

# Liberia Compact

## **Post-Compact Monitoring & Evaluation Plan**

**March 2021**

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## PREAMBLE

This Post Compact Monitoring and Evaluation (“M&E”) Plan is part of the action plan set out in the Millennium Challenge Compact (the “Compact”) signed on October 2, 2015 between the United States of America, acting through the Millennium Challenge Corporation (“MCC”), and the Republic of Liberia, acting through its government (the “Government”). The Post-Compact M&E Plan serves as a guide for monitoring the sustainability of the Compact investments and is required by the MCC Policy for Monitoring and Evaluation of Compacts and Threshold Programs (“M&E Policy”)<sup>1</sup>. As stated in the M&E Policy, “MCC and MCA, along with the designated representative for Post-Compact M&E if appropriate, will develop a Post-Compact M&E Plan designed to observe the sustainability of benefits created under the Compact in conjunction with the Program Closure Plan. This plan should describe ongoing and future monitoring and evaluation activities, identify the individuals and organizations that would undertake these activities, and provide a budget framework for future monitoring and evaluation which draws upon both MCC and country resources, and document the role the partner country will play in results dissemination.” “MCA” in the above quoted paragraph refers to MCA-Liberia, the entity designated by the Government pursuant to the Compact to implement the Compact Program.

As spelled out in the MCA-Liberia Program Closure Plan, the designated representative for Post-Compact M&E activities is Tanneh Brunson, Deputy Minister of Budget and Development Planning in the Ministry of Finance and Development Planning.

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<sup>1</sup> <https://www.mcc.gov/resources/doc/policy-for-monitoring-and-evaluation>

## ACRONYMS

ARMEP	Annual Road Maintenance Expenditure Report
BA	Beneficiary Analysis
CA	Constraints Analysis
CCR	Compact Completion Report
CPS	Common Payment System
CT	Current transformer
DQR	Data Quality Review
EPA	Environmental Protection Agency
ERR	Economic Rate of Return
ESP	Environmental and Social Performance
GoL	Government of the Republic of Liberia
GPOBA	Global Partnership on Output-Based Aid
GSI	Gender and Social Inclusion
HFO	Heavy Fuel Oil
ITT	Indicator Tracking Table
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt hour
LACEEP	Liberia Accelerated Electricity Expansion Project
LCPDP	Least Cost Power Development Plan
LEC	Liberia Electricity Corporation
LISGIS	Liberia Institute of Statistics and Geo-Information Services
M&E	Monitoring and Evaluation
MCA	Millennium Challenge Account
MCA-L	Millennium Challenge Account Liberia
MCC	Millennium Challenge Corporation
MCC MIS	MCC Management Information System
MCHPP	Mt. Coffee Hydropower Plant
MFDP	Ministry of Finance and Development Planning
MHI	Manitoba Hydro International
MME	Ministry of Mines and Energy
MoGCSP	Ministry of Gender, Children and Social Protection
MoT	Ministry of Transportation
MPW	Ministry of Public Works
MW	Megawatts
NGO	Non-governmental organization
NPV	Net Present Value
NRF	National Road Fund
PIU	Project Implementation Unit
POC	Point of contact
PV	Present Value
QDRP	Quarterly Disbursement Request Package

RMC	Regional Maintenance Center
RMMS	Road Maintenance Management System
RREA	Rural Renewal Energy Agency
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SGA	Social and Gender Assessment
WAPP	West African Power Pool
WDI	World Development Indicator
WTP	Water Treatment Plant

# 1. GENERAL DESCRIPTION OF THE PLAN

## 1.1 Objectives of the M&E Plan

The Post Compact Monitoring and Evaluation Plan serves as a guide for monitoring the sustainability of Millennium Challenge Corporation (MCC) investments. The Post Compact Monitoring and Evaluation (M&E) Plan is required according to the M&E Policy: “In conjunction with the Program Closure Plan, MCC and MCA will develop a Post Compact monitoring and evaluation plan designed to observe the persistence of benefits created under the Compact. This plan should describe future monitoring and evaluation activities, identify the individuals and organizations that would undertake these activities, and provide a budget framework for future monitoring and evaluation which would draw upon both MCC and country resources.”

The Government of the Republic of Liberia (GoL) is committed to delivering on the promises made to the nation in the Compact signed between the governments of Liberia and the United States in October 2015 and entered into force in January 2016. As such, measuring and tracking achievements and the impact that the Compact (also referred to as “the Program”) is having on beneficiaries is of great significance, not only during implementation (from January 2016 to January 2021) but also after the 5-year Compact has come to an end as part of MCC requirements. Therefore, this Post-Compact M&E Plan picks up on where the final version of the Liberia Compact M&E Plan left off, with modifications to the monitoring indicators, reporting requirements, updates to the evaluation plan, incorporating the findings of Data Quality Review (DQR) and new roles and responsibilities for post-Compact M&E activities.

The Post Compact M&E Plan has been developed by the Millennium Challenge Corporation (MCC), Millennium Challenge Account Liberia (MCA-L), and GoL’s designated representative, Hon. Tanneh G. Brunson, Deputy Minister, Department of Budget and Development Planning of the Ministry of Finance and Development Planning (MFDP), to serve as a tool to plan and manage the process of post-Compact monitoring, evaluating, and reporting progress towards achieving and sustaining Liberia’s Compact results. The plan will be managed by MFDP’s National M&E Unit and used in conjunction with other reporting and management tools.

The Post Compact M&E Plan serves the following functions:

- Explains in detail what will be (a) Monitored for the various Projects and their Activities and Sub-Activities to determine whether they are/remain on track to achieving their intended results and (b) Evaluated to estimate the impact and determine the cost-effectiveness and sustainability of projects and activities, and the approach of each evaluation.
- Includes all indicators that must be reported to Millennium Challenge Corporation (MCC) and other Compact stakeholders. The Indicator Documentation Table in Annex I provides a detailed definition of each indicator, unit of measurement, source of data,

responsible entity, and frequency of reporting. Annex II identifies indicator baselines and targets.

- Serves as a guide for GoL post-Compact and a communication tool that allows GoL and national and international stakeholders to understand the Compact's objectives, the targets the Program was set to achieve, and progress made towards those objectives and targets.
- Discusses post-compact reporting requirements and identifies the individuals and organizations that would undertake monitoring and evaluation activities after compact end date.
- Describes post-compact evaluation activities.
- Documents the role the GoL will play in results dissemination.
- Provides an example that MFDP may draw upon in feeding into the national M&E framework under development by Ministry of Finance and Development Planning.

## 2. SUMMARY OF THE COMPACT PROGRAM AND OBJECTIVES

### 2.1 Introduction

Liberia is located on the western coast of Africa and has a population of approximately 4.4 million<sup>2</sup> people covering 37,420 square miles that border Guinea to the north, Côte D'Ivoire to the east, Sierra Leone to the west, and the Atlantic Ocean to the south.

Liberia is a post conflict country still working to revive itself from a fourteen-year civil war, which decimated much of the country's existing infrastructure before ending in 2003. Liberia's Gross National Income per capita for 2019 was \$580, a 4.9% decline from 2018. In 2018 it stood at \$610 which represents a 1.6% decline from 2017.<sup>3</sup> The economy is primarily dependent on subsistence agriculture and export of raw materials and remains vulnerable to external shocks given the volatility of commodity prices, limited diversification, dependence on imported foods and fuels, constraints to business investment and productivity, the insufficient supply and prohibitively high cost of energy generation and its deplorable road network. Approximately half of the population is rural.<sup>4</sup>

The GoL and MCC undertook a Constraints Analysis (CA) to better understand the constraints to economic growth in Liberia. The CA, which was completed in September 2013, was based on the growth diagnostic methodology developed by Ricardo Hausmann, Dani Rodrik and Andrés Velasco of the Kennedy School of Government at Harvard University. Liberia's CA revealed two binding constraints to private sector investment, poverty reduction and economic

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<sup>2</sup> World Bank, WDI, 18 September 2015. Washington, DC. However, the Least Cost Power Development Plan (LCPDP) estimates the population at approximately 4.0 million.

<sup>3</sup> [www.macrotrends.net](http://www.macrotrends.net).

<sup>4</sup> See Liberia Constraints Analysis, MCC & Liberia Core Team, 2013 and World Bank, Liberia Accelerated Electricity Expansion Project, Project Appraisal Document, 2013, p.1.



growth in Liberia: (i) lack of access to reliable and affordable electricity; and (ii) high cost of and limited access to road infrastructure.

In September 2013, the GoL and MCC also conducted a Root Cause Analysis workshop to dive deeper into the underlying causes of the two binding constraints. Utilizing the principles of Results Focused Project Design,<sup>5</sup> the GoL and MCC, together with key stakeholders, identified a variety of root causes that contributed to the binding constraints identified in the CA. The root causes for unreliable power infrastructure were organized into three overarching areas: the existence of a weak policy and regulatory environment, insufficient supply and distribution of electricity, and weak capacity across institutions in the electricity sector. The root causes of poor road infrastructure were also grouped into three areas: a weak policy and regulatory environment, inadequate planning and budgeting, and inadequate implementation and maintenance.

On October 2, 2015, the United States of America through the Millennium Challenge Corporation and the Government of Liberia signed a US\$257 million Compact designed to reduce poverty through economic growth by investing in energy and road maintenance projects in Liberia. The selection and design of Compact Projects was informed by the Constraints Analysis and subsequent Root Cause Analysis. The Compact also supports key development priorities of the GoL as identified in the *Agenda for Transformation*, a five-year development strategy for FY 12-17, and *Liberia RISING 2030*, which is Liberia's long-term vision of socio-economic and political transformation and development.

The Compact officially entered into force on January 20, 2016.

The goal of the Liberia Compact is to reduce poverty through economic growth. MCC's assistance will be provided in a manner that strengthens good governance, economic freedom, and investments in the people of Liberia. The objectives of the Projects are to: (i) provide access to more reliable and affordable electricity; and (ii) improve the planning and execution of routine, periodic and emergency road maintenance. These goals and objectives are expected to be realized through MCC's investments, which are expected to increase power generation and the share of generation from renewable sources, improve overall power sector performance, and provide funding and support to improve the road maintenance system.

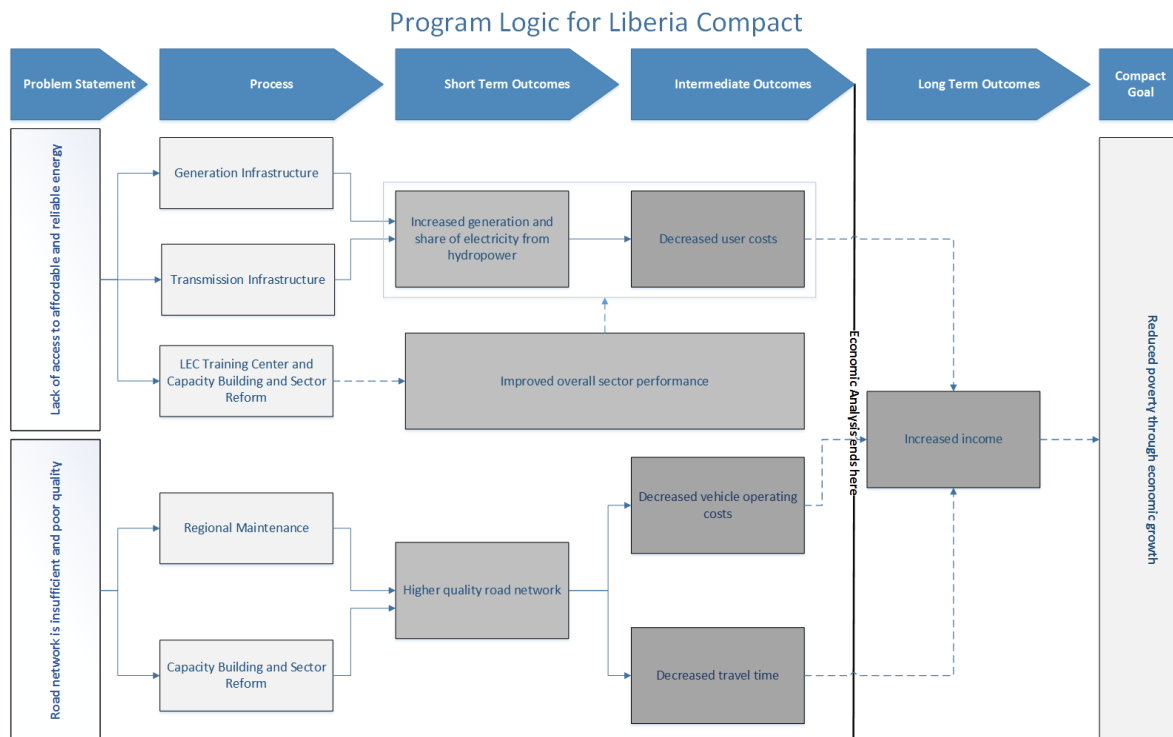
## 2.2 Program Logic & Project Descriptions

The diagram below illustrates and describes the expected causal relationships among the program components and synthesizes outcomes intended to achieve the Project objectives and the program goal.

### Figure 1: Liberia Compact Logic

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<sup>5</sup> Asian Development Bank, "Guidelines for Preparing a Design and Monitoring Framework," Project Performance Management System, Second Edition, July 2007.



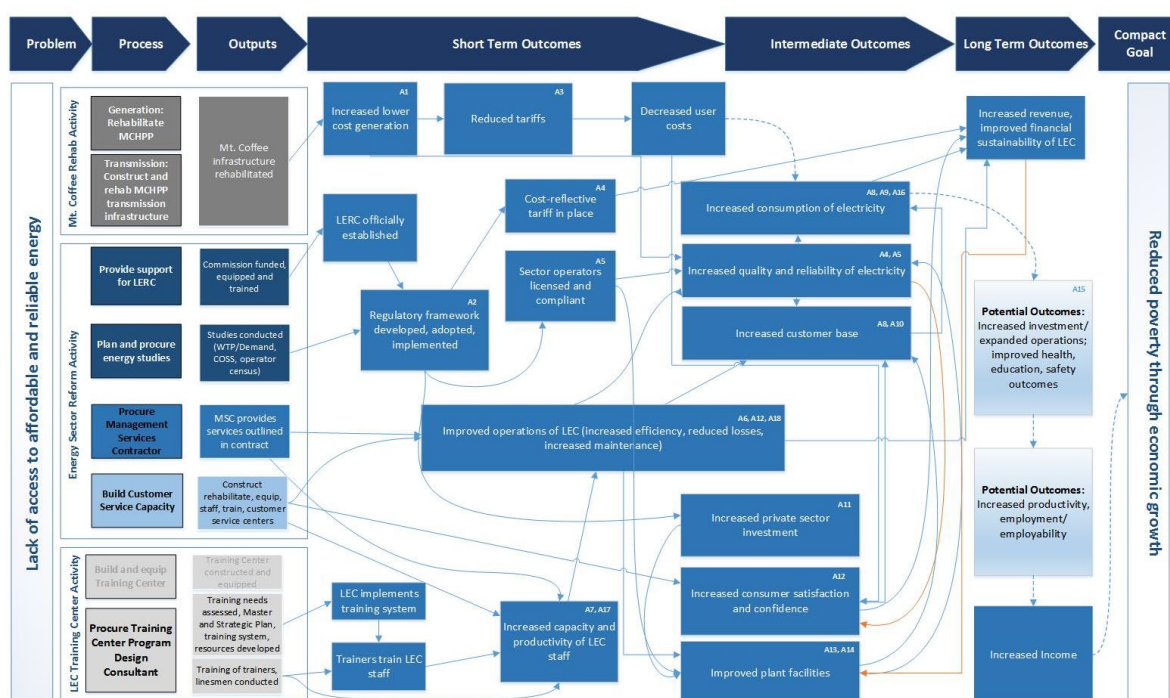
### 2.2.1 Energy Project

At the time of Compact approval, Liberia had an electrification rate of less than two percent and one of the highest electricity tariffs in the world at US\$0.52 per kilowatt hour (kWh). The average cost of generation for countries in sub-Saharan Africa was about US\$0.15 per kWh, ranging from US\$0.05 in energy-rich countries such as Nigeria to about US\$0.25 for less energy-endowed countries like Cabo Verde. According to the World Bank, “the main reason for high cost of electricity in Liberia is the dependency on high-cost diesel generation.”<sup>6</sup> The CA also asserted that these costs mainly resulted from the destruction of Liberia’s hydroelectric dam, which was the country’s single largest source of power before the war, and the diminished capacity of LEC which provided as much as 191 Megawatts (MW) of electricity prior to the war. At Compact signing in 2015, LEC provided only 22 MW of power, which represented an increase from 9.6 MW in 2009. Liberia’s power supply was also unreliable with frequent planned and unplanned outages.

The diagram below illustrates and describes the expected causal relationships for the Activities contributing to achieving the objective of the Energy Project.

**Figure 2: Liberia Energy Project Logic**

<sup>6</sup> World Bank, Project Appraisal Document - LACEEP, May 2013, p.2.



The logic diagram above reflects the following set of assumptions:

A1 – Bringing Mt. Coffee online will lower LEC’s operating costs.

A2 – Planned technical support from other donor(s) will complement MCA-L’s intervention. Studies funded under the Compact will inform the implementation of the regulatory framework, including the tariff-setting process, and licensing operators.

A3 – Cost savings from lower-cost generation will be passed onto consumers; tariffs will recover the utility’s costs, which is critical for running a sustainable utility.

A4 – The tariff-setting process will adhere to LERC’s regulations as stipulated in Section 13.3 of the 2015 Electricity Law and will be insulated from political interference.

A5 – LERC has the ability and resources to ensure compliance.

A6 – LEC has the capacity and resources to manage its operations effectively and efficiently, including reducing losses, increasing collections, and performing routine maintenance; LERC standards are effective.

A7 – There is sufficient staff capacity and continuity in order to accomplish MSC capacity building objectives. Increased capacity is sustained after MSC ends.

A8 – LEC increases ability to make customer connections. New customers can afford to pay for electricity; LEC can accommodate increased energy demand during dry season.

A9 – Increased generation capacity and the planned T&D investments are capable of increasing the quality and reliability of electricity.

A10 – LEC has sufficient manpower, skill, materials, and operational capacity to respond to user requests for connections.

A11 – A clear regulatory framework is a critical requirement for private sector investment.

A12 – Project outputs will result in appreciable improvement in customer services practices; LEC is willing and able to address customer complaints. Customer willingness to pay increases.

A13 – MSC works to attract donor funding. External actors will extend the transmission and distribution networks as planned. These extensions are critical to expanding LEC's consumer base.

A14 – LEC will invest in lifecycle maintenance and capital investment.

A15 – Electricity is used productively. Cost savings are invested and other constraints such as access to finance, or lack of political stability do not inhibit additional investments.

A16 – Customers pay for the electricity they consume.

A17 – Training of trainers system is effective.

A18 – The MSC is able to effect long-term change in LEC operations and stakeholders with interest and influence support these changes.

The Compact's Energy Project aims to address several of the problems facing the energy sector in Liberia through four Activities which are discussed below.

### **Activity 1: Mount Coffee Rehabilitation Activity**

The Mt. Coffee Rehabilitation Activity aimed to address the overarching problem in the energy sector, i.e., the lack of access to affordable and reliable electricity by increasing the amount of electricity generated in Liberia, facilitating a decrease in the overall electricity tariff, and helping to increase reliability and adequacy of electricity.

The Mt. Coffee Rehabilitation Activity built on ongoing rehabilitation efforts funded by the Government of Norway, the German Development Bank, and the European Investment Bank. Initially, Mt. Coffee Hydropower Plant (MCHPP) was to be rehabilitated to a rated capacity of 66 MW with the GoL providing 20% of the costs. Rehabilitation costs increased substantially as a result of cost overruns and changes to the design, delays caused by the Ebola Virus Disease outbreak, and the decision to expand MCHPP's capacity to 88 MW in part due to the expected availability of MCC funding. The Mt. Coffee Rehabilitation Activity assumed responsibility for the GoL's financial commitment and includes the following specific components:

- the additional cost required to provide a total installed generation capacity of up to 88 MW;
- funding to cover gaps between existing stakeholder commitments and a total cost to complete the rehabilitation of MCHPP in an amount not to exceed \$357 million;
- the cost of a second 66 kV transmission line from MCHPP to the Paynesville substation; and

- costs related to the establishment of certain dispute adjudication boards.

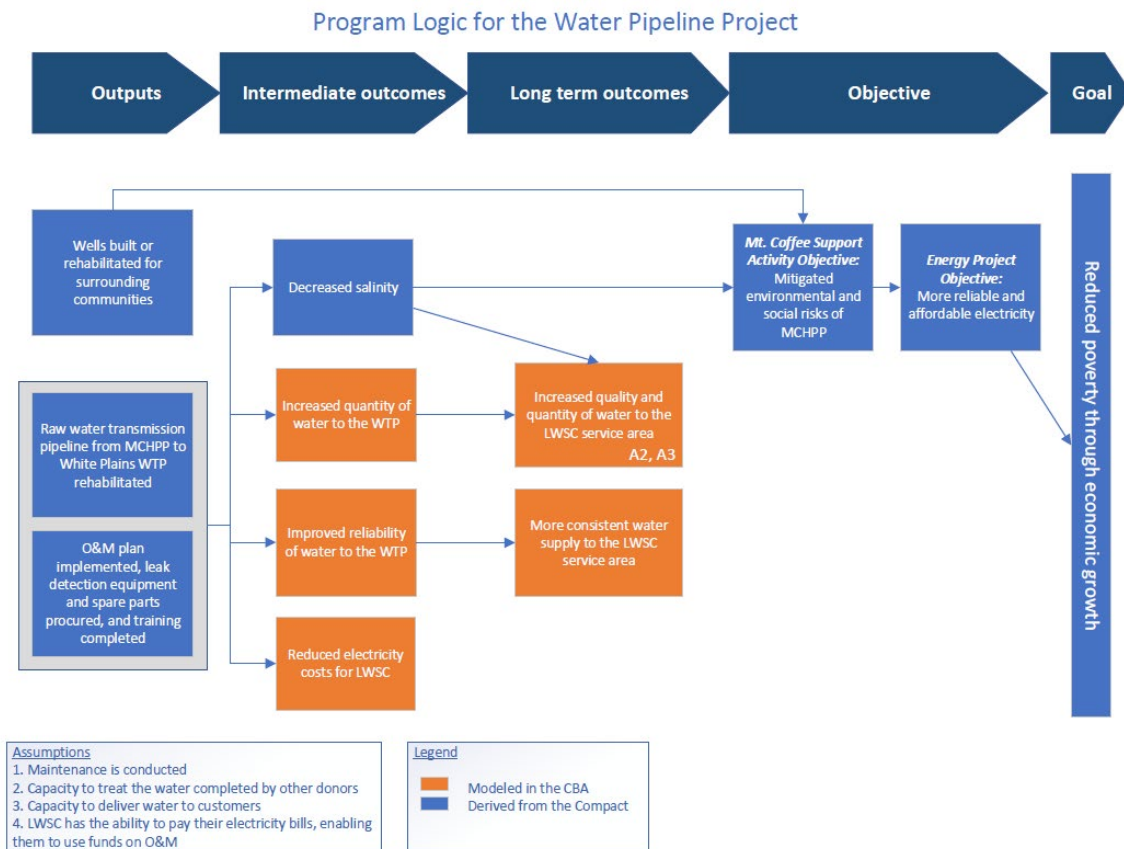
The remaining activities in the Energy Project intended to support the results of the Mt. Coffee Rehabilitation Activity and address other root causes of the problems in the sector.

### **Activity 2: Mount Coffee Support Activity**

The Mt. Coffee Support Activity aimed to provide additional support to the Mt. Coffee Rehabilitation Activity to mitigate environmental and social risks and ensure long-term sustainability. For example, MCC funding supported:

- the provision of small-scale community infrastructure (e.g., bridges) in order to ensure communities and/or settlements surrounding the MCHPP reservoir are not permanently blocked from accessing their farms, settlements, and/or other social services (e.g., health clinics, schools);
- additional human resources support to LEC, including the Project Implementation Unit (PIU), to ensure timely and professional management, oversight and reporting of environmental and social impacts and risks;
- a watershed management plan (including climate change and fisheries studies); and
- the cost of rehabilitating the raw water intake at MCHPP from the power house to the MCHPP site boundary; and
- rehabilitation of the raw water transmission line from MCHPP to the White Plains Water Treatment Works.

**Figure 3: Liberia Pipeline Project Logic**



The rehabilitation of the raw water pipeline from MCHPP to the White Plains Water Treatment Plant was part of the Mt. Coffee Support Activity, which aimed to provide additional support to the Mt. Coffee Rehabilitation Activity to mitigate environmental and social risks and ensure long-term sustainability.

The program logic maps out two kinds of benefit streams. This first type of benefit stream (in blue) links to the objective of the Energy Project. This stems from decreased salinity of water delivered directly from MCHPP rather than from pumped water from the St. Paul River and therefore mitigating environmental impact of the hydropower plant.

The second category of benefit streams (in orange) is modeled in the cost benefit analysis, which do not link to the objective of the Project. However, due to the fact that there will be more high-quality water flowing to the water treatment plant at a lower cost, it stands to reason that there are benefits accruing outside of the Energy Project objective. The logic posits that there will be increased quality, quantity, and reliability of water to the water treatment plant. This improved water is gravity fed so the costs of getting the water to the plant are expected to be lower. The logic asserts that the improved water to the water treatment plant will in turn lead to improved water in the network and in the service area.

This logic is based on the critical assumptions that the Liberia Water and Sewer Corporation (LWSC) has the capacity to maintain the pipeline and treat the increased water, and that the piped network has the capacity to deliver the water to the LWSC service area.

### **Activity 3: LEC Training Center Activity**

The LEC Training Center Activity aimed to improve capacity in the sector by building LEC's technical, operational, financial, and administrative capacity, and forming the core base for training of technicians in the electricity sector.

### **Activity 4: Energy Sector Reform Activity**

The Energy Sector Reform Activity aimed to address the weak policy and regulatory environment by providing support to the key institutions responsible for policy making, investment planning, asset management, and environmental, gender and social oversight of the sector – namely Ministry of Mines and Energy (MME), and LEC. This Activity comprised two Sub-Activities<sup>7</sup>:

#### **Sub-Activity 4.1: Management Support to LEC Sub-Activity**

This Sub-Activity supported the tendering and implementation of a management services contract for LEC. This short-term (3-5 year) plan, selected by the GoL and informed by a study of public management and private sector participation options for LEC, aimed to help lead to a financially sustainable utility. Other management options, such as a concession, are still within LEC's long-term vision for the utility.

#### **Sub-Activity 4.2: Establishment of an Independent Regulator Sub-Activity**

Built upon planned programming from the European Union and the Government of Norway which focuses on the development of MME's Department of Energy, this Sub-Activity assisted in standing up an independent regulatory agency. The Sub-Activity included a number of studies, including a situation assessment for the sector; demand, willingness-to-pay, and cost of service studies.

### ***2.2.2 Roads Project***

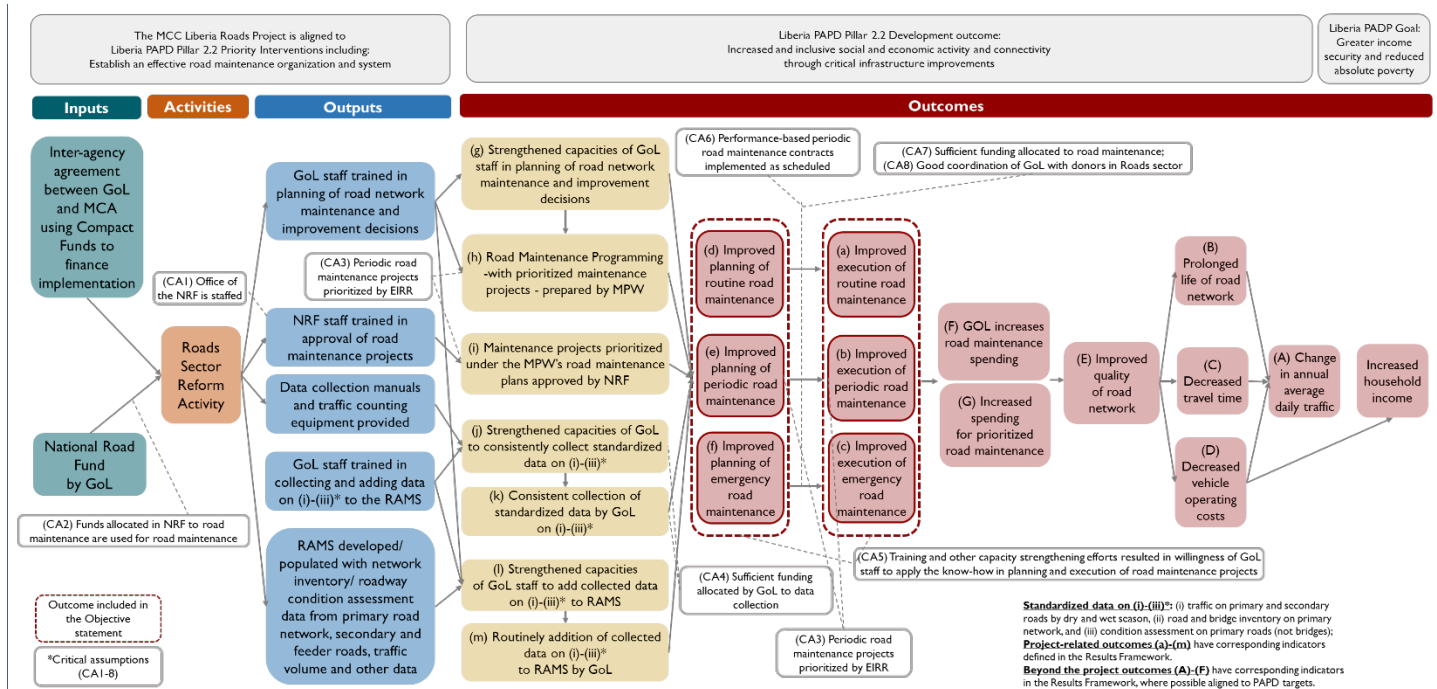
The Roads Project aimed to address problems in the sector and improve the quality of Liberia's road network by supporting the piloting of a new maintenance regime and by building capacity. The Project Activities were expected to improve the weak policy and regulatory environment and inadequate maintenance occurring in the roads sector. Ultimately, improved management of the road sector is expected to result in a larger stock of well-maintained roads, which will decrease vehicle operating costs and provide time savings for road users.

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<sup>7</sup> The Compact described a third Sub-Activity that was not ultimately implemented.

The diagram below illustrates and describes the expected causal relationships for the Activities contributing to achieving the objective of the Roads Project.

**Figure 4: Roads Project Program Logic**



The logic diagram above contains several assumptions. One item not explicit in this diagram but made explicit in the Roads Project Evaluation Design Report, is that outcomes are not anticipated beyond the improved planning and execution of routine, periodic, and emergency maintenance. The additional outcomes are included in the diagram because they remain a possibility and align with MCC's approach to roads projects, but they are not likely to be achieved as the result of this project. For improved legibility outside of the diagram, the other assumptions are:

CA1 – Office of the National Road Fund (NRF) is staffed.  
 CA2 – Funds allocated in NRF to road maintenance are used for road maintenance.  
 CA3 – Periodic road maintenance projects prioritized by economic internal rate of return (EIRR).

CA4 – Sufficient funding allocated by GoL to data collection.  
 CA5 – Training and other capacity strengthening efforts resulted in willingness of GoL staff to apply the know-how in planning and execution of road maintenance projects.

Use of “(i)-(iii)” in several outputs refers to (i) traffic on primary and secondary roads by dry and wet season, (ii) road and bridge inventory on primary network, and (iii) condition assessment on primary roads (not bridges).



### **Activity 1: National Road Maintenance Activity**

The National Road Maintenance Activity aimed to match GoL contributions for periodic road maintenance to better maintain and sustain Liberia's primary paved and unpaved roads and increase institutional capacity in the sector.

- *Matching Road Maintenance Fund Sub-Activity.* MCC funding will match GoL contributions that have been deposited by the GoL to an account (Matching Road Maintenance Fund Account) that are dedicated to periodic road maintenance on a one to one basis up to \$15 million during the Compact Term, subject to measurable indicators of performance on maintenance planning, capacity and implementation.

This activity was de-scoped during the compact, so there is no Post-Compact activity to be monitored by MFDP under the National Road Maintenance Activity.

### **Activity 2: Road Sector Reform Activity**

The Roads Sector Reform Activity aimed to build capacity and provide technical assistance to the sector through the following tasks:

- **Network Analysis/Data Collection:** The United States Department of Transportation (DoT) will partner with the GoL via MCC/MCA-L to assist in collecting roadway condition, traffic volume, and other data for models to develop a national road inventory and support road maintenance planning.
- **Sector Reform/Institutional Strengthening/Capacity Building:** This task is intended to assist MCC and ensure that Compact transportation sector investments are coordinated with the projects of other major donors and compliment their efforts in road maintenance activities and any other transportation planning and capacity building activities.

## **2.3 Projected Economic Benefits<sup>8</sup>**

An initial economic analysis of the Mt. Coffee Rehabilitation Activity was carried out prior to Compact approval. As shown in Table 1, using base-case assumptions (which are described below), the original economic rate of return (ERR) for the Activity was 13%. This initial economic analysis was developed before other components of the Energy and Roads Projects were fully designed. Further cost benefit analysis will be done for Compact closeout and along with the final evaluation results in 2025 to calculate their economic returns.

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<sup>8</sup> This section will be updated in a subsequent M&E Plan revision to document key updates to the economic analysis of the Energy Project.

**Table 1. Summary of Economic Analysis Results**

Project	Activity	Original Project-Level ERR	Original Activity-level ERR	Date Original Economic Rate of Return (ERR) Established	Revised Project-Level ERR	Revised Activity-level ERR	Date Revised Economic Rate of Return (ERR) Established
Energy Project	Mt. Coffee Rehabilitation Activity	11%	13%	06/2015	8-9%	10-11%	07/2017
	Mt. Coffee Support Activity		13%	06/2015		10-11%	07/2017
	LEC Training Center Activity		Not Calculated	N/A		N/A	N/A
	Energy Sector Reform Activity		Not Calculated	N/A		N/A	N/A
Road Project	National Roads Maintenance Activity	Not Calculated	Not Calculated	N/A	N/A	N/A	N/A
	Roads Sector Reform Activity		Not Calculated	N/A		N/A	N/A

### ***2.3.1 Energy Project Economic Analysis***

The supply and distribution of electricity in Liberia is extremely limited, both in terms of the number of connections and the total demand for those connections. The table below shows the number of existing, active customers on the grid and their estimated peak load use of electricity at the time the Liberia Least Cost Power Development Plan (LCPDP) was prepared. Until May 2016, customers paid a tariff of \$0.52/kWh (as reported by Manitoba Hydro International (MHI)),<sup>9</sup> due to the high fuel price for the high speed diesel generators

<sup>9</sup> MHI is a private company that has been contracted to manage LEC.

that were in use for LEC's entire supply of electricity. When Mount Coffee came online, the tariff was dropped to \$0.35 per kwh.

**Table 2. LEC Customer Structure (2013)<sup>10</sup>**

Customer Category	No. of Active Customers	Estimated Average Peak Load per Customer
Low income (single phase prepaid meter)	6,459	0.21 kW
Residential/small commercial, GoL and NGO single phase	6,447	0.59 kW
Commercial, GoL and NGO (three phase)	490	3.4 kW
GoL CT-metered	44	49 kW
Commercial CT-metered	65	25 kW
<b>TOTAL</b>	<b>13,505</b>	

As described above, power generated by MCHPP is expected to reduce the price of electricity for customers. For those already on the grid, they are expected to have fairly minimal increase in demand due to the change in cost. The estimated price elasticity of demand is -0.2.<sup>11</sup> Note that this is the same elasticity of demand used in the CBA. The largest portion of the benefits for existing customers is from a one-time price decrease. After that, their utility will be measured by the amount they consume. The majority of the increase in demand, thus, is expected to be gained through additional connections to the grid. For new customers to the grid, they will receive a one-time benefit scaled by their willingness to pay, followed by a similar valuation based on their consumption. The economic rate of return depends heavily on this increase in demand from new connections.

Developing new connections is critical to the commercial viability of LEC. Until <sup>now</sup>, LEC has kept their customer base relatively small, largely because they did not have enough generation capacity to increase their base without worsening already considerable load

<sup>10</sup> "Preparation of a Government of Liberia Least Cost Power Development Plan (LCPDP)," 2014. Prepared by Fichtner for MME and LEC.

<sup>11</sup> Fichtner, LCPDP; 5-9.

shedding. While we know that there are generally plans by donors to fund up to 90,000 new household and commercial connections, the general expected timing of those new connections has been delayed.<sup>12</sup> Given the uncertainty around connections, the following are some potential scenarios of connections and the concomitant ERRs.

**Table 3. Connection Scenarios and ERRs**

Scenario Name	Demand (MW)	Number of Connections (Industrial)	Number of Connections (Household)	Timeline for Connections	ERR (all Project costs)	ERR (Mt. Coffee Rehabilitation Activity costs only)
Base scenario from LCPDP	52	1,450	90,000	2020	11%	13%
Pessimistic scenario (Low demand, slow connections)	26	1,000	90,000	2025	3%	5%
Low trust of LEC scenario (Low demand, quick connections)	26	1,000	90,000	2018	7%	9%
Low LEC capacity scenario (High	75	3,000	150,000	2025	14%	16%

<sup>12</sup> MCC has learned about plans to fund additional connections since the economic analysis of MCHPP was initially developed. However, we are still trying to clarify the magnitude and timing of those plans, along with longer-term plans for the electricity tariff. We expect that the economic analysis will be updated once these inputs have been obtained.

Scenario Name	Demand (MW)	Number of Connections (Industrial)	Number of Connections (Household)	Timeline for Connections	ERR (all Project costs)	ERR (Mt. Coffee Rehabilitation Activity costs only)
demand, slow connections)						
Optimistic scenario (High demand, quick connections)	75	3,000	150,000	2018	17%	20%

The base case scenario, as outlined in Fichtner's Least Cost Power Development Plan (LCPDP), includes a number of assumptions about growth and demand of users connected to the grid. Aside from the numbers of connections to the grid and the decreased tariff rate after MCHPP begins operating, other assumptions include:

- Price elasticity of demand = -0.2<sup>13</sup>
- World Price of Oil = US\$100 per barrel in 2015, assumed to drop to \$75 per barrel after that<sup>14</sup>
- Capacity Factor = .592 once all four Mount Coffee turbines are online<sup>15</sup>
- Load Factor = 0.72 for commercial users and 0.5 for residential<sup>16,17</sup>

While it is clear from available demand surveys that there is market demand for the cheaper generation provided by MCHPP, there is much that is uncertain about the scope and timeline of connecting that additional demand and whether there are other hindrances to connecting customers and to reaching the level of demand that would make generation at this scale economically viable.

There are very limited large businesses or housing complexes that could readily connect to the grid under the current scale of grid penetration. The question thus remains on how the

<sup>13</sup> LCPDP, 5-9.

<sup>14</sup> Calculations based on Technical and Financial Feasibility Study for the Reconstruction and Expansion of the Mount Coffee Hydropower Facility in Liberia, Stanley Consultants; 8-38.

<sup>15</sup> LCPDP, 11-21.

<sup>16</sup> LCPDP, 5-16

<sup>17</sup> For a full list of assumptions used in Fichtner's Least Cost Power Development Plan, see pages 5-12 and 5-14.

grid will expand, who will pay for the expansion of connections, and whether businesses and households will be able and willing to connect. A willingness-to-pay study executed in the Monrovia area by the World Bank's Global Partnership on Output-Based Aid (GPOBA) in 2010 suggested that there is a fairly high willingness to pay, and only a small percentage (~15%) of households would not be able to afford to wire their house or purchase a Ready Board (small unit that obviates the need to wire a house, meant primarily for one room households). Donors have plans to fund over 90,000 new household and commercial connections, and LEC has done a demand study of potential larger customers to target for connection. Nevertheless, MCC experience in other contexts suggest that even when, by all accounts, there are customers clamoring for connections, they do not always take the steps required to acquire network connections. Questions remain on how and when these connections will be completed and whether the demand projections by various parties (Fichtner (in the LCPDP), LEC, and others) will play out.

If we follow the base case for demand projected by Fichtner, we get an ERR of 11%, inclusive of all capacity building activities that support the Mt. Coffee Rehabilitation Activity (both operations and maintenance) and **connecting** new customers to the grid (e.g. the LEC Training Center Activity). Just including costs currently envisioned by the donors, the ERR would be 13%. However, if the connection activities do not progress as envisioned or there are unforeseen barriers to accessing electricity, the ERR could drop well below the hurdle rate of 10%. For this reason, the Compact includes a connection assessment analysis that could identify and potentially help close the gaps to facilitate network access.

There are a number of investments included in the costs, whose potential benefits were not quantifiable at the time of the investment decision and which thus are not included in the model. After the Compact, the economist will revisit the possibility of developing cost benefit analysis. These include:

- i. **LEC Training Center Activity.** Though the benefits have not been quantified, in the medium or long term, the capacity to train staff locally will be necessary to support LEC's operations and maintain their fixed capital resources.
- ii. **Second circuit transmission line to Paynesville (part of the Mt. Coffee Rehabilitation Activity).** The purpose of this transmission line is as a redundancy in case the first circuit ever fails. The probability of this occurring and then knowing how long the ensuing outage would last would be two critical variables to know in order to calculate the benefit of adding the second circuit. Unfortunately, we have no historical data or other means by which to estimate these figures and thus cannot calculate the benefits directly attributable to this redundancy.
- iii. **Energy Sector Reform Activity.** Lack of capacity was highlighted in the Root Cause Analysis along a number of dimensions, affecting the ability to operate, maintain, and expand electricity operations by LEC and MME.
- iv. **Mt. Coffee Support Activity.** Similar to the Energy Sector Reform Activity, there is no detailed design of these activities to be able to create a cost benefit analysis.
- v. **Water intake (part of the Mt. Coffee Rehabilitation Activity) and water pipeline (part of the Mt. Coffee Support Activity).** Based on the

information available at the time of the investment, salinity increases as a result of the MCHPP and downstream of the MCHPP was considered a serious risk created by the MCHPP and mitigation measures were included in the Compact. These investments are not necessary to see the benefits of MCHPP, but they respond to MCC's concerns at the time the investment decision was made. There could be a completely separate program logic related to water intake. However, based on the information available at the time of the investment decision, it was not possible to build a robust economic model. Apart from mitigating a serious risk there would be additional benefits from a substantially expanded supply of water for Monrovia and decreased operating costs associated with a gravity-fed supply as opposed to pumping water from the river as currently occurs. Since this cost is included in the MCHPP rehabilitation contracts, the costs have been included in the ERR model for the Mt. Coffee Rehabilitation Activity.

### ***2.3.2 Roads Project Economic Analysis***

At the time of MCC's investment decision, economic analysis was not available for the Roads Project. In general, road maintenance programs are expected to have significantly better economic returns than upgrading individual road segments. Thus it was expected that, once the Roads Project is designed it would have a good likelihood of achieving sufficient returns to justify the investment. However, due to uncertainty and rescoping within the Project, the team's economist did not produce a model for this Project.

## **2.4 Projected Program Beneficiaries**

According to the *MCC Guidelines for Economic and Beneficiary Analysis*, beneficiaries of projects are considered individuals who experience better standards of living due to Compact activities aimed at increasing their real incomes. The economic rate of return analysis for proposed projects gives details on benefit streams through which beneficiaries should experience increased income.

A general overview of the span of program benefits across the population of Liberia, used for Compact justification to MCC's Investment Committee, is presented in the table below.

**Table 4: Projected Program Beneficiaries**

Project	Program Beneficiary Definition	Est. Number of Beneficiaries	Present Value (PV) of Benefits <sup>18</sup>	Net Present Value (NPV) <sup>19</sup>
Mt. Coffee Rehabilitation Activity	Number of individuals in households connected to the grid plus the number of commercial enterprises connected	460,000	\$517,899,307	\$83,718,571
Road Project	TBD	TBD	TBD	TBD

#### ***2.4.1 Energy Project Beneficiary Analysis***

The total beneficiary count for the Energy project, using the Fichtner base scenario, is approximately 460,000 people. If the number of household connections increased to 150,000, then a beneficiary count of 766,000 people is expected.

The Beneficiary Analysis (BA) for this project builds on the customer profile outlined in the ERR model. Beneficiaries, in this case, are defined as individuals who benefit from the increased availability of electricity through the Compact activities. This increased availability of electricity is expected to yield cost savings or otherwise improve beneficiaries' current standard of living. In the case of households, the BA counts all members of the household benefitting from the Compact, assuming an average household size of 5.1.<sup>20</sup>

In the case of firms benefitting from the Compact, only the owner is counted as a beneficiary. Within the ERR model, benefits accrue to firms with existing connections due to increased consumption of grid-supplied electricity, valued at an assumed willingness to pay. What the firm does with the assumed cost reduction is unknown; assuming that wages increase or that employment increases would be to include multiplier effects. Liberia experiences high unemployment which would lead to the expectation that wages would not increase without increases in labor productivity. Labor productivity increases may result from increases in capital productivity, but this would be expected to result from the employment of new capital.

<sup>18</sup> The PV of benefits are included in the ERR as the "estimated discounted increase in income over the life of the project" or the "beneficiary income gain."

<sup>19</sup> The NPV illustrates the net benefits, which subtract the discounted costs from the discounted benefits. Cost-benefit analysis produces two main outputs: the ERR and NPV. This provides a more complete picture and allows for comparison at this level across projects.

<sup>20</sup> 2008 National Population and Housing Census: Preliminary Results. Liberia Institute of Statistics and Geo-Information Services (LISGIS), 2008.



New capital could reduce the need for labor. Assumptions for such changes should only be made for targeted investments where extensive data has been collected on a specific sector, leading to a reasonable understanding of the expected adjustments. Thus, for the case of firms with existing grid connections, no assumption is made that firm employees benefit from the Compact. Firm owners are counted as beneficiaries but then removed, as they are expected to have been previously counted among those benefitting from residential connections and thus may be double counted.

When the results of the model indicate expected *new* commercial and industrial connections resulting from the Compact, the expected employees associated with these firms are included as beneficiaries. The average size of existing firms is used as the expected size of new firms, and the average size of households in Liberia is used to determine the assumed size of the employee's household. We do not currently have this data, so for the sake of the initial beneficiary count, all new commercial connections are estimated to have one beneficiary.

#### ***2.4.2 Roads Project Beneficiary Analysis***

Because the activities under the Road Project were not sufficiently designed, the country team economist did not develop a beneficiary analysis during the Compact.

### **3. MONITORING COMPONENT**

The Post-Compact Monitoring and Evaluation Plan aims to measure the results and implementation of the program after Compact End Date, to ensure that the objectives have been achieved. At the same time, it will continue with the process of monitoring through annual reports that include the indicator tracking table (ITT).

#### **3.1 Summary of Monitoring Strategy**

The Compact systematically monitored and reported progress regularly through the Indicator Tracking Table (ITT). There are four levels of indicators that follow from the program logic framework: (i) goal, (ii) outcome, (iii) output and (iv) process. The various indicator levels map to the program logic and thus allow Project developers and managers to understand to what extent planned activities are likely to achieve their intended objectives. Monitoring data will be analyzed regularly to allow managers of MFDP and MCC to make programmatic adjustments as necessary with a view towards improving the overall results monitoring of the Compact. Often most outcome and goal indicators are not achieved during the life of the Compact, but rather are reported through evaluations after the Compact is complete. Those levels of results typically take longer to be achieved.

Monitoring data will be analyzed regularly to allow managers of MFDP and MCC to make programmatic adjustments as necessary with a view towards improving the measurement of results from the Program.

- Goal indicators measure the economic growth and poverty reduction that occur during or, most likely, after implementation of the program. For MCC Compacts, goal indicators will typically be a direct measure of local income and are typically measured through post compact evaluations.
- Outcome indicators measure intermediate effects of an Activity or set of Activities and are directly related through the program logic to the output indicators.
- Output indicators measure the direct result of the Project Activities. They describe and quantify goods or services produced directly by the implementation of an Activity.
- Process indicators record an event or measure progress toward the completion of Project Activities. They are a forerunner to the achievement of Project outputs and a means to ensure the work plan is proceeding on a timely basis.<sup>21</sup>

MCC has introduced common indicators for external reporting across all MCC Compacts. The common indicators relevant to the MCA-L Compact are included in this M&E Plan.

Annex III of the Compact outlines the initial indicators for the Compact. The M&E Plan builds on this information with additional relevant indicators developed by MCC, MCA-L project managers, and implementers.

The Indicator Definition Table provides relevant details for each indicator by Project and can be found in Annex I. It provides descriptions for the indicator structure by specifying each indicator's: (i) name; (ii) definition; (iii) unit of measurement; (iv) level of disaggregation; (v) data source; (vi) frequency of reporting; and (vii) party or parties responsible.

To ensure that the Program is on track to meet its overall goals and objectives, the monitoring indicators will be measured against established baselines and targets, derived from the ex-ante economic rate of return analysis, other types of analysis, and project planning documents. The targets reflect the underlying assumptions made in program design about what each Activity would likely achieve. Baselines and target levels for each indicator are defined in Annex II.

Indicators may need to be modified in future versions of the M&E Plan. Modifications and revisions to the indicators may only be made according to the MCC M&E Policy. Any

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<sup>21</sup> The indicator levels are formally defined in MCC's *Policy for Monitoring and Evaluation of Compacts and Threshold Programs*.

significant modifications to the indicators or other content will be summarized in Annex III of the M&E Plan per the M&E Policy.

The M&E Unit shall consult and assist Implementing Entities in setting up their data collection plans and reporting templates.

### **Data Disaggregation**

Where feasible and appropriate, monitoring and evaluation indicators will be disaggregated by sex, age, income, and/or other traits.

### **Data Sources**

The indicators identified in this M&E Plan will require the collection of a range of data from various sources within Liberia such as the Implementing Entities and implementers. MCC and MCA-L worked closely with these sources to harmonize data collection with other existing data sources or planned surveys to ensure that the data collected and reported are useful and cost-effective. Specific data sources are outlined in Annex I of this M&E Plan.

#### **3.1.1 Definition of Indicators**

The program was monitored using MCC common indicators and program-specific indicators. For the next five years the indicators will measure the achievement of objectives, and the long-term effects and sustainability.

Annex I and II of this Post Compact M&E Plan provide a concise description of each indicator that will be monitored at the end of the Compact Program, as well as its baseline, goal, methodology and frequency, as well as the entities in charge of data collection.

### 3.2 Data Quality Review

As part of M&E Plan management, an initial DQR was contracted by MCC during Year 1 of the Compact (2016); a follow-up data quality assessment of LEC data was conducted in Year 3 of the Compact (2018). The purpose of the DQR was to: conduct review of performance indicators in the Compact's M&E Plan, identify data quality issues impacting the entities who were part of the reporting framework and to provide detailed recommendations for improvement of data quality to inform M&E Plan revision. The major findings of the 2018 exercise are as follows and come directly from the report developed by Millennium Partners:

#### Energy

- The Energy Program Logic is generally sound. One potential weakness is the assumption that increased hydro generation from Mt. Coffee will automatically lead to reduced tariffs. The implicit assumption is that since hydro generation costs are significantly lower than the current diesel and heavy fuel oil generation costs, lower costs will naturally lead to a lower tariff. While this is certainly likely, particularly given the political climate, MCC must recognize that this link is not automatic and that other factors, including LEC's financial viability and significant need for capital, may reduce the expected near-term impact of Mt. Coffee on the electricity tariff.
- The Energy Program indicators have the following issues that need to be addressed:
  - Several indicators, including Percent of Households in LEC Service Areas Connected to the National Grid, Share of Renewable Energy in the Country, and Maintenance Expenditure Asset Value Ratio, would be fine if they were just numbers instead of percentages or ratios. The problem with these indicators is that the denominators (total service area, off-grid capacity, and fixed asset value) are unknown or unreliable, which makes the percentage or ratio impossible to calculate accurately.
  - SAIDI and SAIFI were found to be unreliable because of errors in the spreadsheet used to calculate them, although these errors were reported to LEC and apparently corrected (unfortunately proof of that correction wasn't yet available at the time of writing the DQR).
  - Power Plant Availability is invalid and unnecessary. What it is trying to show is much better reflected by the Available Power Plant Generation Capacity indicator.
  - The four loss indicators (Total System Losses, Transmission System Technical Losses, Commercial Losses, and Distribution System Losses) all require LEC to install proper metering at substations, feeders, and transformers in order to be properly calculated.
  - The Operating Cost Recovery Ratio and Maintenance Expenditure Asset Value Ratio both require a proper accounting of LEC's fixed assets. Unfortunately, PwC, LEC's external auditor, has raised qualifications and given an adverse opinion regarding LEC's financial statements, so the fixed assets need to be properly accounted for before these indicators will be reliable.

- Common indicator Total Megawatt Hours Billed seems redundant with common indicator Total Electricity Sold and should be removed unless the distinction can be clarified.
- The energy component of the M&E Plan has too many indicators. Given that the data collection and analysis capacity of MCA-L is finite, optimum utility might be achieved by reducing the number of indicators so that the M&E team is not overwhelmed by indicators that either add nothing or may even detract from effectively analyzing the overall Compact.
- In some cases, MCC should recognize the distinction between the needs of LEC's operational indicator reporting and MCC's performance and monitoring indicator requirements. These are mostly distinctions in definition and frequency. For example, LEC is (or should be) concerned with changes in available generation capacity caused by seasonal variations in available water for Mt. Coffee and the maintenance of the diesel generators and HFO plants, and these factors should be accounted for in their monthly reporting. However, these factors are generally irrelevant to MCC's Available Power Plant Generation Capacity indicator.

## Roads

- The Roads Program Logic needs to better account for institutional factors that may hinder the full realization of the identified causal chain. In particular, factors that may vitiate program effects include the following:
  - Failure of maintenance planning to be reflected in maintenance budgeting
  - Maintenance budgeting that under-funds routine maintenance, possibly due to MCC program incentives to fund periodic maintenance
  - Poor MPW budget execution
  - Weak procurement systems that lead to bid failures or an uncompetitive bidding process
  - Poor axle load enforcement
- The Roads Program indicators have the following critical issues that need to be addressed:
  - *Percentage of road network in good or fair condition:* In order to be sufficiently unambiguous, once the MCA program is defined, a target road network needs to be defined. For this indicator to be practical, a simplified approach to data collection is recommended.
  - *Percentage of roads maintained according to the annual maintenance plans developed under the Compact:* This indicator needs to be further defined (and perhaps revised) once the first AMP is developed. It should also be targeted toward the parts of the road network where MCC interventions are most focused. To understand important dynamics within the causal chain, an indicator or indicators monitoring maintenance budgeting is recommended.
  - *Expenditures on road maintenance:* This indicator needs to be disaggregated according to maintenance type and ideally would be used in relation to a core

road network identified in the AMP. This will allow “per km” analysis to be conducted, which will allow further analysis of measures like expenditure adequacy and the competitiveness of the contractor market.

- *Matching funds for road maintenance provided by MCC*: The DQR Team recommends re-defining this indicator to become the “Value of budget funding that the Road Fund allocates to periodic maintenance” or “Value of budget funding that the Road Fund allocates to periodic maintenance that has been prioritized in the Annual Maintenance Plan” in order to capture the GOL’s (not MCC’s) commitment to maintenance. This indicator needs to be supplemented with indicators that monitor budgeting for routine maintenance to ensure that budget distortions are not resulting from the MCC program’s incentives.
- *Percentage of periodic maintenance projects completed on time and variance of amount paid for periodic maintenance projects from original contract cost*: The DQR Team does not see either of these indicators as particularly relevant measures of the current MCC program, given that there appear to be no plans to build the capacity of MPW in procurement or contractor management. The DQR Team would recommend using higher level outcome indicators (e.g., travel time, traffic count) to measure the effect of its periodic maintenance interventions. There are low-cost ways to collect this data, and, in addition, this would support the strengthening of MPW’s capacity.
- Based on this analysis, the DQR Team recommended considering the addition of some or all of the following indicators, which are mapped to program outputs and outcomes in the table below.

Proposed Indicator	Output/Outcome
Percent of road network where road condition surveys (or traffic counts) have been conducted	Road Management Systems Created with Assets Inventoried
Annual budget for maintenance (disaggregated by maintenance types)	Road Maintenance Funded
Annual budget for maintenance per km (disaggregated by maintenance types)	
Annual maintenance expenditures per km (disaggregated by maintenance types)	
Percentage of periodic maintenance projects drawn from the maintenance plan (in km)	Roads Maintained According to Plan
Value of budget funding that the Road Fund allocates to periodic maintenance	Roads Maintained According to Plan
Value of budget funding that the Road Fund allocates to periodic maintenance that has been prioritized in the Annual Maintenance Plan	Roads Maintained According to Plan

Pre-/Post project travel time on roads where periodic maintenance has been done	Improved Quality and Prolonged Life of Road
Pre-/Post project traffic count on roads where periodic maintenance has been done	Improved Quality and Prolonged Life of Road
Percent of vehicles compliant to axle load limits (on selected roads)	Axle Load Law Implemented

- As to data quality, it proved difficult to assess the data quality of the Roads Program indicators. Four of the DQR target road indicators were program-specific, so no data is currently being collected on them. The remaining four indicators related to data that might customarily be expected to be collected by MPW, but the DQR Team was unable to get access to adequate data or data collection systems. Apparently, Volpe has encountered similar challenges in getting access to data. Without such access, it is not possible to conduct any assessment.

To address this data quality deficiency, MCC and MCA revised the M&E Plan, accounting for both the recommendations of the DQR and the rescoping of the Liberia Compact.

As a follow up to the DQR, MCA-Liberia is conducting a second DQR in the final year of the compact. The purpose of this DQR is to verify the consistency and quality of data reported toward the M&E Plan, including a deep review of the accuracy of the Q19ITT, which inform much of the closeout results materials.

The particular objectives for this DQR include identification of the following parameters:

- What proportion of the data has quality problems (completeness, conformity, consistency, accuracy, duplication, integrity);
- Which of the records in the dataset are of unacceptably low quality;
- What are the most predominant data quality problems within each indicator;
- What are the main reasons behind low quality; and
- What steps can be taken to improve data quality.

As in the case of the ACMS, the DQR was planned to be finalized by the CED, which due to unforeseen circumstances related to the COVID-19 pandemic became unrealistic. As a result of registered delays, the DQR is planned to start by the end of November 2020 and to be carried out and finalized by the CCD. The estimated due date to finalize the DQR is April 15, 2021.

In addition to this work, the M&E coordinator and MFDP project leaders also regularly verified the quality of the data, which were collected through field visits quarterly or when requested by MCC. This exercise was carried out in coordination with stakeholders of the respective project.

### 3.3 Standard Reporting Requirements

In accordance with MCC’s M&E Policy and as laid out in this Post-Compact M&E Plan, MFDP is responsible for submitting a Post-Compact ITT based off the indicators in Annex I and II of this document. Unless otherwise agreed with MCC, MFDP will also develop and submit an Annual Summary Report (ASR) to MCC, as per the reporting scheduled noted at the end of the section. This report will be submitted on or before March 31st of each year, starting from 2022 through 2025. The ASR for 2021 should be prepared on or before September 30<sup>th</sup>, 2021. MCC specifically, as a key stakeholder, will receive the ASR via an email to the Vice President of the Department of Compact Operations at VPOperations@mcc.gov, with the current MCC M&E Counterpart CCed and the Results Reporting Analyst, with the subject line “Liberia Post-Compact Reporting” and the dates of report coverage.

The Post-Compact ITT will have the same format as the Compact ITT only with additional years added to it. MCC will provide the template for reporting by January 31st of each year in which an ASR is due; the template will be developed with the MFDP National M&E Unit’s input and will be standardized to the extent possible over the years until the end of post-Compact reporting.

The ASR will include the following:

- A summary of any activities undertaken or continued by GoL post-Compact that relate to the sustainability of Compact investments (including any issues with operations and maintenance of infrastructure) as well as complementary activities undertaken by GoL or donors.
- A Post-Compact ITT using the MCC template that is comprised of the indicators included in Annex I of this plan for the preceding calendar year.
  - While the ASR will only be reported annually, the Post-Compact ITT (part of the ASR) should include each indicator broken down by the period noted in the Frequency of Reporting column.
- Data Quality Review findings related to indicators in the Post-Compact M&E Plan.
- Status of outstanding issues for infrastructure components through the end of the defects liability period. MFDP will make public the final version of the ASR, less the ITT, by posting it on MFDP’s website along with other related reports, particularly on indicators’ progress towards targets, where applicable. MFDP’s National M&E Unit plans to use the progress reported in the ASR and other reports as a basis for other results-reporting and public outreach for accountability and decision-making purposes.

The schedule for data collection is as follows:

**Table 3: Schedule for the collection of indicator information**

Collection period	Responsible	Date to receive information and data for ASR	Preliminary report deadline	Final Delivery to MCC
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Year #1: January - December 2021	MFDP POC	September 1, 2021	September 30, 2021	October 31, 2021
Year #2: January - December 2022		March 1, 2022	March 31, 2022	April 30, 2022
Year #3: January - December 2023		March 1, 2023	March 31, 2023	April 30, 2023
Year #4: January - December 2024		March 1, 2024	March 31, 2024	April 30, 2024
Year #5: January - December 2025		March 1, 2025	March 31, 2025	April 30, 2025

Source: Own elaboration

## 4. EVALUATION COMPONENT

### 4.1 Summary of Evaluation Strategy

While good program monitoring is necessary for program management, it is not sufficient for assessing ultimate results. Hence, MCC and MCA-L used different types of evaluations as complementary tools to better understand the effectiveness of its programs. As defined in the MCC M&E Policy, evaluation is the objective, systematic assessment of a program's design, implementation and results. MCC and MCA-L committed to making the evaluations as rigorous as warranted in order to understand the causal impacts of the program on the expected outcomes and to assess cost effectiveness. This Evaluation Component contains three types of evaluation activities: (i) independent evaluations (impact and/or performance evaluations); (ii) self-evaluation, and (iii) special studies, each of which is further described below. The results of all evaluations will be made publicly available in accordance with the MCC M&E Policy.

#### Independent Evaluations

According to the MCC M&E Policy, every Project in a Compact must undergo a comprehensive, independent evaluation (impact and/or performance). The next section on Specific Evaluation Plans will describe the purpose of each evaluation, methodology, timeline, and the process for collection and analysis of data for each evaluation. All independent evaluations must be designed and implemented by independent, third-party evaluators, which are hired by MCC.

For each independent evaluation, relevant stakeholders are expected to review and provide feedback to independent evaluators on the evaluation design reports, evaluation materials (including questionnaires), baseline report (if applicable), and any interim/final reports in order to ensure proposed evaluation activities are feasible, and final evaluation products are technically and factually accurate. MCC's evaluation review process will follow the guidelines outlined in the MCC M&E Policy.

## Special Studies

Either MCC or the Government may request special studies or ad hoc evaluations of Projects, Activities, or the Program as a whole prior to the expiration of the Compact Term.

MCA-L funded an Asset and Customer Mapping Study (ACMS) to be conducted by LEC. The study seeks to address problems associated with locating customers on the grid and the location of grid assets, and assist LEC to:

- Obtain accurate and validated network asset and customers data to accurately report on MCA-L/MCC indicators and assist LEC achieve its KPIs
- Reduce time taken to resolve customers' complaints of power outage and requests for new connections
- Improve the enforcement of transparency in LEC business operations and internal accountability
- Improve the planning, upgrading and implementation of T&D expansion projects on the national grid
- Define standards for the GIS data, and how other GIS projects will interface with the LEC Integrated Management System infrastructure in the future

## 4.2 Specific Evaluation Plans

### 4.2.1 Project Evaluations

The following table includes a high-level summary of the evaluations that are being carried out within the Compact Program. More specific details on each of the evaluations are articulated below.

**Table 4: Summary Table of Assessments**

Evaluation Name	Evaluation Type	Evaluator	Primary/ Secondary Methodology	Final Report Date
<b>Energy Project Evaluation – Mount Coffee Rehabilitation and Sector Reform</b>	Performance	Mathematica Policy Research	Pre-post	05/20/2025
<b>Energy Project Evaluation – Utility Training Center</b>	Performance	Mathematica Policy Research	Ex-post	12/2021
<b>Energy Project Evaluation – White</b>	Performance	Mathematica Policy Research	Ex-post	12/2021

Evaluation Name	Evaluation Type	Evaluator	Primary/ Secondary Methodology	Final Report Date
<b>Plains Water Pipeline</b>				
<b>Roads Project Evaluation</b>	Performance	International Development Group	Pre-post	03/01/2023 or 03/01/2024

Source: Own elaboration based on information provided by the evaluators

Since the evaluations are financed with MCC resources, there is no obligation to finance components of the evaluation on the part of the Government of Liberia. However, the POC will contribute to activities related to the evaluation, such as liaising with governmental institutions, organizing events to inform about the results of the evaluations (including the organization, facilitation and financing of the presentations), as well as making relevant reports and publishing data on its website. MCC will facilitate the evaluators' presentations, as feasible, and will publish the reports and data on its website.

In addition to the specific questions for each of the evaluations, the reports will report data disaggregated by sex and by department, when appropriate. The evaluation reports also include lessons learned in the implementation of the program, which can be useful for activities that will be carried out in the future.

The M&E plan can be consulted at the following link: <https://assets.mcc.gov/content/uploads/Liberia-ME-Plan-v3-Final.pdf>. It details the methodology, questions and data sources for each evaluation, below only a summary of the strategies and activities that remain outstanding in each of them is presented.

#### 4.2.1.1 Mt. Coffee Rehabilitation and Energy Sector Reform Evaluation

The following evaluation questions and methodology applies to the Mt. Coffee Rehabilitation and Energy Sector Reform evaluation. Evaluation designs for the remaining Energy Project Activities are under review.

Overarching research questions	Evaluation design and methods
<ol style="list-style-type: none"> <li>1. Were the activities implemented as planned?</li> <li>2. What was the quality of implementation of the activities?</li> <li>3. What lessons can be drawn from implementation of the activities?</li> </ol>	<p>Implementation analysis:</p> <ul style="list-style-type: none"> <li>• Review of quantitative administrative data, particularly measures captured in LEC's new Information Management System (IMS) funded by the WB. The evaluator will explore measures that demonstrate the quality of implementation of Activities 1 and 2, including key indicators of efforts to improve the productivity, functionality, and performance of infrastructure, the utility, and the energy sector's market structure, governance, and regulation</li> <li>• Review of project documents, including work plans, progress, annual and monitoring and evaluation (M&amp;E) reports, as well as relevant media and news, and other important documents</li> <li>• Qualitative interviews of key informants and sector stakeholders with specific knowledge of implementation activities</li> <li>• Focus group discussions (FGDs) with staff (non-leadership roles) at implementing organizations</li> <li>• Site visits to observe and expand understanding of infrastructure, operations, and implementation that cannot be captured in written documents; presents an opportunity to ask more in-depth and relevant questions and inform future evaluation activities</li> <li>• Tracking implementation of Compact activities and sub-activities; complementary or contradictory interventions; relevant political events, economic shifts, energy pricing, and the contemporary societal context that affects implementation and the energy sector</li> <li>• Tracking the development, passage, and implementation of policies, laws, and regulations throughout the energy sector</li> </ul> <p>Cost-benefit analysis</p> <p>An analysis of the ERR model, along with suggested revisions and justification as warranted</p>
<ol style="list-style-type: none"> <li>4. To what extent, if any, does comparing the assumptions made in the forecasted economic model, actual program implementation, and evaluation findings generate lessons that can be applied to future economic models?</li> </ol>	

Grid-level research questions and outcomes	Evaluation design, methods, and key indicators
<ol style="list-style-type: none"> <li>1. To what extent, if any, has increased electricity generation contributed to increased reliability of Liberia's electricity supply, such as a reduction in planned and unplanned outages and improved voltage stability?</li> <li>2. To what extent has capacity strengthening and sector reform improved LEC's operations and maintenance of the grid, so that increased generation leads to reduced outages and voltage stability?</li> <li>3. To what extent, if any, have energy sector reform activities contributed to improvements in electricity regulation, policy formulation, and monitoring? How sustainable are these improvements?</li> </ol>	<p>Performance evaluation, which will integrate and triangulate data from multiple sources: <i>Note that analyses from the document and energy sector policy review, and qualitative interviews will be mapped to repeated measures of indicators of power production, T&amp;D, and consumption to fully understand processes and mechanisms driving outcomes.</i></p> <ul style="list-style-type: none"> <li>• Longitudinal analyses of repeated quantitative measures to assess indicators such as electricity generation, transmission, distribution, load factor, power availability, voltage stability and outages, consumption, number of customers, un-served demand, peak demand shortage, and transformer and overhead line failure rates</li> <li>• Review of documents and reports, as well as relevant media and news, that provide insights into (1) grid-level changes and (2) LEC's and the MSC's operations related to grid operations and maintenance</li> <li>• Qualitative key informant and stakeholder interviews, during which the evaluator will pose questions focused on a SWOT analysis of capacity strengthening and sector reform activities that facilitate or inhibit grid improvements, operations, and maintenance</li> <li>• Review of energy sector policies, laws, and regulations, and other evidence of activities affecting grid improvements</li> </ul>

Energy sector research question and outcomes	Evaluation design, methods, and key indicators
<ol style="list-style-type: none"> <li>1. What effect, if any, have LERC activities to regulate the legal, economic, and technical environment, or changes in the availability and reliability of electricity, had on IPPs operations?</li> <li>2. What new energy policies, laws, and legal, economic, and technical regulations have been enacted or adopted, given the LERC's activities and support from the donor community? How have these contributed to modernizing the energy sector and making the sector financially viable?</li> </ol>	<p>Performance evaluation which will integrate and triangulate data from multiple sources:</p> <ul style="list-style-type: none"> <li>• Longitudinal analyses of repeated quantitative measures using administrative data, including indicators of power generation, T&amp;D, and consumption, as well as electricity purchased from IPPs, and the role, type, and size of IPPs. Further, the evaluator will track tariff rates across user types</li> <li>• Review and tracing of documents and reports, energy sector policies, laws, and regulations and evidence of other sector reform activities that aim to optimize electricity consumption, quality of supply, prices, and financial performance, and capacity and maintenance, which will be mapped to an event timeline to inform the interplay between changes and effects; Also review of relevant media and news, that provide insights into (1) LERC's activities around legal, economic, and technical regulations, including the process and dates of the introduction, passage, and implementation of regulations and laws; and (2) activities and events leading to the modernization of the energy sector, the market structure, and sector governance and performance.</li> <li>• Qualitative key informant and stakeholder interviews, with questions focused on understanding facilitators and barriers to LERC devising and adopting the policies, laws, and regulations that modernize the energy sector and improve the utility's financial standing. Also focus on perceptions of LERC's credibility, legitimacy, transparency, independence, accountability, and ability to set tariffs. Respondents will also</li> </ul>

include interviews with IPPs to understand their role, type, size, number, and experience with power production and sales.

End-user research questions, outcomes, and impacts	Evaluation design, methods, and key indicators
<ol style="list-style-type: none"> <li>1. To what extent, if any, have the Mt. Coffee Rehabilitation and Energy Sector Reform Activities affected the number of users connecting to the grid and the demand for electricity?</li> <li>2. To what extent do customers invest in energy-intensive appliances or equipment? What is the effect of energy on time use (household production, leisure, school work, and employment)? What, if any, are the spillover effects on non-electrified households? How do all of these impacts vary by differences in gender, socioeconomic status, and other demographic characteristics?</li> <li>3. How did new households, commercial, industrial, and other consumers decide to connect? For potential consumers, why have they not connected? What barriers do potential customers face when trying to connect to the grid? How have changes in the reliability of electricity affected connected and unconnected households' perceptions of the quality of electricity? Are there differences in these issues by respondents' gender and socioeconomic status?</li> </ol>	<p>Performance evaluation which will integrate and triangulate data from multiple sources:</p> <ul style="list-style-type: none"> <li>• Longitudinal analyses of repeated quantitative measures of administrative data; measures include the number of customers and new applications, wait time for applicants, electricity consumption, total energy sold, and measures of customer satisfaction with LEC</li> <li>• Review of documents, reports, and media that provide insights into how Activities 1 and 2 have affected new connections</li> <li>• Stakeholder interviews with commercial, industrial, public sector, and other consumers selected to represent a range of enterprise types and sizes to investigate decisions to connect, barriers to connecting, perceptions of electricity quality, and energy-related behaviors, such as changes in consumption, new purchases and services, and productivity</li> <li>• FGDs with connected and unconnected households and small enterprises to investigate decisions to connect, barriers to connecting, and energy-related behaviors, such as changes in consumption, new purchases, productivity and time use, and potential spillover effects</li> </ul>

Utility-level research questions and outcomes	Evaluation design and methods
<ol style="list-style-type: none"> <li>1. How has the electricity tariff changed since MCHPP was rehabilitated? To what extent does it cover the costs of electricity generation and other operating costs?</li> <li>2. To what extent, if any, has LEC's management improved since the new management contract became effective? What progress has the GoL made toward establishing a longer-term management arrangement for LEC?</li> <li>3. How sustainable is LEC as a utility? What are the biggest barriers to its sustainability?</li> </ol>	<p>Performance evaluation which will integrate and triangulate data from multiple sources:</p> <ul style="list-style-type: none"> <li>• Longitudinal analyses of measures using administrative data on indicators such as tariff rates across user types, energy forecasts, and mismatch between demand, load, and forecast, peak demand shortage, transformer and overhead line failure rates, customer pay rates, collection rates, response to supply and meter complaints, generation unit cost, staff productivity index, energy lost, and other priority indicators. Data will be aligned with ESBI's key performance indicators.</li> <li>• Analysis of LEC management using indicator tracking, analysis of work plans, comparing plans with actual activities, systems, and processes; review of M&amp;E reports, annual reports</li> <li>• Qualitative key informant and stakeholder interviews, with questions focused on LEC's management and operations, including the MSC's efforts to bolster LEC's functionality and effectiveness as a utility and the sustainability of plans, processes, data, and other systems</li> </ul>

The following key outcomes will be included in those measured through the evaluation:

**Table 6: Energy Project Key Outcomes**

Program Logic Result	Indicator	Definition	Unit	Baseline	Target	Target Date <sup>22</sup>
Decreased user costs	Cost savings to existing customers	Cost savings experienced by current LEC customers as a percentage of original electricity costs	Percentage	0	58	2021
Decreased user costs	Cost savings for new industrial connections	Cost savings experienced by new industrial customers as a percentage of original electricity costs	Percentage	0	47	2021
Decreased user costs	Cost savings for new commercial connections	Cost savings experienced by new commercial customers as a percentage of original electricity costs	Percentage	0	58	2021

#### Data Sources

Two types of data will be used in the evaluation: primary data collected specifically for the evaluation and secondary data, such as administrative data, which already exists.

<sup>22</sup> Although the target date is indicated as 2021, the original economic analysis anticipated these targets being achieved by 2017.

**Table 7: Energy Project Primary Data Collection**

Survey Name	Quantitative or Qualitative	Define Sample	Sample Size	Number of Rounds	Exposure Period (months)	Expected Dates of Primary Data Collection
Document review	Qualitative	N/A	N/A	Continuous	The exposure period varies based on the activity and outcomes of interest	Regularly throughout evaluation
Interviews with key informants and stakeholder	Qualitative	MCHPP MME, LERC LEC, CMC MCC, MCA, EU, KfW, NORAD, Power Africa, WB IPPs, CIE	2 4-6 4-6 10+  4-6	2-5 <sup>[1]</sup>	Grid outcomes: • 1 – 3 years Energy sector: • 12 – 48 months Utility outcomes: 6 - 24 months	10/2018-11/2019 and annually thereafter
Interviews with end-users  Focus group discussions with end-users	Qualitative	Enterprises of various sizes  Public sector  Households and small enterprises	10  10 10, with 8-10 FGD participants	3	12 - 48	Baseline: 8/2019 Midline: 8/2021-10/2021 Endline: 8/2023-10/2023
Site visits	Qualitative	MCHPP and substation  T&D infrastructure	TBD	3	For infrastructure related outcomes: 12 months – 3 years For utility related outcomes: 6 - 12 months	Baseline: 9/2018-11/2019 Midline: 9/2020-11/2021 Endline: 10/2022-11/2023
Administrative data from LEC, LERC, MME	Quantitative	N/A	N/A	Continuous	6 - 12	Monthly

<sup>[1]</sup> It is possible to collect data more often than once a year dependent on key milestones and events.



Survey Name	Quantitative or Qualitative	Define Sample	Sample Size	Number of Rounds	Exposure Period (months)	Expected Dates of Primary Data Collection
Small end user listing (households and small businesses)	Quantitative	Connected EAs in Monrovia  Unconnected communities in Greater Monrovia	All households/b businesses in 30 EAs  All households/b businesses in ~125 EAs	1	12 - 24	Baseline: • Connected 9/2018 Unconnected 4/2019-5/2019
Community survey	Quantitative	Connected end users in Monrovia  Unconnected small end users in Greater Monrovia	30 communities  25 communities	3	12 - 24	Baseline: • Connected: 9/2018 • Unconnected: 4/2019-5/2019  Midline: • Connected: 10/2020-12/2020 • Unconnected: 4/2021-5/2021  Endline: • Connected: 10/2023 Unconnected: 11/2023
Household and small enterprise survey	Quantitative	Connected small end users in Monrovia  Unconnected small end users in Greater Monrovia	1,500  1300	3	12 - 24	Baseline: • Connected: 9/2018-12/2018 • Unconnected: 5/2019-6/2019  Midline: • Connected: 10/2020-12/2020 • Unconnected: 5/2021-6/2021  Endline:

Survey Name	Quantitative or Qualitative	Define Sample	Sample Size	Number of Rounds	Exposure Period (months)	Expected Dates of Primary Data Collection
						<ul style="list-style-type: none"> <li>Connected: 10/2023-12/2023</li> <li>Unconnected: 12/2023-2/2024</li> </ul>
Enterprise survey  Public institution survey	Quantitative	Medium and large businesses and public institutions in Monrovia	200-300	3	12 - 24	Baseline: <ul style="list-style-type: none"> <li>Connected: 9/2018-12/2018</li> <li>Unconnected: 5/2019-6/2019</li> </ul> Midline: <ul style="list-style-type: none"> <li>Connected: 10/2020-12/2020</li> <li>Unconnected: 5/2021-6/2021</li> </ul> Endline: <ul style="list-style-type: none"> <li>Connected: 10/2023-12/2023</li> <li>Unconnected: 12/2023-2/2024</li> </ul>

#### Existing Data

- LEC Administrative Data
- Other secondary data

#### 4.2.1.2 Evaluation of the Pipeline Sub-Activity

The following evaluation questions will be assessed through data collection from the Mt. Coffee Rehabilitation and Energy Sector Reform Evaluation.

1. Did implementation of the White Plains Pipeline go according to plan?
2. To what extent, if any, has the water transmission line increased the supply of water to the White Plains facility, improved water quality, and reduced risks associated with salt-water intrusion, sediment and other impurities?

3. Has the new pipeline design led to a reduction in operating costs now that water is gravity fed at no cost?
4. What is the status of the existing water network? To what extent can it accommodate the increased supply? Will the WPP limit the ability of LWSC to meet a growing demand for water? Is the asset being maintained?
5. What is the cost benefit analysis of the pipeline? (Recalculation and justification)

#### 4.2.1.3 Evaluation of the Training Center Activity

The following evaluation questions will be assessed through data collection from the Mt. Coffee Rehabilitation and Energy Sector Reform Evaluation.

1. How is the LEC Training program functioning in practice? How effective is the LEC Training Activity at training LEC staff and improving relevant skills of LEC staff?
2. To what extent is the LEC Training Activity meeting skill needs at LEC both in terms of the number of people trained and the quality and relevance of skills provided? How sustainable is the LEC Training program? Do LEC staff have the time and capacity to operate the training program? Are new LEC staff offered training and how does LEC manage skill and capacity continuity?

#### 4.2.1.4 Evaluation of the Roads Project

MCC developed a Principles into Practice paper based on a review of its early investments and evaluations in the transport sector, which includes a set of lessons for improving our transport practice going forward for both project design and evaluation design. In particular, this review has highlighted the importance of understanding the program logic of the investment before designing an evaluation, collecting updated high-quality data, as well as ensuring that the benefit of the evaluation is greater than its cost. With these lessons in mind, MCC has contracted an independent evaluator to assess the performance of the road maintenance regime resulting from the Road Sector Reform Activities.

### Evaluation Questions

#### *Planning and Implementation*

1. To what extent did the project have a clear plan? Was it implemented according to plan?

#### *Engineering Analysis and Economic Model*

1. What is the economic return of the road maintenance investments? What factors drove changes to the ERRs over time? How could the project have been designed to result in a higher ERR?

### *Maintenance*

1. What are the relevant road authority's maintenance practices? How have these changed since the beginning of the Compact?
2. Objective Question (Main Evaluation Question): How were routine, periodic and emergency maintenance works planned and executed by the Government before the Compact and how are they planned and executed after the Compact? Did planning and execution of routine, periodic and emergency road maintenance improve?
  - a. Did the improved planning and execution of road maintenance result in maintenance cost savings?
  - b. How does the execution of road maintenance compare to the GoL's maintenance plans?
  - c. If maintenance is carried out using the improved methods implemented by MCC using HDM-4 and cost savings result, are cost savings returned to the Government of Liberia, or are the added available funds used to carry out further maintenance?
  - d. What is the role of the private sector in the new maintenance regime and how does this compare to the role envisioned for it under the Project?
  - e. The established procedure put in place by the program includes, (1) Data collection, (2) Data analysis, (3) Planning, (4) NRF Approval of planned prioritized MPW works, (5) Allocation of funding by NRF, (6) Timely award of road maintenance contracts, and (7) Execution. The success of this program going forward depends on continuing this process. How likely is it post-compact that Government will perpetuate this cycle? What, if anything, could MCC have done differently to ensure this cycle would last longer?
  - f. How sustainable is the new maintenance regime? Volpe's assistance is currently slated to end at the end of July 2019. After that, Volpe will only be assisting with RAMS, but won't be helping MPW with HDM-4, data collection, etc. Sustainability activities could continue Volpe's assistance for one more cycle. Can GoL continue to use the system on their own? Why? If not, what could MCC have done differently to ensure the GoL would continue to use the system on their own?
  - g. Does the overall quality of the road network improve, as a result of MCC's investments in maintenance planning and execution?
3. What organizational, political, and economic factors are shaping road maintenance decisions and practices in Liberia?
  - a. How is road maintenance regulated?
  - b. How and to what extent did the Compact help to clarify and strengthen governance and regulatory arrangements for road maintenance?

- c. How is road maintenance funded and how does this compare to funding needs and projections?
- d. How did this change from before the MCC intervention to after?
- e. What evidence is there that MCC facilitated those changes (if relevant)?
- f. Are there factors influencing road transport agencies' policies and practices that could have been addressed by MCC to improve investment outcomes? What are these factors, and how should they be assessed during project design?
- g. Are the funds in the Road Fund being used to maintain the road network?

Optional: *Road Usage Patterns*<sup>23</sup>

- 1. Have road usage patterns changed, in terms of who is traveling on the roads, why, what they are transporting, what they are paying for transport, and how long it takes to move along key routes? Previous scopes of work for MCC road evaluations have separated Research Question 3 into two parts because they were being contracted only for endline data collection and analysis. Since this contract is being signed before project implementation, there is no need to separate the research question into two parts.

Optional: *Transportation Market Structure*

- 1. Given the existing transportation market structure, what portion of VOC savings will be passed on to consumers of transportation services? If not all savings are passed on, could this project have cost effectively addressed these inefficiencies? How? How is the transportation market structured and what is the likelihood that VOC savings will be passed on to consumers of transportation services? Did this change from before the MCC intervention to after? What evidence is there that MCC facilitated those changes (if relevant)?

### Evaluation Methodology Description

The evaluation of the Roads Project will explore the short-term and intermediate outcomes in the program logic and the role of critical assumptions.

The methodology for the evaluation is a pre-post performance evaluation, relying heavily on key informant interviews to assess the road maintenance regime following MCC's work in the sector. The optional evaluation questions will be evaluated with an ex-post methodology if they meet the empirical thresholds included in the Evaluation Design Report.

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<sup>23</sup> Evaluation questions marked "optional" are tied to the possible-but-unlikely outcomes described in the program logic. While the evaluation may ultimately address these questions, MCC does not currently expect to be able to answer these questions at the time of the final report.

The following key outcomes will be included in those measured through the evaluation:

**Table 8. Roads Project Key Outcomes**

Result	Indicator
Improved execution of routine road maintenance	Kilometers of primary, secondary, and urban roads maintained
Improved execution of periodic road maintenance	
Improved execution of emergency road maintenance	
Improved execution of routine road maintenance	Share of financial needs for routine maintenance projects met with budget disbursed
Improved execution of periodic road maintenance	Share of financial needs for periodic maintenance for PSIPs met with budget disbursed
Improved execution of emergency road maintenance	Average response time between start and completion of emergency road maintenance
Improved planning of routine road maintenance	ARMEP submitted on schedule and approved on time
Improved planning of periodic road maintenance	
Improved planning of emergency road maintenance	Emergency planning response time

The exposure period (the period of time between project completion and final data collection) will be between 12 and 24 months.

#### Data Sources

Two types of data will be used in the evaluation: primary data collected specifically for the evaluation and secondary data, such as administrative data, which already exists.

**Table 9: Roads Project Primary Data Collection**

Survey Name	Quantitative or Qualitative	Define Sample	Sample Size	Number of Rounds	Exposure Period (months)	Expected Dates of Primary Data Collection
KIIs	Qualitative	Staff of MPW (IIU, RMMU, etc), NRF, MoT, MoFDP and other stakeholders	20-40	2	13-25 months <sup>24</sup>	Baseline: (2020) Endline: (2022-2023)
Complementary Online Mini-Survey	Quantitative	Staff of MPW (IIU, RMMU, etc), NRF, MoT, MoFDP and other stakeholders	20-40	2	13-25 months	Baseline: (2020) Endline: (2022-2023)
Traffic Counts	Quantitative	Road users	N/A	1	13-25 months	Baseline: (2020) Endline: (2022-2023)
Vehicle Intercept Survey	Qualitative	Road users	N/A	1	13-25 months	Baseline: (2020) Endline: (2022-2023)

#### Existing Data

- MPW Administrative Data

<sup>24</sup> The endline will be initiated depending on a benchmark set in the Evaluation Design Report ([found here](#)). “If the budget allocation is done as per the prioritized maintenance plan, endline data collection will be conducted in July/August 2022. However, the team recognizes that due to unforeseen economic events, such as the impact of COVID-19, the Liberian economy might not return to business as usual until 2021. Therefore, if the budget approval process in 2021 does not make budget allocations based on the prioritized plan, the evaluation team will monitor the progress made from July 2021 to July 2022.”

- NRF Administrative Data
- Other secondary data

## 5. IMPLEMENTATION AND MANAGEMENT OF M&E

### 5.1 Responsibilities

The development of the Post-Compact M&E Plan was based on a participatory methodology, in accordance with the procedures of MCC M&E, and a Memorandum of Understanding (MOU) signed by MCC and MFDP. The management of the plan will be under the responsibility of the designated POC, that is, the Deputy Minister of Budget and Planning, who may designate someone from the team to be able to give a more detailed follow-up. MFDP is responsible for the collection, compilation, processing, and analysis of the information on pending activities and the indicators specified in the monitoring section.

The MCC M&E counterpart is to provide technical assistance to the team to carry out Post-Compact monitoring and evaluation, and to facilitate the implementation of specific activities in accordance with existing processes.

The MCA-L Monitoring and Evaluation coordinator of the Compact Program will conduct a brief training for the POC and/or staff within MFDP and institution's counterpart. The training will address the objectives, contents and formats of the Post-Compact M&E Plan.

The specific actors responsible for tasks in the Post-Compact M&E Plan are detailed below.

Tasks of the MFDP and its designated POC include:

- Designate personnel to facilitate MFDP contact for requests regarding the annual report or other requests from the evaluating firms.
- Send an annual report of the indicators in the specified period.
- Report on the status of activities prioritized by the Compact Program that were not completed or that they want to follow up after completion of the program, particularly ACMS.
- Be the point of contact for questions from MCC, implementing entities, evaluators or others in relation to the Post-Compact M&E Plan.
- Prepare and submit the Post-Compact Annual Summary Report to MCC which includes data collection for reporting indicators from different government institutions.
- Provide advice and training to institution counterparts on proper filling of instruments to meet the requirements for preparing the Annual Summary Report.
- Ensure that the indicators have supporting documentation, including the Annual Road Maintenance Expenditure Plan (ARMEP), Annual Expenditure Report of the NRF, and approved Five-Year Road Maintenance Plan, as updated.
- Follow up on the monitoring and evaluation system defined above in the Post-Compact Monitoring & Evaluation Plan that includes the collection, processing,



analysis, verification/validation and centralization of information for the Post-Compact ITT indicators.

- Disseminate information and results related to program performance and impact while maintaining the integrity of the documents received. The dissemination will be made through the government website and/or other means.
- Identify opportunities to apply learning from evaluations to project design and implementation.
- Manage agreements with government entities in the field of monitoring and evaluation.
- Facilitate the work of evaluation teams, particularly to assist in mission planning, organizing events to disseminate information and coordinate the contribution of comments to the deliverables of stakeholders.
- Inform external entities of the Post-Compact M&E Plan upon request, particularly government entities.
- Reviews and provides an official response to each evaluation; helps to coordinate the review of evaluation reports by other government agencies as necessary.
- Review and revise the Post-Compact M&E Plan, as necessary, in coordination with the MCC M&E team, to confirm that the activities that are contained are in accordance with what is established and limited by the agreement.

Tasks of the Implementing Entities and key partners, such as LEC, NRF, LERC, & LSWC, include:

- Identifying a focal person to provide continuous assistance and advice to the MFDP on all aspects related to Post-Compact M&E
- Coordination of technical M&E aspects with entities responsible for providing primary data for indicators as detailed in this Post-Compact M&E Plan;
- Monitoring and maintaining the reporting system, to ensure that the Post-Compact ITT is up to date;
- Ensuring completeness, accuracy, and integrity of data compiled within each entity, before submitting data for the annual reports to MFDP.
- Supporting the MFDP with dissemination of information, organization (if applicable) of presentations of the results of evaluations and publication on relevant websites, such as MFDP's;
- Provide data to MFDP annually on the indicators reported in Annexes I & II.
- Provide input and comments for reports produced by the independent evaluators (Table 4) to ensure accuracy and provide perspective.

The main tasks for the MCC M&E Director(s) include:

- Providing advice and training to the POC, or the person designated for this activity to meet the requirements to prepare the annual Post-Compact report.
- Manage evaluations.
- Make sure evaluation reports include feedback from interested parties.

## **5.2 Other Miscellaneous Post-Compact Responsibilities**

As required by Section 3.7(d) of the Compact (which survives the expiration of the Compact pursuant to Section 5.5), the Government, through the designated representative (or otherwise), will continue to permit any authorized MCC representative, the Inspector General, the US Government Accountability Office, any auditor responsible for an audit contemplated by the Compact or conducted in furtherance of the Compact, and any agents or representatives engaged by MCC or the Government to conduct any assessment, review or evaluation of the Compact Program, the opportunity to audit, review, evaluate or inspect activities funded by MCC Funding. Without limiting the foregoing, the Government, through the designated representative (or otherwise), further agrees to cooperate and coordinate with, and provide such documentation as may be requested from time to time, by MCC or any consultants or representatives working for MCC in connection with any of MCC's Post-Compact monitoring and evaluation activities in connection with the Liberia Compact Program.

### **5.3 M&E Post-Compact communication strategy**

The POC or its designee will develop workshops with interested parties as part of Post-Compact M&E Plan to publicize the results.

### **5.4 Review and Revision of the M&E Plan**

Further revisions of the Post-Compact M&E Plan will be made when there is consensus between MCC and the POC.

## **6. M&E BUDGET**

The evaluations are funded directly by MCC. MCC will be responsible for the costs of contracting for the collection of additional data, while the Government of Liberia will be responsible for the collection and coordination of monitoring data, and organizing venues and stakeholders for dissemination events.

## 7. ANNEXES

### **Annex I**

**Liberia Compact**  
**Annex I: Indicator Documentation Table**

Program Logic Result	CI Code	Indicator Level	Indicator Name	Definition	Unit of Measure	Disaggregation	Primary Data Source	Responsible Party	Frequency of Reporting <sup>25</sup>	Additional Information
<b>Energy Project</b>										
<i>Increased lower cost generation</i>	P-15	Outcome	Total electricity supply	Total electricity, in megawatt hours, produced or imported in a year.	Megawatt hours	Electricity supply source	LEC Quarterly Reports	LEC Generation	Quarterly	The categories for the disaggregation “Electricity supply source” are: Domestic (P-15.1) and Imports (P-15.2). Liberia currently imports a small amount of energy from Cote d’Ivoire to serve communities in three border counties. Unfortunately, this energy is not well documented by LEC. The baseline value differs from those used in the original and revised CBA models (i.e., original model: 54,860; revised model: 71,574). The baseline value used in the M&E Plan is based on LEC

<sup>25</sup> “Frequency of Reporting” here refers to the units within the data. Data will still be reported to MCC in line with the schedule defined in Section 3.3.  
Liberia Post-Compact Monitoring & Evaluation Plan

										data as of December 2015, while the baseline value used in the original CBA is based on the 2014 Least Cost Power Development Plan.
<i>Increased consumption of electricity, increased revenue</i>	P-23	Outcome	Total electricity sold	The total megawatt hours of electricity sales to all customer types.	Megawatt hours	Tariff class	LEC Quarterly Reports	LEC	Quarterly	The categories for the disaggregation “Tariff class” are: Residential (P-23.1); Commercial (P-23.2); Industrial (P-23.3); Government; and Other.
<i>Increased customer base</i>	P-25	Outcome	Percentage of households connected to the national grid	Number of households that have access to a legal connection to electricity service from an electrical utility or service provider / Total number of households in the country.	Percentage		LEC Quarterly Reports and LCPDP	LEC	Annual	
<i>Increased customer base</i>	P-25.1	Outcome	Households that have access to a legal connection to electricity service from an electrical utility or service provider	Number of households that have access to a legal connection to electricity service from an electrical utility or service provider.	Number		LEC Quarterly Reports	LEC	Annual	This indicator assumes that each residential connection reported by LEC represents one household.

<i>Increased customer base</i>	P-25.2	Outcome	Total number of households in the country	Total number of households in the country.	Number		LCPDP	MFDP	Annual	In the absence of a means to track annual changes in the number of households, the projections from the LCPDP on page 5-8 (i.e., targets for this indicator) will be treated as actuals in Compact reporting.
<i>Increased customer base</i>		Outcome	Customers connected to the grid	Number of customers that have a legal connection to electricity service from LEC	Number	Customer class, customer phase	LEC Quarterly Reports	LEC	Quarterly	The baseline value is higher than the baseline value used in the CBA model (i.e., 13,599). The former is based on LEC data as of December 2015, while the latter is based on the number of LEC customers documented in the 2014 Least Cost Power Development Plan.
<i>Increased quality and reliability of electricity</i>		Outcome	System Average Interruption Frequency Index (SAIFI)	Sum of all customer interruption durations / Total number of customers	Rate		LEC Quarterly Reports	LEC	Annual	SAIFI is only counted at the 22kV level and above; the number of customers associated with each feeder is estimated and is likely an underestimate. This indicator will aggregate the monthly index values to report the quarterly and annual totals.

<i>Increased quality and reliability of electricity</i>		Outcome	System Average Interruption Duration Index (SAIDI)	Sum of durations, in customer-hours, of all customer interruptions in a year / Total number of customers connected to network in the same year	Hours		LEC Quarterly Reports	LEC	Annual	SAIDI is only counted at the 22kV level and above; the number of customers associated with each feeder is estimated and is likely an underestimate. This indicator will aggregate the monthly index values to report the quarterly and annual totals.
<i>Increased quality and reliability of electricity</i>		Outcome	Adequacy of supply	The minimum value in a quarter of the following: total dependable capacity available from all power plants in a month divided by peak daily demand in the corresponding month	Rate		LEC Quarterly Reports	LEC	Quarterly	
<i>Increased quality and reliability of electricity</i>		Outcome	Available power plant generation capacity	Total dependable capacity available from all power plants in the month with the lowest calculated adequacy of supply	Megawatts		LEC Quarterly Reports	LEC	Quarterly	Formula: available power plant generation capacity in a month = power plant dependable capacity (MW) * hours plant was available at that capacity during month / hours in month
<i>Increased quality and reliability of electricity, increased consumption of electricity</i>		Outcome	Peak demand	Daily peak demand for on-grid power in the month with the lowest calculated adequacy of supply	Megawatts		LEC Quarterly Reports	LEC	Quarterly	

<i>Improved plant facilities</i>	P-16	Outcome	Power plant availability	Unweighted average across all power plants of the following: total number of hours per quarter that a plant is able and available to produce electricity / Total number of hours in the same quarter.	Percentage	Liberia power plants	LEC Quarterly Reports	LEC	Quarterly	Targets will not be established for this indicator because it aggregates values that do not reflect Compact performance directly and for which LEC does not have operational targets. The categories for the disaggregation "Liberia power plants" are: Mt. Coffee, HFO, and Diesel generators.
<b>Mt. Coffee Rehabilitation Activity</b>										
<b>Mt. Coffee Support Activity</b>										
<b>Training Center Activity</b>										
<i>Increased capacity and productivity of LEC staff</i>		Outcome	Assessment pass rate	The number of those that successfully completed training/Number of participants registered	Percentage		LEC and UTC	LEC and UTC	Quarterly	
<i>Training, mentorship, and oversight of the trainers provided</i>	E-5	Output	Instructors trained	The number of classroom instructors who complete MCC-supported training focused on instructional quality as defined by the compact training activity.	Number	Sex	UTC and TATA reports	LEC	Quarterly	



<i>Training for non-technical, corporate, and customer service center staff conducted</i>		Output	Students participating in MCC-supported education activities	The number of students enrolled or participating in MCC-supported educational schooling	Number	Sex	LEC and UTC	LEC and UTC	Quarterly	
<b>Pipeline Activity</b>										
<i>Decreased salinity</i>		Outcome	Electrical conductivity measure	Amount of salinity present in raw water as measured in µS/cm	Ratio		WTP	LWSC	Quarterly	LWSC to provide technical information/explanation about how they measure salinity
<i>Increased quantity of raw water to the WTP</i>		Outcome	Raw water supplied volume	The volume of raw water in millions of liters per day supplied to that part of the water supply system to which the water balance calculation relates Ratio is defined as Million Gallons / Day	Ratio		WTP	LWSC	Quarterly	Pre-war capacity was 16 million gallons per day (MGD)

<i>Improved continuity of service of raw water supply to the WTP</i>		Outcome	Water coming to LWSC through the pipeline	Raw water delivered daily to LWSC from the pipeline	Hours per day		WTP	LWSC	Quarterly	
<i>Reduced electricity use for LWSC</i>		Outcome	Reduced electricity use for LWSC	Amount of electricity used by LWSC to pump water	Kilowatt hours		WTP	LWSC	Quarterly	
<i>Increased quantity of treated water to the LWSC service area</i>		Outcome	Volume of treated water produced	Total volume of water produced in cubic meters per day for the service area, i.e. leaving treatment works operated by the utility and purchased treated water, if any.	Cubic meters per day		WTP	LWSC	Quarterly	
<b>Energy Sector Reform Activity</b>										
<b>Management Support to LEC Sub-Activity</b>										
<i>Improved operations of LEC</i>		Outcome	Aggregate technical and commercial losses	The amount of electricity generated or input to system (kWh) minus the amount in US\$ for which payment is collected from customers	Percentage		LEC reports	LEC Generation, LEC Commercial and LEC Finance	Quarterly	AT&C = $1 - (\text{revenue collected converted into MWh} / \text{total electricity supply (MWh)}) \times 100$ , where the annual value is an average of the monthly values

				converted to energy (kWh) divided by the amount of electricity generated or input to system (kWh) x 100						
<i>Improved operations of LEC</i>	P-20	Outcome	Commercial losses	Total distribution system losses minus distribution technical losses	Percentage		LEC reports	LEC Generation, LEC Commercial and LEC Finance	Quarterly	$\%Com = \%Gen - \%Ttl - \%Ct = \%EaFs - \%Dtl - \%Billing$ ; where Energy Generated (Gen) = 100%; consumption at transmission level (Ct) = 0 (because there are currently no transmission-level customers); transmission technical loss (Ttl) is estimated at 3%; Energy Available for Sale = EAfS; Distribution Technical Losses (Dtl) are estimated at 12%; Billing = LEC Internal Consumptions + Energy billed to consumers
<i>Improved operations of LEC, improved plant facilities</i>		Outcome	Maintenance expenditure – asset value ratio	Actual maintenance expenditures / Total value of fixed assets	Percentage		LEC reports	LEC Finance	Annual	
<i>Improved operations of LEC, improved</i>		Outcome	Maintenance expenditures	Actual maintenance expenditures	US Dollars		LEC reports	LEC Finance	Annual	

<i>plant facilities</i>										
<i>Improved operations of LEC, improved plant facilities</i>		Outcome	Asset value	Total value of fixed assets	US Dollars		LEC reports	LEC Finance	Annual	
<i>Increased revenue, improved financial sustainability of LEC</i>	P-24	Outcome	Operating cost recovery ratio	Total revenue collected / Total operating cost	Percentage		LEC reports	LEC Finance	Annual	
<i>Increased revenue, improved financial sustainability of LEC</i>		Outcome	Total revenue collected	Total revenue collected	US Dollars		LEC reports	LEC Finance	Quarterly	
<i>Increased revenue, improved financial sustainability of LEC</i>		Outcome	Collection rate	[Trailing twelve months of total value of post-paid bills collected / Total value of bills issued for same customers in trailing twelve months] x 100	Percentage		LEC reports	LEC Finance	Annual	
<b>Establishment of an Independent Regulator Sub-Activity</b>										
<b>Roads Project</b>										

Improved execution of routine road maintenance Improved execution of periodic road maintenance Improved execution of emergency road maintenance		Outcome	Kilometers of primary, secondary, and urban roads maintained	Kilometers of primary, secondary, and urban roads maintained	Kilometers	Road Type	RAMS	ICDU for PAPD at MoFDP	Semi-Annual	
Improved execution of routine road maintenance		Outcome	Share of financial needs for routine maintenance projects met with budget disbursed	Total amount disbursed on routine maintenance divided by total financial needs for routine maintenance specified in Annual Maintenance Expenditure Program (ARMEP)	Percentage		Annual Budget Execution Report of MoFDP, ARMEP	NRF	Annual	
Improved execution of periodic road maintenance		Outcome	Share of financial needs for periodic maintenance for PSIPs met with budget disbursed	Total amount disbursed on periodic maintenance for Public Sector Infrastructure Project (PSIP)s divided by total financial needs for periodic routine maintenance specified in Annual Maintenance Expenditure Program (ARMEP).	Percentage		Annual Budget Execution Report of MoFDP, ARMEP	NRF	Annual	For projects funded by Development Partners, the information is at the PFMU at MoFDP which makes data collection more time consuming. Looking only at PSIP projects will simplify the data collection for this indicator with the same quality of information.

				PSIPs were chosen because it aligns more closely with work attributable to MCC's interventions.						
<i>Improved execution of emergency road maintenance</i>		Outcome	Average response time between start and completion of emergency road maintenance	Average response time between the start and completion of emergency road maintenance works until the complete cut of a primary road is removed (and traffic can continue)	Days		Annual Maintenance Reports	MPW	Annual	
<i>Improved planning of routine road maintenance</i> <i>Improved planning of periodic road maintenance</i>		Outcome	ARMEP submitted on schedule and approved on time	ARMEP submitted on schedule and approved on time by the IMSC before the start of the next fiscal period on July 1. Indicator will be reported in binary	Number		Signed ARMEP	NRF & MPW	Annual	
<i>Improved planning of emergency road maintenance</i>		Outcome	Emergency planning response time	Average response time between the time an emergency has been reported (e.g. complete cut of the road) and the start of the emergency road	Days		Maintenance Contract Documents	MPW	Annual	

				maintenance works						
<i>Maintenance projects prioritized under the MPW's road maintenance plans approved by NRF</i>		Outcome	Share of periodic maintenance projects in One-Year Road Maintenance Program that are budgeted in the ARMEP	Share of periodic maintenance projects in the One-Year Road Maintenance Program of MPW which are budgeted in the Annual Road Maintenance Expenditure Program of the NRF	Percentage		ARMEP	MPW IIU	Annual	
<i>Routinely addition of collected data on (i)-(iii)* to RAMS by GOL</i>		Outcome	Data uploaded to RAMS according to the RAMS plan	The number of times per year that standardized data is added to the RAMS system according to the RAMS plan	Number		ARMEP	MPW IIU	Annual	
<i>Assumptions</i>		Outcome	Funds allocated to road maintenance in NRF	Total funding allocated to road maintenance in NRF budget	Number		Annual Report of the NRF	NRF	Annual	
<i>Assumptions</i>		Outcome	Share of funds allocated to road maintenance in NRF	Funding allocated to road maintenance / Total funding of NRF	Percentage		Annual Report of the NRF	NRF	Annual	

## Annex II

Indicator Level	Indicator Name	Unit of Measure	Indicator Classification	Original Baseline	End of Compact Target	End of Compact Value (As of 3/2/2021)	Post-Compact Target
Outcome	Total electricity supply	Megawatt hours	Level (Cumulative)	62039 (2015)	319,070	176,806.04	No Target
<i>Outcome</i>	<i>Total electricity supply (Domestic)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>48975 (2015)</i>		176,806.04	No Target
<i>Outcome</i>	<i>Total electricity supply (Imports)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>0 (2015)</i>			No Target
<i>Outcome</i>	<i>Total electricity supply (Unspecified)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>				No Target
Outcome	Total electricity sold	Megawatt hours	Level (Cumulative)	37464 (2015)	198,460	63,131.76	No Target
<i>Outcome</i>	<i>Total electricity sold (Residential)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>19237 (2015)</i>		22,700.48	No Target
<i>Outcome</i>	<i>Total electricity sold (Commercial)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>9065 (2015)</i>		10,507.68	No Target
<i>Outcome</i>	<i>Total electricity sold (Industrial)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>0 (2015)</i>		291.73	No Target
<i>Outcome</i>	<i>Total electricity sold (Government)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>7806 (2015)</i>		14,877.04	No Target



<i>Outcome</i>	<i>Total electricity sold (Other)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>1294 (2015)</i>		<i>11,791.37</i>	<i>No Target</i>
<i>Outcome</i>	<i>Total electricity sold (Unspecified)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>62 (2015)</i>		<i>2,963.47</i>	<i>No Target</i>
<i>Outcome</i>	<i>Total electricity sold (Single-phase)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>18822 (2015)</i>	<i>92,740</i>	<i>18,674.95</i>	<i>No Target</i>
<i>Outcome</i>	<i>Total electricity sold(Three-phase)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>7124(2015)</i>	<i>34,540</i>	<i>11,846.05</i>	<i>No Target</i>
<i>Outcome</i>	<i>Total electricity sold (CT)</i>	<i>Megawatt hours</i>	<i>Level (Cumulative)</i>	<i>11518 (2015)</i>	<i>71,180</i>	<i>19,382.41</i>	<i>No Target</i>
<i>Outcome</i>	Percentage of households connected to the national grid	Percentage	Level	3.9 (2015)		8.30	No Target
<i>Outcome</i>	Households that have access to a legal connection to electricity service from an electrical utility or service provider	Number	Level	30475 (2015)		71,864.00	No Target
<i>Outcome</i>	Total number of households in the country	Number	Level	789245 (2015)	885,344	866,124.00	No Target
<i>Outcome</i>	Customers connected to the grid	Number	Level	36964 (2015)	105,101	76,263.00	No Target
<i>Outcome</i>	<i>Customers connected to the grid (Residential)</i>	<i>Number</i>	<i>Level</i>	<i>33296 (2015)</i>		<i>71,864.00</i>	<i>No Target</i>
<i>Outcome</i>	<i>Customers connected to the grid (Commercial)</i>	<i>Number</i>	<i>Level</i>	<i>3,441 (2015)</i>		<i>4,145.00</i>	<i>No Target</i>
<i>Outcome</i>	<i>Customers connected to the grid (Industrial)</i>	<i>Number</i>	<i>Level</i>	<i>0 (2015)</i>		<i>1.00</i>	<i>No Target</i>
<i>Outcome</i>	<i>Customers connected to the grid (Government)</i>	<i>Number</i>	<i>Level</i>	<i>159 (2015)</i>		<i>205.00</i>	<i>No Target</i>
<i>Outcome</i>	<i>Customers connected to the grid (Other)</i>	<i>Number</i>	<i>Level</i>	<i>65 (2015)</i>		<i>34.00</i>	<i>No Target</i>

Outcome	Customers connected to the grid (Unspecified)	Number	Level	3 (2015)		15.00	No Target
Outcome	Customers connected to the grid (Single-phase)	Number	Level	35531 (2015)	103,000	71,907.00	No Target
Outcome	Customers connected to the grid (Three-phase)	Number	Level	1236 (2015)	1,940	4,148.00	No Target
Outcome	Customers connected to the grid (CT)	Number	Level	197 (2015)	161	208.00	No Target
Outcome	System Interruption Index (SAIFI) Average Frequency	Rate	Level	TBD		179.03	No Target
Outcome	System Interruption Index (SAIDI) Average Duration	Hours	Level	TBD		306.77	No Target
Outcome	Adequacy of supply	Rate	Level (Average)	0.95 (2015)	1.2	2.96	No Target
Outcome	Available power plant generation capacity	Megawatts	Level (Average)	11.94 (2015)		113.40	No Target
Outcome	Peak demand	Megawatts	Level (Average)	12.6 (2015)		38.35	No Target
Outcome	Power plant availability	Percentage	Level	63 (2015)		61.70	No Target

Outcome	Power plant availability (Mt. Coffee)	Percentage	Level	0 (2015)	97	87.98	No Target
Outcome	Power plant availability (HFO)	Percentage	Level	0 (2015)		75.28	No Target
Outcome	Power plant availability (Diesel generators)	Percentage	Level	63 (2015)		21.85	No Target
Outcome	Power plant availability (Unspecified)	Percentage	Level				No Target
Outcome	Electrical connectivity measure	Ratio	Level	0	0	40-50μS/cm	No Target
Outcome	Raw water supplied volume	Ratio	Level	10	20	5,196,223.90	No Target
Outcome	Water coming to LWSC through the pipeline	Hours per day	Level	12	18	5.19	No Target
Outcome	Reduced electricity use for LWSC	KWH	Level				No Target
Outcome	Volume of treated water produced	Cubic meters per day	Level	8	16	19,670.00	No Target
Outcome	Assessment pass rate	Percentage	Level		60		No Target
Output	Instructors trained	Number	Cumulative	0	65		No Target
Output	Students participating in MCC-supported education activities	Number	Cumulative	0	75		No Target
Outcome	Aggregate Technical and Commercial Losses	Percentage	Level (Average)				No Target
Outcome	Commercial Losses	Percentage	Level (Average)				No Target
Outcome	Maintenance expenditure – asset value ratio	Percentage	Level	0.4 (2015)	2		No Target
Outcome	Maintenance expenditures	US Dollars	Level	790,000 (2015)	11,491,000		No Target
Outcome	Asset value	US Dollars	Level	202,162,000 (2015)	497,381,000		No Target

Outcome	Operating cost recovery ratio	Percentage	Level (Cumulative)	88 (2015)	115		No Target
Outcome	Total revenue collected	US Dollars	Level (Cumulative)	18,395,000 (2015)	76,342,000		No Target
Outcome	Collection rate	Percentage	Level	77.4 (2015)	98		No Target
<b>Road Sector Reform Activity</b>							
Outcome	Kilometers of primary, secondary, and urban roads maintained	Kilometers	<i>Cumulative</i>	<i>(2016)</i>	TBD		No Target
	<i>Kilometers of primary, secondary, and urban roads maintained (Primary)</i>	Kilometers	<i>Cumulative</i>	<i>(2016)</i>	TBD		No Target
	<i>Kilometers of primary, secondary, and urban roads maintained (Secondary)</i>	Kilometers	<i>Cumulative</i>	<i>(2016)</i>	TBD		No Target
	<i>Kilometers of primary, secondary, and urban roads maintained (Urban)</i>	Kilometers	<i>Cumulative</i>	<i>(2016)</i>	TBD		No Target
Outcome	Share of financial needs for routine maintenance projects met with budget disbursed	Percentage	<i>Level</i>	<i>(2019)</i>	TBD		No Target
Outcome	Share of financial needs for periodic maintenance for PSIPs met with budget disbursed	Percentage	<i>Level</i>	<i>(2019)</i>	TBD		No Target

Outcome	Average response time between start and completion of emergency road maintenance	Days	<i>Level</i>	(2019)	TBD		No Target
Outcome	ARMEP submitted on schedule and approved on time	Number	<i>Cumulative</i>	0	TBD		No Target
Outcome	Emergency planning response time	Days	<i>Level</i>	2019)	TBD		No Target
Outcome	Share of periodic maintenance projects in One-Year Road Maintenance Program that are budgeted in the ARMEP	Percentage	Level	(2016)	TBD		No Target
Outcome	Average score of standardized data collection training participants	Number	Level	0 (2016)	TBD		No Target
Outcome	Standardized data collection performed in line with ARMEP	Number	Cumulative	0 (2016)	TBD		No Target
Outcome	Average score of adding standardized data training participants to RAMS	Number	Level	0 (2016)	TBD		No Target
Outcome	Data uploaded to RAMS according to the RAMS plan	Number	Cumulative	0 (2019)	TBD		No Target
Outcome	Funds allocated to road maintenance in NRF	Number	Level	TBD	TBD		No Target
Outcome	Share of funds allocated to road maintenance in NRF	Percentage	Level	TBD	TBD		No Target

### **Annex III**

There have been no changes to the Post-Compact M&E Plan to document in Annex III at this time.