00	Revised
Construction of HFO Facilities for Off-loading, Transport, and Storage and Support for Optimization of HFO Procurement	Construction of HFO Facilities for Off-loading, Transport, and Storage and Support for Optimization of HFO Procurement	11.00	11.00	No Change
Support for the Expansion of Supply Options and for the Strengthening of the Sector's Institutional Capacity	Support for the Expansion of Supply Options and for the Strengthening of the Sector's Institutional Capacity	4.00	11.00	Revised
	Total:	35.00	95.00	

Other Change(s)

Change in Implementation Schedule

Explanation:

As described above, the AF includes an extension of the project by 22 months, to April 30, 2020 to reflect the impact of the Ebola crisis since the first quarter of FY15 and the new activities to be supported under the AF.

IV. Appraisal Summary

Economic and Financial Analysis

Explanation:

Economic Analysis

The economic internal rate of return (EIRR) of the AF is estimated at 34 percent, with a net present value (NPV) of US$135 million. The key economic benefit from expanding the distribution network is derived from the value of the additional electricity sold to new consumers in Monrovia and the Bomi and Grand Cape Mount Counties. In addition, there are other benefits that are also important, even if less tangible and less easily quantified. The completion of the installation of a CMS in 2019 is expected to enable LEC to improve billing. The installation and use of the IMS will contribute to improve the quality and reliability of services. Access to electricity of more users, including businesses, will also have a positive impact on the economic activity in Monrovia and the living standards of the beneficiaries. Sensitivity

scenarios and other details are provided in Annex 2.

Financial Analysis

IDA resources will be on-granted to LEC. The financial analysis focuses on the calculation of the financial internal rate of return (FIRR), which is 16 percent. See Annex 2 for details of the analysis.

Technical Analysis

Explanation:

The technologies that will be financed by the AF are well known and proven in Sub-Saharan Africa. Design of the AF is based on LEC's Electric Master Plan for Greater Monrovia and on a pre-feasibility study prepared by an international consultant. In addition, a consultant will be hired to prepare technical specifications, bills of quantities, bid documentation, and a procurement strategy for the AF. An owner's engineer will be contracted to assist in the procurement of contractors.

State-of-art information systems to support efficient, transparent and accountable management of commercial functions (CMS), and attention and resolution of incidents in electricity supply (IMS) are used by well performing electricity utilities worldwide (both in developed and emerging countries). In Liberia, the incorporation of these modern management tools and the technical assistance provided under the AF to recruit and train professionals in the use of these tools, will strengthen LEC's commercial department to improve its performance and the company's operational and financial viability.

Institutional and Implementation Arrangements

Implementation Arrangements: MLME and LEC continue to be the two implementation agencies in charge of implementing the project and the AF. MLME is the agency in charge of the coordination of the overall project. LEC will be responsible for the implementation of the AF activities under components 1 and 3.

Financial Management: The project's financial management arrangements will not change. A financial management assessment was carried out at LEC and MLME on January 28, 2013, and a re-assessment for the AF was conducted on January 27, 2015 to confirm the adequacy of the financial management arrangements for managing the LACEEP AF. The proposed financial management arrangements satisfy the Bank's minimum requirements under OP/BP 10.00 and FM Guidelines. The current FM rating for the LACEEP is *Moderately Satisfactory*.

Funds Flow: Funds flow arrangements for project are assessed as *satisfactory* and it will not change as designed under the parent project. The LEC and MLME will each continue to maintain their current separate Designated Accounts. The IFR based method of disbursement will not change.

Disbursement: Disbursement Arrangements will remain the same, and there will be one disbursement category for the AF as follows: (1) Goods, works, non-consultants' services, consultant services, training and Operating Costs under Part 1 and 2 of the Project.

Procurement: A Procurement Plan for the proposed AF has been agreed between GoL and IDA covering the first 18 months of the project. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Environmental and Social Analysis

Explanation: Environmental and Social Safeguards:

The environmental category of the project will remain the same, category B. None of the proposed new activities will have new, significant, or irreversible environmental and social impacts. The proposed activities do not trigger any new safeguard policies.

OP/BP 4.12 is triggered to cover any clearance of land for the new transmission and distribution networks and sub-stations, which might require some land acquisition leading to compensation, and potential, but very limited relocation and displacement of some households and assets. OP 4.01 is triggered because of the environmental impacts related to the construction of the transmission and distribution lines and equipment, the fuel supply lines and storage facilities. While the general location of some of the works is known the exact route of the transmission line and types of the works are yet to be finalized. The ESMF has been updated to reflect the additional project activities of the LACEEP AF. It contains the environmental management provisions necessary to guide the preparation and implementation of activities in the energy sector. In the case of the ESMF, the intensification of connection activities and transmission line construction are already covered by the Framework's Impact Mitigation and Environmental and Social Management and Monitoring Plan. The updated ESMF has been disclosed in the World Bank InfoShop on April 17, 2015 and in-country and on April 21, 2015. The implementing agencies of the project, MLME and the LEC, will be responsible for the implementation of the ESMF and the RPF. The RPF has also been updated to reflect the additional activities of the AF and disclosed in the World Bank Infoshop on 17, 2015 and in-country on April 21, 2015.

The project traverses Monrovia, and there is the possibility of finding physical cultural resources during the siting and placement of the new transmission line; therefore the World Bank's Safeguard Policy on Physical Cultural Resources (OP/BP 4.11) is triggered. The ESMF includes a "Chance Finds Procedure" to appropriately protect any physical cultural resources that may be found during project implementation and, any subsequent ESIAs will address impacts on physical cultural resources as necessary.

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

Safeguard Issues and Impacts Associated with the Proposed Project

The AF will finance the extension of the transmission and distribution systems, including connections to end users which will have limited physical impacts during construction. The exact locations for new lines and subsequently the exact scope and type of impacts are not yet known. Detailed design plans will be completed during implementation, therefore, the project is relying on frameworks as safeguards

instruments. Specific safeguards plans will be prepared, if deemed necessary, once design plans and locations become known. In particular, the project will ensure that the routing will avoid densely populated areas, especially avoiding areas where institutional structures (e.g., schools, churches and health centers) may be displaced or where graves might be affected (a chance find procedure will be included in all contractor contracts). The environmental and social impacts are expected to be limited due to the use of already existing rights of ways and premises in the urban areas of Monrovia.

For OP/BP 4.11 on Physical Cultural Resources, the ESIAs to be prepared during implementation will assess whether there are any such resources in the line routing areas to be designed. Based on future ESIA studies, the line routing will avoid any sites with significant cultural or historical artifacts or physical properties. In addition, the Environmental and Social Management Framework contains a "Chance Finds Procedure" which will be included in all contractor contracts in case there are any unexpected findings of physical cultural resources. In case physical cultural property is discovered during implementation, the contractor will need to stop working at that site and adopt the necessary in-country procedures or methods for appropriate handling and preservation of any such find.

The World Bank Safeguard Policy on Environmental Assessment OP/BP 4.01 and its associated General Environmental, Health and Safety Guidelines and the Electric Transmission and Distribution Environmental, Health and Safety Guidelines of April 2007 will guide the mitigation of environmental impacts from AF activities.

It is not anticipated that any serious indirect or long-term environmental or social impacts will be caused by the AF activities. Cumulative impacts of the proposed AF are expected to be minimal. The project is expected to bring positive benefits to communities and individuals. The environmental and social concerns arising from the construction of the transmission and distribution networks include minor loss of vegetation cover in the peri-urban areas in the Monrovia vicinity, noise, dust and waste generation as well as occupational/public health and safety issues. When in operation, the Monrovia-Bomi transmission line will need to be monitored for health and safety issues and human encroachment on the right-of-ways.

Environmental and social clauses, which are part of the ESMF, will need to be included in the bidding documents and contracts for the contractors. For more complex works contracts, the ESIAs and ESMPs will need to be included in the bidding documents and the contractors will need to prepare and implement their own Contractor Environmental and Social Management Plan (CESMP) in accordance with the ESMF and/or any relevant ESIAs or ESMPs. In all cases, the Owner's Engineer will be made responsible contractually for the adequate compliance with the environmental and social clauses and for the CESMPs.

Disclosure

Any ESIA, ESMPs and/or RAPs resulting from AF activities will be reviewed and cleared by the Liberian Environmental Protection Agency, IDA, and disclosed in-country and in the World Bank's Infoshop before any construction can start.

Arrangements for Safeguards Monitoring

The AF activities with safeguards implications are in component 1. Coordination and implementation of the project's environmental and social safeguards related to component 1 of the project will be carried out by LEC, which has recruited environmental and social specialists to be responsible for overseeing project compliance with the environmental and social guidelines established under the ESMF and RPF related to component 1 of the project in accordance with national and Bank policies and procedures. LEC will ensure adherence to the safeguard documents of all agencies involved in the implementation of the

project, including contractors. All contractor bidding documents will include specific environmental and social clauses to be strictly implemented during implementation phase.

World Bank Grievance Redress

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

Risk

Explanation:

The overall risk rating for the AF is High. The proposed AF faces similar implementation risks as the original project. The risks for the additional financing have been reduced as MLME has now completed the Least Cost Power Development Plan, which provides a comprehensive road map for the development of the sector and sets the grounds for a more coherent sector strategy.

The risk related to LECs management capacity remains but is mitigated by the fact that the GoL has identified and is starting to implement an action plan to introduce a new permanent management arrangement to move LEC towards steady-state and commercially sustainable operations. Also, LEC is undertaking most of the actions recommended to strengthen its capacity to manage investments in the network by hiring specialized consultants for the design and supervision of the works, forming a dedicated team, and recruiting a financial management officer. However, the risk remains that the capacity of LEC to implement the activities will be reduced after the financing of the Management Contract with MHI ends in July 2015. The AF will address this risk in several ways with: (a) hands on supervision and support on the fiduciary performance of the Management Project Teams in LEC and MLME; (b) support to LEC's new management arrangements per the action plan for sustainable management arrangements of LEC adopted by the GoL in March 2015, to ensure efficient performance and long term sustainability of the utility; and (c) provision of technical assistance and financing for the necessary management tools to support the strengthening of the local capacity of LEC.

The AF faces an additional risk besides those identified at appraisal of the original project which is the risk of additional delays in implementation and/or increase in costs due to the impact of the Ebola crisis. Impact includes potential delays in getting contractors to return to Liberia. It also includes the possibility of increases in the cost of the offers submitted by bidders even after the Ebola crisis has passed. The AF will address this risk in several ways by: (a) adopting a simple design; (b) launching the procurement process for works as soon as possible; (c) financing the recruitment of additional experts to assist LEC and MLME in the design and implementation of the activities; and (d) adopting a conservative budget and including contingencies to be able to face higher than normal costs of the bids.

The AF has been screened for risks related to climate change and disaster risk management. These risks are expected to be negligible since the transmission and distribution activities included in the AF are not

along the coast, the main area affected by floods, which is a recurrent natural disaster in the country.

Annex 1: Revised Results Framework and Monitoring Indicators
LIBERIA: Additional Financing for Accelerated Electricity Expansion Project

Project Name:	Liberia: LACEEP Additional Financing (P153124)			Project Stage:	Additional Financing
Status:	Final				
Team Leader(s):	Clemencia Torres De Mastle	Requesting Unit:	AFCW1	Created by:	Maria Luisa Ana Esteban Meer on 05-Jan-2015
Product Line:	IBRD/IDA	Responsible Unit:	GEEDR	Modified by:	Maria Luisa Ana Esteban Meer on 07-May-2015
Country:	Liberia	Approval FY:	2015		
Region:	AFRICA	Lending Instrument:	Investment Project Financing		
Parent Project ID:	P133445	Parent Project Name:	Liberia Accelerated Electricity Expansion Project (LACEEP) (P133445)		

Project Development Objectives

Original Project Development Objective - Parent:

The project development objectives are to increase access to electricity and strengthen institutional capacity in the electricity sector.

Proposed Project Development Objective - Additional Financing (AF):

No change

Results

Core sector indicators are considered: Yes

Results reporting level: Project Level

Project Development Objective Indicators

Status	Indicator Name	Core	Unit of Measure		Baseline	Actual(Current)	End Target
Revised	People provided with access to	☒	Number	Value	0.00	0.00	46650

	electricity by household connections			Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Adjusted end target and date of completion according to the additional investments.
Revised	People provided with access to electricity by household connections-Grid	☒	Number	Value	0.00	0.00	46650
			Sub Type	Date	30-May-2013	30-Apr-2015	30-Apr-2020
			Breakdown	Comment			Adjusted end target and date of completion according to the additional investments.
Revised	Commercial and institutional customers provided with access to electricity under the project	☐	Number	Value	0.00	0.00	450
				Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Adjusted end target and date of completion according to the additional investments.
Revised	MLME has established a framework for private sector participation in electricity generation	☐	Yes/No	Value	No	No	Yes
				Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Adjusted date of completion based on implementation delays of the original project.

Revised	Direct project beneficiaries	☒	Number	Value	0.00	0.00	233000
				Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Adjusted end target and date of completion according to the additional investments.
No Change	Female beneficiaries	☒	Percentage Sub Type Supplemental	Value	0.00	0.00	49

Intermediate Results Indicators

Status	Indicator Name	Core	Unit of Measure		Baseline	Actual(Current)	End Target
Revised	Transmission lines constructed or rehabilitated under the project	☒	Kilometers	Value	0.00	0.00	110
				Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Revised end target and completion date to include the transmission line to be constructed from Monrovia to Madina via Kle under the additional financing.
Revised	Transmission lines constructed under the project	☒	Kilometers Sub Type Breakdown	Value	0.00	0.00	110
				Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Revised end

							target and completion date to include the 60km transmission line to be constructed from Monrovia to Madina via Kle under the additional financing.
Revised	Distribution lines constructed or rehabilitated under the project	☒	Kilometers	Value	0.00	0.00	250
				Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Adjusted end target and date of completion according to the new investments to be done in Transmission and distribution under the additional financing.
Revised	Distribution lines constructed under the project	☒	Kilometers	Value	0.00	0.00	250
			Sub Type Breakdown	Date	30-May-2013	30-Apr-2015	30-Apr-2020
				Comment			Adjusted end target and date of completion according to the new investments to be done in

							T&D under the additional financing.
No Change	HFO Storage capacity	☐	Cubic Meter(m3)	Value	0.00	0.00	16200
				Date	30-May-2013	30-Apr-2015	30-Jun-2018
				Comment			
No Change	Length of pipeline for HFO fuel transportation constructed	☐	Kilometers	Value	0.00	0.00	1.50
				Date	30-May-2013	30-Jan-2015	30-Jun-2016
				Comment			
Marked for Deletion	HFO pipeline, pumping station and storage facility in operation	☐	Yes/No	Value	No	No	Yes
				Date	30-May-2013	30-Apr-2015	30-Jun-2016
				Comment			
Marked for Deletion	Assessment of options for launching procurement of fuel on a competitive basis completed	☐	Yes/No	Value	No	No	Yes
				Date	30-May-2013	30-Apr-2015	30-Jun-2016
				Comment			
Marked for Deletion	Market sounding analysis for power generation projects with private sector participation completed	☐	Yes/No	Value	No	No	Yes
				Date	30-May-2013	30-Apr-2015	30-Jun-2016
				Comment			
No Change	MLME and LEC staff trained	☐	Yes/No	Value	No	No	Yes
				Date	30-May-2013	30-Apr-2015	30-Jun-2018
				Comment			
New	LEC's Action plan for improving commercial management and strengthening local managerial capacity approved by LEC Board of	☐	Yes/No	Value	No	No	Yes
				Date	30-Jan-2015	30-Apr-2015	31-Mar-2016
				Comment			

	Directors						
New	LEC's customers billed using the CMS	☐	Percentage	Value	0.00	0.00	95.00
				Date	30-Jan-2015	30-Apr-2015	30-Apr-2020
				Comment			
New	Percentage of grievances processed from total grievance received	☐	Percentage	Value	0.00	0.00	100
				Date	30-Jan-2015	30-Apr-2015	30-Apr-2020
				Comment			
New	CMS and IMS fully implemented	☐	Yes/No	Value	No	No	Yes
				Date	30-Jan-2015	30-Apr-2015	30-Jun-2018
				Comment			

Annex 2: Economic and Financial Analysis
LIBERIA: Additional Financing for Accelerated Electricity Expansion Project

I. Economic Analysis

1. The economic analysis of the Additional Financing (AF) to the Liberia Accelerated Electricity Expansion Project (LACEEP) is based on cost-benefit analysis of the project's investment components.

2. The analysis shows that the expected economic return to the project, 34%, exceeds the estimated opportunity cost of capital to Liberia, taken to be 12%, and that this conclusion is sensitive mainly to the variations in the willingness to pay and in the cost of the supply of electricity.

A. Methodology and Assumptions

Overview

3. The economic return to the project is calculated in terms of net present value (NPV) and economic internal rate of return (EIRR) from a stream of incremental economic costs and benefits over the life of the project. The life of the distribution and transmission equipment funded under the project is estimated at 30 years. The life of the CMS and IMS is estimated at 10 years. The incremental costs and benefits are estimated based on the comparison between the "without the project" case and "with the project" case of the relevant project variables. All economic costs and benefits are expressed in constant US$ 2015. The project is considered sustainable when the NPV exceeds zero and the value of the EIRR exceeds the opportunity cost of capital (12%).

4. The economic analysis has been carried out for a period of 30 years, using as a discount rate the opportunity cost of capital of 12%. Benefits are assumed to start gradually accruing since the first year of investments 2016. The economic analysis of the project has been carried out on the basis of the base scenario, with imports, described in the Least Cost Power Development Plan for Liberia, prepared by Fichtner in 2014, adjusted for the delays in the implementation of the generation projects presently in construction because of the Ebola crisis. The base scenario with imports scenario envisages the diversification of the current generation based on High Speed Diesel (HSD) with new Heavy Fuel Oil (HFO) and hydropower plants (Mt. Coffee and others later on) along with imports from the West African Power Pool (WAPP), once the CLSG line is built and operating, to meet growing demand. A sensitivity analysis has been carried out with respect to the project parameters to identify the range of changes to their values within which the project remains sustainable.

Economic Costs

Incremental costs in the "with the project case"

5. The additional (incremental) costs in the "with the project case" are incurred as investment costs in the expansion of the transmission and distribution network, as well as the installation of a Commercial and an Incidents Management System. The costs of staff and equipment to enable proper project implementation have been also included in the analysis.

6. The project investment costs have been assumed to have an 80% foreign component and 20% local component. The project investment costs also include costs of project preparation and administration. The project costs are net of taxes and duties. The original project costs were presented with price contingencies and were brought to 2015 constant prices by adjusting the foreign costs component with the Manufacturing Unit Value (MUV) index, and the local costs component for inflation with the GDP deflator index for Liberia.

7. Physical contingencies of 10% were also added to the project's investment costs. On this basis Operations and Maintenance (O&M) costs for transmission were set at 3% of the investment cost. It has been assumed that some of the incremental electricity to the new 36,800 customers under the project will be carried through transmission lines other than the one built under this AF (Monrovia-Bomi-Grand Cape Mount corridor) outside the scope of this project. In this regard, the O&M cost for the project transmission line Monrovia-Bomi-Grand Cape Mount, has been set at a bit higher level (3%) than the usual (2%) of investments to capture additional O&M transmission costs that might be incurred from carrying incremental electricity supply from the project through transmission lines constructed outside the project.

8. The O&M costs for distribution were set at 2c/kWh, based on the analysis in the "Options for the Development of Liberia's Energy Sector", World Bank, October 2011, p.4. The cost of lost welfare to consumers as a result of the reduction of previously unbilled consumption upon installation of the CMS under the project has been also considered.

Total Cost of Electricity Supply in the analysis

9. In addition to the incremental investment costs in transmission and distribution, the total costs of supplying electricity to new consumers under the project also include the leveled costs of the generation mix in consideration of the respective shares of the types of generation identified in the Least Cost Power Development Plan for Liberia – Diesel, HFO and hydro, along with estimated cost of WAPP imports, including a border price and wheeling charges, and related administrative costs of LEC.

Economic benefits

10. The value added of the Bank's support to the project through the AF will have two dimensions: (i) increasing access and (ii) enhancing the commercial capacity of LEC.

11. Adding 36,800 new connections will more than double the number of customers (about 29,900 in December 2014).

12. Installing new Commercial and Incidents Management Systems will help LEC to improve its billing and to shorten the duration of network outages by providing a faster response

for repairs. The use of these two systems will also improve the attention to the clients and the quality of service.

13. Under the approach to the economic analysis, outlined above, the key economic benefit from expanding the distribution network is derived from the value of the additional electricity sold to new consumers in Monrovia and in the Bomi and Grand Cape Mount Counties.

14. Other benefits are outlined in the table below, in addition to the key benefit.

Table 1: Economic benefits and their sources

Economic Benefit	Source
Additional electricity supplied to consumers to meet growing demand	Increased transforming capacity at substations, reduced outages, and additional distribution capacity
Savings from reduced power generation	Reduced consumption of newly billed energy upon installation of a Commercial Management System
Improved quality and reliability of service	Reduced outages and voltage disturbances from the installation of an Incidents Management System.
Higher standard of living for the beneficiaries of the project	Better education and health services due to improved access to electricity (for lighting) and refrigeration (for preservation of medicines)
Improved economic opportunities for small and medium size business	Extended hours of operations and a broader range of products, offered to customers due to improved access to electricity
Improved performance of the economy as a whole	Improved access to electricity as a key driver of economic activities

15. To achieve the above benefits the project will finance US$53 million worth of investments in the expansion of the distribution network.

16. The economic analysis has focused on quantifying the main project net benefit of additional electricity supply to consumers. The impact of other activities such as the additional revenues from using modern management system is also significant but it is not taken into consideration in the economic analysis because it represents rather a transfer from the clients to the utility. The remaining benefits are less tangible.

Benefits from increased consumption of electricity

17. Total sales in FY2014 amounted to 41,899 megawatt hours (MWh) with residential users accounting for 41% of sales, commercial users accounting for 29%, government (GoL) accounting for 23%. Sales to pre-paid users amounted to 53% of total sales. 93% of all users

were pre-paid. 280 MWh were identified as supplied but not properly billed initially, representing less than 1% (0.67%) of total electricity supplied to consumers (see Table.2 below).

Table 2: Sales by category of customers in FY2014 (June 2014-July 2014)

Types of customers	Sales MWh	Avrg. Number of Customers	Avg. Annual Sales per Customer (MWh)	Share of Sales %	Distribution of customers %
Residential	17,127	16,153	1.06	0.41	0.83
Commercial	12,089	3,077	3.93	0.29	0.16
GOL	9,693	144	68	0.23	0.01
NGO	417	43	9.74	0.01	0.002
Public. Corp.	1,323	8	158.81	0.03	0.0004
LEC	1,159	7	165.63	0.03	0.0004
Tax exempt	91	4	22.66	0.002	0.0002
Total	41,899	19,435	2.16	1.00	1.00
Pre-paid total	22,404	19,022	1.18	0.53	0.98
Post paid total	4,285	281	15.27	0.1	0.01
CT Total	15,210	133	114.14	0.4	0.01
Unbilled Free Load	*280*		*0.01*		
Total (billed)	41,899	19,435	2.16	1.00	1.00

Source: LEC Key Performance Indicators

18. It has been estimated that the project investments will enable 36,800 new connections. It has been assumed that the 36,800 new customers will have the same distribution by customer categories as the current distribution. It has been also assumed that the new customers in each category will have the current annual consumption per customer (represented by sales, MWh) in each category. On the basis of these assumptions, the initial annual consumption of new 36,800 customers upon completion of the project in 2020 has been estimated at 79,864 MWh (see Tables 2 and 3).

19. This consumption is only a portion of the total consumption of about 270,000 MWh for all 120,000 customers of LEC, expected to be available in 2020 (see Table 4 below) on the basis of available generation capacity of about 104MW planned for that year, which can fully meet the total consumption. The generation capacity includes a mix of newly developed HFO and hydro generation plants along with WAPP imports. The related costs of generation, transmission and distribution along with WAPP costs of imports, including wheeling charges and border price, have been included in the analysis.

Table 3: Estimated initial annual consumption of 36,800 new customers with project

Types of Customers	Number of customers	Distribution of Customers %	Avg. Annual Sales per Customer (MWh)	Annual Consumption per Customer of Unbilled Energy (MWh)	Total Annual Consump/Customer Sales & Unbilled (MWh)	Total Annual Consump. per customer category Sales & Unbilled (MWh)
Residential	30,585	0.83	1.06	0.01	1.07	32,870
Commercial	5,825	0.16	3.93	0.01	3.94	22,973
GOL	272	0.01	67.51	0.01	67.52	18,356
NGO	81	0.002	9.74	0.01	9.76	791
Public. Corp.	16	0.0004	158.81	0.01	158.82	2,506
LEC	13	0.0004	165.63	0.01	165.64	2,195
Tax exempt	8	0.0002	22.66	0.01	22.67	172
Total	36,800	1.00				**79,864**

Source: Staff estimates on the basis of LEC Key Performance Indicators

Table 4: Estimated annual consumption of all 120,000 customers of LEC

Types of Customers	Number of Customers	Distribution of Customers %	Avg. Annual Sales per Customer (MWh)	Annual Consumption per Customer of Unbilled Energy (MWh)	Total Annual Consump/Custom Sales & Unbilled	Total Annual Consump. per customer category Sales & Unbilled (MWh)
Residential	99734	0.83	1.06	0.01	1.07	107,184.05
Commercial	18995	0.16	3.93	0.01	3.94	74,912.91
GOL	887	0.0074	67.51	0.01	67.52	59,857.98
NGO	264	0.0022	9.74	0.01	9.76	2,580.73
Public. Corp.	51	0.0004	158.81	0.01	158.82	8,171.71
LEC	43	0.0004	165.63	0.01	165.64	7,159.20
Tax exempt	25	0.0002	23	0.01	22.67	559.94
Total	120,000					**260,427**

Source: Staff estimates on the basis of LEC Key Performance Indicators

20. Projection of electricity consumption in the project area is explained below. During construction, consumption gradually increases in proportion with the newly established connections, which reflect the annual pace of investments under the project. Upon completion of the project in 2020, consumption is set to grow at 7% per year during the project's life, which is commensurate with the overall economic growth estimate. It is assumed that the network will be able to carry the additional electricity as a results of the project to end consumers. The additional consumption with project does not include consumption from additional connections to the 50km 66kV transmission line to be constructed under the project from Bomi to the Paynesville substation in Monrovia, beyond the new 6,800 connections envisaged under the project. Such connections will be financed outside the scope of the current project.

21. The installation of a CMS in 2018 is expected to subsequently enable LEC to improve billing. Upon installation of the CMS, LEC is expected to begin billing the electricity equivalent of the projected 10% reduction of commercial losses. Consumption of the energy currently

supplied, but not billed, is expected to decline by 15% when it becomes billed. This impact is expected to be maintained during the life of the CMS, set for 10 years.

22. This analysis uses estimates of the willingness to pay for electricity (WTP) in Liberia as a basis to calculate the economic value of the additional electricity consumed as a result of this project. In Liberia, with a growing economy and one of the lowest rate of on-grid electrification in the world, the willingness to pay can be expected to be higher than the current LEC's tariff of 52c/kWh. Studies on WTP in Liberia report values of WTP for urban areas higher than $/kWh 1.00, which is more than the double of the current LEC tariff, and some quote values as high as four times the tariff. WTP is even higher in rural areas. At the same time, this WTP may be less high than expected because Liberia's current tariff is one of the highest in the world, and also because people have other alternatives: there is a significant share of self-generation among commercial and industrial customers, and there are also illegal suppliers of electricity to small users in Monrovia.

23. A conservative economic value of 55 c/kWh has thus been adopted for the WTP in the project analysis. This estimate reflects factors which reduce the value of grid connected electricity to consumers due to inadequate quality and reliability of service and the obligation to make regularly monthly payments for electricity consumption, which do not match the highly variable income of poor consumers.

B. Economic Returns to the Project

24. The economic internal rate of return (EIRR) of the project at a discount rate of 12% and based on the methodology and assumptions discussed in the previous section is 34%. The Net Present Value (NPV) of the project is US$135 million. If we use instead a 10% discount rate, the NPV increases to US$193 million.

Table 5: Economic returns to project

	Discount rate 12%	Discount rate 10%
NPV (US$ M)	135	193
EIRR (%)	34%	34%

C. Sensitivity Analysis

25. A sensitivity analysis was undertaken to test the robustness of the model against changes in the key parameters on which the sustainability of the project depends.

26. Variations in the following parameters were considered in the sensitivity analysis:

(i) Delays by two and four years in introducing hydropower generation capacity [4]
(ii) Increase of cost of electricity supply along the value chain

[4] Delay beyond the adjustments made already in the base case to account for the impact of the Ebola crisis.

(iii) Increase of project costs by 10%
(iv) Reduction of planned new connections by 50%
(v) Reduction by 10% of the value of additional electricity consumption, proxied by the consumers' willingness to pay (WTP) for electricity.

27. The values of the main economic indicators NPV and EIRR remain robust and sustainable within a wide range of changes of the key project parameters from the base case scenario.

28. The switching values for the above parameters were also estimated. The switching values indicate the range of change from the base case value within which the project remains sustainable before reaching NPV=0, and EIRR=12%.

29. The economic value of additional electricity consumption is most sensitive to change followed by project costs and cost of electricity supply, and number of new connections.

Table 6: Sensitivity analysis

	Change in parameter	NPV (US$ M)	EIRR (%)
Base case		135	34
Delay in introducing 20MW hydro capacity (10MW yr1 +10MW in yr2)	2 year delay	132	32
	4 year delay	129	31
Increase of cost of electricity supply along the value chain	10%	104.8	27
Switching value for increase of cost of electricity supply along the value chain	44%	0	12
Project cost increase	10%	104	26
Switching value of project cost increase	43.7%	0	12
Lower rate of connections, resulting in 50% less connections (18,400) with project	50%	44	20
Switching value for reducing connections with project is	74%	0	12
a 74% reduction of connections to about 9,300			
Reduction of the economic value (WTP) of additional electricity consumption by 10%	10%	90	26
Switching value for WTP for additional consumption			
is a 31% reduction of WTP	31%	0	12

II. Financial Analysis

30. The financial analysis of the LACEEP AF covers the same project activities as the ones included in the economic analysis.

31. The analysis shows that the project is sustainable with expected financial internal rate of return (FIRR) of 16%.

A. Methodology and Assumptions

Overview

32. The cost of capital to LEC is 0 as LEC receives its financing through grants. Therefore the financial analysis focuses on the calculation of the financial internal rate of return (FIRR) from a stream of incremental financial costs and benefits over the life the project. As in the economic analysis, the incremental costs and benefits are obtained from the comparison between the "without the project" case and "with the project" case of the relevant project variables. All financial costs and benefits are expressed in constant US$ 2015.

33. The financial analysis has been carried out for a period of 30 years. Benefits are assumed to start gradually accruing since the first year of investments 2016. The financial analysis of the project has been also carried out on the basis of the most likely "import" scenario in the Least Cost Power Development Plan for Liberia, prepared by Fichtner in 2014. A sensitivity analysis has been carried out with respect to the project parameters to identify the range of changes to their values within which the project remains sustainable.

Financial costs vs. economic costs

34. The structure of the financial costs mirrors the structure of the economic costs. The applicability of relevant taxes and duties to the project costs has been considered for the purpose of the financial analysis. Under the existing regime of tax exemptions and refunds in Liberia there are no taxes and duties applicable to the project's financial capital costs.

35. Under Liberia's Revenue Code of December 15, 2000, Section 16. "Special Investment Initiatives", sub-section 3.B. stipulates that "Equipment & machinery, specialized vehicles, raw materials, capital spare parts and other specialized capital goods related to energy" are exempt from Goods and Service Tax (GST) and import duties. Therefore, no GST and import duties have been applied to the financial capital costs of the project.

36. At present, fuel costs represent about 82% of the cost of fuel-based generation. The price of 4.23US$/gallon of fuel includes 0.2US$ of GST and 0.2US$ of a government duty. LEC receives a refund of the GST tax and gets a government duty relief. Therefore the GST and the government duty have not been included in the generation component of the cost of electricity supply, which is considered in the financial analysis.

37. The economic cost of lost welfare as a result of the reduction of previously unbilled consumption upon installation of a CMS with the project has not been considered in the financial analysis.

38. The analysis of the financial return of the project has been based on the following cost assumptions:

(i) Since no taxes and duties apply to the project capital costs, they remain the same as in the economic analysis at US$60 million, adjusted to 2015 US$58.8 million without price contingencies. Physical contingencies at 10% of the project costs have been maintained.

(ii) All project capital costs are assumed to be invested over five years at the following rates: Year 1: 1% (only ESIA cost), Year 2: 12%; Year 3: 54%, Year 4: 13% and Year 5: 20%

(iii) The life of the grid investment is assumed at 30 years. The life of the Commercial and Incidents Management Systems is assumed at 10 years.

39. In addition to the project capital costs, the following costs associated with the project have been also included in the financial analysis:

(i) Operations and maintenance costs of transmission have been maintained at 3% of investment costs, including physical contingencies. Operations and maintenance costs of distribution have been maintained at 2c/kWh.

(ii) The cost of power generation has been added to the project costs of transmission and distribution to complete the overall costs of power supply to consumers under the project. These overall costs of power supply amount to an average of US$65.2 million a year over the 30 years of project life.

(iii) A corporate tax of 35% has been included as an additional expense in the project's financial analysis.

Financial benefits vs. economic benefits

40. A comparison between the project financial and corresponding economic benefits is presented in Table 7 below.

41. Under the methodology outlined in the previous section, the key financial benefit of the project is derived from the revenue from the additional electricity sold by LEC in Greater Monrovia as a result of the project. It is assumed that with the installation of the CMS under the project, the commercial losses currently at 13% will be gradually reduced to 3%. The electricity equivalent to 10% loss reduction, currently supplied, but not billed, will be billed, contributing to LEC's revenue.

Table 7: Financial benefits vs. economic benefits

Financial Benefits	Economic Benefit	Source
Additional revenue to LEC	Additional electricity	Increased transforming

from electricity sales	supplied to consumers to meet growing demand	capacity at substations, reduced outages, and additional distribution capacity
Additional revenue to LEC from electricity sales from improved reliability of service due to reduced outages	Improved reliability (due to reduced outages) and quality (due to reduced voltage disturbances) of service.	Reduced outages and voltage disturbances from the installation of an Incidents Management System.
Savings from reduced power generation	Savings from reduced power generation	Reduced consumption of newly billed energy upon installation of a Commercial Management System

42. In terms of project benefits from additional revenue, the following assumptions were made:

(i) The additional revenue during the project's life has been based on the incremental sales to 36,800 new consumers with the project, equal to their total estimated annual consumption of 79,864MWh upon project completion in 2020 as presented in Table 3. In the economic analysis section, with a subsequent annual growth of sales at 7%. The annual growth rate of sales at 7% has been assumed in the context of the projected long term economic growth at the same rate.

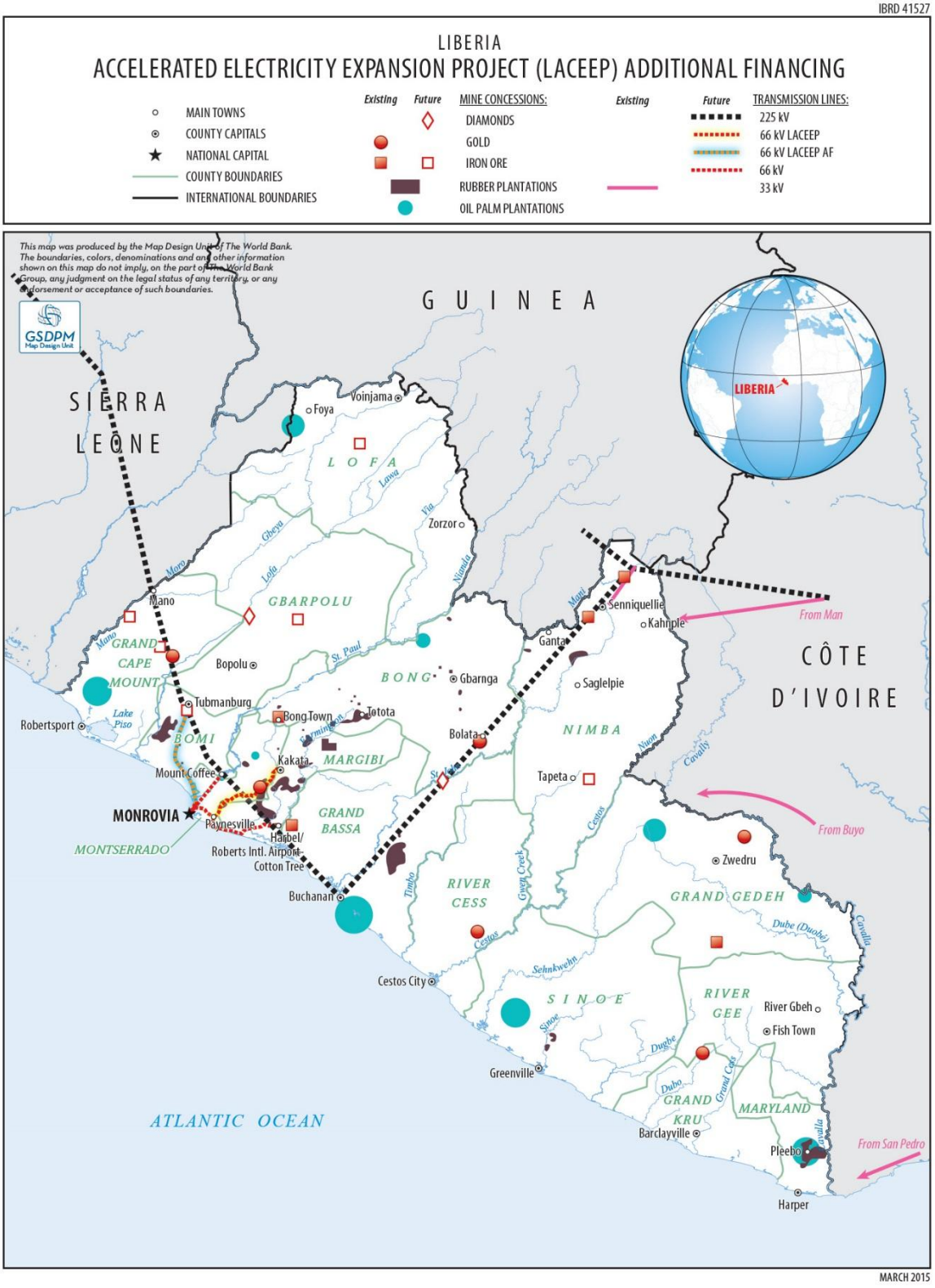
(ii) The average annual additional revenue from the project has been estimated at US$105 million over the 30 years of project life. The project revenue (the value of the energy bill (sales) has been adjusted by 93.4% collection rate, to reflect the actual cash collected, which amounts to an annual average of US$98 million over the 30 years of project life. The cash collected has been conservatively used for the calculation of the FIRR.

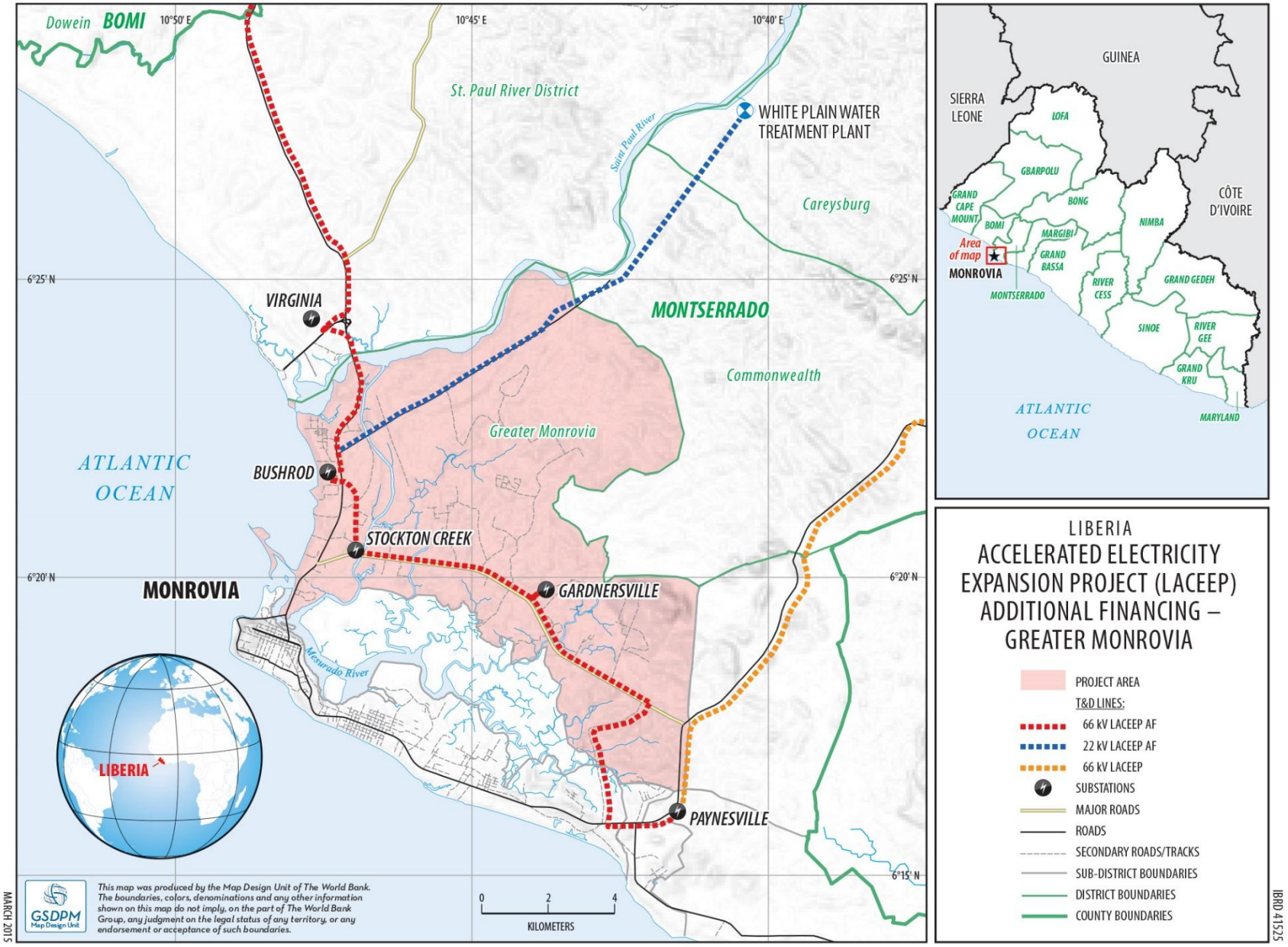
(iii) Electricity tariff has been estimated by LEC at present at 52c/kWh and is then subsiding to 46c/kWh for two years (2016-2018), as an initial response to the beginning of operations of the Mt. Coffee hydropower plan. The tariffs of 52c/kWh and 46c/kWh have been estimated by LEC to cover the debt service of investments of US$512 million in a three year period until 2017. However, Fichtner's Master Plan, envisages additional much greater investments, which coincide with the project's life: US$ 1.5 billion in generation under the "import" case of generation expansion, used in the project analysis, and US$ 333 million in related distribution. Therefore, a tariff of 48c/kWh has been assumed for the project life in the absence of a long term forecast of LEC's revenue requirements and the corresponding level of tariff.

B. Financial Returns to the Project

43. Based on the methodology and assumptions described in Section I, the project is financially viable with the FIRR of 16%.

Annex 3: Maps IBRD 41527, IBRD 41525 and IBRD 41526
LIBERIA: Additional Financing for Accelerated Electricity Expansion Project

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10°45' E
10°40' E
St. Paul River District
WHITE PLAIN WATER TREATMENT PLANT
Saint Paul River
Careysburg
6°25' N
VIRGINIA
MONTSERRADO
Commonwealth
Greater Monrovia
ATLANTIC OCEAN
BUSHROD
STOCKTON CREEK
6°20' N
MONROVIA
GARDNERSVILLE
Mesurado River
LIBERIA
PAYNESVILLE
6°15' N
0 2 4
KILOMETERS
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MARCH 2015
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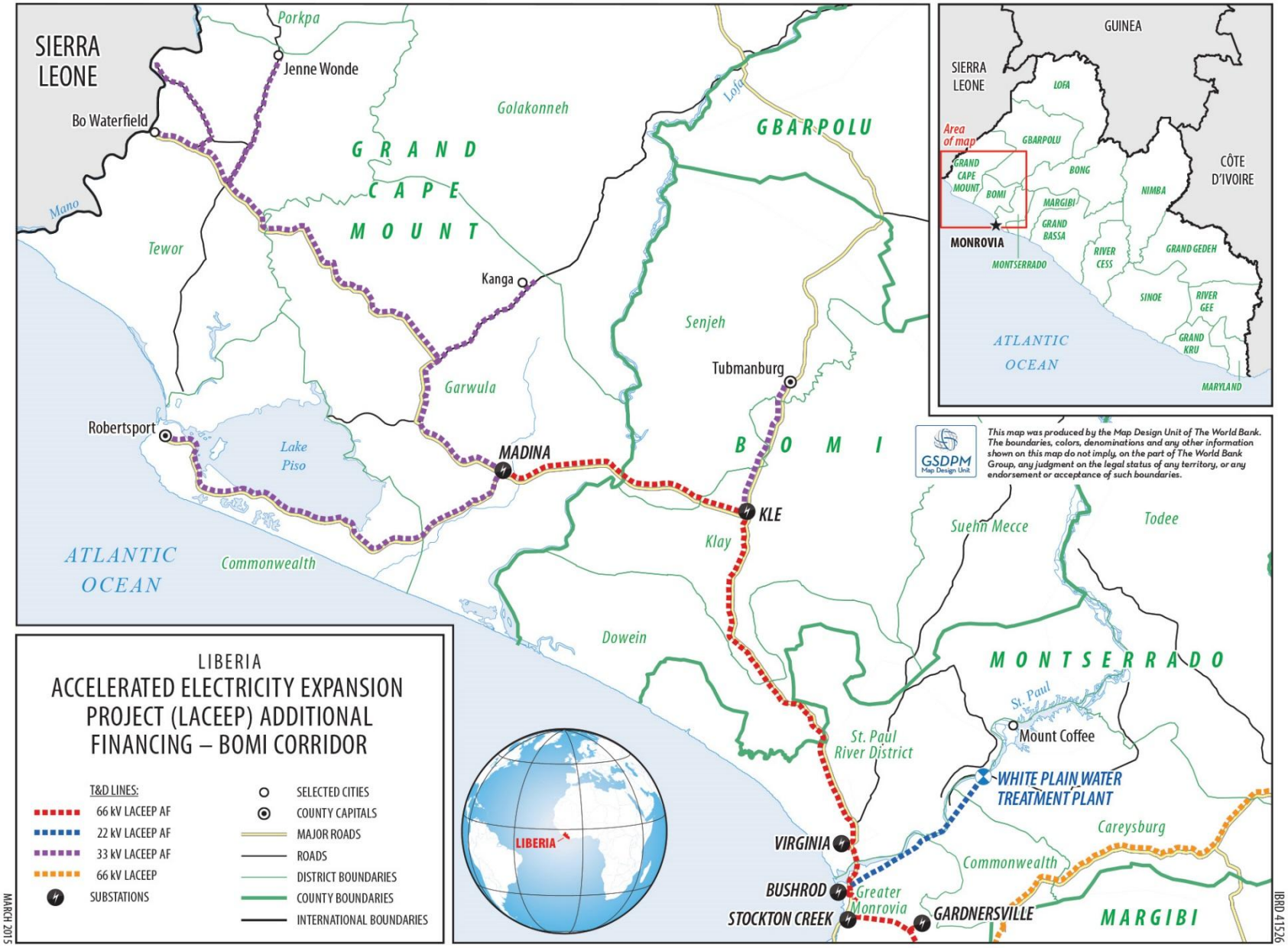
SIERRA LEONE
CÔTE D'IVOIRE
LOFA
GBARPOLU
GRAND CAPE MOUNT
BONG
NIMBA
BOMI
MARGIBI
Area of map
GRAND BASSA
MONROVIA
MONTSERRADO
RIVER CESS
GRAND GEDEH
SINOE
RIVER GEE
GRAND KRU
MARYLAND
ATLANTIC OCEAN
LIBERIA
ACCELERATED ELECTRICITY EXPANSION PROJECT (LACEEP) ADDITIONAL FINANCING – GREATER MONROVIA
PROJECT AREA
T&D LINES:
66 kV LACEEP AF
22 kV LACEEP AF
66 kV LACEEP
SUBSTATIONS
MAJOR ROADS
ROADS
SECONDARY ROADS/TRACKS
SUB-DISTRICT BOUNDARIES
DISTRICT BOUNDARIES
COUNTY BOUNDARIES
IBRD 41525


SIERRA LEONE
Porkpa
Jenne Wonde
Bo Waterfield
Golakonneh
GRAND CAPE MOUNT
GBARPOLU
Lofa
Mano
Tewor
Kanga
Senjeh
Tubmanburg
Garwula
Robertsport
Lake Piso
MADINA
BOMI
KLE
Klay
Suehn Mecce
Todee
ATLANTIC OCEAN
Commonwealth
Dowein
MONTSERRADO
St. Paul
St. Paul River District
Mount Coffee
WHITE PLAIN WATER TREATMENT PLANT
Careysburg
VIRGINIA
Commonwealth
BUSHROD
Greater Monrovia
STOCKTON CREEK
GARDNERSVILLE
MARGIBI
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Area of map
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LIBERIA
ACCELERATED ELECTRICITY EXPANSION PROJECT (LACEEP) ADDITIONAL FINANCING – BOMI CORRIDOR
T&D LINES:
66 kV LACEEP AF
22 kV LACEEP AF
33 kV LACEEP AF
66 kV LACEEP
SUBSTATIONS
SELECTED CITIES
COUNTY CAPITALS
MAJOR ROADS
ROADS
DISTRICT BOUNDARIES
COUNTY BOUNDARIES
INTERNATIONAL BOUNDARIES
MARCH 2015
IBRD 41526