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Norwegian support to the Liberian energy sector

Baseline study and RBM system

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NORWEGIAN SUPPORT TO THE LIBERIAN ENERGY SECTOR

BASELINE STUDY AND RBM SYSTEM


FINAL REPORT v2

MARCH, 2011

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EXECUTIVE SUMMARY

Introduction

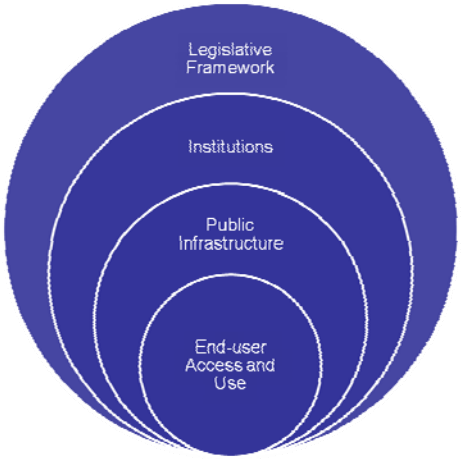
Liberia experienced from 1989 to 2003 a civil war that has led to a range of post-conflict challenges; poverty and violence is widespread and people have limited access to basic services and infrastructure. Liberia's rate of access to publicly provided electricity is close to zero, the lowest known rate of access in the world.

The Norwegian support to Liberia's energy sector was initiated in 2007 through funding to the Emergency Power Program (EPP) II. The cooperation was expanded in 2010 when Norway entered into 4 cooperation agreements related to electricity generation, distribution and transmission; energy planning and institutional development.

The first part of this report presents a quantitative and qualitative description of the situation in the Liberian energy sector pre-project implementation. These data have been gathered and systemized to allow for future cost-benefit analyses and impact assessments. The second part of the report presents a system for Result Based Management (RBM) of the Norwegian supported energy projects in Liberia, including mechanisms for monitoring, reporting and evaluation of the projects.

Energy sector baseline data

The current situation in the Liberian energy sector is described as a starting point for the Norwegian program. The information is categorized on 4 levels – legislation, institutions, public infrastructure and end-user access and use.



The Liberian legislative framework on energy is weak. A national Energy policy has been approved, however it has yet to be fully implemented, and there is no national energy bill. Parts of the policy need to be made into laws such as a statutory establishment of the Rural and Renewable Energy Agency (RREA) and the Energy Regulatory Board. A new Energy Law must be developed with sector laws on electricity, petroleum and renewable energy.

The two most important institutions in the energy sector are the Ministry of Lands, Mines and Energy (MLME) and Liberia Electricity Corporation (LEC). MLME is the Ministry with statutory oversight of the Lands, Mineral, Water and Energy sectors. It has 560 employees whereof 53 are women, however only 20 employees work within the Department of Energy (DoE). The Ministry experiences a lack of competence and resources, and capacity building is highly needed. The National Energy Policy calls for a reorganization of the MLME.

For the energy sector the most important departments/agencies under MLME are DoE (including the Bureau of Alternative Energy and the Bureau of Hydrocarbons), Liberia Hydrological Services (LHS) and the Rural and Renewable Energy Agency (RREA).

LEC is a public utility with a mandate to *"..generate, transmit and distribute electric power throughout the nation".* LEC's capacity and competence is very low; out of 233 employees 57% have no or basic compulsory education. The average employment time is less than 3 years, and 55% were employed as late as in 2009.

LEC's main focus for the years to come will have to be improvements in the performance of the utility – increasing credibility (quality and cost of supply) and its financial situation

The public infrastructure is limited. LEC has a generation capacity of 9 x 1 MW diesel generators; Kru Town 5 MW, Congo Town 2 MW and Bushrod 2 MW. An additional 3 MW will be provided through the Gaps project, along with 10 MW from USAID. Monrovia's electricity transmission is based on a 66 kV transmission grid while the distribution grid consists of both 33 kV and 22 kV grids transforming down to 400 V for customer connections. There are a total of 2403 connections (October 2010). The current tariff is USD 0.43 per kWh, while the cost of producing 1 kWh is USD 0.328.

In addition to LEC's generators the electricity generation capacity in Monrovia comprises (1) public and private organizations' own generators, (2) private enterprises' (often informal) generators distributing energy to households and other small enterprises on a "local grid" set-up (called IPPs), and (3) private households' own generators.

Households in Monrovia use energy mainly for lighting and cooking. Typically, households with access to electricity use it for lighting, possibly some other electrical appliances such as charging batteries and ironing, and only for a few hours each evening. Around 60 % of the surveyed households rely on other sources than electricity for lighting. As many as 40 % use battery LED lamps (so-called Chinese lamps) that have become very popular over the last few years. Some 40% of the surveyed households say they use electricity for lighting (either from a shared or owned generator, or LEC). 85 % of the private generators had bought this during the last two years (NORPLAN, 2010).

53 % of the schools surveyed have electricity supply, mainly from their own small generators. The common uses of electricity are for lighting, running computers, printing and photocopying. The end-user survey indicates that 84 % of the schools with access to electricity provide evening classes. The schools mainly provide adult literacy classes in the evenings (71%), and to a smaller degree accelerated learning programs and conventional classes.

Data shows that 77% of all health facilities in Monrovia have access to electricity, but that only 53% of the governmental facilities have access. Of the government facilities, only JFK Hospital is connected to the LEC grid.

There is little comprehensive statistical data available on the number of enterprises currently in business in Monrovia, and the survey results on enterprises cannot be verified as representative. 71 entreprises were sampled and around 80 % of these had access to electricity, mainly own small generators.

Energy Sector RBM system

A baseline study is effectively the first step in a monitoring and evaluation system. A monitoring plan reflects the desired achievements and includes key performance indicators. Baseline data allow for assessments of how efficiently the activities are being implemented.

Current overall reporting on results in MLME is limited to the Annual report. This implies that a reporting system must be developed for monitoring of the institutional support to MLME. Further, MLME has yet to begin the work of preparing an Energy Master Plan, which is expected to provide a road map and goals for the sector. Before such a document with agreement on goals exists, reporting and monitoring is ineffective.

LEC is the main actor in the electricity sector. Manitoba Hydro International (MHI) has a management contract of LEC, and in MHI's contract a thorough monitoring and reporting system has been described. As LEC is the responsible partner for implementing all programme components within the electricity sector these components are monitored within the management contract. Thus, this report focus on developing a monitoring and reporting system for the institutional support to MLME.

For the institutional support project the Ministry has identified desired goals with key indicators and targets, these are tied as closely as possible to the statements in the National Energy Policy (NEP) (MLME, 2009) .

The first objective of Norplan's assignment was to assess, update and revise the proposed Result Based Management (RBM)-matrices for the 4 Norwegian supported energy projects; *Gaps*, *Management of LEC*, *Investments in the grid* and the *Institutional cooperation between MLME and NVE*. The projects are complex and vary in size, and it was necessary to improve the understanding of the coherence of the programme. A good link between the projects was ensured through design of an "Overall energy support matrix" (Result matrix 1). The electricity sector projects were joined in an aggregated matrix (Result matrix 2), while the activities in the institutional support programme were assembled in a third matrix (Result matrix 3). The structure of the matrices is included below, while the matrices are attached in Appendix 2. For a more detailed presentation of the matrices please refer to the Inception report (NORPLAN, 2010).

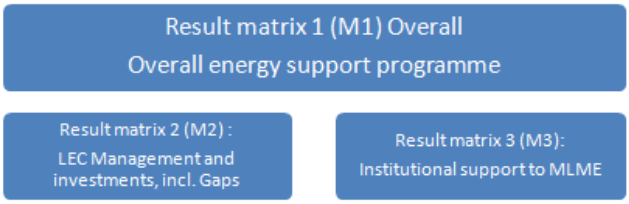


Figure: Structure of the overall energy support programme matrices

The stakeholders of the Institutional cooperation have been provided with a system for monitoring, reporting and evaluation. This system includes a presentation of key performance indicators, what data that should be collected, how this is done, the frequency with which it should be collected and by whom. As far as possible performance indicator baseline values have been collected and targets formulated, these are attached as Appendix 3.

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APPENDICES:

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A5 ToR for this study

LIST OF ABBREVIATIONS / ACRONYMS

BoAE	- Bureau of Alternative Energy (MLME)
BoH	- Bureau of Hydrocarbons (MLME)
CBA	- Cost-Benefit Analysis
COPD	- Chronic Obstructive Pulmonary Disease
COTC	- Contracting Officer's Technical Consultant (i.e. NETGROUP)
COTR	- Contracting Officer's Technical Representative (i.e. NORPLAN)
CSET	- Centre for Sustainable Energy Technology
CVD	- Cardiovascular Disease
DHS	- Liberia Demographic and Health Survey
DoE	- Department of Energy (MLME)
EC	- European Commission
ECOWAS	- Economic Community of West-African States
EPP	- Emergency Power Programme
ERB	- Energy Regulatory Board
EU	- European Union
GDP	- Gross Domestic Product
GOL	- Government of Liberia
GON	- Government of Norway
HDI	- Human Development Index
HDR	- Human Development Report (UNDP)
I	- Impact
IPP	- Independent Power Producer
IMCC	- Inter-Ministerial Concessions Committee
IT	- Information technology
kWh	- kilowatt hours
LEC	- Liberia Electricity Company
LHS	- Liberia Hydrological Services
LISGIS	- Liberia Institute of Statistics and Geo-Information Services
MC	- Management Contract
MCI	- Ministry of Commerce and Industry (Liberia)
MHI	- Manitoba Hydro International
MoE	- Ministry of Education (Liberia)
MoFA	- Ministry of Foreign Affairs (Liberia)
MoHSW	- Ministry of Health and Social Welfare (Liberia)
MLME	- Ministry of Lands, Mines and Energy (Liberia)
MW(h)	- Megawatt (hours)
NEC	- National Energy Committee
NEP	- National Energy Policy
NGO	- Non-governmental organization
NIMAC	- National Information Management Centre
NOCAL	- National Oil Company of Liberia

NOK	- Norske Kroner (the Norwegian currency)
Norad	- Norwegian Agency for Development Cooperation
NVE	- Norwegian Water Resources and Energy Directorate
OC	- Outcome
OP	- Output
PD	- Project Document
PPCA	- Public Procurement and Concession Act, 2005
PPP	- Purchasing Power Parity
PRS	- Poverty Reduction Strategy
RBM	- Result Based Management
RDL	- Reznate Development Ltd.
RE	- Rural electrification
REFUND	- Rural Energy Fund
RREA	- Rural and Renewable Energy Agency
SAIDI	- System Average Interruption Duration Index
SAIFI	- System Average Interruption Frequency Index
SME	- Small and medium enterprises
SWOT	- Strength, Weaknesses, Opportunities and Threats
TOR	- Terms of Reference
UL	- University of Liberia
UN	- United Nations
UNAIDS	- United Nations Programme on HIV/Aids
UNDP	- United Nations Development Programme
UNICEF	- United Nations Children's Fund
UNMIL	- United Nations Mission In Liberia
USAID	- United States Agency for International Development
USD	- United States Dollar
WB	- World Bank

1 INTRODUCTION

1.1 Liberia's challenges

Liberia is severely challenged and one of the poorest countries of the world due to the recent civil war. In December 1989 Charles Taylor launched a rebellion against President Samuel Doe's regime. Taylor came to power in 1997 but the fighting resumed until August 2003 when a peace agreement ended the war. For two years a transitional government ruled, and in 2005 democratic elections brought President Ellen Johnson-Sirleaf to power. The UN Mission in Liberia (UNMIL) still has a strong stabilizing presence in the country.

Liberia is experiencing a range of post-conflict challenges such as poverty, violence, population displacement and limited access to basic services and infrastructure. Public energy infrastructure is practically non-existing, and according to the World Bank Liberia is possibly the country in the world with the lowest rate of access to public electricity (World Bank, 2010). UNDP's annual Human Development Report (HDR) [1] 2010 ranked Liberia as number 162 of 169 countries in the world. UNDP estimates that 83.7% of the Liberian population live below the income poverty line (PPP $1.25 a day, (UNDP, 2010)).

The post-conflict challenges of Liberia all increase the vulnerability of women and girls. According to HDR 2010 Liberia is among the bottom 10 countries in the world concerning gender inequality (UNDP, 2010).

1.2 Cooperation Norway-Liberia

Norway started supporting Liberia's energy sector in 2007 through funding to the Emergency Power Program (EPP) II. Around NOK 50 millions were donated for procuring and installing 7 MW of diesel generators and a small grid for distributing the power. In 2010 Norway entered into the following cooperation agreements with the Liberian Government (GOL):

Project	Objective	Cost (MNOK)	Duration
Gaps project	Financial support to LEC to procure and install 3 MW new capacity and expand the distribution network in Monrovia	81.9	2010 – 11
LEC management	Rebuild LEC and strengthen electricity services in Monrovia through a 5 year management contract with Manitoba Hydro International (MHI) as LEC Operator	86	2010 – 15
Investment funding	Financing of the annual investments plans of LEC (LEC Operator) to reach the goal of 33,000 new connections by 2015	203	2010 – 15
Institutional cooperation	Strengthening of Ministry of Lands, Mines and Energy (MLME) through an institutional cooperation with Norwegian Water Resources and Energy Directorate (NVE).	51.4	2010 – 15

[1] UNDP's Human Development Report presents indicators measuring human development throughout the world. Their Human Development Index (HDI) measures achievements regarding access to education, decent standard of living and a long and healthy life and ranks 169 countries. http://hdr.undp.org/en/

1.3 Baseline study

What is a baseline study?

A baseline study is a study of the current situation to identify the starting points / initial conditions for a program or project. The purpose of the study is to provide an information base against which to monitor and assess an activity's progress and effectiveness during implementation and after completion. The monitoring of progress will not repeat the baseline study; the focus will be on comparing recent data with information from the baseline study. Subsequent studies of the same scope at (a) later time(s) could be conducted to see if there are changes as compared to the baseline, allowing the researcher to attempt to determine whether the changes are related to the said program.

The Liberia baseline study

The data compiled and presented in this report is a description of the current situation in Liberia's energy sector and it forms the baseline for Norwegian energy development support.

All of Liberia's public electricity supply is found within the capital city of Monrovia, which is also the focus area for Norwegian energy support (apart from the support to the Rural and Renewable Energy Agency). The system boundaries for the study have been set to Monrovia city. However, some data are only available on Montserrado county[2] level or on national level, and in these cases this has been specifically stated.

Data collection in Liberia

A basic constraint is the paucity of available data in Liberia. The only systematic data available is the population Census of 2008 (referring to 2007) which, although comprehensive in providing key demographic and socio-economic profiles of households in Monrovia, lack information of electrification. It is therefore challenging to find relevant and reliable data for monitoring of long-term effects of development support.

1.4 Report structure and study process

This report presents a system for Result Based Management (RBM) of the Norwegian supported energy projects in Liberia. The RBM system includes mechanisms for monitoring, reporting and evaluation of the projects. The system has been developed in close cooperation with the Liberian cooperating institutions[3]. For a more detailed description of the methodology please refer to Appendix 1.

The first part of the report presents a quantitative and qualitative description of the situation of the Liberian energy sector pre-project implementation. Chapter 2 focuses on the energy sector and its structure, while Chapter 3 gives a presentation of the most relevant energy institutions. A more general introduction to energy access and use is given in Chapter 4. En empha-

[2] Greater Monrovia District constitutes 87% of Montserrado's total population

[3] Mainly MLME, LEC, RREA and LHS

sis has been put on describing the baseline situation in a way that allows for a future Cost-Benefit Analysis (CBA) as well as impact assessments of the projects

In the second part of the report the RBM system is presented. Chapter 5 describes the methodology, including revised results matrices and monitoring indicators for the four projects. Final result matrices are presented in Appendix 2. Chapter 6 describes the proposed monitoring system, and the baseline data for the key performance indicators are detailed in Appendix 3. Lastly, Chapter 7 suggests how the impact evaluation can be implemented.

PART 1: ENERGY SECTOR BASELINE DATA

This part of the report is a quantitative and qualitative description of the baseline situation for Monrovia and the Liberian energy sector. It has been prepared in accordance with the methodology described in Appendix 1 and an emphasis has been put on including sufficient data to allow for a future cost-benefit analysis (CBA) and impact assessment.

2 ENERGY SECTOR

2.1 Legislation and Structure

With the installation of a democratically elected government a reform of the Liberian legal framework was called for. President Ellen Johnson-Sirleaf, commenting on the multi-layered legal framework in her country, stated that "*we had so many interim governments, and they passed so many laws, that some of them are duplicating each other, while others are contradicting each other*" (Isser). This has led to the formulation of new acts and policies, and today the activities in the energy sector are mainly governed by the National Energy Policy (NEP) (MLME, 2009).

National Energy Policy

The NEP is based on the long-term energy policy for the Economic Community of West-African States (ECOWAS) and was ratified by the cabinet in June 2009. NEP calls for significant reforms in the energy sector with immediate objectives to strengthen the regulator capacity and ensuring sustainable development of the power market. One of GOL's most critical priorities is the expansion of the energy supply and generation systems. The Government has adopted a three phased strategy towards the visions in the NEP (MLME, 2009):

- The short term (emergency) phase
- The medium term (capacity building) phase
- The long term (development) phase

As of 2010 Liberia has moved from the emergency phase into the capacity building phase. Important tools for the capacity building phase will be the management contract of Liberia Electricity Corporation (LEC) and the institutional cooperation between the Ministry of Lands, Mines and Energy (MLME) and Norwegian Water Resources and Energy Directorate (NVE). MLME will need substantial technical assistance to implement NEP through various activities. To ensure fulfillment of Liberia's energy sector goals critical activities will be:

- Drafting and enactment of enabling legislation
- Setting up appropriately resourced institutions
- Development of an energy master plan
- Facilitating the first major IPP investments
- Rehabilitation of Mount Coffee hydropower plant

Energy law

The GOL has decided to provide a new Energy Law with the following sector laws:

- New Electricity Law
- New Petroleum Law
- New Renewable Energy Law

The Energy Law will include a regulatory framework for restructuring the power sector, and furthermore make provision for the establishment of an Energy Regulatory Board (ERB).

Environmental framework

In addition to the NEP the following environmental framework influences the energy sector:

- The National Environmental Policy (MoFA, 2003)
- The Environmental Protection Agency Act (MoFA, 2003)
- The Environmental Protection and Management Law (MoFA, 2003)

2.2 Key actors in the Energy Sector

MLME

The Ministry of Lands, Mines and Energy (MLME) has statutory oversight of the Land, Mineral, Water and Energy sectors. Liberia's Poverty Reduction Strategy (PRS (GOL, 2008)) has goals and objectives for the Land, Mineral, Energy, Environment and Water & Sanitation subsectors (components of Pillars 2 and 4) and the Ministry's activities are geared towards achieving these.

For the energy sector the most important departments/agencies under MLME are the *Bureau of Alternative Energy* (BoAE), *the Bureau of Hydrocarbons* (BoH), the *Rural and Renewable Energy Agency* (RREA) and the *Liberia Hydrological Services* (LHS).

National Energy Committee

A National Energy Committee (NEC) is in process to be established to facilitate coordination between energy-oriented organizations in the public and private sector and developers and users of related infrastructure services. The EPP Steering Committee has fulfilled this role as a temporary arrangement.

Energy Regulatory Board

The NEP introduces an Energy Regulatory Board (ERB) that shall be responsible for monitoring all energy policies and standards established by the MLME. This is based on an understanding that GOL should *"… balance the interests of consumers with those of firms engaged in the im-*

portation, production, transportation, distribution, and sale of energy products and services..." (MLME, 2009).

The Board has not been established. It is to become "...*an autonomous regulatory body enabled by legislation, to eliminate distortions in energy-related markets through transparent, predictable and stable oversigh*t." (MLME, 2009) The ERB will monitor policy implementation by all operators, whether owned by the public sector, private sector or local communities. It shall enforce policies, plans and standards. However, it is uncertain when the ERB will be established.

LEC

The Liberia Electricity Corporation (LEC) is a public utility established by an act of legislation in 1973 with a mandate to generate, transmit and distribute electric power throughout the nation. During the civil war all assets owned by LEC were destroyed and all commercial activities stopped. LEC re-started operation in Monrovia for the first time in 14 years in 2006.

LEC is on a short-term basis responsible for rehabilitation, upgrading, expansion and day to day operation of generation, transmission and distribution networks. In the NEP it is stated that LEC "... *shall be a national grid company with special responsibility to advice the MLME on national power system expansion planning."* (MLME, 2009).

It is likely that LEC will continue to be involved in distribution in the future; however GOL is considering other options. The distribution of power requires a viable state utility and due to this GOL has signed a management contract with Manitoba Hydro International (MHI) for the operation of LEC from 2010-2015 (MFA, 2010).

Inter Ministerial Concessions Committee

According to the Public Procurement and Concessions Act (PPCA) (MoFA, 2005) the Inter-Ministerial Concessions Committee (IMCC) is responsible for the review of a concession and approval of the report of the Concessions Bid Evaluation Panel and the preparation of the annual concessions plan for submission and approval by Cabinet.

IMCC reviews and approves concession bid documents prior to the invitation of bids, reviews and approves the evaluation reports, approves the minimum benchmarks for negotiations with the concessionaire, authorizes the Concession Entity to negotiate with the next highest ranking bidder if negotiations breakdown, constitutes the Concession Bid Evaluation Panel and makes recommendations to the head of the Concession Entity and the Commission as and when necessary (MoFA, 2005).

3 ENERGY INSTITUTIONS

The Norwegian support programme includes support to the main energy institutions in Liberia; LEC and MLME and its agencies. As described in Chapter 1.2 MLME shall be strengthened through an institutional cooperation with NVE, while LEC will receive support for investments in new generation capacity, expansion of the distribution network and rebuilding of the company through a management contract.

This chapter describes the current situation in the institutions in the energy sector with a main emphasis on the institutions that will receive support from the Norwegian programme.

3.1 Ministry of Lands, Mines and Energy (MLME)

The current management structure of the Ministry is given in Figure 1 below.

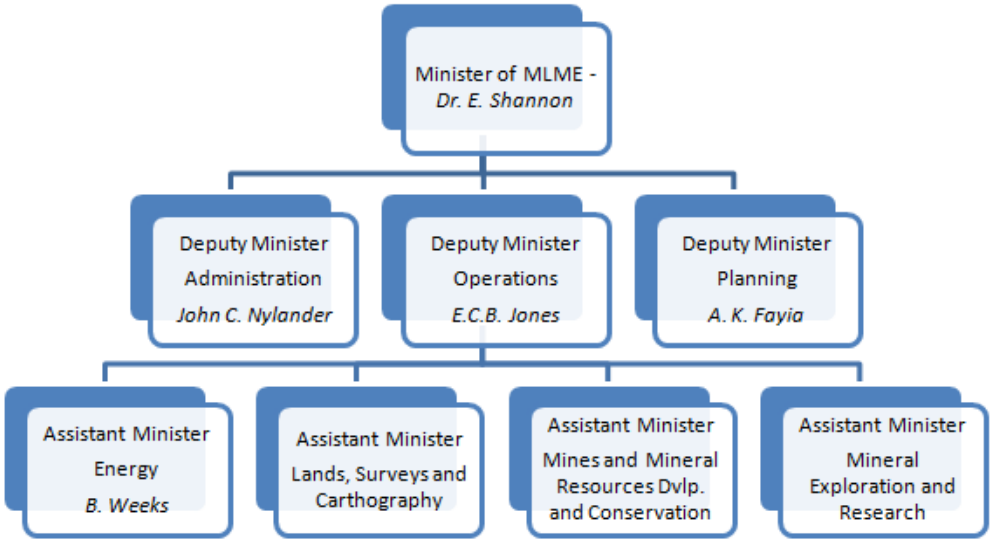

Figure 1: Ministry of Lands, Mines and Energy

There are three Deputy Ministers reporting to the Minister; Planning, Operations and Administration. Operations is the coordinating unit supervising the departments. The Assistant Ministers report to the Deputy Minister of Operations, mainly on quarterly and annual basis. Administration is responsible for support services, personnel management, procurement, finances and asset management. They coordinate the budget proposals from the various departments. Planning is responsible for "*planning short and long term activities for the Ministry, including necessary training*" (Morlu, 2010), they ensure that the Ministry has the needed competence. In addition Planning does a lot of work related to the Kimberly process.

In the Ministry there are two departments specifically working towards the energy sector, they report to the Assistant Minister for Energy, currently Mr. Beauford Weeks:

- The **Department of Mineral Exploration and Research**, which consists of the *Liberian Geological Survey* and the *Liberian Hydrological Service*

- The **Department of Energy** which consists of the *Bureau of Hydrocarbons* and the *Bureau of Energy Technology and Policy Development*

There is no office in MLME dedicated to the electricity sector. During EPP I and EPP II LEC has reported to the EPP Steering Committee chaired by the MLME, but the Ministry's oversight over LEC is otherwise ad hoc (MLME, 2009).

In total, the Ministry has 560 persons on payroll (MLME, 2010) of which 53 are women. Regular reporting within the Ministry is through the Annual report. Each bureau reports to its department and each department reports to the Minister. A complete report is compiled and sent to the President. Other reporting throughout the year is on a need-to-know basis, and project specific reports are prepared when deemed necessary.

Department of Energy

Mandate

The mandate of DoE encompasses the following (DoE, 2009):

- Policy guidance and exercise of general oversight of the energy sector
- Develop and review energy policies, quality standards, and master plans based on stakeholders inputs
- Coordinate NEC meetings
- Liaise with relevant energy regulatory authorities
- Coordinate all support services required for the issuing of licenses and concessions in the sector; and
- Monitor and evaluate the overall impacts and benefits of energy sector policies through regular reviews of reports from energy related institutions – public and private

Organisation

The Department consists of the Bureau of Hydrocarbons (BoH) and Bureau of Alternative/Renewable Energy (BoAE) and it is organized as illustrated in Figure 2.

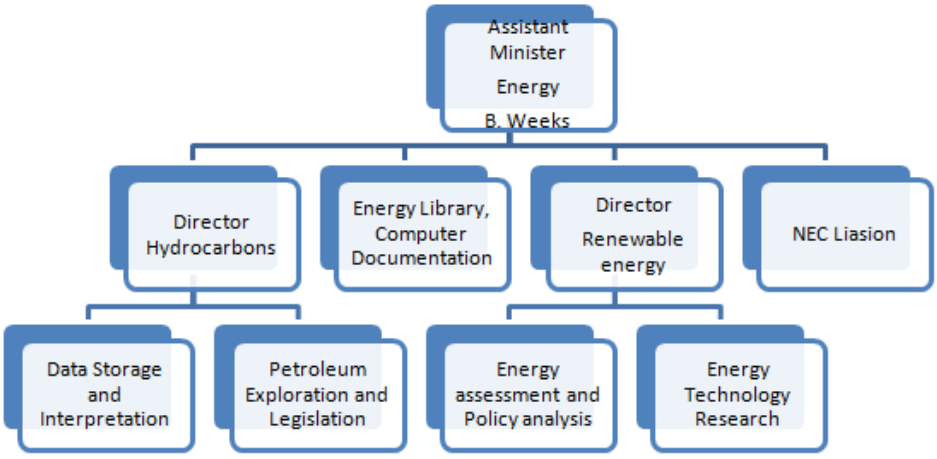

Figure 2: Department of Energy (NEP (MLME, 2009))

According to the NEP the Bureau of Renewable/Alternative Energy should be split into two departments; *Energy assistance and policy analysis* and *Energy technology research*. This is not the case today. Further, the NEP states that the Government will ensure that DoE shall be "*...organized efficiently and resourced adequately to discharge its oversight role over all the different energy sub-sectors as well as to direct and supervise, through policy making and planning, the efficient development of the energy sector as a whole*". However, the NEP acknowledges that the Government has limited capacity to undertake energy policy monitoring and regulatory functions. (MLME, 2009)

Capacity and competence

The work in the Ministry, particularly within the Department of Energy, is constrained by lack of personnel, resources and offices. The 20 persons working within the department share 2 offices and a meeting room. Obviously this does not make for good working conditions and it is hard to imagine an efficient department without more office space available.

Compared with pre-war levels the department lack both personnel and competence. Further the department needs to consider which adjustments should be done to the staff related to the coming restructuring (as outlined in the NEP).

The education level of the DoE is as follows:

Table 1: DoE education level (DoE, 2010)[4]

Education level	Male	Female	Total
BSc/BA/BBA	8	1	9
UL students	4	2	6
8-11th grade	2	0	2
Junior High school	1	0	1
Other	0	1	1
No education	1	0	1
TOTAL	16	4	20

At present, the DoE is involved with the following agencies in the energy sector: National Oil Company of Liberia (NOCAL), LEC and RREA. BoH has interface with NOCAL and BoAE with RREA. The interface between RREA and BoAE is not yet clear, as RREA is in its start-up phase. They rely on close cooperation, and BoAE expresses that it would want to hand over some areas to RREA that normally would be within the Ministry, as it does not have the capacity to perform its tasks properly. As soon as the BoAE is properly manned it will reclaim its tasks from RREA. In April 2009 the Department of Energy performed a "strategic planning workshop" (DoE, 2009). As part of the workshop a SWOT-analysis was developed, and it identified the following:

Table 2: DoE SWOT analysis (DoE, 2009)

Strength: - Cooperation from sub-sectors such as LEC and NOCAL - Continuous and increasing interest of international donors - National Energy Policy prepared	Weakness: - Limited institutional capacity o Office space o Logistics/equipment and materials - Lack of trained personnel
Opportunities: - High demand for energy services - Funding potential from development partners - Membership with international and sub-regional organizations - Strategic partnership with other institu-	Threats: - Limited funding - Duplication of functions - Inadequate mechanisms for monitoring and evaluation

[4] According to the MLME personnel roster 2009-2010 (MLME, 2010) DoE has 24 employees, however 4 of these where not included in the information provided by DoE (DoE, 2010)

tions	
- GOL support	

In accordance with the SWOT the Department identified "institutional capacity development" as its priority short and medium term goal. In this they included more office spaces, personnel and necessary logistics, equipment and materials in order to achieve the capacity necessary to perform its statutory mandate.

Apart from LHS neither bureau of MLME has a proper staff plan for the shorter or longer term. There is a "Manpower assessment report" prepared by the Department of Planning and Development that is to identify areas that need immediate, short term and long term capacity building; however this is based on reconstructing the pre-war Ministry set-up and is thus not very relevant (Morlu, 2010).

3.2 Rural and Renewable Energy Agency (RREA)

The Rural and Renewable Energy Agency (RREA) started as the World Bank funded LEAP project and was established as a state agency by executive order in January 2010. The agency shall exist for two years when its mandate will either be renewed by the President or a future law will establish it as a permanent agency (Guanoue, 2010).

RREA is mandated to

- Promote and establish rural energy cooperatives and private electricity companies in rural areas
- Act as a regulatory body for energy matters in rural areas
- Facilitate the funding of rural energy projects through the Rural Energy Fund
- Establish and maintain data on rural and renewable energy service provision
- Support IPPs developing power generation using renewable energy technologies for rural development.

Its mandate does not include owning or operating any equipment or installations for energy provision.

The agency is governed by a board which includes representatives for the MLME, LEC, Ministry of Justice, Ministry of Internal Affairs and the Energy Advisor to the President as Members. The Board meets every quarter. The RREA has a staff of nine, of which 3 are female. The Rural Energy Fund (REFUND) is as yet without funding and no person has been appointed its director (Guanoue, 2010).

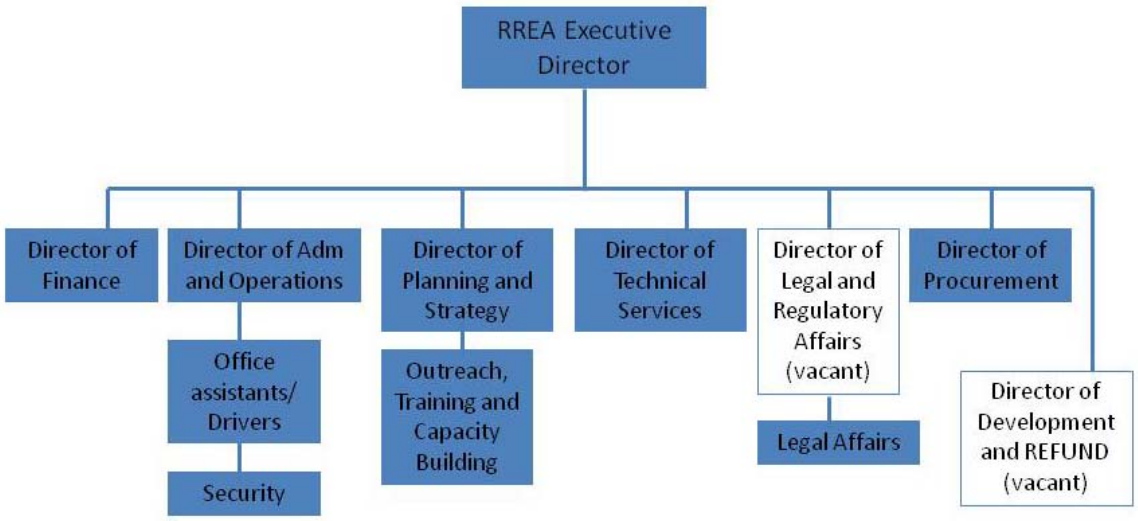

Figure 3: RREA structure

The GOL supports the RREA by payment of some USD 200,000 per year for salaries and an additional USD 250,000 is contributed by a member of the Liberian parliament. Within the Institutional Development component of the Norwegian support wages for the Director of Development and REFUND and a gender specialist will be covered.

The RREA is to a large extent funded by the World Bank. The funding (USD 6 million until 2014) covers both capacity building of RREA's staff, staff salaries and funding of two pilot projects (Stroup, 2010):

- Construction of a micro-hydro power project in Lofa County. RREA's role is to manage the procurement, contracting of the installation and supervise and monitor the operation.
- Sustainable Solar Market Packages whereby solar power systems are installed at public facilities and small scale solar lanterns and home systems will be provided on a commercial basis.

The Executive Director reports to the Board of Directors quarterly on activities carried out, but these are not linked to any tangible goals for the organization. Monthly reports on funds used are sent to the World Bank (Guanoue, 2010).

3.3 Liberia Hydrological Services (LHS)

The Liberian Hydrological Services is a bureau under the Department of Mineral Exploration and Environmental Research. It is the mandate of LHS to monitor, evaluate, manage and protect water resources and to provide technical support to water users (Wylie, 2010).

LHS is formally organized under the Department of Mineral Exploration and Research.

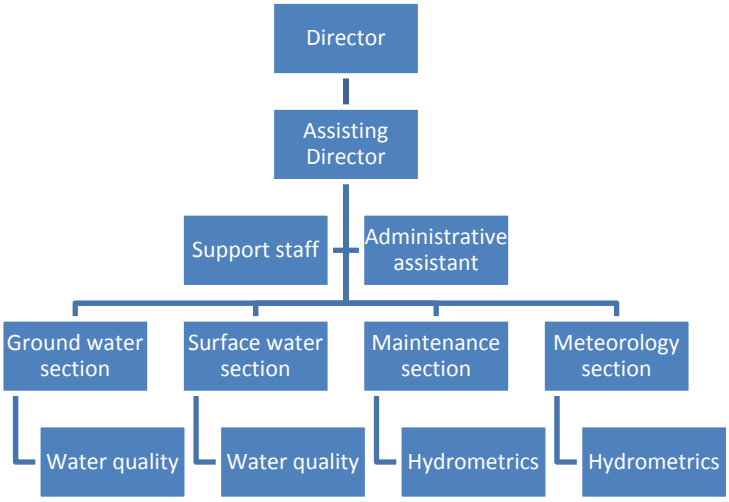

Figure 4: LHS (LHS, 2009)

Monitoring and management of the water resources suffered during the civil war and all hydrological stations were ruined. There are some hydrological data from before the war but this is very limited. LHS has identified a need for quarterly reports from the bureau as soon as it starts collecting data. These reports will compile information and communicate this to potential users.

Capacity/competence

Currently LHS has 32 employees, of which 5 are female. 3 of the women are technical staff. Before the war LHS had hydrological measurements at 40 sites all over Liberia, today no sites are being measured. Due to the need for fast reconstruction of the system and start-up of measurements LHS would like to have trained staff deployed at each site. The Bureau wants its employees to get short-term training in Liberia, it does not have sufficient manpower to send people abroad (Wylie, 2010).

LHS has developed a "Three-Year Strategic Plans of Action, 2009-2012" (LHS, 2009). In this strategic plan a SWOT analysis identifies insufficiently trained staff and monitoring equipment as major weaknesses in addition to insufficient logistics, centralization in Monrovia and lack of motivations. To meet these weaknesses LHS has prepared a plan of action for the period involving setup of hydrometric stations, climatic stations, ground- and surface water monitoring and a hydro-information management system. The bureau has also identified its human capacity development needs. LHS seems well prepared for development should it be able to overcome the constraints of lack of funding, lack of trained manpower and lack of motivation.

3.4 Liberia Electricity Corporation

The Liberia Electricity Corporation is a public utility created by an act of legislation in 1973 (GOL, 1973). All its shares are owned by the Republic of Liberia.

LEC's mandate includes:

- Development, generation and transmission of electrical energy,
- Manufacture, construction and installation of electrical equipment,
- Distribution and sale of electrical energy to cities, towns and the public in general and for the carrying out of all business,
- Establishing fair and reasonable rates for the generation, transmission, distribution and sale of electrical energy,
- Manufacture, import, buy electrical equipment of every type
- Acquiring and protecting patents, licenses, concessions,
- Acquiring, building, operating and disposing of lands, buildings, machinery, and
- Entering into, perform and modify contracts, leases agreements or any other transactions with any public or private agency, person, partnership or association.

The statutes state that LEC has perpetual existence and allows the organization to manage all aspects of energy generation, transmission and distribution. It does not grant LEC monopoly but the right to enter into concessionary agreements with any organization for the purpose of providing electrical energy. Currently, LEC is thus the agency allowed to grant concessions with regard to generation, transmission and distribution of electrical energy. LEC has monopoly on transmission.

Existing LEC infrastructure

The current generation capacity in the public LEC-system is 9 x 1 MW diesel generators provided through the Emergency Power Projects I and II (EPP I and EPP II). The generators are installed at three sub-stations; Kru Town (5 MW), Congo Town (2 MW) and Bushrod (2 MW). Two smaller generators previously situated in Paynesville are not in use (Osoro, Jasera, & Gathuru, 2010).

It is expected that 13 additional 1 MW diesel generators will be installed at the Bushrod site by early 2011; 3 generators will be provided through the Gaps project, the other 10 generators are installed through a USAID-funded project.

The Kru Town sub-station supplies the main commercial centre of Monrovia including several large customers such as hotels and large shops. The units in Congotown supply the area from the UN Airport up to the Elwa Gap while the Bushrod generators supplies the Bushrod area northwards up to the St.Paul River Bridge. LEC is currently expanding the distribution eastwards to Tucker Bridge and Somalia drive (Pearce, 2010). The present generators have been running for three years and were not designed as “primary power production units”. With the continuous 24 hours running they are doing today their remaining lifetime will be relatively short.

A 66 kV transmission grid is being constructed through a project funded by EC. It will reconstruct the previous 66kV grid system and associated 22 kV substations (at Bushrod, Sinkor, Capitol and Paynesville). Project installations are expected to be finalized quite soon. The distribution grid consists of both 33 kV and 22 kV grids transforming down to 400 V for customer connections. The majority of connections are in the Krutown area.

Organisation

When MHI entered the company as Management Contractors LEC had some 241 staff employed (LEC, 2010). MHI introduced an additional 10 staff members in key positions and some 18 staff have left the company since MHI entered. Currently, the number of employees is 233 (Mohammad, 2010). LEC is divided into several departments of varying size:

Table 3: LEC departments (LEC, 2010)

Department	Activities	# of empl.
Administrative staff		
MD's office and administration	Management	7
HR Development Department	Staff recruitment and training	7
Procurement/Government Supplies Department	Procurement of supplies	34
Accounts	Bookkeeping, cash management and record keeping	7
Deputy Managing Director office/Technical services		4
Corporate Planning and Dev.		10
Management Internal Control	Internal audit and control	4
Sub-total administrative staff		73
Operational staff		
Loss prevention force	Teams working to prevent tampering with hardware and disconnect illegal connections	51
Warehouse		4
Commercial General	Meter readings, receipt of connection applications and managing connections	13
Commercial Technical	Technical meter issues, linesmen and inspectors	14
Generation		44
Transmission & Distribution		31
New Services	Design for new customers and registry of new customers	11
Sub-total operational staff		168
TOTAL NUMBER OF EMPLOYEES		**241**

The ratio of customers to employees is very low 10.31:1 and the number of administrative staff to operational staff is high with almost one administrative staff per two operational staff. However, staff salaries are very low; the generation and transmission and distribution workers earn between USD 170 -210 per month according to LEC's accounts. Salary costs represent only nine percent of total operating and administrative costs and USD 33 per customer connection.

Management

The Management Contractor has introduced a total of 10 new staff members from MHI into LEC, some of which work in the following key positions (MHI positions in red boxes):

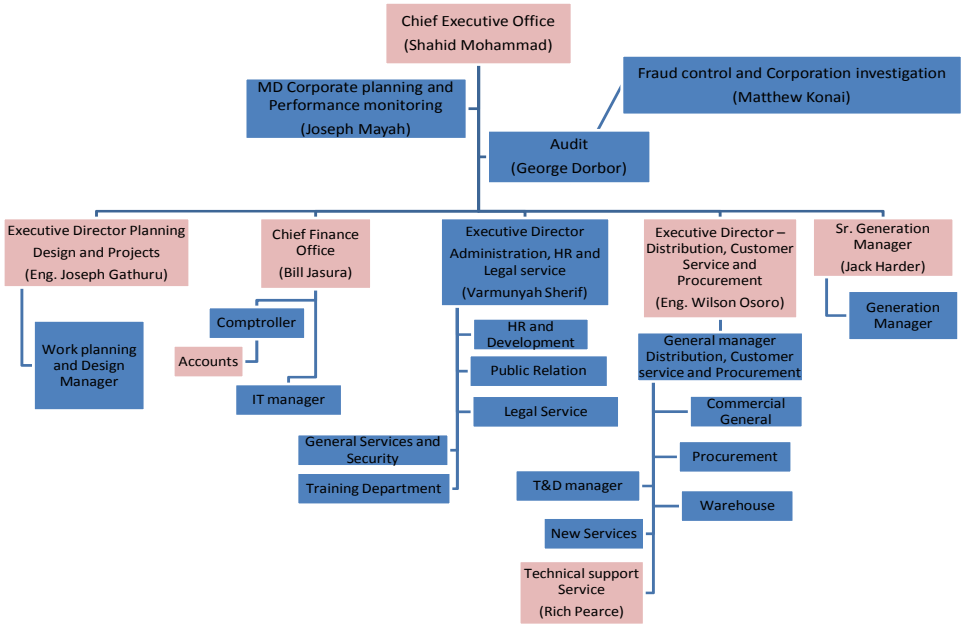

Figure 5: LEC organization (Mohammad, 2010)

Information management systems are nearly non-existing in LEC today. The Accounts Department has the accounting software "*Quick Books"* while the IT Department is using the *"Meter Billing and Collection 2000 (2.0)"* for all metering, billing and collection activities (Sims, 2010).

Capacity and competence

The staff average age is about 48 years, but has according to the staff roster been with the organization less than three years[5] (LEC, 2010). About 43 percent of the employees have either a graduate degree or a vocational certificate and 57 percent have no, or basic compulsory education. 13 out of 233 employees are female.

[5] More than 55 percent of the staff was employed only in 2009.

Table 4: LEC education level

Education level	Male	Female	Total
Graduate academic degree	2	12	22 %
Vocational /Clerical degree	47	1	21 %
High school degree	97	0	42 %
No education or Junior High school degree	10	0	15 %
TOTAL	220	13	100 %

The low education and experience level means that a large number of the workers need training. Those with only a basic degree need hands-on technical training in how to carry out the job; many employees will need re-training in the installation and operation of the new equipment to be used and a number of new positions and roles that have previously not existed in Liberia will be created for which staff will be need to be trained. As a consequence, MHI plans to spend a significant amount of the investment funds on training of both workers and administrative staff during the first year of the project (MHI, 2010). The training and development projects include:

- Creation of a new procurement unit with improved systems for tendering, goods receiving and rejection and contractual matters
- Meter reading skills enhancement,
- Training in distribution system construction and operation
- Increasing competencies in substation maintenance and operation
- generation mechanical skills
- System planning and design skills and
- Training of supervisors.

Cost level of service and tariff

During the first four months as MC the MHI team has supported LEC in steadily increasing its generation output. This has been accompanied with an overall increase in billing of kWh. The graph below shows how generation and billing has increase over the past four months.

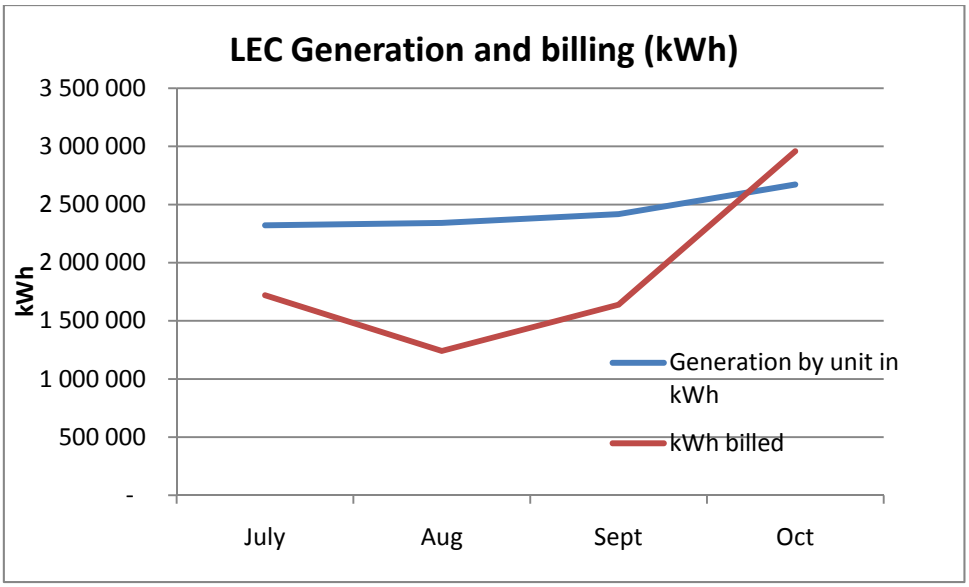

Figure 6: LEC generation and billing

LEC has overhauled its billing system adjusting both for overbilling in some cases and under-billing in other. In July errors equivalent to some 444,000 kWh were charged to customers and in October some 832,000 kWh of previously unbilled energy were billed to the customers. The result was a substantial drop in the collection rate[6] which over the period has average 87% but dropped to 52% for October (LEC, 2010).

Average and marginal cost of electricity for generation and T&D

LEC's current operating costs are summarized in Table 5 below.

Table 5: LEC operating costs (MHI, 2010)

LEC monthly progress report for October 2010	**Total**	**Average cost [USD/kWh] of generation**
Energy production [kWh]	2 672 148	
Energy billed [kWh]	2 959 176	
Energy revenue billed [USD]	1 272 438	0,430
Energy revenue collected [USD]	707 696	
Operating costs		
Generation		
Fuel for generation [USD]	666 595	

[6] Collection rate means total collections during a period of time divided by the total billing in the same period of time

O&M on generation equipment [USD]	5 713	
Lubricants and solvents [USD]	16 280	
Salaries [USD]	9 738	
Other salary expenses [USD]	1 845	
***Sub-total* [USD]**	700 170	0,262
Transmission & Distribution costs		
Maintenance & spare parts [USD]	1 353	
Salaries [USD]	7 875	
Other salary expenses [USD]	4 720	
***Sub-total* [USD]**	13 948	0,005
Operational overheads		
Transport [USD]	22 591	
Salaries [USD]	24 537	
Other [USD]	928	
***Sub-total* [USD]**	48 055	0,018
TOTAL GENERATION, TRANS & DISTR COSTS	762 174	0,285
Administration costs		
Salaries [USD]	41 137	
Other [USD]	73 984	
TOTAL ADMINISTRATION COSTS [USD]	115 121	0,043
TOTAL COSTS [USD]	877 295	0,328

LEC's largest cost by far is that of the diesel to run the generators. The total average operating cost for generation is USD 0.262 per kWh. Transmission and distribution[7] costs are low, USD 0.005 cents per kWh produced.

Overall, the cost to LEC of producing one kWh is equivalent to USD 0.328. The tariff is USD 0.43 which, it would appear, allows for a substantial price premium. However, the costs to LEC of technical and non-technical losses (bills not paid and electricity theft) are equivalent to 11% and 21% of total production respectively. Thus, if these losses did not exist, LEC's revenue would be around 30% more than is it today. Calculated per kWh of generation this represents USD 0.1/kWh which is, in effect the difference between the average cost and the tariff charged.

The world average loss in the electric network system is 8.8% (including both technical and non-technical). In Europe and North America, average network losses are around 7%. (Targosz, 2008) MHI's performance goal states that LEC should achieve technical losses of 5% and non-technical losses of 7% by 2015.

LEC has over the months of July to October attempted to improve its billing system to ensure that customers are billed according to the correct tariff and for the kWh used. This has meant

[7] The department is integrated for the moment and a split into the costs for transmission and distribution respectively is not possible according to LEC.

that some month's bills have been adjusted for previous billing errors. The following table shows LEC's billing and collection rates per month.

	July	Aug	Sept	Oct	Total for the period
Generation by unit in kWh	2 321 005	2 342 260	2 418 199	2 672 148	9 753 612
kWh billed	1 720 683	1 240 682	1 638 743	2 959 176	7 559 283
Energy sales billed ($)	744 689	525 615	693 201	1 272 438	3 235 942
Energy sales bills collected ($)	771 263	666 289	662 777	707 696	2 808 024
Collection rate	104%	127%	96%	56%	87%

The marginal costs associated with LEC's Generation and Transmission and Distribution activities are USD 0.19 and USD 0.007 respectively. The marginal cost of generation is high due to the reliance on diesel as the main variable cost of production. The marginal cost of distribution, on the other hand is slightly higher than the average cost and would represent the price a transmission and distribution provider would be able to charge if the energy sector would be unbundled (in accordance with the NEP). The marginal cost of generation is very high and more in line with the tariffs established in some neighboring countries.

Table 6: Electricity tariffs in other countries[8]

Electricity tariffs in different countries	Price USD/kWh (2010)
Benin	0,20
Ghana	0,11
Guinea	0,02-0,27
Ivory Coast	0,06-0,13
Liberia	0,43
Nigeria	0,06
Sierra Leone	0,44
USA	0,09[9]

If and when the Liberian electricity sector is unbundled, it is expected that part of Liberia's potential for hydropower would be exploited and the marginal cost of generation would drop significantly. The current marginal cost of generation can be seen as the reference price of

[8] Data provided by GtZ Country reports 2009 for Ghana, Guinea, Ivory Coast, Liberia, Nigeria, Sierra Leone and Benin as part of a project called Renewable Energies in West Africa, relating to different tariffs charged to residential and comercial customers.

[9] (US Energy Information Administration, 2010)

generation capacity, if the electricity generation market in Liberia was competitive and based on diesel generation only.

Progress under the Management Contract

MHI has since assuming the leadership of LEC carried out a number of activities:

- Appointed key staff members
- Focused its efforts on several fronts:
  - reducing electricity theft thereby increasing the room to connect new customers and increase revenue
  - improve efficiency and reliability of the power supply
  - cost control to reduce operating expenses
  - review erroneous billing and bill customers correctly.

  These measures will increase the cash flow to LEC which is important in order to be able to connect and service new customers.
- Presented an investment plan
- Presented a financial model for the follow-up of the investment plan and financial situation of LEC.

Financial Performance

LEC's financial situation is challenging with debt to the GOL equivalent to USD 126 million (LEC, 2010) and no capacity to service it. This debt is not represented by any assets in the balance sheet other than a "GOL debt stock", nor did LEC's balance sheet as of August 2010 reflect the true value of its assets as asset management systems were incomplete. The debt of USD 126 million, according to LEC's finance director, most probably represented LEC's operational costs during the past conflict. In order to make LEC a financially sustainable organization, this debt would need to be written off by the government. LEC is under a great financial stress and their creditworthiness is in doubt due to its past performance, its low number of customers and the uncertainty of the conditions of the GOL USD 126 million debt repayment or write off. This constricts them from obtaining commercial loans without external parts guarantees.

The key financial performance indicators for MHI's first year and targets are summarized below:

Table 7: Key financial performance indicators (LEC, 2010)

Performance Indicator	Current (Oct 2010)	Target value	Target date
# of connected customers	2,403	35,403	June 2015
Average operating cost	USD 0.285	USD 0.152	June 2015
Customers : Employees	10,33:1	124:1	June 2015

Tariff	0.43	0.28	June 2015

Until October, MHI had managed to connect only 229 new customers compared to the number of customers connected in July 2010. With a goal of connecting some 10,000 customers in a year, it would appear that LEC needs to substantially step up the connection pace.

Average operating costs (excluding administrative expenses) currently is USD 0.285 with the target value according to MHI's forecasts to be USD 0.152. In order to achieve this, new generation capacity from other types of generation plants will be needed.

The number of customers to employees is expected to increase and if MHI achieves the target value of some 33,000 additional customers by 2015, the current number of employees can be maintained and the target still achieved.

The tariff is also forecasted to decrease. The analysis above has shown that by reducing technical and non technical losses the tariff could be reduced substantially. A reduction of losses to the target value of 12% would allow LEC to reduce tariffs by USD 0.04 which is an important start. The remaining tariff reduction would need to be achieved through cheaper sources of power generation (mainly hydro or bio-mass) and productivity improvements.

Generation

The key performance indicators for generation are listed below

Table 8: Key performance generation indicators (LEC, 2010)

Performance Indicator	Current (Oct 2010)	Target value	Target date
Generation (MWh) per month	2,672	8,800	June 2015
Service quality reliability (SAIFI[10])	6,67		
Service quality reliability (SAIDI[11]) in min/customer	436,78		

During October the generation plants produced some 2,672 MWh and the target value is 8,800 MWh. Achieving this target is dependent on new energy production facilities coming on line as well as new transmission capacity.

[10] System Average Interruption Frequency Index=Total number of customer interruptions/number of customers served.

[11] System Average Interruption Duration Index=Sum of all customer interuption durations/number of customers served.

The indicators for service quality reliability indicate that in October 2010 6.67 out of 100 customers experienced interruptions and that the outages that were experienced lasted a total of 437 minutes (i.e. more than seven hours) per customer.

Customers

Key performance indicators and targets for the customers include the following:

Table 9: Key performance customer indicators (LEC, 2010)

Performance Indicator	Current (Oct 2010)	Target value	Target date
# of connected customers	2,403	35,403	June 2015
Total losses	32%	12%	June 2015
Collection ratio	56 %	98%	June 2015
Quality of service indicators:			
Connection time new customers	45 days		
Average outage repair time	48 hrs		

In October 2010 losses resulting from both technical losses and theft amount to some 32 percent, the bill collection was 56 % of total amounts billed. The following financial losses are extremely high and MHI's strategy to begin by taking a tough stance on stealing by cutting illegal wires is important to establish that stealing and subsequently non-payment of invoices is not allowed. The main culprits of non-payment of invoices are the commercial customers where about half of the connected customers are in default. The aim is to bring the total losses down to 12% by end of the 5 year contract.

MHI has yet to establish the target values for the quality of service indicators.

4 ENERGY ACESS AND USE

The main source underlying the analysis in this section is the End-user Survey carried out as part of the overall baseline study. For a detailed discussion of the methodology, strengths and pitfalls of the survey, see Appendix 1.

4.1 Electricity Access in Monrovia

The current energy situation in Liberia is characterized by a dominance of traditional biomass consumption and low access to poor quality and expensive modern energy services. The generation capacity in Monrovia comprises:

- LEC's generators,
- Public and private organizations' own generators distributing energy for their own purpose. Public organizations with own generation capacity include e.g. hospitals with solar power, ministries with their own generators, private companies with their own generators etc.
- Private enterprises' generators distributing energy to households and other small enterprises on a "local grid" set-up (informally called IPPs in Liberia)
- Private households' own generators.

LEC has a very small number of customers at present and have not managed to increase these substantially over the past four months:

Table 10: LEC customers

Customer type	**July 2010**	**Aug 2010**	**Sept 2010**	**Oct 2010**
Residential	1 004	1 020	1 036	1 096
Commercial	1 038	1 014	1 025	1 171
Government Of Liberia	96	94	95	98
Non Governmental Organisation	19	18	18	21
Other	17	16	16	17
Total Customers	**2 174**	**2 162**	**2 190**	**2 403**

Since LEC connections are so few, individuals solve their electricity need in a number of other manners including illegal connections and sharing power with neighbors. The total number of businesses, households and other organizations that have access to electricity is therefore challenging to estimate.

Data from both end-user survey and census has been used to estimate a total number of connections in Monrovia.

Table 11: Access to electricity

	Population and Housing Census 2008		End-user survey: Household data		Estimated total number of connections	
Households						
Own generator	17,744	8.3 %	100	21 %	~45,000	21 %
Shared generator/LEC	4,934	2.3 %	91[12]	19 %	~41,000	19 %
Other sources of lighting	191,103[13]	89.4 %	287	60 %	~128,000	60 %
Total no of urban households surveyed	213,781	100 %	478	100 %	~214,000	100 %
Institutions (schools)						
Electricity/Own generator			17	47%		
Electricity/Shared generator			2	6%		
LEC connected			2	6%		
Without electricity			15	42%		
Total			36	100%		

In the 2008 Population and Housing Census only 10.6 % of the urban households surveyed used electricity for lighting. Data from the end-user survey show that significantly more households used electricity for lighting (in total some 40% had access to electricity, either shared a generator, had their own or used LEC). However, the end-user survey also showed that 85 % of the owner of their own generator had bought this in the last two years which may account for the increase in generator usage (NORPLAN, 2010).

Assuming that the same percentages currently apply to all households in urban areas of Montserrado would mean an estimated 75-85,000 households use electricity for lighting. This figure is most likely on the high side. Firstly, the end-user survey was carried out in populous areas in the center of Monrovia and the Census data covers also less centralized and even rural areas surrounding Monrovia that are likely to be less populated. In less populated areas with farther between the houses, sharing a generator is more difficult and expensive. However, the calculation above does not take into account the urbanization of Monrovia i.e. the increase in the total number of households as families move from rural areas in the past two years.

[12] ~ 0% of the households surveyed in the end-user survey had LEC power.

[13] Other sources are 1) candle light 2) Kerosene 3) Battery Lamp

Some 19 % of the households are connected to a shared generator, either connected to neighbor's generator or to local mini-grids. These local grids (called IPP-grids in Monrovia) are not formally registered businesses and supply a number of customers from their own diesel generators and small local grids. The electricity lines are often of very low quality, with rickety poles and dangerous installations. Some "IPPs" have relatively large installations, even up to 1 MW and larger. It has not been possible within the scope of this study to estimate the total number of "IPPs" in Monrovia, but it is likely that they in sum are becoming a sizeable provider of electricity.

The Population and Housing Census 2008 does not include data on businesses nor on institutions. The end-user survey carried out as part of this assignment indicated that a high share of businesses and up to 58 % of institutions use electricity for lighting. There are 42 health facilities and 1,351 state and private schools in Montserrado (Sumo, 2010). Data on the number of other institutions (police stations, churches, NGOs, government agencies etc.) has not been accessible. However, bearing in mind that the end-user survey suggests that a very high percentage of businesses and institutions in Monrovia use electricity would suggest that the total number of connections to electric power in Monrovia is somewhere in the range of 80,000 to 100,000.

4.2 Household Baseline Data

Although the household sample was very small (in all 478 out of a total of some 214,000 in urban Montserrado as per the 2008 population census) it is, as pointed out in Appendix 1, fairly representative for the urban population of Monrovia as a whole:

- 37% were 'poor' (in terms of observable physical characteristics of the residence as well as of educational level) – as against 44% of the Census 2008
- 57% were 'middle' – as against 49% of Census 2008
- 6% were 'rich' – as against 7% of Census 2008

Households in Monrovia use energy mainly for lighting and cooking. Typically, households with access to electricity use it for lighting, possibly some other electrical appliances such as charging batteries and ironing, and only for a few hours each evening. The average household size from the end-user survey is 7 persons.

Some 60 % of the surveyed households rely on other sources than electricity for lighting. As many as 40 % use battery LED lamps (the so-called Chinese lamps) that have become very popular over the last few years. Chinese lamps were not even included in the 2008 Household Census.

The market size for household electricity consumption in USD can be estimated based on the calculation of what electricity users currently pay. Accurately estimating the kWh price households pay for non-LEC electricity depends on the type of generator used and the price of fuel.

Anecdotal evidence from households with own generators suggests that the average kWh cost is in the range of USD 1,83 – 4,16, this seems an unlikely high cost. [14]

The most commonly used generators in Monrovia are 0,5-1 kVA diesel generators. These generators have an investment cost of around USD 90-100 and use approximately 0,35 l/USD. This leads to a theoretical electricity cost in the range of 0.5-1 USD/kWh when maintenance costs and losses are included, most likely around 1 USD/kWh considering the amount of maintenance required for these generators.[15] For shared generators/IPPs it is likely that households pay considerably more, 1.5-2.0 USD/kwh, as they normally pay a fixed price unrelated to actual consumption. [16] In comparison LEC charges USD 0,43/kWh.

Table 12: Monthly household spending on electricity (NORPLAN, 2010)

Household spending on electricity	**Monthly household energy expense for lighting (USD)**	**Estimated cost / kWh [USD]**
Own generator	74 USD	0.5-1.0[17]
Shared generator	52 USD	1.5-2.0
LEC grid	-	0.43
Candle	6 USD	
Kerosene/oil	7 USD	
Battery lamp	6 USD	

In theory it should be possible, and from an impact point of view certainly desirable, to calculate the unit cost of lighting (e.g. USD/ kWh for electricity or USD/ lighting hour for other sources of light). However, this would require reliable data on lighting behavior, i.e. how many hours the light sources are used. As noted in the methodology appendix (Appendix 1) all interviews were carried out during daytime for security reasons. Attempts to get reliable answers on lighting use over source had to be given up as it they turned out to be very vague and in many cases obviously erratic. In Appendix1 a proposal is consequently put forward for a small sentinel study, using individual households as diary keepers of lighting behavior.
According to LEC's statistics the average monthly consumer bill is equivalent to USD 196 per month; this appears very high compared to the average spending as reported by households in the end-user survey. A study by LEC on the use of electricity in households where pre-payment

[14] Two examples were available: A household connected to a neighbour's generator paid USD 110 per month for 60 hours of electricity per month. This would result in a cost of USD 1.8/kWh. Another middle income household bought their own generator and had an operating cost of USD 500 per month and used it for four hours each evening resulting in an average cost of USD 4.16/kWh, this seems like an unlikely high cost.
[15] Based on a fuel price of 1,004 USD/kWh, 0,5 kVA Tiger diesel generator
[16] Refer to footnote 14
[17] This is based on the theoretical calculations above

meters[18] have been installed shows the monthly consumption of a household to be 40 kWh per month which generated income to LEC of some 18 USD. This confirms the end-user survey results. Reasons for the high average monthly bill reported by LEC may be that:

- many households with a connection connect their neighbors and act as a mini-local grid
- households connected often also use the electricity in their informal business and therefore spend more
- many connected households are middle-class or moderately rich by Liberian standards or
- the high incidence of electricity theft

Spending on electricity is a variable cost for consumers connected through a pre-payment meter. The family's use can be monitored on a daily basis. Households connected to an unregistered IPP often pay a fixed fee per month for a maximum amount of hours per evening.

The end-user survey shows that 98 % of the households use charcoal for cooking. The monthly average spending is:

Table 13: Charcoal cooking expenses

	Monthly cooking expense[19]
Charcoal	12.4 USD

An estimate of the average household energy spending compared to total expenditure and categorized by estimated wealth of households[20] is shown in

[18] LEC have two systems installed, one in Wroto Town and on on Bushrod Island where custommers connected purchase "scratch cards" at a local vendor registered with LEC. Customers chose the amount they would like to buy electricity for and pay the vendor. The vendor deposits funds collected with LEC.

[19] Currently a bag of coal sells for L$250 - L$275. The weight of the bag will vary due to factors that could be: type of wood used, size of the wood/sticks used, whether the coal is dry or wet, etc.

[20] The household wealth was subjectively categorized by the individual enumerators based on a set of predefined markers such as state of house, furnishing, how children appear, etc.

Table 14 below.

Table 14: Household spending on electricity in relation to total monthly household expenditure (NORPLAN, 2010)

	% of all households surveyed	Total monthly spending	Monthly spending on energy		% of total spending on energy
			Lighting	Cooking	
Rich household	5 %	932 USD	98 USD	17 USD	12 %
Moderatly rich household	58 %	378 USD	33 USD	12 USD	12 %
Poor household[21]	37 %	216 USD	9 USD	12 USD	10 %

In order to get a better grip on *behavior, attitudes and preferences* as regards use and source of lighting, particularly with respect to LEC as electricity supplier, the anthropologist of the Norplan team undertook a limited field study in a medium-to-low income area. The mini-field excursion was carried out between 7 and 10.30 pm, i.e. during darkness (and it certainly was very dark, with no streetlightning). During this time several group discussions were conducted as well as 3 household visited, one of which had access to a shared generator.

Although the findings should not be taken as representative and are in many ways anecdotal, they are nevertheless of some interest.

- First, everyone (men and women) with whom the issue of lighting and electricity was discussed were of the opinion that the best use and first priority of an expanded LEC grid should be on streetlights – for security as well as convencience.
- Second, public supply for households was OK but convictions very strong that corruption would mar the delivery as well as collection of payment. Arranging from private sources seemed to be regarded as safer: you know who you are dealing with ….
- Third, there was a fairly unanimous agreement that women decided on energy use in the households, although less so as regards souce or technology.
- Forth, in this particular area the main desired improvement was in terms of a water supply rather than on electricity. This is likely due to the fact that this was a poor area where lighting was a very high-cost 'luxury'.
- Finally, no one thought that electricity had any relevance as a source for cooking (and most thought kitchen and other household appliances as way beyond their dreams).

[21]With an average household size of 7, the international WB poverty threshold of 1.25 USD per day equals 270 USD per month.

4.3 Social Sector Baseline Data: Education and Health

Reliable electricity supply has documented positive impact on provision of education and health services, both of which currently are at a very low level of quality in Liberia. Below is a short baseline description of the education and health sectors in Monrovia.

Education baseline description

According to the most recent School Directory (2008/09) issued by the Ministry of Education (MoE) there are 1,351 private and public schools in Montserrado county. With all education levels from pre-primary to senior high included, the pupil: teacher ratio is 29.4 (MoE, 2008). The literacy rate in Montserrado (above 10 years of age) is 72% according to the 2008 Census; 81% for men and 66% for women respectively.

Liberia is among the bottom eight countries in the world with respect to gender gap in years of education, and Liberian women have on average less than half the years of schooling of men (UNDP, 2010). The trend is however towards a higher female participation in education and figures from MoE show that 49.6 % of the pupils enrolled in 2008 were female. The end-user survey indicates that 33 % of the pupils currently attending school are female.

53 % of the schools surveyed have electricity supply, mainly from own small generators. The common uses of electricity are for lighting, running computers, printing and photocopying. Schools with electrical access are able to provide sufficient lighting and very often provide evening classes. The end-user survey indicates that 84 % of the schools with electricity provide evening classes. The schools mainly provide adult literacy classes in the evening (71%), and to a smaller degree accelerated learning programs and conventional classes.

The average monthly energy spending for schools with electricity supply is 156 USD.

Table 15: Education baseline indicators (NORPLAN, 2010)

	Total
% of schools with electricity supply[22]	58 %
# of schools with LEC grid connected electricity	43
% of schools offering evening classes	44 %
% of schools with electricity offering evening classes	84 %

Health baseline description

According to the Ministry of Health and Social Welfare (MoHSW) their experience is that health institutions without electricity perform poorly compared to the ones with electricity. The Ministry reports significantly increased immunization rates at electrified facilities, and ob-

[22] Including own or shared generator, IPP grid or LEC grid

serves that the number of home deliveries is constantly reducing with more health facilities being electrified. (MoHSW, 2010)

The most recent Liberia Demographic and Health Survey (DHS) was carried out in 2007 (LISGIS, MoHSW, Macro Intl., 2008). This was the third DHS survey to be held in Liberia, the first two were implemented in 1986 and 1999-2000. The survey data show that several key health indicators have begun to improve. In particular, infant and under-five mortality rates have reduced significantly.

Mother and child health

Infant and child mortality rates are regarded as good indicators to reflect the degree of poverty of the population. In 2007, the infant mortality rate was 72 deaths per 1000 live births, and under-five mortality 111 deaths per 1000 live births (i.e. one in every nine Liberian children die before reaching the age of five). Maternal mortality was high at 994 per 100 000 live births. (LISGIS, MoHSW, Macro Intl., 2008)

According to the MoHSW the number of home deliveries in Liberia is steadily reducing. In 2008, 55 % of all deliveries were done at home while the number for 2009 was 44 %. For 2010 so far this has been further reduced to 40 % (MoHSW, 2010).

Health facility operation and electricity

By end of 2009 there were 550 registered health facilities in Liberia (governmental and private) of which 145 were located in Montserrado county (MoHSW, 2010). Hospitals and health centers are required to have available electricity at all times, and clinics to have sufficient electricity for required services during their opening hours. Clinics are also required to refrigerate vaccines and have an emergency method for nighttime deliveries. MoHSW assesses all health facilities' performance in their annual Accreditation Report, and reports that for 2010 the operational requirements are only met by 36% of clinics, 50% of health centers and 83% of hospitals (throughout Liberia) (MoHSW, 2010).

Significant and measureable effects of having health clinics electrified include:

- Higher immunization rates due to the use of electrical refrigeration instead of kerosene powered refrigerators;
- Less home deliveries by pregnant women in areas close to electrified health clinics.

The Accreditation Report also identifies access to electricity as a key challenge at health facilities. Table 16 shows the primary source of electricity for governmental and private health facilities registered in Montserrado by the end of 2009.

Table 16: Primary source of electricity for health facilities (MoHSW, 2010)

	# of governmental facilities	**# of non-governmental facilities**
None	16	18
Generator	14	84

Solar panels	3	1
Community/ shared power	1	8
TOTAL	34	111

The table shows that 77% of all facilities have access to electricity, but that only 53% of the governmental facilities have access. Of the government facilities, only JFK Hospital is connected to the LEC grid. Figures from the end-user survey support the information from MoHSW and indicate an overall health institution electricity access of 74 %.

Having a primary source of electricity does not ensure a stable access to electricity. 78 % of the governmental facilities in Montserrado with electricity access report that electricity is available at all operating hours, while 86 % of the non-governmental facilities with electricity access report the same.

Table 17: Health baseline indicators

	Total
Infant mortality rate (LISGIS, MoHSW, Macro Intl., 2008)	72/1000
Under 5 mortality rate (LISGIS, MoHSW, Macro Intl., 2008)	111/1000
Maternal mortality rate (per live birth) (MoHSW, 2010)	994/100000
Government health facilities with electricity access (MoHSW, 2010)	53 %
Government health facilities with electricity grid connection (LEC or IPP) (MoHSW, 2010)	3 %
Non-governmental health facilities with electricity supply (MoHSW, 2010)	84 %
Non-governmental health facilities with electricity grid connection (LEC or IPP) (MoHSW, 2010)	7 %
# of reported accidents at Redemption Hospital (per month) (Nyankun, 2010)[23]	486

4.4 Productive Sector Baseline Data: Enterprises

Due to its civil war Liberia experienced a serious economic decline; the Liberian per capital GDP nose-dived during the war from USD 1,269 in 1980 to USD 163 in 2005 (McDougal, 2009). Current GDP per capita is estimated to USD 213 (World Bank, 2010) which puts Liberia in rank nr 162 of 169 countries in the Human Development Index (UNDP, 2010).

[23] Average number of traffic accident cases reported from Jan-July 2010 (includes cars, motorcycles and bikes)

President Johnson-Sirleaf has taken steps to reduce corruption, gain support from international donors and encourage private investments. This has lead to a lifting of embargos on timber and diamond exports, and with it new sources of revenue for the government.

Liberia still has some 75,000 refugees living outside its borders and many citizens fled during the war. There are no statistics available on the number of returnees but many remain abroad and those who have returned have needed re-training.

Recent academic research (McDougal, 2009)[24] as to the effects of the civil war on the business community in Monrovia shows that the civil war has had important effects on local businesses:

- Rising local content in domestically produced goods. The port of Monrovia was often and sporadically over-run by rebels and looted and supply chains deteriorated. Medium-sized companies used low-value raw material bought from local businesspeople in the informal sector.
- The local labor force fled the country or was killed giving rise to high turnover rates. The Liberian elite were given the opportunity to manage when expatriates were evacuated. More women were employed as women (generally) tended to be more free to move around than men. This has meant more women currently doing business than before the war.
- New knowledge of how to process raw materials and use new techniques was gained in response to the lack of imports of raw material and spare parts.

There is little comprehensive statistical data available on the number of enterprises currently in business in Monrovia. Data provided by the Ministry of Commerce and Industry (MCI, 2010) (Kamara, 2010) shows that about 7,000 existing firms have registered in the MCI's business registry over the past two years. Some 3,000 new firms were registered in 2009.

All firms "desiring to become engaged in any form of commercial or industrial activity in Liberia" must be registered with the MCI. Of all firms registered with the MCI between 2008 and 2010, 58 % were sole proprietorships, 34% were corporations and the remaining were partnerships. This data does in itself not provide much information since the total number of firms registered is not known. Both the MCI as well as the Municipality of Monrovia register businesses and cost of registration fee is between LD$ 2000-4000 (USD 30-60). Observations from the end-user survey show that 86 % of the responding enterprises had some sort of visible certificate of business, indicating that their business is formally registered. The Municipality of Monrovia is reportedly more aggressive than MCI in registering new businesses, and send out employees to have informal businesses in the townships "registered". Fewer businesses register with the MCI.

[24] McDougal selected firms in areas that conincide with the planned expansion and connection program by LEC: Bushrod Island to the north, Red Light District and Gardnersville to the east and the Central peninsula of Monrovia. (McDougal, 2009)

Data from the end-user survey sample of 71 enterprises is summarized below. The results cannot be verified as representative for Monrovia, but summary results from this specific sample indicate:

Table 18: Liberian enterprises' spending on electricity

	With electricity access[25]	Monthly spending on electricity	Company sale last month
Entreprise <3 employees	78 %	52 USD	428 USD
Entreprise 3-10 employees	83 %	363 USD	4239 USD

The end-user survey further indicates 80 % of the sample enterprises with electricity access and > 10 employees had purchased their generator the last 2 years. Only 32 % of the small enterprises respond that last month's sale was better than the same month last year.

Five larger enterprises were interviewed on a case by case basis in the Bushrod Island commercial area. The main results from these targeted interviews are:

Table 19: Electricity spending large enterprises (NORPLAN, 2010)

	Type of business	**Electricity used for**	**Current power supply**	**Monthly cost of electricity**
Company 1	Dealer vehicles	Lighting, AC, mechanical equipments	Own generators (3 with total capacity 135 kVA)	2,440 USD
Company 2	Dealer building materials	Lighting, AC, mechanical equipments	Own generators (2 with total capacity 350 kVA)	10,500 USD
Company 3	Cold storage of fish	Lighting, cooling/ freezing, mechanical equipment	Own generators (6 with total capacity 935 kVA)	N.A.
Company 4	Bank	Lighting, AC, office equipment	Own generators (2 with total capacity 290 kVA)	8,820 USD
Company 5	Private medical clinic	Lighting and medical equipment	IPP connection	2,800 USD

All the interviewed large companies would have shifted to LEC power if given the opportunity. Reliability and cost of services were the main arguments.

The pre-war Liberian electrical system was based on the American style with 110-220 Volts and 60 Hz. Since most of the grid and electrical equipment were destroyed during the war, the EPP-

[25] Including LEC grid, own or shared generator/ IPP grid

programme implemented the European style 230-380 Volt and 50 Hz system. However, there are still quite a few large establishments fitted with 60 Hz equipment and many of these are unable to finance a conversion of their equipment to 50 Hz, thus are unlikely to connect to the LEC system. Examples of such large potential end-users are the brewery, the Coca-Cola factory, rubber plantations, Cemco and Iron ore plants (Pearce, 2010).[26]

4.5 Cross-cutting Issues

HIV/Aids

The HIV/Aids prevalence in West Africa is much lower than in southern Africa, nevertheless the subregion is home to several serious national epidemics. Today it is estimated that some 35,000 people in Liberia live with HIV, the majority living in urban areas. The estimated adult prevalence rate is 1,7% (WHO/UNAIDS, 2008). The HIV prevalence among young women aged 15-24 is about three times higher than that of young men. (UNAIDS, 2010)

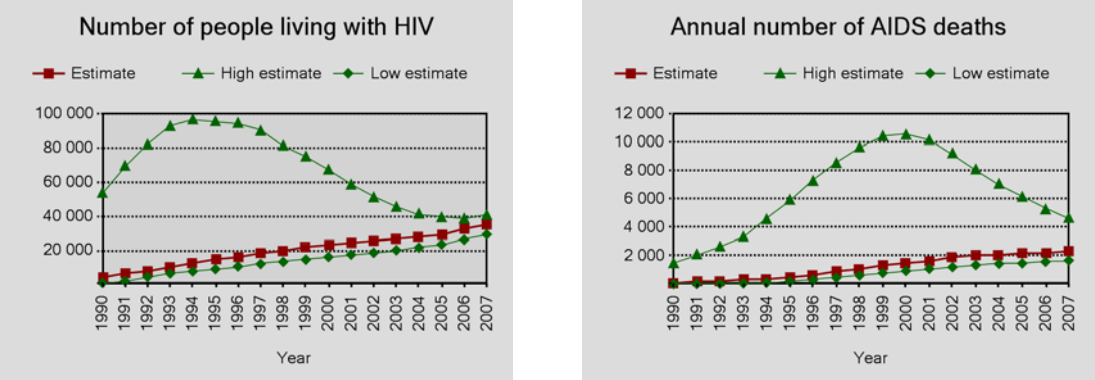

Figure 7: Number of people living with HIV and annual number of AIDS deaths (WHO/UNAIDS, 2008)

The "*Agenda for accelerating country actions for women, girls, gender equality and HIV*" was launched by the President Johnson-Sirleaf in October 2010 in cooperation with UNAIDS and UNICEF. This national roadmap aims to strengthen data collection and analysis on the impact of the HIV epidemic on women and girls in Liberia and to contribute to broader efforts to stop gender based violence. (UNAIDS, 2010)

Corruption

Transparency International's "corruption perception index" measures the perceived levels of public sector corruption in the world. Liberia has climbed rapidly on the ranking the last years, probably thanks to a range of anti-corruption measures introduced by President Sirleaf's Gov-

[26]Efforts made to contact larger enterprises or institutions for interviews turned out to be very difficult. This was not only due to difficulties in finding time for a meeting, but also because of low interest on the part of these companies. The main reason is probably that they are more or less self-sufficient in their electrical supply (generators) and do not wish to discuss their cost structures with outsiders.

ernment. In 2007 the country ranked 150 out of 179 countries, while in 2010 they appeared as number 87 out of 178 countries, a huge improvement.

The energy sector is generally a prime target for and a source of corruption. In Liberia's energy sector there have been several large scale corruption allegations recently, showing the need for efforts to reduce corruption. Transparency in decision and accounting methods and improved effectiveness in the legal system may improve the situation.

PART 2: RESULTS MANAGEMENT AND MONITORING

5 RESULTS BASED MANAGEMENT METHODOLOGY

5.1 Results matrices

A Results Based Management methodology for the Norwegian support programme has been developed with results matrices for all projects. The results matrices include planned impacts, outcomes, outputs and a comprehensive number of revised indicators, both qualitative and quantitative. As all four programme components (projects) contribute towards the same long-term objectives an overall matrix has been developed. It covers medium to long-term results that are not directly attributable to one specific project but a consequence of all the projects combined. The structure of the matrices is illustrated in Figure 8 below.

The result matrices for the Norwegian supported energy programme are presented in Appendix 2. The matrices are identical to the ones presented in the Inception report (NORPLAN, 2010) apart from matrix M1 where one more outcome has been included: *M1OC8 Improved gender balance in energy sector*.

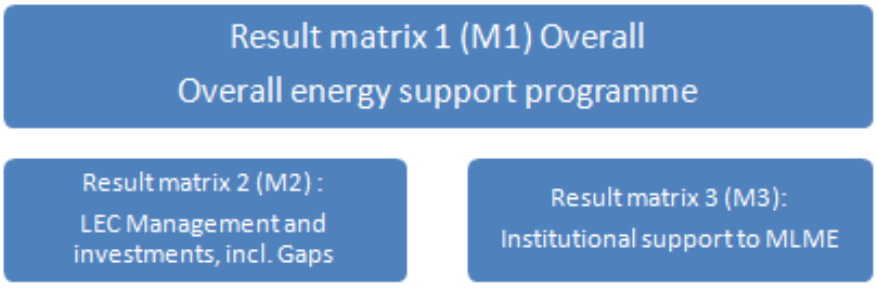

Figure 8: Proposed structure of result matrices for the Norwegian energy sector support to Liberia

5.2 List of indicators

Indicators should be as simple, measurable, achievable, realistic and time-bound as possible. For the monitoring system a particular focus was placed on the outcome level.

The list of indicators presented in the Inception report was a comprehensive list including all indicators deemed relevant. A revised list has now been prepared based on discussions with organizations and assessment of data sources in Liberia. As the indicators will be used for monitoring, reporting and evaluation purposes it is very important that the data is easily available and with high quality.

The list of indicators has been divided into 4 parts according to the result matrices:

1) **Matrix M1 overall – OC I**: presents indicators on outcome (OC) and impact (I) level

For the overall matrix output indicators have not been identified as it was deemed more relevant to monitor the implementation of programme components on project level.

2) **Matrix M2 Gap, MC LEC, Investments –OP OC**: presents indicators on output (OP) and outcome level

   For Matrix 2 outputs have been identified, but only LEC management and Investment outputs (OP7-OP14) have been assigned indicators. As the Gaps-project is about to be finalized it was not deemed relevant to develop indicators for monitoring this project.

3) **Matrix M3 MLME – OP**: presents indicators on output level

   On the output level the initial matrix included quite a few outputs and indicators. To simplify the monitoring an emphasis has been placed on reducing the number of indicators.

4) **Matrix M3 MLME – OC and I**: presents indicators on outcome and impact level

   Most of the impact indicators have been changed from quantitative to qualitative. These indicators are not proposed for monitoring purposes, they are intended for impact assessments after project finalization.

   On the outcome level the indicators and their targets were thoroughly discussed in a workshop with MLME, LHS and RREA representatives in September 2010. The indicators were adjusted accordingly.

5.3 Data availability and quality

The main challenge for result monitoring in Liberia is the availability of reliable data. In general there is a lack of statistics, and the existing data are not necessarily accessible. The availability of data has been assessed and discussed with possible data sources.

On the overall level the reliability of data is questionable. The existing systems and databases lack information, and the international data (WB, UN, etc.) are mostly based on estimates. The quality of available data will probably improve during the support period, and hopefully the estimates for 2010 might be corrected accordingly.

Where there has been a lack of appropriate data the team has strived to come up with alternative indicators to monitor the progress of the projects. Some indicators have been kept in the system even if a baseline value was not found, in the hope that the data will become available. As a result of these assessments the number of indicators has been reduced. The result monitoring and reporting should be easier and give a more realistic picture with these changes.

6 MONITORING

The results-based monitoring and reporting system is based on some key principles:

- Information on results should be available both at the top and at the bottom of the organization
- What information is needed at each level should be identified
- Responsibility for data needs to be identified, more specifically what data is collected, how it is collected, the frequency with which is it collected and by who.

6.1 Monitoring in MLME

Current overall reporting on results in MLME is limited to the Annual Report. Although the NEP establishes the responsibilities of the MLME with regard to energy reorganization has not yet taken place; the MLME does not grant concessions, there is no regulatory board and the Energy Act is yet to be passed. MLME has not yet begun the work of preparing an Energy Master Plan, which is expected to provide a road map and goals to achieve. Before such a document with agreement on goals exists, reporting and monitoring is ineffective.

Current monitoring of energy related activities within the MLME is limited to:

- Monthly operational report are prepared by each department head and sent to the Minister. These are not kept or recorded and were not made available to the team.
- Monthly attendance reports (recording the time employees spend working) is prepared by the HR dept.
- Annual reporting on activities by each department. These are sent to the planning department that compiles them into the Annual Report.
- The department of planning prepares two-, three- and five year training plans
- Annual budgets are prepared by each department and submitted to the Assistant Minister's office. The Assistant Minister consolidates the budget and submits it to the Government. About 10% of what was requested is usually granted.
- The Annual Report provides a list of activities carried out during the year without any reference to goals, outputs or agreed results. Under the section "Department of Energy" there is a table listing actions to be carried out during the year, progress and completion rate. The table lists only actions, not outputs or expected results but is nevertheless a first attempt at monitoring.

There is limited feedback to staff (other than department heads) on achievements. Department heads have regular meetings with the Minister and the Assistant Minister, however regular reviews of performance do not form part of a standard agenda for the regular (monthly) meetings.

Outcome Monitoring and Reporting System for MLME, LHS and RREA

The key indicators for outcome and impact have been identified in several workshops. As mentioned in Chapter 3.1 MLME's DoE, the RREA and the LHS prepared a SWOT analysis for the challenges facing the DoE in April 2009 (DoE, 2009). In August 2010 the outcome indicators for the MLME-NVE Institution Building project were discussed in a workshop facilitated by the

team and attended by the DoE, Department of Planning and the Assistant Minister for Energy as well as the directors of the LHS and RREA. During this workshop targets were established for each of the outcomes of the Institutional Development project.

The proposed monitoring system for MLME is presented in the following table. It is based on Matrix 3: *RBM-matrix for Institutional cooperation – outcomes and impacts* (attached in Appendix 3). The system should enable NVE and MLME to focus and structure their cooperation program, adjusting activities and plans as deemed necessary. Reporting of results will go to the GON as well, describing clearly the progress, changes and delays in achieving the targets.

In addition to reporting on the outcome level we have included two indicators on output level into the monitoring system. These are found under outcome 7: Increased female participation in the energy sector; management, project implementation and policy making. The importance of this outcome has been emphasized from Norad's and MoFA's side, and to ensure the focus on gender issues we suggest monitoring the implementation of the planned bi-annual meetings targeted at women and the support set aside for women led initiatives.

Monitoring System for MLME, LHS and RREA						
Indicator for Outcomes	**Target (2015)[27]**	**What data (Source)**	**Frequency**	**How (Method)**	**Who collects (Responsible)**	**Where is the data reported**
Outcome 1: Proposed new and/or revised laws and regulations are approved		Same as indicator				At the Performance Review Meetings (see below)
Number of law proposals approved	1 (3 chapters[28])		Annually	Verification from Minister and official gazette	Assistant Minister's office	
Technical regulations approved	4[29]			Verification from licensing and concession unit within DoE		
Administrative regulations approved	Restructuring MLME					
Licensing procedures approved	4[30]					
Outcome 2: Reasonable professional level and knowledge of staff at DoE and other relevant agencies						
% of DoE positions filled (and training performed) according to staffing plans[31]	100 % of Bureau and unit heads 50% of staff[32]		Bi-annually	Head of department verifies existing staff against the staffing plan	Head of DoE	
% of LHS positions filled according to staffing plans	Staffed according to LHS strategic plan[33]			Director verifies existing staff against the staffing plan	Director of LHS	
% of RREA positions filled according to staffing	100% of man-			Director verifies existing staff	Director of RREA	

[27] As established at a workshop in August 2010.
[28] It is the responsibility of the DoE, RREA and LHS to draft three sections of the law that will relate to energy, electricity and renewable energy.
[29] Four regulations: on IPP generation, Grid, Renewable Energy and Hydrological data
[30] Four licensing procedures regarding IPPs, Distribution, licensing in rural areas and accreditation of NGOs
[31] The staffing plans of the MLME are on two levels – capacity of Ministry compared to pre-war level, technical staff compared to pre-war level)
[32] Would like to have job descriptions / ToRs for their jobs
[33] LHS would like NVE to help them modify the plan

Monitoring System for MLME, LHS and RREA						
Indicator for Outcomes	**Target (2015)[27]**	**What data (Source)**	**Frequency**	**How (Method)**	**Who collects (Responsible)**	**Where is the data reported**
plans	agement			against the staffing plan		
Outcome 3: Investment environment conductive to increased private sector involvement						
% of power produced by IPPs	50%		Bi-annually	Data collected from each IPP on generation[34]. Data collected from T&D operator on energy from different IPP transmitted.	Head of DoE (in the future the Director of Energy)	
Outcome 4: Increased power production at affordable cost from renewable energy sources						
% Reduction of cost of LEC provided electricity (for end-user)	40%		Quarterly	MHI shares monthly progress reports with MLME through which the two key indicators are extracted	Head of DoE (in the future the Director of Energy)	
% of energy produced from renewable energy sources (by regulated power producers)	50%		Bi-annually	Data collected from each IPP on generation (see Outcome 3 above).		
Outcome 5: Reliable hydrological data and analyses available to external users						
% increase in number of external users provided with hydrological data	Progressive increase35		Quarterly	Director of LHS prepares the Annual and Quarterly Reports	Director of LHS	
Number of reports provided each year	1 annual 4 quarterly					
Outcome 6: Improved access to modern energy services in rural areas						

[34] Data collected from IPPs: ”Monthly generation by unit in kWh”. Data collected from T&D operator: ”kWh fed into the grid”.

[35] The workshop participants agreed that they would not put a target on this as there is no data provided this year. A progressive increase is expected when they start collecting data

Monitoring System for MLME, LHS and RREA						
Indicator for Outcomes	**Target (2015)[27]**	**What data (Source)**	**Frequency**	**How (Method)**	**Who collects (Responsible)**	**Where is the data reported**
Number of rural households provided with electricity through BoAE/RREA projects	100,000		Bi-annually	RREA project managers collect data through review of project progress reports.	Director of RREA	
Outcome 7: Increased female participation in the energy sector; management, project implementation and policy making						
% of women in DoE management (unit heads or above)	30%		Bi-annually	Head of DoE collects data	Head of DoE	
% of female staff in DoE	40%					
% of female staff in LHS (technical staff)	15%			Director collects data	Director of LHS	
% of female staff in RREA	40%			Director collects data	Director of RREA	
Biannual workshops targeting women			Bi-annually	Head of DoE collects data	Head of DoE	
Size of support to women led initiatives	100,000 per year		Bi-annually	Head of TAP team collects data	Head of TAP team	
Outcome 8: Energy Regulatory Board/Agency established						
Energy Regulatory Board/Agency established	Yes		Once during the 5-year period	Verification from Minister and official gazette	Assistant Minister's office	

Proposed meeting schedule

It is proposed that the DoE, LHS and RREA hold quarterly meetings during the first year with a pre-established agenda: Performance Review Meetings. Subsequent years of the project these meetings can be held bi-annually. The agenda for the meetings should be as follows:

- Meeting attendance
- Chairman and secretary is appointed
- Review of progress against targets using the result matrix named M3 MLME OC I (Appendix 2).
    - Each person responsible reports on the current value of the outcome indicator and describes progress since the last meeting.
- Next steps for the next meeting are agreed. These should include
    - Activities to carry out and persons responsible
    - Risk identification: Which are the risks that this action/decision is not implemented?
    - Risk mitigating actions: What can be done to mitigate the risk?

It is important that "Next Steps" are written down and agreed during the meeting. Minutes from the meeting should be circulated to all attendees within a week of the meeting. It is also important that the meeting secretary (responsible for taking notes during the meeting and recording it) is changed from one institution to another.

Proposed evaluation schedule

With regard to evaluations, it is proposed that both a mid-term and final evaluation of the Institutional Support Programme is carried out, and the final evaluation must be done by external consultants. These evaluations should focus on achievement of the impact indicators.

With regard to evaluations it is important that:

- The management and staff firmly establish dates for the start of the evaluation, finalization of the evaluation and the time needed to discuss and follow-up on findings.
- That the evaluation is budgeted for
- That the Terms of Reference are widely circulated beforehand.

The evaluations should:

- Result in an action plan
- Be made public
- Focus on expected impacts for the project
- Help MLME, RREA and LHS to rethink or refocus problem areas
- Identify emerging risks to impact achievement

Risks to achievement of outcomes

An analysis of the main risks to the Institutional Cooperation Project show that there are several important and possibly contentious decisions that need to be taken in order for the Institutional Cooperation Project to kick-off:

Outcome 1: there is a high[36] and significant[37] risk that the NEP is not translated into an Energy Law or that the Law is delayed. There are currently several stakeholders vying to influence the energy sector reform process. Without a new Energy Law in force the MLME cannot begin its restructuring process, the regulation of the sector is not carried out nor is licensing of IPPs. This may seriously hamper development of generation and transmission capacity in the sector and achievement of outcomes and impacts. There are, at the moment, few risk mitigating actions that the MLME can take.

Outcomes 3, 4 and 8: Without a legal framework, technical and licensing regulations in place and without an Energy Regulator, the responsibility for licensing of IPPs is unclear and this process may be hampered. The goal of un-bundling the generation and transmission grid and allowing new types of energy production may thus not be achieved. This is another issue that rests with the GOL and is outside the MLME's direct control.

6.2 Outcome Monitoring in LEC

Current monitoring in LEC is regular (monthly) and detailed covering financial, commercial and operational aspects. It closely follows the Management Contract and includes a summary with key performance indicators covering collection rates, operating cost per unit sold, generation cost per unit sold and customers per employee.

Reports from each generation unit (Bushrod, Congo Town, Kru Town and Paynesville) form the basis for operational data. Automated operational data is complied into reports by the Generation and the Transmission and Distribution departments. The summary of operational performance is presented in the Monthly Performance Report.

Financial information is recorded on a daily basis through the accounting system and monitored monthly when MHI produces unaudited financial statements and financial key ratios for the Monthly progress report sent to the donors. The chief finance officer is responsible for compiling the Monthly Progress Report.

Commercial data on customers, billing, and customers in default is carried by several departments: the IT department maintains a database of all connected customers, the commercial department of billing to the various customers and those in default and the finance department compiles all the data in the report and the key ratios.

[36] High= very likely to occur.
[37] Significant = with a large impact on the project/outcome.

The draft Monthly Progress Report is sent to MHI in Canada for quality checking before submission to the donors. All the key performance indicators for the Monthly Progress report are recorded in an excel spread sheet. Summary of department accounts are in separate excel files. The narrative part of the Monthly Performance Report provides explanations of activities during the period, challenges and problems.

MHI have clearly outlined responsibilities for monitoring with MHI staff collecting and compiling the data. However, this process appears to be isolated to the MHI staff at the moment and LEC employees appear not to be party to the overall performance. Nor are the performance results shared in the organization. The study team recommends that performance/ achievements are shared with the staff.

The current system for monitoring output indicators within LEC:

- is clearly functioning well as it produces the data needed to measure the indicators,
- has responsibilities for collection clearly defined,
- has both automated and manual data collection methods that are functioning
- are produced with a regular frequency
- and is reported to donors on a monthly basis.

Proposed system for monitoring of outcome indicators for the Management Contract

MHI are focused on the delivery of outputs and compliance with the Management Contract. Some of the outcome indicators are therefore not included in the Monthly Performance Reports.

The following monitoring of outcome indicators is suggested:

Monitoring System for Outcomes Indicators for the Management Contract						
Indicator for Outcomes	**Target (2015)**	**What data (Source)**	**Frequency**	**How (Method)**	**Who collects (Responsible)**	**Where is the data reported**
Outcome 1: Substantially increased access to affordable and reliable energy services in Monrovia						
# of connections: Residential	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: Commercial	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: GOL	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: NGO	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: Public Corporation	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: LEC	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: Tax Exempt	-	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
# of connections: total	35,403 by 2015	Customer database	Monthly	Collect from customer database	MHI	Monthly Performance Report
SAIDI	-		Monthly	Collect from customer database	MHI	Monthly Performance Report
SAIFI	-		Monthly	Collect from customer database	MHI	Monthly Performance Report
Electricity tariff	0,28		Monthly	Collect from customer database	MHI	Monthly Performance Report
Outcome 2: LEC established as a substantially strengthened and competent institution						

Monitoring System for Outcomes Indicators for the Management Contract						
Indicator for Outcomes	**Target (2015)**	**What data (Source)**	**Frequency**	**How (Method)**	**Who collects (Responsible)**	**Where is the data reported**
Customer:employee ratio (effective staffing)	124:1	Customer database and personnel roster	Monthly	Collect from commercial department and HRDD	Chief Financial Officer	Monthly Performance Report
Inhabitants perception of the quality and availability of energy services		Customer Poll	Annually	Annual poll of randomly and statistically relevant sample carried out	New services	Annual report
Skills in planning, design, procurement, project management and documentation within LEC, particularly among senior managers	100% of senior managers attended training in planning, design, procurement, project management and documentation.	HR training plan and follow-up reports	Annually	Training courses offered and attendance rosters	HR dept	Annual report
Outcome 3: Reduced cost of electricity (LEC expenses / kWh sold)						
Operational cost (USD/unit sold)	0.152	Financial accounts	Monthly	Calculation of key ratio	Chief financial officer	Monthly Performance Report
Outcome 4: LEC established as a financially sustainable institution						
Revenue> fixed+variable costs in a financial year	Net Profit	Annual accounts	Annually	Annual accounts	Chief financial officer	Annually
External audit approved	External Audit without issues raised	Audited account	Annually	Audited financial accounts	Chief financial officers	Annually

Risks to the Achievement of outcomes

The main risk that all three outcomes depend upon is that the increase in the number of paying customers does not occur. This would significantly impact LEC's financial viability with costs remaining high and poor development on the revenue side. Operational costs would per unit sold are currently high and depend on the high variable cost of the diesel used to run the generators.

Another important risk is that the projections made by MHI regarding revenue are substantially overstated bearing in mind the actual and estimated electricity consumption of residential customers. Currently, the average residential customer uses some 450 kWh per month and are billed USD 196. However, the end user survey as well as evidence from LEC's pre-payment meters program suggests that household consumption is far below that; between kWh 20-40 per month. MHI has in its projections assumed that new residential customers will use some kWh 110 per month (MHI, 2010).

Household spending on electricity	**Monthly household energy consumption (kWh)**
LEC average bill (Oct 2010)	444
Own generator	120
Shared generator	60
LEC pre-paid meter customers	40
MHI Financial projections	110

Considering the fact that LEC will focus mainly on connecting poor households it is important that the projections regarding revenues are as accurate as possible.

MHI is carefully monitoring the performance data as required by the Management Contract and will thereby be able to assess progress against the goals. MHI have also established annual sub-goals for key indicators such as number of connections, customers to employee ratios and other operational ratios which is one measure to monitor progress and assess the risks of not achieving these.

7 IMPACT EVALUATION OF THE OVERALL PROGRAM

To measure impact indicators for all parts of the program, the team suggests an external evaluation. The main reasons for this is that

- the different stakeholders involved in implementation i.e. Reznate Development Ltd, MHI, LEC, MLME, RREA and LHS, NVE and other all have their commitments established in contracts and terms of references and there is limited room for additional evaluations of this type.
- the data collected to be able to measure achievement of impact indicators would need to be collected from other sources than the above mentioned stakeholders, such as other ministries, LISGIS, other donors etc.
- the impartiality of the evaluator and his/her ability to collect analyze and verify statistical data must be unquestionable.
- the report may be used by a wide audience such as the Liberian government and other international agencies and the quality of the data and analysis must therefore not be questioned.

The team proposes that both a mid-term and a full-scale final evaluation be carried out. The mid-term evaluation should

- aim at assessing, firstly, progress against the impact indicators and secondly, outcome indicators;
- gauge the availability of statistical data to measure impact;
- identify emerging risks to impact achievement;
- help LEC, MLME, RREA and LHS to rethink or refocus problem areas;
- result in an action plan for the implementing agencies as well as for the donors.

The final evaluation should include a cost-benefit analysis (CBA), a draft ToR for such a CBA is attached as Appendix 4. If no reliable statistical data exists the evaluation should also include an end-user survey in Monrovia to assess the impact indicators.

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APPENDICES

A1 Methodology

A2 Result Matrices

A3 Baseline data

A4 ToR for CBA

A5 ToR for this study

APPENDIX 1:

METHODOLOGY

Content of Appendix 1: Methodology

A1-1: A note on the methodology of data collection

A1-2: Questionnaire Phase 1

A1-3: Questionnaire Phase 2

A1-4: Copy of the practical field guide

A1-1: A note on the methodology of data collection

A. The end-user survey

The methodology of the end-user survey was based on three considerations[1].

- It should allow for a cost-benefit analysis (CBA) as well as impact evaluation of the interventions at the conclusion of the programme
- It should as far as possible be representative across the socio-economic, demographic and economic urban Monrovia
- It should provide baseline information on key indicators of output and results of the programme

A basic constraint faced by the survey was the paucity of available data that would allow for a more rigorous design – in terms of sampling as well as in terms of framing the questionnaire. The only systematic data available was the population Census of 2008 (referring to 2007) which, although comprehensive in providing key demographic and socio-economic profiles of households in Monrovia lacked any information of electrification. Furthermore, there was no systematic information on private sector entities or on social service institutions (public or private) that would enable prior considerations of representativeness of a sample.

Given the meager data situation it was decided to carry out the survey in two phases. The first phase had as its basic objective to generate data:

(a) at household level that would make it possible to compare the first operational sample with the socio-economic profiles of the Census 2008, in order to make possible a complementary purposive sample in the second phase so as to make the survey representative for Monrovia as a whole;

(b) to explore the characteristics and distribution of private enterprises and service institutions and again make more focal and purposive sample in the second phase; and

(c) on the basis of responses of phase 1 add/delete questions in the questionnaire, particularly with respect to CBA-related issues, to enhance the relevance of the survey[2].

The two questionnaires are attached, with the differences between the two marked in bold italics (see Appendices 1-2 and 1-3).

Organization and design of the survey

The local team and division of responsibilities

Centre for Sustainable Energy Technology (CSET), a Liberian consultant group with previous experience from the energy sector and surveys, was identified through consultations with

[1] For the initial approach, see the Inception Report section 3.4

[2] It should be stressed that only deletions and additions in the questionnaire were included in the second phase as the two phases would otherwise not be statistically compatible

international references, including the World Bank. CSET was contracted to carry out the end-user survey in Monrovia, with one member of the international team providing standing guidance and supervision. CSET provided a team of 9 persons of which 3 were women.

The team members and their respective roles were as follows[3]:

Code	Name	Role	Contact
CSET-1	Hady G. Sharif	Team leader	mhadys@yahoo.com
CSET-2	Wellington G. Suomie	Field coordinator	wellingg@yahoo.com
CSET-3	Georsay Z. Stevens	Enumerator	georsay11@yahoo.com
CSET-4	Jonathan B. Gardener	Enumerator	Jbgardner65@yahoo.com
CSET-5	J. Foley Pusaly II	Enumarator	Jfpusah2@yahoo.com
CSET-6	Zeko G. Meaka	Enumerator	zekomeaka@yahoo.com
CSET-7	Marlene K. Tokpa	Enumerator	marlenetokpa@yahoo.com
CSET-8	Freeman	Office coordinator	
CSET-9	Osel Y.C.Z. Williams	Office coordinator II	

Team leader: Overall responsibility for the data collection. Liaison with Norplan. Ensure that the planned methodology is implemented and deadlines are met. Quality assurance of the process. Contact with NORPLAN team.

Office coordinator: Responsible for practical execution of the survey in accordance with the methodology, numbering and quality assurance/ archiving of filled questionnaires. Keep track of number and category of respondents interviewed. Contact with NORPLAN team.

Office coordinator II: Entering of data into the database on a daily basis and share results with NORPLAN twice a week.

Field coordinator/ spokesperson: One per field team/ per sample area. Day-to-day field coordination. Spokesperson on behalf of the field unit and resource person in the field, responsible for the formal introduction to local authorities when needed. Provide the office team with practical information for executing the survey in accordance with the planned methodology.

*Enumerators***:** Carry out interviews in the selected areas and liaise closely with the coordinators.

Training of the survey team

A training program was held the first week of the survey to establish a common understanding in the team of the work to be carried out.

Training day 1: Public holiday, short day. Introduction of team members, overall project objectives and end-user survey.

Training day 2: Full day training. Introduction to the data collection process (how to select localities and respondents, how to conduct the interview, etc.). Presentation of draft questionnaire and mock internal rounds of interviews to ensure that all questions are understood and unambiguous. This process led to a revised questionnaire.

[3] The names and contact details are included to make possible a follow-up survey.

Training day 3: Field testing - short discussions with full team on revised questionnaire, data collection in Larkpase to test interviewing, questionnaires and implementation routines. Debrief at the end of the day, quality check of questionnaires and test of office routines. Review of the field testing led to limited modifications resulting in a final questionnaire for phase 1.

As an integral part (and outcome) of the training and field testing of the instruments a practical field guideline was finalized to guide the team and its individual members during the implementation of the survey (appended as Appendix 1-4).

Time of field survey and interviews

The survey was carried out in two phases, the first from August 24 to August 31 and the second from September 20 to September 24. We do not know to what extent this particular time period affected the content or profile of individual responses (e.g. in terms of energy consumption). However, it was noted that the immediate preceding days of the first phase coincided with the payment of school fees, which is likely to have increased its importance when asking for information on the overall domestic expenditure pattern.

The actual interviews were carried out from 10 am until 4 pm during work days (with some exceptions for the larger enterprises and institutions that scheduled their own availability). None of the questionnaires were canvassed when it was dark, mainly for security reasons. This also means that there was a limited chance to make direct observations of electricity use.

For a follow-up survey it is *recommended* that the same time period and the same canvassing schedule is maintained.

Quality assurance

Quality assurance was primarily carried out at two levels: the *survey/field work*, and the *data entry.*

(a) Throughout the survey process routine debriefings were held reviewing performance and experience from each of the surveyed communities. The emphasis on these debriefings were on identifying inconsistencies in data collected, due either to differences between interviewers (understanding, behavior, diligence) or to respondents/responses – and to deal with these inconsistencies before the data were recorded electronically. A key reference point during these recurrent debriefings/reviews was the practical field guide that had evolved as part of the initial training and field testing (see above).

During phase 2 daily reviews were held between the CSET team and a member of the international team. Apart from providing a platform for standing quality control these daily reviews focused on discussing the practical experience and approach to the two most difficult categories of respondents: private enterprise and social service institutions. With the benefit of hindsight it is also clear that the field work as well as data entry were completed in

time mainly due to the close interaction on site between a member of the NORPLAN team and the local survey team.

(b) It was originally intended that the data entries should be done with one day's time-lag in relation to the actual data collection in the field. For various reasons this turned out to be unrealistic. The data entry into the pre-designed spreadsheet formats[4] was only initiated at the end of the first phase of data collection, leaving a lag of more than 2 weeks between phase 1 and phase 2.
The key identifiers of the data entry, based on the actual hard copies of the individual questionnaires, are
- Interviewer – to allow comparison and possible (systematic) differences within the survey team itself. This in turn resulted in a number of cross-checks as well as post-survey verification checks between Oslo and Monrovia
- Community and location/road within community – to allow for an assessment of spread of actual sample and for future replication of the survey

It should be stressed that in line with international practice (particularly as regards conflict and post-conflict contexts)[5] the individual respondents – be they households, enterprises or institutions – cannot be derived from the hard copies of the questionnaires or from the electronically generated data base.

Sampling

As a first step three communities were selected based on their inclusion in the planned interventions[6]. In addition one community not included in the short to medium plans (Larkpase) was chosen as a 'control community'.

The selected communities were:

1. Larkpase, located on the northern side of James Springs Payne Airfield. It is currently not electrified by LEC, and it is not scheduled to be connected in the coming 5 year period. It can be characterised as a mainly poor to middle income residential area with a central and busy market/commercial street. The poorest households are located in the area bordering the wetland.

2. Clara Town, located on the south-western end of Bushrod Island, off the UN Drive. The LEC grid runs through the community, and some customers along the main line have been connected. The community is scheduled to be connected in the coming 5 year period. The community is characterized by mainly larger retail and trade businesses along UN Drive, and poor to middle income residential area off UN Drive. The poorer households are located in the area closest to the river.

[4] The formats were designed by Norplan/Oslo in MS Excel.
[5] See for example the Council of American Survey Research Organizations: Code of Standards and Ethics for Survey Research (1998)
[6] The communities are to be understood as 'townhoods' within Monrovia proper. In total there are 16 such communities and the sample therefore constitutes 25% of the total number of urban communities in Monrovia

3. New Georgia, located on the eastern side of Somalia Drive. The community is currently not connected to the LEC grid, but is scheduled to be connected in the coming 5 year period. New Georgia is mainly a poor to middle income residential area.

4. Sinkor, one of the more central communities of Monrovia, located between Capitol Hill and JFK Hospital. The community is partly connected to the LEC grid, and is scheduled to have substantially more connections in the coming 5 year period. The community can be characterized as a mixed business and middle income residential area.

Figure A1-1: Selected sample areas

All communities had some form of scattered supply through usually private sources of electricity. In each community streets were selected based on the physical layout as well as consultation with local informants so that both major thoroughfares as well as backyard streets were covered. In each selected street the ground floor[7] occupant of every 4th house was interviewed, irrespective of whether it was a private residence or an institution/enterprise. As it turned out the dropout rate was very low, less that 4%, and primarily due to non-availability of respondent. The target for phase 1 was

[7] The bulk of the houses covered by this survey (92%) only had one floor.

set at 400 households and as many enterprises and social service institutions as were to be found[8]. The resulting number of households of phase 1 was 397 along with 25 institutions and 41 private enterprises.

In order to facilitate a follow-up survey (mid-term and/ or end of project) satellite images[9] are inserted below with the selected areas/ streets marked in yellow. The maps could also allow for an assessment of changes in construction, layout etc. at the time of a follow-up survey.

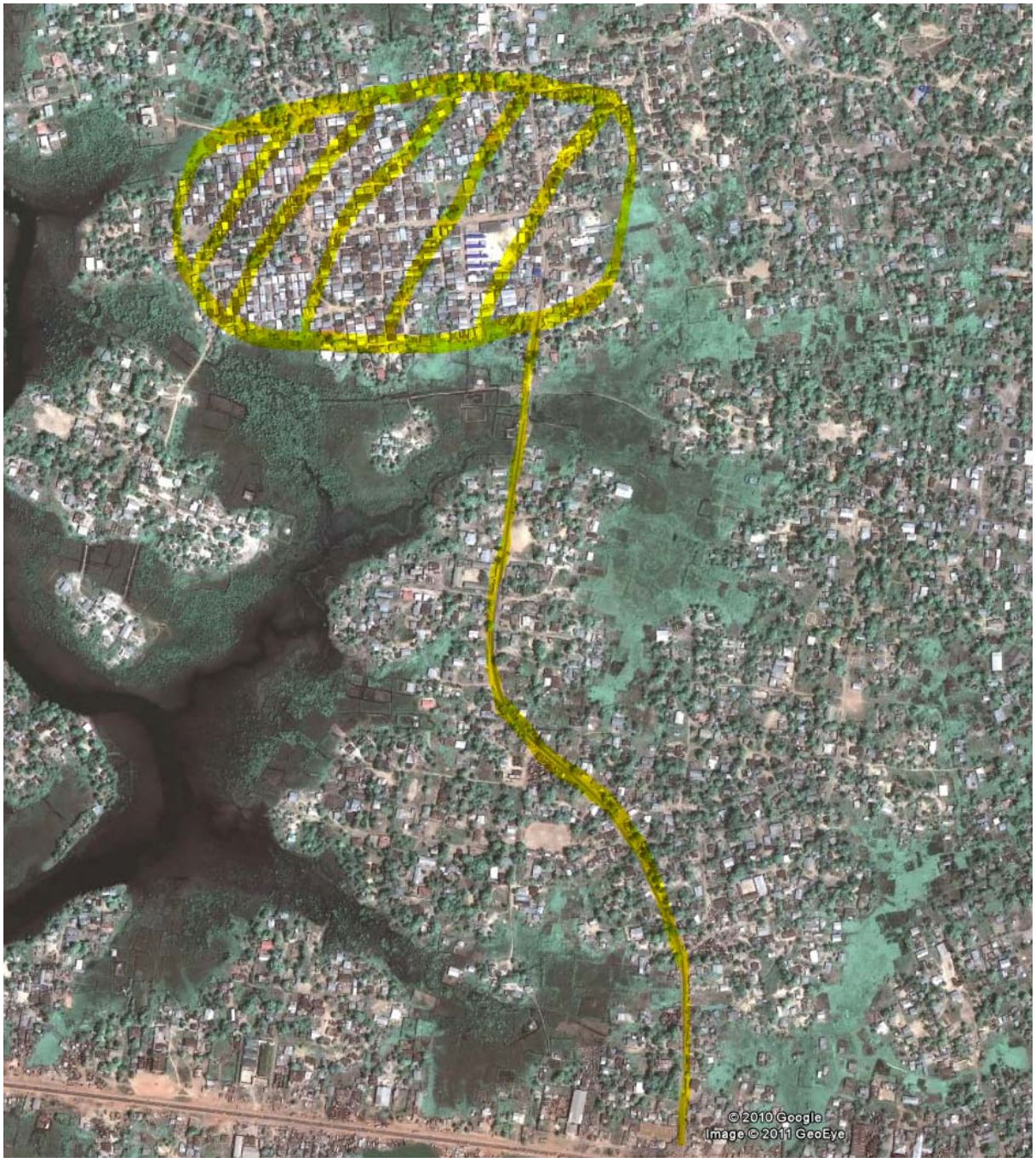

Figure A1-2: New Georgia Estate area and streets

[8] Again it should be emphasized that there was no prior information available on the number and location of enterprises or institutions.
[9] The images are taken from Google Maps and are dated 2011.

Figure A1-3: Clara Town area and streets, off UN Drive

Figure A1-4: Sinkor area and streets

Figure A1-5: Larkpase area and streets

At the community level it was difficult to determine either ex ante or ex post how representative the selected four are in terms of the overall Monrovia/urban Montserrado situation (apart from 3 of them being included in the short/medium plans of the Norad assisted interventions, and the 4th being a 'control' community). In terms of demography the combined survey sample of all the 4 communities tallies well with the overall urban profile of the 2008 Census[10]. Similarly, in terms of household profiles the four selected communities can statistically be regarded as representative of the range of communities making up urban Montserrado. However, due to the lack of corresponding prior information on distribution of enterprises as well as social service institutions it is very difficult to state to what extent the survey sample (at community as well as unit/respondent level) aligns with the overall Monrovia/urban Montserrado pattern. We are, however, confident that the survey generated information on SMEs as well as SSIs that is representative in overall terms for urban Montserrado/Monrovia even if this may not be true in terms of the individual communities.

[10] It should be mentioned that the communities do not entirely match the units on which the Census is based, even if the overlap is considerable. The reason for opting for the community/'townships' as units for this survey is that these are the planning units of the planned interventions and are also the local administrative and political units.

When the result of phase 1 was reviewed it was found that it corresponded well with the Census 2008 as regards ***households***, using both visual observations with respect to such indirect socio-economic parameters as type of construction/flooring/roofing and nature of water supply as well as educational parameters and size of households. The main difference was in source of lighting – which reflected the very rapid increase in the use during the recent 2-3 years of so-called 'chinese lamps' (battery driven neon-lights) instead of candles.

However, in order to enhance the policy relevance of the survey it was decided that phase 2 should target more poor (and to some extent rich households), using primarily the visually determined parameters as those used during phase 1 (and in the Census 2008). The sample method was the same as for phase 1 – i.e. every 4th house – although the streets covered were more purposefully selected in terms of observable socio-economic characteristics (type of construction, flooring, roofing etc). As a result phase 2 came to include 81 households out of which 60 (74%) were characterized as 'poor' (against 29% of the random sample of phase 1), resulting in a total sample of 478 households of which

- 37% were 'poor' (in terms of physical characteristics of the residence as well as of educational level) – as against 44% of the Census 2008
- 57% were 'middle' – as against 49% of Census 2008
- 6% were 'rich' – as against 7% of Census 2008

This allows for a reasonable projection for Monrovia as a whole at the household level of the survey results.

With respect to ***social service institutions*** the situation is very different – primarily because of lack of overall data onto which to project the findings. During phase 1 a total of 25 institutions were reviewed, the bulk being educational (72%). In order to provide a better policy spread phase 2 included a purposive sample of that laid more stress on health facilities and other social centers such as religious institutions and community centers. As a result the total sample (phase 1&2) comprised

- Educational institutions (incl crèches): 32
- Vocational training centres: 1
- Health institutions: 9
- Other (police stations, townhalls, religious institutions): 11

Given the fact that these are spread over 4 communities we believe that this provides a representative sample – even if overall data on which to project it is lacking. However, as will be further discussed below the data provided gives more a picture of *variation* than of representativeness.

Private enterprise comprises the most varied group – methodologically as well as in terms of representativeness. The first challenge of the survey was that of moving away from the dominant groups of 'service' and 'trade' – both of which are low in terms of energy consumption, even if they are omnipresent in an urban economy like that of Monrovia. The first phase included 43 respondents in this category (and no manufacturing/processing units), the bulk being very small businesses. As a result it was decided to purposively include 'manufacturing/processing' in the second phase in order to explore the determinants of the more energy-intensive private sector units. As a result the total sample (phase 1&2) comprises

- 11 manufacturing/processing units
- 41 service units
- 20 trade units

This is the most uncertain of all the categories included in the end-user survey. This is not only because of lack of overall data onto which to project the results. More importantly it is a case of non-(or partial-) disclosure of information. Very few of the businesses interviewed were able/willing to provide information.

In addition to the above a total of 5 large institutions and private enterprises were interviewed on a case by case basis. The quality of the information given is similarly very varied, and there is little ground for taking the information provided as anything but cases.

Main challenges and problems faced during the survey

In carrying out the survey the team was face by a number of problems, some of which also affected the quality and reliability of the data generated.

(a) The foremost problem was the lack of prior information on which to base the sample. This was particularly so as regards the number and location of enterprises as well as social service institutions (including public/private schools and health facilities). Some information could be gained from key informants in the selected communities, but this was more indicative than 'hard' data.

It may be that within the foreseeable future more systematic data will be compiled by government agencies and/or through NGOs etc. However, at the moment this does not seem a likely priority of GOL. In addition, the urban scenario is changing rapidly – in terms of demography as well as in terms of infrastructure and economic activities. For a later follow-up survey it is therefore *recommended* that this should be undertaken in the same locales and along the same streets as those included in this survey.

(b) Interview skills and consistency in filling up the questionnaires. In spite of extensive training and standing supervision by both international team members and CSET management it was clear that the consistency and quality of data entered varied over enumerators. This in turn necessitated a very time-consuming and complicated review of the data generated by each enumerator. Although we believe that in the end the post-survey interaction between the Norplan team and the CSET managed to correct most of the data, there is still an element of uncertainty, particularly as regards economic data (see below).

(c) Interview fatigue. One of the problems encountered was that this survey was but one of a sequence of surveys in the areas selected. Many of these surveys had been carried out by NGOs in connection with project implementation. As they apparently also implicitly or explicitly included promises of goods and services that never or only erratically materialized many respondents were rather lukewarm in their interest in this survey. Again, to what extent this influenced the quality of the data generated is difficult to say, but a consistency

check across different localities suggests that this was not a serious issue – except to delay the implementation of the survey.

It is *recommended* that the planning for follow-up survey is started at least 2-3 months in advance, including a visit by an international team member to identify concluded as well as ongoing and planned surveys in the study area. This would also make possible a better economy of scale as well as scope of the follow-up survey.

(d) Data entry in electronic format. For various reasons the data entry of the filled up questionnaires did not start until well beyond the conclusion of the first phase interviews (even if some trial entries were supervised by one member of the international team). This meant that the entries were undertaken by the local team on its own, with little or no supervision or quality control, and then sent on to Oslo for review and analysis. The outcome of this was a very difficult process of quality control that should have been possible to launch in Monrovia itself had the entry been done on a running basis with a one day time lag from the actual interviews. This would also have enabled a more focused daily debriefing with the team as whole.

It is strongly *recommended* that a future follow-up survey should make sure that the data entry is organized in such a way as to have each day's crop of questionnaire entered the day after in order to enable a running review of the quality and profile of the information.

It is furthermore *recommended* that the data of the present survey is entered into a database (e.g. SPCS) with a preformatted design, and that it is made available to all interested parties for their own manipulation and use.

Reliability of the data

As noted above, we are convinced that the household data is largely reliable as well as representative for urban Montserrado as a whole. The main exception is the economic data, an almost universal feature of surveys of this kind. Even so, we do not think that the latter data is not useful (or useable), but they should be interpreted as medians within a range of +/- 10%.

As regards enterprises the reliability is no doubt less across the board – again particularly as regards economic data. In addition, the scale of operation measured in such terms as workers and/or employees should be used with some caution (e.g. family members not included, informal inputs etc). One of the reasons for scaling up the sample of enterprises (and institutions) during phase 2 was to have a larger total – allowing for a better statistical manipulation as well as for a sheer 'equalization of errors'.

Finally, as regards social service institutions the main uncertainty, apart from the ubiquitous one of economic data, is in the scale of service – as measured by pupils, patients, visitors etc. This was frequently hard to come by, and reliability of the information varied also markedly over enumerators.

Main weaknesses of the survey outcome and *Sentinel Study*

Most of the problems and weak spots of the survey and its outcomes have been discussed above, e.g. the data on the user economics, the uncertainties pertaining to the enterprise and institutional data (including the span of enterprises and institutions over types of main activities), the need for constant guidance and hands-on supervision of local enumerators, etc. We have in respect of most of these tried to identify ways by which the implementation of a follow-up survey can be improved.

In addition, one of the foremost difficulties in any survey of this type is to generate information on behavioral and attitudinal patterns. This is all the more serious as it is this, rather than shifts in frequencies and distribution of one-off answers or observations that will provide much of the explanatory power required both for a CBA and a later impact assessment.

We therefore propose that a limited 'sentinel study' should be launched whereby a limited number of carefully selected households (e.g. 15-20) and wherever possible also some SMEs and smaller strategic social service providers are brought onboard as diary keepers of

- Daily use of energy by source and purpose
- Problems faced in energy supply and use
- Expenditure on key domestic requirements, with an emphasis on energy and lighting.

The participants will then be requested, against a small fee, to maintain a dairy for one week every month during a 6 month period. This information will then be collected and compiled by a person associated with the project (although not an official), for example by a member of the CSET team. The information gained will then be presented at semi-annual review or management meeting, and be stored as an input to the forthcoming CBA and mid-term/end of project assessment, prior to which a similar 6 month sentinel study should be carried out to record changes in consumer behavior and attitudes.

The cost for such a study is very small and is estimated not to exceed USD 2.000 (excluding a possible home-based input/support by an independent international expert to the tune of 1 week/study period).

B. Data collection and review

In addition to performing an end-user survey baseline data was gathered from a number of sources, both primary and secondary. The following arranged meetings were held with potential holders of information:

Person	Position	Organization	When
Shahid Mohammad	CEO	LEC (MHI)	25.aug
Beuford Weeks	Assistant Minister for Energy	MLME	25.aug
Rufus Tarnue	Director Hydrocarbons	MLME	25.aug
Felix Morlu	Assistant Minister Dept. Of Planning and Development	MLME	26.aug

John Nylander	Deputy Minister Administration	MLME	26.aug
Ernest Jones	Deputy Minister for Operations	MLME	26.aug
Augustus Guanoue	Director	RREA	27.aug
Keith Marsland	Senior Contractor	Reznate	27.aug
Bill Jasera	Finance	LEC (MHI)	30.aug
Wilson Osoro	Generation	LEC (MHI)	30.aug
Joseph Gathuru	Executive Director Planning Design & Projects	LEC (MHI)	30.aug
Philip Freeman	Customer service	LEC	30.aug
Ivan Sims	Information	LEC	30.aug
Sylvester Massaquoi	Director Alternative Energy	MLME	30.aug
Edward Konneh	Research officer Altenative Energy	MLME	30.aug
Jefferson Wylie	Director	LHS	30.aug
Edward Liberty	Director General	LISGIS	30.aug
Abu Kamara	Director of Domestic Trade	MCI	31.aug
Benjamin Sumo	Information dept.	Ministry of Education	31.aug
Jan Schiere	EU representative	Ministry of Education	31.aug
	Director of Planning	MoHSW	31.aug
Francis Cooper	Chairman of the Board	LEC	01.sep
David Sairay	Director of Administration	Redemption Hospital	01.sep
Eddie Nyankun	Director of Records	Redemption Hospital	01.sep
Lisa Earls	Social service Director	JFK Hospital	02.sep
Eugene Shannon	Minister	MLME	02.sep
Kristin Stroup	Project manager	WB	03.sep

The collection and review of statistical data mainly followed the described approach in Chapter 3.3 of the Inception report (NORPLAN, 2010). In addition a workshop was held as described below.

C. **Workshop MLME**

To provide ownership for project outcomes of the Institutional cooperation NVE-MLME a workshop was held. The workshop was facilitated by the team and attended by the DoE, Department of Planning (MLME) and the Assistant Minister for Energy (MLME), as well as the directors of LHS and RREA. During this workshop targets were established for each of the outcomes of the Institutional Development project (see Appendix 3 Baseline data).

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

Questionnaire number:

Date of interview: …..... (day) …..... (month) ……..... (year)

Code name interviewer:

Name of community:

House no:

What is the type of interviewed unit?

Household ☐ **Go to A below**
Public institution ☐ **Go to B below**
Private enterprise ☐ **Go to C below**
Other (describe): ……

A HOUSEHOLD

A1 OBSERVATIONS (*to be filled in by interviewer*)

a Nature of roofing

1 Concrete ☐
2 Tiles or asbestos ☐
3 Corrugated metal sheets ☐
4 Other (tarpaulin, thatch etc) ☐

b Flooring

1 Earth / cowdung ☐
2 Concrete, cement ☐
3 Other (specify): ……

c Observable electricity source

1 Connection to LEC grid ☐
2 Connection to shared generator ☐
3 Own generator ☐
4 None ☐
5 Other (specify): ……..

d Estimated wealth of the household?

(Use indicators such as house, TV, motorcycle, furnishing, state of repairs, how children appear, etc.)

1 Rich ☐
2 Moderately rich ☐
3 Poor ☐

e Sex of the interviewee

1 Male ☐
2 Female ☐

A2 GENERAL QUESTIONS *(to be asked by the interviewer)*

a Status of interviewee

1 Household head ☐
2 Partner of the household head ☐
3 Other (specify): ……..

b How long have you lived here? ☐ *Enter number of years*

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

c **Do you:**

1 own your house/residence? ☐
2 rent your house/residence? ☐

d **What is your age?** ☐ *Enter age*

e **What is the highest class in school you (or other permanent member of household) attended?**

1 Never attended school ☐
2 Elementary School ☐
3 Junior High School ☐
4 Senior High School ☐
5 Higher ☐

f **What is the household's main source of income?** *MORE THAN ONE ANSWER IS POSSIBLE*

1 Agriculture ☐
2 Own business ☐
3 Paid employment ☐
4 Other (specify): ……

g **Expenditure profile** *(TAKE TIME TO DISCUSS IN FRIENDLY MANNER!!!)*

How much were the household expenses during last month for *(specify currency)*

1 Health care: ……
2 Education/ school fees: ……
3 Food: ……
4 Energy/ fuel (all sources) : ……
5 Consumables (clothes, etc): ……
6 Rent/ loans: ……
7 Other (specify): ……

h **Size of household, specify number of**

1 Adults of 18 years or older ☐
2 Adolescents 13-17 years ☐
3 Children 5-12 years ☐
4 Infants less than 5 years ☐

i **How do you compare the overall economic situation of the HOUSEHOLD with one year ago?**

1 Much worse now ☐
2 A little worse now ☐
3 Same ☐
4 A little better now ☐
5 Much better now ☐
6 Don't know ☐

j **How do you compare the overall economic situation of the COMMUNITY with one year ago?**

1 Much worse ☐
2 A little worse ☐
3 Same ☐
4 A little better ☐
5 Much better ☐
6 Don't know/ Not applicable ☐

k **How does this household compare with the others in this COMMUNITY?**

1 Much worse ☐
2 A little worse ☐
3 Same ☐
4 A little better ☐
5 Much better ☐
6 Don't know/ Not applicable ☐

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

A3 AMENITIES QUESTIONS

a **What is the household's main source of <u>light</u> at night?** *(Plse verify visually if possible)*

1 Own generator ☐
2 Shared generator ☐
3 Electricity from LEC grid ☐
4 Candle ☐
5 Oil/ kerosene lamp ☐
6 Battery lamp (chinees lamps) ☐
7 Other ☐

8 What is the weekly cost of fuel for lighting (Lib $): ……..…… *(Take time to discuss)*

b **What is the household's main source for <u>cooking</u>?** *(Plse verify visually if possible)*

1 Own generator ☐
2 Shared generator ☐
3 Electricity from LEC grid ☐
4 Gas ☐
5 Kerosene ☐
6 Charcoal ☐
7 Wood ☐

8 What is the weekly cost of fuel for cooking (Lib $): …… *(Take time to discuss!!)*

c **If own generator, please specify:**

1 Size (Watt): ……..
2 Year purchased: ……..
3 Cost *(specify currency)* ……..
4 How many neighbours are connected to your generator: ……..

d **What are the main advantages of your present energy supply?**

1 Predictable supply ☐
2 Predictable costs ☐
3 Other (specify): ……

e **What are the main disadvantages of your present energy supply?**

1 Erratic performance/production ☐
2 Costs ☐
3 Other (specify): ……

f **What is the main source of drinking water of your household?**

1 Private piped water ☐
2 Piped water on neighbour's ☐
3 Piped water on Community Supply ☐
4 Water sellers ☐
5 Public well (protected) ☐
6 Public well (un-protected) ☐
7 Private well (protected) ☐
8 Private well (un-protected) ☐
9 Spring (protected) ☐
10 Spring (un-protected) ☐
11 River, Dam, Lake etc. ☐
12 Other (*specify):* ……

g **Do you pay for water?**

1 Yes ☐
2 No ☐

h **If yes, how much do you pay for water?**

1 ☐ Monthly fixed rate of ……
2 ☐ Volume rate of …….
3 Other (specify): ……

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

B PUBLIC INSTITUTIONS

B1 OBSERVATIONS *(to be filled in by interviewer)*

a **Nature of establishment:** …… (e.g. townhall, police, school, courthouse, health facility, kindergarden)

b **If school, specify type:** …… (e.g. elementary, high, vocational, other)

c **Type of construction**

1 Separate building ☐
2 Part of commercial complex ☐
3 Part of residential unit ☐

d **Nature of construction**

1 Cement blocks ☐
2 Bricks ☐
3 Wood ☐
4 Mud/makeshift ☐
5 Other (specify): ……

e **Observable electricity source**

1 Connection to outside grid ☐
2 Own generator ☐
3 Shared generator ☐
4 None ☐
5 Other (specify): ……

f **Position of interviewee**

1 Senior manager ☐
2 Senior administrator ☐
3 Other (specify): ……

g **Sex of interviewee**

1 Female ☐
2 Male ☐

B2 GENERAL QUESTIONS *(to be asked by the interviewer)*

a **Number of employees** (specify)

1 Total: ☐
2 Female: ☐

b **Average number of beneficiaries/ service users/ visitors per month?**
(e.g. number of students, church visitiors, patients to clinic, etc.)
Specify number and category: ……

c **Main source of finance**

1 Government ☐
2 Fees ☐
3 Mixed ☐
4 Donations ☐
5 Other (specify): ……..

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

d **Present electricity source**

1 LEC grid ☐
2 Own generator ☐
3 Shared generator ☐
5 Other (specify): ……..

e **Energy cost last month** *(specify currency)*

1 Fuel: ……..
2 Electricity bills: ……..
3 Other: ……..

f **How stable is your energy demad over the year?**

1 Very stable ☐
2 Seasonably varying ☐
3 Determined by workload ☐

g **If own generator, please specify:**

1 Size (Watt): ……..
2 Year purchased: ……..
3 Cost *(specify currency)* : ……..
4 How many neighbours are connected to your generator: ……..

h **What are the main advantages of your present energy supply?**

1 Predictable supply ☐
2 Predictable costs ☐
3 Other (specify): ……..

i **What are the main disadvantages of your present energy supply?**

1 Erratic performance/production ☐
2 Costs ☐
3 Other (specify): ……

If school:

j **Does the school offer night classes?**

1 Yes ☐
2 No ☐

k **Does the school use computers to register students?**

1 Yes ☐
2 No ☐

If health clinic:

l **Does the health clinic offer night-time services?**

1 Yes ☐
2 No ☐

m **Does the health clinic have vaccine refrigerator?**

1 Yes ☐
2 No ☐

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

C PRIVATE ENTERPRISE

C1 OBSERVATIONS *(to be filled in by interviewer)*

a Nature of enterprise

1 Manufacturing ☐ Specify nature of products: ……
2 Service ☐ Specify nature of service: ……
3 Trade ☐ Specify nature of trade: ……

b Is the entreprise formally registered with Ministry of Commerce or other authority *(registration certificate visible)*

Yes ☐
No ☐

c Type of construction

1 Separate building ☐
2 Part of commercial complex ☐
3 Part of residential unit ☐

d Nature of construction

1 Cement blocks ☐
2 Bricks ☐
3 Wood ☐
4 Mud/makeshift ☐

e Observable electricity source

1 Connection to outside grid ☐
2 Own generator ☐
3 Shared generator ☐
None ☐
4 Other (specify): ……

f Position of interviewee

1 Senior manager ☐
2 Senior administrator ☐
3 Other (specify): ……

g Sex of interviewee

1 Male ☐
2 Female ☐

C2 General Questions *(to be asked by the interviewer)*

a Economic data

1 How much were your company sales last month *(specify currency)*: ……
2 Were sales last month better than the month before?

Yes ☐
No ☐

3 Were sales last month better than the same month one year ago?

Yes ☐
No ☐

Appendix A1-2: Questionnaire Baseline End-user Survey, PHASE 1

b **Employees**

1 Number of emloyees: ……

2 Number of female employees: ……..

c **Present electricity source**

1 LEC grid ☐

2 Own generator ☐

3 Shared generator ☐

4 Mixed ☐

5 Other (specify): ……

d **Energy cost last month** (*specify currency)*

1 Fuel: ……..

2 Electricity bills: ……..

3 Other: ……

e **If own generator, please specify:**

1 Size (Watt): ……..

2 Year purchased: ……..

3 Cost *(specify currency)* : ……..

4 How many neighbours are connected to your generator: ……..

f **How stable is your energy demad over the year?**

1 Very stable ☐

2 Seasonably varying ☐

3 Determined by workload ☐

g **What are the main advantages of your present energy supply?**

1 Predictable supply ☐

2 Predictable costs ☐

3 Other (specify): ……

h **What are the main disadvantages of your present energy supply?**

1 Erratic performance/production ☐

2 Costs ☐

3 Other (specify): ……

D Interviewer's observations

Write here your general observations about

(a) the interview itself (e.g. required prompting, interference by male if woman respondent, ease of interview, etc.)

(b) the household (e.g. general condition such as orderliness, sanitary condition, TV, AC, motorcycle, etc)

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

Questionnaire number:

Date of interview: …..... (day) …..... (month) ……..... (year)

Code name interviewer:

Name of community:

House no:

What is the type of interviewed unit?

Household ☐ **Go to A below**
Public institution ☐ **Go to B below *(Note: both govt and not-for profit inst)***
Private enterprise ☐ **Go to C below**
Other (describe): ……

A HOUSEHOLD

A1 OBSERVATIONS (*to be filled in by interviewer*)

a Nature of roofing

1 Concrete ☐
2 Tiles or asbestos ☐
3 Corrugated metal sheets ☐
4 Other (tarpaulin, thatch etc) ☐

b Flooring

1 Earth / cowdung ☐
2 Concrete, cement ☐
3 Other (specify): ……

c Observable electricity source

1 Connection to LEC grid ☐
2 Connection to shared generator ☐
3 Own generator ☐
4 None ☐
5 Other (specify): ……..

d Estimated wealth of the household?

(Use indicators such as house, TV, motorcycle, furnishing, state of repairs, how children appear, etc.)

1 Rich ☐
2 Moderately rich ☐
3 Poor ☐

e Sex of the interviewee

1 Male ☐
2 Female ☐

A2 GENERAL QUESTIONS *(to be asked by the interviewer)*

a Status of interviewee

1 Household head ☐
2 Partner of the household head ☐
3 Other (specify): ……..

b How long have you lived here? ☐ *Enter number of years*

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

c **Do you:**

1 own your house/residence? ☐
2 rent your house/residence? ☐

d **What is your age?** ☐ *Enter age*

e **What is the highest class in school you (or other permanent member of household) attended?**

1 Never attended school ☐
2 Elementary School ☐
3 Junior High School ☐
4 Senior High School ☐
5 Higher ☐

f **What is the household's main source of income?** *MORE THAN ONE ANSWER IS POSSIBLE*

1 Agriculture ☐
2 Own business ☐
3 Paid employment ☐
4 Other (specify): ……

g **Expenditure profile** *(TAKE TIME TO DISCUSS IN FRIENDLY MANNER!!!)*

How much were the household expenses during last month for *(specify currency)*

1 Health care: ……
2 Education/ school fees: ……
3 Food: ……
4 Energy/ fuel (all sources) : ……
5 Consumables (clothes, etc): ……
6 Rent/ loans: ……
7 Other (specify): ……

h **Size of household, specify number of**

1 Adults of 18 years or older ☐
2 Adolescents 13-17 years ☐
3 Children 5-12 years ☐
4 Infants less than 5 years ☐

i **How do you compare the overall economic situation of the HOUSEHOLD with one year ago?**

1 Much worse now ☐
2 A little worse now ☐
3 Same ☐
4 A little better now ☐
5 Much better now ☐
6 Don't know ☐

j **How do you compare the overall economic situation of the COMMUNITY with one year ago?**

1 Much worse ☐
2 A little worse ☐
3 Same ☐
4 A little better ☐
5 Much better ☐
6 Don't know/ Not applicable ☐

k **How does this household compare with the others in this COMMUNITY?**

1 Much worse ☐
2 A little worse ☐
3 Same ☐
4 A little better ☐
5 Much better ☐
6 Don't know/ Not applicable ☐

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

A3 AMENITIES QUESTIONS

a **What is the household's main source of <u>light</u> at night?** *(Plse verify visually if possible)*

1 Own generator ☐
2 Shared generator ☐
3 Electricity from LEC grid ☐
4 Candle ☐
5 Oil/ kerosene lamp ☐
6 Battery lamp (chinees lamps) ☐
7 Other ☐
8 How many hours of light/24 hrs ☐

9 What is the weekly cost for lighting (Lib $): …….. *(Take time to discuss)*

of wich generator fuel:
batteries:
candles:
oil/kerosene:
other:

b **What is the household's main source for <u>cooking</u>?** *(Plse verify visually if possible)*

1 Own generator ☐
2 Shared generator ☐
3 Electricity from LEC grid ☐
4 Gas ☐
5 Kerosene ☐
6 Charcoal ☐
7 Wood ☐

8 What is the weekly cost of fuel for cooking (Lib $): …… *(Take time to discuss!!)*

c **If own generator, please specify:**

1 Size (Watt): ……..
2 How manyyears have you had it: ……..
3 Cost *(specify currency)* ……..
4 How many neighbours are connected to your generator: ……..

d **What are the main advantages of your present energy supply?**

1 Predictable supply ☐
2 Predictable costs ☐
3 Other (specify): ……

e **What are the main disadvantages of your present energy supply?**

1 Erratic performance/production ☐
2 Costs ☐
3 Other (specify): ……

f **What is the main source of drinking water of your household?**

1 Private piped water ☐
2 Piped water on neighbour's ☐
3 Piped water on Community Supply ☐
4 Water sellers ☐
5 Public well (protected) ☐
6 Public well (un-protected) ☐
7 Private well (protected) ☐
8 Private well (un-protected) ☐
9 Spring (protected) ☐
10 Spring (un-protected) ☐
11 River, Dam, Lake etc. ☐
12 Other (*specify):* ……

g **Do you pay for water?**

1 Yes ☐
2 No ☐

h **If yes, how much do you pay for <u>water</u>?**

1 ☐ Monthly fixed rate of ……
2 ☐ Volume rate of ……
3 Other (specify): ……

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

B PUBLIC INSTITUTIONS

B1 OBSERVATIONS *(to be filled in by interviewer)*

a **Nature of establishment:** …… (e.g. townhall, police, school, courthouse, health facility, kindergarden)

b **If school, specify type:** …… (e.g. elementary, high, vocational, other)

c **Type of construction**

1 Separate building ☐
2 Part of commercial complex ☐
3 Part of own residential unit ☐
4 Part of other residential ubnit ☐

d **Nature of construction**

1 Cement blocks ☐
2 Bricks ☐
3 Wood ☐
4 Mud/makeshift ☐
5 Other (specify): ……

e **Observable electricity source**

1 Connection to outside grid ☐
2 Own generator ☐
3 Shared generator ☐
4 None ☐
5 Other (specify): ……

f **Position of interviewee**

1 Senior manager ☐
2 Senior administrator ☐
3 Other (specify): ……

g **Sex of interviewee**

1 Female ☐
2 Male ☐

B2 GENERAL QUESTIONS *(to be asked by the interviewer)*

a **Number of employees** (specify)

1 Total: ☐
2 Female: ☐

b **Average number of beneficiaries/ service users/ visitors per month?**
(e.g. number of students, church visitiors, patients to clinic, etc.)
Specify number and category: ……

c **Main source of finance**

1 Government ☐
2 Fees ☐
3 Mixed ☐
4 Donations ☐
5 Other (specify): ……..

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

If government

1 Fixed monthly sum for electricity ..... enter Lib dollars
2 On special request to govt
3 Private/donations

If private (non-profit) electricity is paid through

1 Parts of fees paid ***i.e. by students, patients etc***
2 Donations

d Present electricity source

1 LEC grid
2 Own generator
3 Shared generator
5 Other (specify): ……..

e Energy cost last month *(specify currency)*

1 Fuel: ……..
2 Electricity bills: ……..
3 Other: ……..

How much is your total cost per month (in Lib dollars)

1 Rent & maintenance ……..
2 Salaries …….
3 Materials/equipment …….
4 Electricity (all sources) …….
5 Other …….

f How stable is your energy demad over the year?

1 Very stable
2 Seasonably varying
3 Determined by workload

g If own generator, please specify:

1 Size (Watt): ……..
2 How many years have you had it ……..
3 Cost *(specify currency)* : ……..
4 How many neighbours are connected to your generator: ……..

h What are the main advantages of your present energy supply?

1 Predictable supply
2 Predictable costs
3 Other (specify): ……

i What are the main disadvantages of your present energy supply?

1 Erratic performance/production
2 Costs
3 Other (specify): ……

If school:

j Does the school offer night classes?

1 Yes
2 No

k Does the school use computers to register students?

1 Yes
2 No

If health clinic:

l Does the health clinic offer night-time services?

1 Yes
2 No

m Does the health clinic have vaccine refrigerator?

1 Yes
2 No

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

If police station/depot

1 What is you main source of lighting

2 Generator ☐
3 Battery lights ☐
4 Mixed ☐
5 Other ☐

6 How many night time traffic accidents were registered with you last month (if only nightime not available, take all)
nightime ……
total ……

7 How crimes were registered with you last month
Burglaires ……
Rapes ……
Violent assaults ……

C PRIVATE ENTERPRISE

C1 OBSERVATIONS *(to be filled in by interviewer)*

a Nature of enterprise

1 Manufacturing ☐ Specify nature of products: ……
2 Service ☐ Specify nature of service: ……
3 Trade ☐ Specify nature of trade: ……

b Is the entreprise formally registered with Ministry of Commerce or other authority
(registration certificate visible)

Yes ☐
No ☐

c Type of construction

1 Separate building ☐
2 Part of commercial complex ☐
3 Part of residential unit ☐

d Nature of construction

1 Cement blocks ☐
2 Bricks ☐
3 Wood ☐
4 Mud/makeshift ☐

e Observable electricity source

1 Connection to outside grid ☐
2 Own generator ☐
3 Shared generator ☐
None ☐
4 Other (specify): ……

f Position of interviewee

1 Senior manager ☐
2 Senior administrator ☐
3 Other (specify): ……

g Sex of interviewee

1 Male ☐
2 Female ☐

C2 General Questions *(to be asked by the interviewer)*

a Economic data

1 How much were your company sales last month *(specify currency)* : ……
2 Were sales last month better than the month before?
Yes ☐
No ☐
3 Were sales last month better than the same month one year ago?
Yes ☐
No ☐

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

Appendix A1-3: Questionnaire Baseline End-user Survey, PHASE 2

b **Employees**

1 Number of emloyees: ……

2 Number of female employees: ……..

c **Present electricity source**

1 LEC grid ☐

2 Own generator ☐

3 Shared generator ☐

4 Mixed ☐

5 Other (specify): ……

d **Energy cost last month** (*specify currency)*

1 Fuel: ……

2 Electricity bills: ……..

3 Other: ……

e **If own generator, please specify:**

1 Size (Watt): ……..

2 Howmany years owned ……..

3 Cost *(specify currency)* : ……..

4 How many neighbours are connected to your generator: ……..

Proportion of electricity cost to total cost of running business (ask as 1/10th, 1/4th, 1/3rd if easier)

1 Less than 10% ☐

2 10-25% ☐

3 25-33% ☐

4 More than 33% ☐

f **How stable is your energy demad over the year?**

1 Very stable ☐

2 Seasonably varying ☐

3 Determined by workload ☐

g **What are the main advantages of your present energy supply?**

1 Predictable supply ☐

2 Predictable costs ☐

3 Other (specify): ……

h **What are the main disadvantages of your present energy supply?**

1 Erratic performance/production ☐

2 Costs ☐

3 Other (specify): ……

D Interviewer's observations

Write here your general observations about

(a) the interview itself (e.g. required prompting, interference by male if woman respondent, ease of interview, etc.)

(b) the household (e.g. general condition such as orderliness, sanitary condition, TV, AC, motorcycle, etc)

Appendix A1-4: Quick guide for interviews

1.1 Selecting the person to be interviewed

The person interviewed should have knowledge of the topics raised in the questionnaires. Preferably the household head or his/her partner will be interviewed.

Half of the interviews in each village/town will be conducted with male and half with female household heads or most senior partner.

1.2 Introducing yourself and the study

1.2.1 Courtesy call to the village headman

After selecting a ward/locale at least one member of the time will pay a courtesy call to the local 'councillor' (or similar functionary or elected representative) and introduce the End User Survey. When meeting this person collect general data on the village and fill the general information about the locale (first section of the questionnaire).
In major institutions/enterprises ask to see the most senior manager available and introduce the Survey to him/her. In the case of big establishments that are selected on a case by case basis (se the 'lazy dog') do not forget to ask about year of establishment, no of employees and turnover.

1.2.2 Introducing the study

Begin the conversation with a friendly opening remark to build a positive relation 'break the ice'. Explain to the respondent who you are, who you are working for, what information you require, why you want the information, and why it is in their interest to participate. It is important that the informant feels completely at ease so they can discuss freely. A sample of how the study could be introduced:

> *Good morning. How are you? My name is …….. . The Government of Liberia with assistance from Norway and other countries is installing new electricity generators in Monrovia to improve the supply of electricity. We are conducting a study to provide information on the need for and use of electricity so that the improved supplies can be well designed and managed. We would like to ask you a few questions. This will take about 30 min. We will write down your answers but we will not write down your name so your answers are anonymous and cannot be traced. We appreciate if you would like to participate.*

During the course of the interview be ready to break off and ask more 'social' questions, or questions about the family or things that you see in the house – most people like to tell others about their work or life etc ....

1.3 Guide to use of the Questionnaire

The same questionnaire will be administered to all households, institutions and enterprises.

All instructions to the interviewer are printed in bold italic capitals.

Section headings are printed in bold

In each interview **ALL QUESTIONS MUST BE ANSWERED**! Probe further if the question is not clear and/or you do not get the right answer.

The answers must be written clearly so others can read it.

People should be interviewed without the presence of others as much as possible.

1.3.1 Whom to interview

The questionnaire is administered to the household head or his/her partner or, in the case of institutions and enterprises to a manager or senior staff.

If you are a ***female interviewer***, you will prioritise:

- The female household head, or
- The partner/wife of the male household head. Sometimes a male household head may have more than one partner/wife. In that case the most senior partner/wife is interviewed with knowledge of the issues covered in the questionnaire.

If you are a ***male interviewer***, you will prioritise:

- The male household head, or
- The most senior adult male person available at the time of interview. The male must have sufficient knowledge on the topics covered in the questionnaire.

If such a person is not available at the time of the interview or does not want to participate, please go to the next 4th household. BUT: note down for each community the number of households you come across that do not want to participate or are not available.

1.3.2 Section A – answered from observations

The first ***section A*** contains two types of questions:

- General information to be recorded
- Information to be observed. The answers to these questions are not asked but ***observed***. Most of the observations can be made when arriving at the ward and the house.

1.3.3 Sections B, C, D and E

These questions are asked to all respondents. Some questions can be skipped if the respondent gives a certain answers. It is indicated in the questionnaire to which question to go next in italic capitals in bold: ***GO TO ..***

Some questions have an option: Other, specify ……. If this is applicable, please; 1) Tick the box in front of the text, and 2) Write down what the other answer option is.

1.3.4 Section F

In this section, please record any observations you made during the interview, such as,

- Number of other people present at the time of the interview
- Influence of the presence of others at the interview
- Behaviour of the respondent – at ease, uncomfortable, focussed on the interview, etc.
- Observation on the house itself.
- Observations on the items found in the house.
- Etc.

1.3.5 Reviewing answers

Immediately after conducting the interview and before moving to the next household use a few minutes to check the questionnaire on:

- Are all questions answered?
- Are all answers recorded correctly, clearly and legibly?

1.4 Keeping and submitting questionnaires

The questionnaires will be handed over to the study coordinator when s/he is coming to see you in the field and when there is a feed-back meeting with the team. The study coordinator will check the questionnaire and sign the questionnaire for his acceptance. The Team Leader will carry out the final check of the questionnaire before it is accepted as fully completed.

APPENDIX 2:

RESULT MATRICES

M1 Overall - Matrix 1: *Overall Norwegian development support to the Liberian Energy Sector*			
Programme components (projects):	Outputs (OP) or short-term Results (at completion of projects)	Outcomes (OC) or Medium-term Results	Impact (I) or Long-term Results
Monrovia Gaps Project Management Contract of LEC Investment in Transmission and Distribution Institutional Cooperation between MLME and NVE	**M1OP1** LEC established as a strengthened and competent institution **M1OP2** MLME established as a strengthened and competent institution **M1OP3** Substantial expansion of T&D grid in Monrovia **M1OP4** 3 MW new generation capacity	**M1OC1** Substantially increased access to affordable and reliable energy services in Monrovia **M1OC2** Improved services/ capacity of social services, especially related to health and education **M1OC3** Increased industrial and commercial activity **M1OC4** Improved personal and traffic related night-time security **M1OC5** Improved local environment and safety from replacing inefficient energy sources (small, private diesel generators, kerosene for light, etc.) **M1OC6** LEC established as a financially sustainable institution **M1OC7** A well-functioning MLME **M1OC8** Improved gender balance in energy sector	**M1I** Poverty reduction through economic and social development in Monrovia from improved access to affordable sustainable and environmentally friendly energy services

M2 Overall – Matrix 2: *Management Contract of LEC, Investments, Gaps (OPs and OCs)*		
Activities:	Outputs (OP):	Outcomes (OC):
Manage all aspects of LEC's operations Prepare and approve Annual investment plan Implement the agreed Annual Investment Plan Prepare and approve Electrical Master Plan for LEC Prepare and approve Business Plan for LEC Submit and approve Annual Operating Budget Submit and approve Utility Service Standards Develop and implement Retail Tariff Model Develop and implement a new management structure (of effective operational, commercial and financial operation and introduce performance based management for LEC staff). Develop and implement a Performance Monitoring and Reporting Framework Develop • Organizational Plan • Human Resource Plan • Training and Development Plan • Maintenance Plan • Quality of Service Plan • Quality of Supply Plan • Customer Database • Revenue Management Plan • Loss Reduction Plan • Financial Model and Tariff Calculation • Handover Plan and Exit Strategy Submit Annual and Quarterly reports Investments in transmission and distribution capability Training and capacity building of LEC's staff and management	**M2OP7** Plans and reports prepared and approved by stakeholders **M2OP8** Number of connections increased according to agreed targets **M2OP9** Total losses reduced **M2OP10** Collection rate increased **M2OP11** Improved operational efficiency **M2OP12** Improved management structure established **M2OP13** LEC staff trained in planning, design, procurement, installation, operation and maintenance of equipment **M2OP14** Km of new distribution and transmission lines installed	**M2OC1** Substantially increased access to affordable and reliable energy services in Monrovia **M2OC2** LEC established as a substantially strengthened and competent institution **M2OC3** Reduced cost of electricity (LEC expenses / kWh sold) **M2OC4** LEC established as a financially sustainable institution

M2 OP - Matrix 2: *Monrovia Gaps Project – Outputs (OPs)*	
Activities:	Outputs (OP):
Engineering and load survey Approval of Final drawings Preparation of bidding documents Procurement of material and hardware Delivery of material and hardware Installation of material and hardware Testing and commissioning of diesel generators Installation for Gaps 1 & 2 Installation of solar street lamps Establish connection plans with criteria and priorities Installation of customers Training of LEC staff in planning, design, procurement and installation of new equipment Develop a revenue model for solar street lighting Contract a COTR	Medium voltage (22kV) distribution and LV lines installed and functioning in: • **M2OP1** Gap 1 (ELWA Junction to Catholic Junction) • **M2OP2** Gap 2 (Red Light Junction/Paynesville) • **M2OP3** Somalia drive **M2OP4** Additional generation (3*1MW)Installed on Bushrod Island **M2OP5** Solar street lights (150-200 units) installed and functioning on Airport road **M2OP6** Full documentation provided for all new and existing facilities.

M3 Overall - Matrix 3: *Institutional Cooperation MLME-NVE (OCs and I)*		
Activities:	Outcomes (OC) or Medium-term Results:	Impact (I) or Long-term Results:
Preparation of a legal and regulatory framework for the power sector Capacity building in the MLME and relevant agencies General coordination Upgrading of the national hydrometric network and database Rural and renewable energy The gender aspects and women's empowerment Coordination, backstopping, provision of long and short term advisers	**M3OC1** Proposed new and/or revised laws and regulations are approved **M3OC2** Reasonable professional competence and knowledge of staff at DoE and other relevant agencies **M3OC3** Investment environment conducive to increase private sector involvement **M3OC4** Increased power production at affordable cost from renewable energy sources **M3OC5** Reliable hydrological data and analyses available to external users **M3OC6** Improved access to modern energy services in rural areas **M3OC7** Increased female participation in the energy sector; management, project implementation and policy making **M3OC8** Energy Regulatory Board/Agency established	**M3I1** An approved, engendered, legal framework supporting the NEP **M3I2** Generation, transmission, distribution and supply of electricity are rationally carried out for the benefit of society **M3I3** Effective management of MLME **M3I4** Effective management of RREA **M3I5** Well functioning water resources monitoring and management (through LHS)

M3 - 1 - Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 1: Preparation of a Legal and Regulatory Framework for the Power Sector	
Activities:	**Outputs (OP):**
Identification of laws and regulations to be revised. Prepare and develop a new legal and institutional framework for the power sector, including an Electricity Reform Act Assistance in preparation of the new Electricity Reform Act Development of regulations for the new Electricity Reform Act Implementation of the regulations for the new Electricity Reform Act Investigation into various restructuring aspects Facilitation of reorganization processes in the power sector Establishment of the regulatory framework comprising of administrative regulations and technical regulations. Development of a regulatory framework with licensing procedures Development of a Water Resources Strategy Planning and execution of seminars, workshops and training programs	**M3OP1** New laws supporting the regulation of the Power Sector prepared **M3OP2** Regulations for the power sector including licensing procedures prepared **M3OP3** An Electricity Reform Act prepared **M3OP4** A Water Resources Strategy proposed

M3 - 2 - Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 2: Capacity Building in the MLME and LEC and other government agencies.	
Activities:	**Outputs (OP):**
Capacity building in MLME to improve regulatory capacity, management and performance, with particular emphasis on the area of negotiation and administration with potential IPPs project. Capacity building in LEC specifically targeting management and performance in the areas of strategic thinking and commercial operations (in cooperation with MC) Institutional support to LEC with regard to LEC accessing funds set aside by donors for distribution capital expenditures, provision of international board room expertise and contract follow-up in case of a management contract, and assistance on WAPP-issues Capacity building in LHS, LWSC, RREA and other relevant agencies Supervision of the restructuring of RREA Planning and execution of seminars, workshops and training programs Capacity "gap filling" in the MLME Support for scholarships and other targeted actions to recruit qualified men and women to the energy sector (on all levels) Capacity assessment study finalized	**M3OP5** Increased professional level, knowledge and capacity of the staff in DoE, LEC, LHS and RREA **M3OP6** A capacity building and recruitment plan prepared based on a training needs assessment. **M3OP7** Professional staff recruited in accordance with staffing plan **M3OP8** A scholarship program established

M3 - 3 - Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 3: Generation Coordination	
Activities:	**Outputs (OP):**
Support in procurement of 1-2 experts at MLME, including definition of ToR, scope of work, mandate, etc. Mentoring and capacity building of 1-2 key staff at the MLME Support in mobilizing additional power through Concession Agreements and Power Purchase Agreements. Establish a regular and constructive working relationship with the Management Contract Operator (LEC). Support in developing, coordinating and implementing a Generation Expansion Plan, covering at least the 5-year Management Contract period.	**M3OP9** Plans exist for implementing new low-cost generation **M3OP10** Increased professional level of MLME staff in tender evaluation and contract negotiations **M3OP11** Concession Agreements and Power Purchase Agreements prepared

M3 - 4 - Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 4: National Hydrometric Network and Database	
Activities:	**Outputs (OP):**
Identification and planning of sites for hydrological stations and rainfall stations. Procurement of hydrological equipment and rain gauges (only water discharge stations, sediment sampling stations, and rain gauges) should be established, Construction work and installation of hydrometric equipment Procurement, installation and maintenance of computers and software Establishment of a simple hydrological database with basic analysis and modeling tools Training for both women and men, short-term and long-term, in-country and abroad	**M3OP12** A national hydrometric network installed **M3OP13** A well-functioning national hydrometric database established **M3OP14** Increased technical knowledge of LHS staff

M3 - 5 - Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 5: Rural and Renewable Energy	
Activities:	**Outputs (OP):**
Support to the start-up of RREA. Financing of two staff members. Capacity building/training of staff. Support for preparation of a National Rural Electrification Strategy and a strategy for RREA in relation to the National strategy Support in development of a rural and renewable energy master plan Training of rural population in end-use of modern energy services Support to RREA in the process of preparation for construction of a mini/micro HPP, including e.g.: Identification studies of various potential small HPP sites incl. documentation of least cost solutions (part of the energy master plan) Completion of a feasibility study of the most favorable site including estimated investment cost Assessments of commercial structure, ownership of HPP plant Development of TORs, procurement, follow-up and supervision, preparation of contracts Filing the funding application for the HPP Provision of funds for related and supplementary activities to the REFUND	**M3OP15** Well-qualified local gender specialist and REFUND manager in RREA **M3OP16** Increased competence and capacity of staff **M3OP17** A realistic and comprehensive National Rural Electrification Strategy prepared **M3OP18** A RREA strategy supporting the RE strategy prepared **M3OP19** A gender-oriented, financially, technically and environmentally sound Rural and Renewable energy Master Plan prepared **M3OP20** Increased end-user knowledge in modern energy services **M3OP21** Mini/micro HPP sites assessed

M3 - 6 - Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 6: Gender aspects and women's empowerment	
Activities:	**Outputs (OP):**
Gender training on methods and tools for staff and policy makers from MLME, LEC and RREA Recruitment and training, scholarships and seminars Bi-annual workshops Networking and advocacy among community organizations, women's groups and within the energy sector. Employment of a local gender specialist in RREA and a part-time gender specialist in the TAP team Financing women-led energy initiatives and collection of gender-related energy data	**M3OP22** Increased knowledge among staff from MLME, LEC and RREA on why and how to gender mainstream their work **M3OP23** Women trained in technical knowledge of modern, decentralized energy services and productive uses. **M3OP24** Well-informed women providing input to energy policy making.

M3 - 7 Matrix 3: *Institutional Cooperation MLME-NVE (OPs)*	
Project objective 7: Coordination, backstopping, provision of long and short term advisors by NVE	
Activities:	**Outputs (OP):**
Technical Advisor assigned to the LEC Board for supervision and monitoring of the MC operator is recruited Support in daily coordination with MLME and NVE personnel Support in recruitment of Technical Advisor to LEC board Support to prepare proposals for revisions of plans, budgets and progress reports Support in preparing reports to NORAD for Annual meetings Support in project accounting, invoicing and practical arrangements of visits from Liberia Support in allocation of short term assistance from NVE or private consultants. Support to job descriptions and recruitment of 2 long term advisers. Support to provision of 2 long term advisors; Technical consultant to monitor the MC Operator and COGS Support on purchase of vehicles and equipment (hydrometric equipment, computers, software, etc.)	**M3OP25** LEC Board fully informed about MC operator's fulfillment of contractual obligations **M3OP26** MC operator audited **M3OP27** Donors fully informed regarding MC operator and sector performance

APPENDIX 3:

BASELINE DATA

Matrix 1: *Overall Norwegian development support to the Liberian Energy Sector*

Matrix	Level	Indicator	What	Baseline value	Date	Target	What data	Frequency	Source baseline value
M1	**OC1**		**Substantially increased access to affordable and reliable energy services in Monrovia**						
M1	OC1	a	# of connections: Residental	1096	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	b	# of connections: Commercial	1171	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	c	# of connections: GOL	98	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	d	# of connections: NGO	21	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	e	# of connections: Public Corporation	6	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	f	# of connections: LEC	7	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	g	# of connections: Tax Exempt	2	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	h	# of connections: total	2403	October-10	35,403 by 2015	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	i	SAIDI	436,78	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	j	SAIFI	6,67	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	OC1	k	Electricity tariff	0,43 USD/kWh	October-10	0,28	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	**OC2**		**Improved services/ capacity of social services, especially related to health and education**						
M1	OC2	a	Number of educational institutions connected to grid	43	August-10	-			LEC
M1	OC2	b	% of schools with access to electricity	53	September-10	-			end-user survey
M1	OC2	c	% of schools providing night-time classes	44	September-10	-			end-user survey
M1	OC2	d	Number of health institutions connected to LEC grid / community power (in Montserrado)	68	August-10	-			LEC
M1	OC2	e	*Number of clinics offering night-time services*	NA	-	-			-
M1	OC2	f	*Number of clinics with vaccine refrigerator*	NA	-	-			-
M1	**OC3**		**Increased industrial and commercial activity**						
M1	OC3	a	*number of SMEs*	NA	-	-			-
M1	OC3	b	number of commercial businesses with grid-connected electricity	1171	October-10	-			MHI – monthly performance status report October
M1	OC3	c	*Average energy expenditure (USD) for commercial connections*	NA	-	-			-
M1	OC3	d	Number of Liberian owned registered businesses	NA	-	-			Ministry of Commerce and Industry (MCI)
M1	OC3	e	Number of non-Liberian owned registered businesses	NA	-	-			Ministry of Commerce and Industry (MCI)
M1	**OC4**		**Improved personal and traffic related night-time security**						
M1	OC4	a	*Traffic accidents reported at JFK hospital (avg. per month)*	NA	-	-			JFK Hospital
M1	OC4	b	Traffic accidents reported at Redemption hospital (avg. per month)	486	Jan-Jul 2010	-			Redemption Hospital
M1	OC4	c	Number of sexual based violence cases reported, Montserrado, per year	1231	2009	-	Statistical bulletin	Quarterly	MoHSW
M1	OC4	d	Home deliveries (% of total number)	40 %	August-10	-			MoHSW
M1	**OC5**		**Improved local environment and safety from replacing inefficient energy sources (small, private diesel generators, kerosene for light, etc.)**						
M1	OC5	a	Number of households with grid connected electricity	1096	October-10	-	MHI-Monthly Performance Report	Monthly	MHI – monthly performance status report October
M1	**OC6**		**LEC established as a financially sustainable institution**						
M1	OC6	a	Revenue> fixed+variable costs in a financial year	No	October-10	Net Profit	Annual accounts	annually	Chief financial officer
M1	OC6	b	external audit approved	No	October-10	External audit without issues raised	Audited financial accounts	annually	Chief financial officer
M1	**OC7**		**A well-functioning MLME**						
M1	OC7	a	Number of proposed new and/or revised laws and regulations approved	-	2010	1 (3 chapters)	Verification from Minister and Official gazette	annually	-
M1	OC7	b	Number of concessions to IPPs granted	-	2010	-	Verification from licensing and concession unit within DoE	annually	-
M1	OC7	c	% of DoE staff plan completed	-	2010	100 % of Bureau and unit heads, 50% of staff	Performance Review meeting		-
M1	OC7	d	Number of rural households provided with electricity through BoAE/RREA projects	-	2010	100,000	RREA annual report	annually	-
M1	OC7	e	Number of external users provided with hydrological data from LHS	-	2010	Progressive increase	LHS annual report	annually	-
M1	**OC8**		**Improved gender balance in energy sector**						
M1	OC8	a	% of women in DoE management (unit heads or above)	0,0 %	2010	30 %	Performance Review meeting	bi-annually	MLME Personnel roaster July 2010
M1	OC8	b	% of female staff in DoE	16,7 %	2010	40 %	Performance Review meeting	bi-annually	MLME Personnel roaster July 2010
M1	OC8	c	% of female staff in LHS (techn. Staff)	10,0 %	2010	15 %	Performance Review meeting	bi-annually	MLME Personnel roaster July 2010
M1	OC8	d	% of female staff in RREA	33,3 %	2010	40 %	Performance Review meeting	bi-annually	RREA interview
M1	OC8	e	% of female staff in LEC	5,6 %	2010	-	Performance Review meeting	bi-annually	LEC personnel roaster
M1	**I**		**Poverty reduction through economic and social development in Monrovia from improved access to affordable sustainable and environmentally friendly energy services**						
M1	I	a	GDP for Liberia (per person)	221,6 USD/cap	2009	-			WB estimates (876,300,028 per 3954979)
M1	I	b	% of population in Monrovia below poverty line	84 %	2010	-			UNDP HDR 2010
M1	I	c	under five mortality rate	72 per 1000	2007	-			LISGIS - Demographic and Health Survey 2007
M1	I	d	Literacy ratio in Monrovia (male/female)	81% / 66%	2008	-			cencus
M1	I	e	% of renewable energy production of total energy production	0	2010	50 %			MLME workshop, Sept. 2010
M1	I	f	(LEC) electricity consumption per capita in Liberia	0	2010	-			LEC

Matrix 2: *RBM-matrix for management contract of LEC, Investments and Gaps*

Matrix	Level	Indicator	What	Baseline value	date	Target	What data	Frequency	How (method)	Responsible	Where is it reported?
M2	**OP1**		**Medium voltage (22kV) distribution and LV lines installed and functioning in Gap 1**	-							
M2	**OP2**		**Medium voltage (22kV) distribution and LV lines installed and functioning in Gap 2**	-							
M2	**OP3**		**Medium voltage (22kV) distribution and LV lines installed and functioning in Somalia drive**	-							
M2	**OP4**		**Additional generation (3x1 MW) installed on Bushrod Island**	-							
M2	**OP5**		**Solar street lights (150-200 units) installed and functioning on Airport road**	-							
M2	**OP6**		**Full documentation provided for all new and existing facilities**	-							
M2	**OP7**		**Plans and reports prepared and approved by stakeholders**								
M2	OP7		Plans and reports related to MC and Investments prepared and approved by stakeholders	-							
M2	OP7		Plans and reports related to Gaps project prepared and approved by stakeholders	-							
M2	**OP8**		**Number of connections increased according to agreed targets**								
M2	OP8	a	# of connections: Residental	1096	October-10	-					Monthly Performance Report October
M2	OP8	b	# of connections: Commercial	1171	October-10	-					Monthly Performance Report October
M2	OP8	c	# of connections: GOL	98	October-10	-					Monthly Performance Report October
M2	OP8	d	# of connections: Non-GOL	21	October-10	-					Monthly Performance Report October
M2	OP8	e	# of connections: Public Corporation	6	October-10	-					Monthly Performance Report October
M2	OP8	f	# of connections: LEC	7	October-10	-					Monthly Performance Report October
M2	OP8	g	# of connections: Tax Exempt	2	October-10	-					Monthly Performance Report October
M2	OP8	h	# of connections: total	2403	October-10	35,403 by 2015					Monthly Performance Report October
M2	**OP9**		**Total losses reduced**			**12 %**					
M2	OP9	a	power distribution losses	11 %	October-10	5 %					Monthly Performance Report October
M2	OP9	b	non-technical losses	21 %	October-10	7 %					Monthly Performance Report October
M2	**OP10**		**Collection rate increased**								
M2	OP10	a	collection rate GOL	32 %	October-10	-					Monthly Performance Report October
M2	OP10	b	collection rate non-GOL	62 %	October-10	-					Monthly Performance Report October
M2	OP10	c	collection rate total	53 %	October-10	97 %					Monthly Performance Report October
M2	**OP11**		**Improved operational efficiency**								
M2	OP11	a	Operational cost (USD/unit sold)	0,285	October-10	0,152					Monthly Performance Report October
M2	**OP12**		**Improved management structure established**								
M2	OP12	a	New management structure prepared and implemented	-	August-10	-					
M2	**OP13**		**LEC staff trained in planning, design and procurement, installation and maintenance**								
M2	OP13	a	# of LEC staff trained in operation and maintenance of equipment	-	August-10	-					
M2	OP13	b	# of LEC operational staff trained according to training and development plans	-	August-10	-					
M2	OP13	c	# of LEC managerial staff trained according to training and development plans	-	August-10	-					
M2	**OP14**		**Km of new distribution and transmission lines installed**								
M2	OP14	a	km of new distribution lines from the Gaps project	-	-						
M2	OP14	b	transmission gaps closed	-	-	all gaps closed					
M2	OP14	c	pace of expansion (connections per month/customer category)	-	-	-					
M2	**OC1**		**Substantially increased access to affordable and reliable energy services in Monrovia**								
M2	OC1	a	# of connections: Residental	1096	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	b	# of connections: Commercial	1171	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	c	# of connections: GOL	98	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	d	# of connections: NGO	21	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	e	# of connections: Public Corporation	6	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	f	# of connections: LEC	7	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	g	# of connections: Tax Exempt	2	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	h	# of connections: total	2403	October-10	35,403 by 2015	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	i	SAIDI	436,78	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	j	SAIFI	6,67	October-10	-	Performance report	Monthly		MHI	Monthly Performance Report October
M2	OC1	k	Electricity tariff	0,43 USD/kWh	October-10	0,28	Performance report	Monthly		MHI	Monthly Performance Report October
M2	**OC2**		**LEC established as a substantially strengthened and competent institution**								
M2	OC2	a	customer:employee ratio (effective staffing)	10,33	October-10	124	Customer database and personnel roster	Monthly	Collect from commercial department and HRDD	Chief Financial Officer	Monthly Performance Report October
M2	OC2	b	inhabitants perception of the quality and availability of energy services	NA	-	80% Satisfaction rate on a few key issues	Customer Poll	annually	Annual poll of randomly and statistically relevant sample carried out	New services	Annual report
M2	OC2	c	skills in planning, design, procurement, project management and documentation within LEC, particularly among senior managers	-	-	100% of senior managers attended training	HR training plan and follow-up reports	annually	Training courses offered and attendance rosters	HR dept	Annual report
M2	**OC3**		**Reduced cost of electricity (LEC expenses / kWh sold)**								
M3	OC3	a	Operational cost (USD/unit sold)	0,285	October-10	0,152	Financial accounts	Monthly	Calculation of key ratio	Chief financi	Monthly Performance Report
M2	**OC4**		**LEC established as a financially sustainable institution**								
M2	OC4	a	Revenue> fixed+variable costs in a financial year	No	October-10	Net Profit	Annual accounts	annually	Annual accounts	Chief financi	Annual report
M2	OC4	b	external audit approved	No	October-10	External audit without issues raised	Audited account	annually	Audited financial accounts	Chief financi	Annual report

Matrix 3: *RBM-matrix for Institutional cooperation - outputs (OPs)*

Matrix	Level	Indicator	What	Baseline value	Target	Where is it reported?
			Legal framework			
M3	OP1	a	# of new laws supporting the regulation of the Power Sector prepared	-		
M3	OP2	a	Regulations for the power sector including licensing procedures prepared	-		
M3	OP3	a	An Electricity Reform Act prepared	-		
M3	OP4	a	A Water Resources Strategy prepared	-		
			Capacity building in MLME and relevant agencies			
M3	OP5	a	Number of staff completed training according to plan (m/f): DoE	-		
M3	OP5	b	Number of staff completed training according to plan (m/f): LHS	-		
M3	OP5	c	Number of staff completed training according to plan (m/f): RREA	-		
M3	OP6	a	A capacity building and recruitment plan proposed for DoE	-		
M3	OP6	b	A capacity building and recruitment plan proposed for LHS	-		
M3	OP6	c	A capacity building and recruitment plan proposed for RREA	-		
M3	OP8	a	Number of scholarships advertised externally/internally	-		
			Generation coordination			
M3	OP9	a	A Generation Expansion Plan prepared	-		
M3	OP10	a	Number of Concession Agreements and Power Purchase Agreements prepared, under negotiation or signed	-		
			National Hydrometric Network and Database			
M3	OP12	a	Installation of hydrometric equipment completed according to plan	-		
M3	OP13	a	Number of months of continuous operation of the hydrometric data collection	-		
M3	OP13	b	Number of external users of hydrological data	-		
M3	OP14	a	Number of workers recruited according to plan (m/f)	-		
M3	OP14	b	Number of workers trained according to plan (m/f)	-		
			Rural and renewable energy			
M3	OP15	a	Local gender specialist is recruited	-		
M3	OP15	b	REFUND manager for RREA is recruited	-		
M3	OP16	a	Number of staff recruited according to plan (m/f)	-		
M3	OP16	b	Number of staff trained according to plan (m/f)	-		
M3	OP17	a	National Rural Electrification Strategy submitted to the Minister	-		
M3	OP18	a	RREA strategy is prepared	-		
M3	OP19	a	Draft Rural and Renewable Energy Master Plan as well as draft National Rural Electrification Strategy has been submitted to the Minister	-		
M3	OP20	a	Number of men and women completing training programmes in modern energy services end-use	-		
M3	OP21	a	Number of mini/micro HPPs identified and assessed	-		
			Gender aspects and women's empowerment			
M3	OP22	a	Number of employees from MLME, LEC and RREA trained in gender mainstreaming (m/f)	-		
M3	OP23	a	Number of women completing training programmes in energy-related issues (level of education disaggregated) and end-use	-		
M3	OP24	a	Number of consultations with women interest groups during the development of a new law or regulation	-		
			Coordination, backstopping, provision of long and short term advisors by NVE			
M3	OP25	a	LEC Board informed about MC operator's fulfilment of contractual obligations through agreed reporting	-		
M3	OP26	a	MC operator external audit approved	-		
M3	OP27	a	Donors fully informed regarding MC operator and sector performance through agreed reporting	-		

Matrix 3: *RBM-matrix for Institutional cooperation - outcomes and impact (OCs and I,*

Matrix	Level	Indicator	What	Baseline value	Date	Target	Frequency	How (method)	Responsible	Where is it reported?
M3	**OC1**		**Proposed new and/or revised laws and regulations are approved**							
M3	OC1	a	Number of law proposals approved	-	2010	1 (3 chapters)	annually	Verification from Minister and Official gazette	Ass. Min. office	Performance Review meeting
M3	OC1	b	Technical regulations approved	-	2010	4	annually	Verification from licensing and concession unit within DoE	Ass. Min. office	Performance Review meeting
M3	OC1	c	Administrative regulations approved	-	2010	Restr. of MLME according to NEP	annually	Verification from licensing and concession unit within DoE	Ass. Min. office	Performance Review meeting
M3	OC1	d	Licensing procedures approved	-	2010	4	annually	Verification from licensing and concession unit within DoE	Ass. Min. office	Performance Review meeting
M3	**OC2**		**Reasonable professional level and knowledge of staff at DoE and other relevant agencies**							
M3	OC2	a	% of DoE positions filled (and training performed) according to staffing plans	-	2010	100 % of Bureau and unit heads, 50% of staff	bi-annually	Head of department verifies existing staff against the staffing plan	Head of DoE	Performance Review meeting
M3	OC2	b	% of LHS positions filled according to staffing plans	-	2010	Staffed according to LHS strategic plan	bi-annually	Director verifies existing staff against the staffing plan	Director of LHS	Performance Review meeting
M3	OC2	c	% of RREA positions filled according to staffing plans	-	2010	100% of management	bi-annually	Director verifies existing staff against the staffing plan	Director of RREA	Performance Review meeting
M3	**OC3**		**Investment environment conductive to increased private sector involvement**							
M3	OC3	a	% of power produced by IPPs	0	2010	50 %	bi-annually	Data collected from each IPP on generation. Data collected from T&D operator on energy from different IPP transmitted.	Head of DoE (in the future the Director of Energy)	Performance Review meeting
M3	**OC4**		**Increased power production at affordable cost from renewable energy sources**							
M3	OC4	a	LEC tariff [USD/kWh]	0,43 USD/kWh		40% reduction	Quarterly	MHI shares monthly progress reports with MLME through which the two key indicators are extracted	Head of DoE (in the future the Director of Energy)	Performance Review meeting
M3	OC4	b	% of energy produced from renewable energy sources	0		50 %	bi-annually	Data collected from each IPP on generation (see Outcome 3 above).	Head of DoE (in the future the Director of Energy)	Performance Review meeting
M3	**OC5**		**Reliable hydrological data and analyses available to external users**							
M3	OC5	a	Number of external users provided with hydrological data	0		Progressive increase	Quarterly	Director of LHS prepares the Annual and Quarterly Reports	Director of LHS	Performance Review meeting
M3	OC5	b	Number of hydrological reports provided to external users each year	0		1 annual, 4 quarterly	Quarterly	Director of LHS prepares the Annual and Quarterly Reports	Director of LHS	Performance Review meeting
M3	**OC6**		**Improved access to modern energy services in rural areas**							
M3	OC6	a	Number of rural households provided with electricity through BoAE/RREA projects	0		100,000	bi-annually	RREA project managers collect data through review of project progress reports.	Director of RREA	Performance Review meeting
M3	**OC7**		**Increased female participation in the energy sector; management, project implementation and policy making**							
M3	OC7	a	% of women in DoE management (unit heads or above)	0	2010	30 %	bi-annually	Head of DoE collects data	Head of DoE	Performance Review meeting
M3	OC7	b	% of female staff in DoE	16,7 %	2010	40 %	bi-annually	Head of DoE collects data	Head of DoE	Performance Review meeting
M3	OC7	c	% of female staff in LHS (techn. staff)	10,0 %	2010	15 %	bi-annually	Director collects data	Director of LHS	Performance Review meeting
M3	OC7	d	% of female staff in RREA	33 %	2010	40 %	bi-annually	Director collects data	Director of RREA	Performance Review meeting
M3	OC7	e	% of female staff in LEC	5,6 %	2010	-	bi-annually			Performance Review meeting
M3	**OC8**		**Energy Regulatory Board/Agency established**							
M3	OC8	a	Energy Regulatory Board/Agency established	-		Yes	once	Verification from Minister and Official gazette	Ass. Min. office	Performance Review meeting
M3	**I1**		**An approved, engendered, legal framework supporting the NEP**							
M3	I1	a	An independent qualitative study show that revised laws exist and are enforced	-						
M3	**I2**		**Generation, transmission, distribution and supply of electricity are rationally carried out for the benefit of society**							
M3	I2	a	Supply/demand ratio for electrified areas	NA						
M3	**I3**		**Effective management of MLME (including DoE and LHS)**							
M3	I3	a	An independent qualitative study shows that MLME organization is effective	-						
M3	**I4**		**Effective management of RREA**							
M3	I4	a	An independent qualitative study shows that RREA organization is effective	-						
M3	**I5**		**Well functioning water resources monitoring and management**							
M3	I5	a	An independent qualitative study shows that LHS organization is effective	-						

APPENDIX 4:

TOR FOR CBA

Draft Terms of Reference for a Cost Benefit Analysis to be carried out shortly after project completion

Background

Norway is now (summer of 2010) in the process of finalizing cooperation agreements with GOL in the power sector. The program has an estimated budget of some NOK 400 mill and consists of; i) investment in 3MW of new generation and distribution network infrastructure, ii) institutional support and capacity building to the Ministry of Lands, Mines and Energy, iii) payment of the professional fees of an international management contract for the Liberian Electricity Corporation (LEC), and iv) investments funds to enable the management contract operator to carry out its investment plan and achieve its targets.

The program will run until 2015.

Prior to program initiation a quantitative and qualitative description of the baseline situation for Monrovia was completed by a team of consultants, see NORPLAN (2010). The program has been monitored throughout, and impact, outcomes, outputs and indicators are reported at Performance Review Meetings. A mid-term review has been carried out, see xx.[1]

Objective

The consultant will carry out a cost benefit analysis of the program. This includes a documentation of impacts of the program on the welfare of the population, and to the extent possible, a valuation of impacts. It also includes a comparison of benefits (valued and non-valued impacts) and costs (valued and non-valued, if any).

Details of the assignment

It is envisaged that the CBA treats each program component separately. Hence, the analysis of the program will be supported by separate analyses of each component. Below, each program component is called a project.

General principles

The baseline as detailed by NORPLAN (2010) should be the starting point for assessing the "without project" situation. However, this needs to be complemented by a careful analysis of whether the baseline situation would have changed had the project not been implemented, how it in that case would have changed, and when major changes would have occurred. The "without project" situation is a dynamic path as opposed to a static situation.

Benefits will in some cases persist after the completion of the project. When the item under assessment is a physical investments the life time of the equipment is the maximum length of the benefit period, but it may be shorter if the equipment would have been installed at a later point in time "without project", or if developments make the equipment economically obsolete before its technical life time has expired. When the item is non-physical, e.g., improved legislation or improved efficiency of an institution there is no other option but to determine a life time based on an

[1] We are assuming that the final evaluation has not yet been carried out when this ToR is published. Maybe the CBA is a component of the final evaluation?

assessment of the "without project" baseline path. This applies whether or not the benefit is monetized.

Costs should be estimated ex post based on financial reports and other material as needed. This should be complemented by ex ante estimates of future costs which, though outside the program, are co-determinants of the benefits of the program. Maintenance is a case in point. Costs should include all opportunity costs, in accordance with good practice in cost-benefit analysis.

A net present value should be calculated and costs and monetary benefits should be discounted back to 2009 or 2010. An appropriate discount rate that reflects opportunity cost for Liberia should be used, in accordance with good practice in cost-benefit analysis.

Sensitivity analysis should be performed in accordance with good practice in cost-benefit analysis.

Project i) investment in 3MW of new generation and distribution network infrastructure
This project was originally allocated NOK 81.9 mill for the requested closing of gaps in the electricity distribution system in Monrovia, supply of 3 MW of diesel generators, improvement of existing network, specialized equipment for Liberia Electricity Corporation (LEC) and a limited number of solar streetlights for critical areas along the airport road.[2] The project was initiated in December 2009 and ran over 18 months. It was managed and administered by RezNate Development Ltd (RDL) with independent technical guidance. Norad has also employed a "Contracting Officer's Technical Representative" (COTR), who reported to Norad and MFA. The reports will be made available to the consultant.

The project introduced electricity to two areas of Monrovia not served by electricity since the start of the civil war, and it expanded coverage in two areas that prior to the project were served by grid extension financed by the European Community. The direct beneficiaries included a combination of domestic customers, schools, public institutions, health facilities, and small and large commercial companies. Indirect beneficiaries were inhabitants in areas that got streetlights, improved public and private services and job opportunities. Women and children were among the main indirect beneficiaries.

It was expected that the project would to a large degree substitute electricity production from small generators fuelled with petrol and diesel. The potential environmental and safety benefits of this were deemed to be substantial. It was expected that the project would also result in a reduction in greenhouse gas (GHG) emissions measured per kWh produced through utilization of larger and more efficient units.

The consultant should

- Estimate cost, benefits and net present value of the project
- Assess non-monetary benefits in a systematic way, for instance using the scoring method recommended by the Norwegian manual in cost benefit analysis (Ministry of Finance, 2005) or another method or methods consistent with good practice.

[2] We are not sure whether the solar streetlights should be included. The ToR to Norplan, from which this text is lifted, says "the project" in brackets before mentioning the streetlights.

When conducting the analysis of benefits it will be useful to distinguish between market benefits and non-market benefits. Market benefits are indicated by the *income from electricity sales* to commercial customers, institutions and households. In addition, since there is underutilization of resources in Liberia *a share between 0 and 1 of net production income* outside the electricity sector, but generated because of better electricity access, should also be counted as a market benefit. The economic value of job creation is covered by this item.

There are likely to be significant non-market benefits, and the consultant should consider the following:

Cost savings for end-users. End-users (households, commercial, institutions…) may experience net cost-savings when the new service is installed since small generators may no longer be used to the same extent. The consultant should report these, i.e. the difference between cost to end-user before and after the new service is installed. It is desirable to report cost savings on a constant consumption basis. However, a higher quality of electricity supply is likely to change end-user behavior. To control for this change and to control for forces that for external reasons change behavior it may be worthwhile to complement a comparison over time with a cross-sectional comparison of similar areas with and without access to modern electricity.

Improved health service, schooling and other services run by the public sector and the third sector (NGOs etc). The social value of electricity to health and school institutions, administrative institutions and the like is likely to be higher than price. This is ignoring cost-savings, which is assumed to be dealt with above. Based on the baseline assessment and the monitoring of impacts, outcomes etc the impact on the quality of public service should be quantified, assessed and monetized to the extent possible. A higher quality of public service is likely to change the behavior of the population at risk (more people choose to use the service) and this change in behavior is one way that benefit is signaled. In addition, any improvement in outcomes is of course an important signal. To control for the impact of change induced by higher quality of service and to control for external forces that also may change behavior and outcomes it may be worthwhile to complement a comparison over time with a cross-sectional comparison of areas with and without access to modern electricity.

Reduced crime and increased security. At the outset the installation of streetlights was expected to increase outdoor security and reduce the risk of, e.g., traffic accidents, robbery and rape. If job creation reduces the propensity to commit crime the project may also have contributed to increased security in indirect ways. Based on the baseline assessment and the monitoring of impacts, outcomes etc the impact on crime and security should be quantified and assessed to the extent possible. Since the existence of streetlights is likely to change the behavior of the population at risk (more people outdoors for longer) and since risks related to crime and security are changing over time for external reasons, it may be worthwhile to complement a comparison over time with a cross-sectional comparison of areas with and without streetlights.

Improved convenience for households. Benefits of improved quality of cooking, hot water and lightning that arise from the project, should be quantified and assessed based on the baseline situation and reported impacts. The increase in household electricity consumption that is likely to arise, is a signal of improved quality of service (as well as cost savings, income change and other factors). If the increase is larger than in comparable areas without access to modern electricity one may hope to isolate the impact of improved quality of service (and cost savings).

Improved outdoor air quality. It is likely that the project has had a positive impact on outdoor air pollution in Monrovia. When reviewing health benefits from outdoor air pollution the project should use the impact pathway approach. There are in this case two starting points for the impact pathway approach. One is to start with air quality measurements and exposure estimates in the baseline year, prior to project initiation; and estimates of fuel and energy consumption in the baseline, see Ulseth et al (2010). From this one constructs an estimate of the impact of the project to improved air quality, using e.g., rapid assessment methods as detailed by the World Bank, or air quality modeling. The other starting point is the current ex post air quality level in Monrovia. From this one will calculate how much worse the air quality exposure would have been without the project. Since exposure-response functions generally are non-linear, the choice of starting point is not innocuous.

It is recommended that the consultant uses state of the art exposure response functions and valuation techniques including benefit transfer techniques to complete the estimate of health benefits from improved outdoor air pollution.

Improved indoor air pollution. To estimate benefits of improved indoor air pollution (health and safety) one option is to use the "fuel based" approach, see, e.g., Smith and Metha (2003). However, the consultant is free to use other state of the art methods.

Lower GHG emissions. GHG benefits should be included, but not necessarily valued. IPCC default emission factors may be utilized if there is no local information.

Faster development of electricity supply. At the outset the project was also expected to have the added value of improving the credibility of LEC, as well as its financial position. Thus it was expected that the project contribute to attracting investors and financiers for further expansion of the electricity supply system. It was deemed likely that within the medium term (2012-2013), Liberia would install larger and more efficient generation units. The project was seen to be essential to making such an investment possible, as well as to ensure that the benefits were fully realized by both the population and LEC. It was also expected that this will contribute to faster development of Liberia's significant renewable energy sources, bio and hydro. Based on these expectations, the baseline assessment and a review of actual developments the consultant should assess to what extent the project has contributed to faster development of electricity supply.

Project 2) The management contract

LEC has been subject to a 5 year management contract and GON has contributed funding to the contract. The operator of the contract, Manitoba Hydropower International (MHI), was paid a fixed fee and performance/penalty fees for overachieving/underachieving on its targets for number of new connections, total losses, collection rate and operating costs. At the outset the cost of the management contract was estimated to be NOK 86 mill over the 5 years.

Under the management contract the operator has been expected to (i) carry out engineering, procurement and construction works to optimally expand by the end of the Contract Period the number of customers of the Service Area; (ii) substantially improve the operating, commercial, customer service and financial performance of the Grantor; (iii) introduce and sustain modern methods of corporate management and informational technology (IT) support of operational, commercial, financial, procurement and human resource management to enable better efficiency and improved internal controls; (iv) build the capacity of Grantor staff to be able to sustain the

operational performance achieved at the end of the term of this Contract; (v) ensure good operation, maintenance, replacement and other asset custodianship so that the assets can also sustain good performance at the end of the term of this Contract; and (vi) to cooperate with the Grantor and the Donors to facilitate the installation and operation of additional generation capacity, initially grant funded.

The consultant should

- Estimate cost, benefits and net present value of the project
- Assess non-monetary benefits in a systematic way, for instance using the scoring method recommended by the Norwegian manual in cost benefit analysis (Ministry of Finance, 2005) or another method or methods consistent with good practice.

From the description above the benefits of the Management Contract are likely to be both monetary and non-monetary. Monetary benefits may include benefits flowing from the number of new connections, total losses, collection rate and operating costs, i.e. the indicators that form the basis of the management contract. With respect to these indicators the benchmarks for performance fee set in the Management Contract may be deemed to be the "without project" reference. See also NORPLAN (2010) for baseline indicators and results matrices related to the project. Using state of the art methods the consultant should quantify, assess and to the extent possible monetize the benefits related to new connections, total losses, collection rate and operating costs.

The project is also expected to yield other, partly overlapping benefits, see the list (i) to (vi) above. Using state of the art methods the consultant should quantify, assess and to the extent possible monetize the benefits related to these items.

Project 3) Transmission and distribution investment

The annual investment plans of LEC (the Operator) have been financed by donors through their contributions to the donor account. At project initiation, donors' indicative budget to support the investments in distribution and to support to the utility under the management contract was estimated at US$ 53.5 million GON was estimated to contribute US$ 29 million, or 54% of the total.

At the outset it was stipulated that any deviation from the budget would give MHI the right for negotiation of the baseline targets. The benefit of project 3) is therefore intimately connected to the benefits of project 2), including some or all of 'the number of new connections, total losses, collection rate and operating costs'. Based on project reporting and monitoring other indicators of benefits may be stipulated as needed. The consultant may choose to emphasize the combined benefit of project 2) and project 3), but an effort should still be made to assess the benefit of each individual project.

It probably does not make sense to disentangle the GON contribution to project 3) from project 3) as a whole. A reasonable default assumption is that the share of benefit from project 3) attributable to the GON contribution is proportional to the share of the GON contribution to cost.

The consultant should

- Estimate cost, benefits and net present value of the project

- Assess non-monetary benefits in a systematic way, for instance using the scoring method recommended by the Norwegian manual in cost benefit analysis (Ministry of Finance, 2005) or another method or methods consistent with good practice.

Project 4) Institutional cooperation

At the outset the institutional cooperation between the Ministry of Lands, Mines and Energy (MLME) in Liberia and the Norwegian Water Resources and Energy Directorate (NVE) was planned to be concentrated on 7 main topics, with targets and indicators of progress as follows:

1. Existing laws and regulations in the power sector and water resources sectors to be revised if required, and new regulations and laws proposed, including licensing procedures for new hydropower projects
2. Increased professional level and knowledge of the staff at MLME, and sufficient capacity to reach the goals set in the National Energy Policy. Increased professional level, knowledge and capacity at other departments and agencies under the MLME, like LHS and LEC.
3. Assist the MLME in ensuring that sufficient, low cost and timely generation is made available
4. A minimum hydrometric network for high-quality data established. The data, which is necessary for all integrated water resources management, will be provided to all relevant users of such data, including data for design purposes.
5. To promote renewable energy and modern energy services to rural areas.
6. Contribute to women being direct and indirect beneficiaries of the development of the power sector in Liberia, particularly developments associated with Norwegian development assistance to the sector.
7. Secure an efficient execution of the project based upon a contract on institutional cooperation between MLME and NVE

The benefits flowing from project 4) are indicated by the extent of progress with respect to these seven topics. Other benefits may also have arisen.

To guide the assessment of benefits a detailed, mostly qualitative assessment of the baseline situation was documented in Ulseth et al. (2010) and indicators of progress have been established. The consultant should make use of those.

Costs including the use of man-power and other resources in relevant institutions in Liberia and Norway, whether or not they are contracted by project 4) or not, should be reported.

The consultant should

- Estimate cost, benefits and net present value of the project
- Assess non-monetary benefits in a systematic way, for instance using the scoring method recommended by the Norwegian manual in cost benefit analysis (Ministry of Finance, 2005) or another method or methods consistent with good practice.

It is expected that several of the benefits of project 4) will be non-monetary.

References

Ministry of Finance (2005): Veileder i samfunnsøkonomiske analyser (Guideline for cost-benefit analyses), Ministry of Finance, Oslo, Norway. http://www.regjeringen.no/upload/FIN/Vedlegg/okstyring/Veileder_i_samfunnsokonomiske_analyser.pdf

Smith, Kirk R. and Sumi Metha (2003): The burden of disease from indoor air pollution in developing countries: Comparison of estimates. *International Journal of Hygiene and Environmental Health*, 206, 279-289.

NORPLAN (2010): Liberian energy sector. End-user survey. Monrovia/Oslo

APPENDIX 5:

TOR FOR THIS STUDY

Final June 4th, 2010.

Terms of Reference

Consultancy to support the development of a system for results based monitoring, reporting and evaluation in Liberia; Norway´s 5-year support program to Liberias power sector

1. INTRODUCTION

The energy cooperation with Liberia was initiated in 2006, when Liberia requested Norwegian financing of emergency electricity production capacity for Monrovia. Norway did in 2007 enter into a 5 way MOU with Liberia, USAID, WB and EU called the Emergency Power Program (EPP) II. This followed EPP I which provided 4 small diesel generators on 3 sited in Monrovia and some high voltage and low voltage distribution. The Norwegian contribution to EPP II was approximately NOK 50 mill financing 7 MW of efficient diesel generators and a small distribution grid in an area characterised by small local industries and markets.

Norway is now in the process of finalizing cooperation agreements with GOL in the sector. The program has an estimated budget of some NOK 400 mill and will consist of; i) investment in 3MW of new generation and distribution network infrastructure, ii) institutional support and capacity building to the Ministry of Lands, Mines and Energy, iii) payment of the professional fees of an international management contract for the Liberian Electricity Corporation (LEC), and iv) investments funds to enable the management contract operator to carry out its investment plan and achieve its targets.

The Norwegian Agency for Development Cooperation (Norad), the Client, will provide support to national partners in Liberia in assessing the proposed results matrices, collecting baseline data and developing a system for results based monitoring, reporting and evaluation.

Norad is hereby requesting a consultant to undertake such an assignement, and the projects to be covered by this study are a) - d):

a) **The Monrovia gaps project**

This project has been allocated NOK 81.9 mill for the requested closing of gaps in the electricity distribution system in Monrovia, supply of 3 MW of diesel generators, improvement of existing network, specialized equipment for Liberia Electricity Corporation (LEC) (the project) and a limited number of solar streetlights for critical areas along the airport road. The project was initiated in December 2009, is to run over 18 months and managed and administered by RezNate Development Ltd (RDL) with independent technical guidance. Norad has also employed a "Contracting Officer's Technical Representative" (COTR), who will report to Norad and MFA.

The project will introduce electricity to 2 areas of Monrovia not served by electricity since the start of the civil war, as well as expand coverage in 2 areas that are only recently served by grid extension financed by the European Community. The direct beneficiaries include a combination of domestic customers, schools, public institutions, health facilities, and small and large commercial companies. Indirect beneficiaries are inhabitants in areas that get streetlights, improved public and private services and creation of job opportunities. Women and children are among the main indirect beneficiaries.

A successful project is also expected to have the added value of improving the credibility of LEC, as well as its financial position, and thus contribute to attracting investors and financiers for further expansion of the electricity supply system. It is likely that within the medium term (2-3 years), Liberia will install larger and more efficient generation units. The current project is thus essential to make such an investment possible, as well as ensure that the benefits are fully realized by both the population and LEC. It is also expected that this will contribute to faster development of Liberia's significant renewable energy sources, bio and hydro.

The project will to a large degree substitute electricity production from small generators fuelled with petrol and diesel. The potential environmental and safety benefits of this are substantial. The project should also result in a reduction in greenhouse gas (GHG) emissions measured per kWh produced through utilisation of larger and more efficient units.

b) **The management contract**

In 2008, it was decided by the Government of Liberia that LEC would be subject to a management contract and requested that GON contribute with funding. Following an international tender, lead by the IFC, Manitoba Hydro International won the 5-year contract against two other bidders. MHI is to be paid both a fixed fee and performance/penalty fees for overachieving/underachieving on its targets for number of new connections, total losses, collection rate and operating costs. GON will pay both the fixed and performance based professional fees, totalling an estimated NOK 86 mill over the 5 years.

The intention of the management contract is that the operator shall (i) carry out engineering, procurement and construction works to optimally expand by the end of the Contract Period the number of customers of the Service Area; (ii) substantially improve the operating, commercial, customer service and financial performance of the Grantor; (iii) introduce and sustain modern methods of corporate management and informational technology (IT) support of operational, commercial, financial, procurement and human resource management to enable better efficiency and improved internal controls; (iv) build the capacity of Grantor staff to be able to sustain the operational performance achieved at the end of the term of this Contract; (v) ensure good operation, maintenance, replacement and other asset custodianship so that the assets can also sustain good performance at the end of the term of this Contract; and (vi) to cooperate with the Grantor and the Donors to facilitate the installation and operation of additional generation capacity, initially grant funded.

c) **Transmission and distribution investment**

The annual investment plans of LEC (i.e. the Operator) will be financed by donors through their contributions to the donor account. Donors' indicative budget to support the investments in distribution and to support to the utility under the management contract is estimated at US$ 53.5 million with annual budgets estimated as in the table below. This table is presented in the management contract and any deviation from these budgets gives MHI the right for negotiation of the baseline targets.

Financing sources for the annual investment plans						
	Year 1	year 2	year 3	year 4	year 5	Total (MUS$)
GON	3.0	6.0	6.0	7.0	7.0	29
USAID	8.5	1.5	1.5			11.5
WB	3.0					3.0
OBA/WB		2.5	2.5	2.5	2.5	10.0
Total financing	14.5	10	10	9.5	9.5	53.5

Government of Norway contribution will be appropriated on a yearly basis and therefore the amounts above are estimated and not committed. The investment plan will represent the ´Project Document´ and the bilateral agreement for this contribution will come once the investment plan for year one is submitted for approval in fall 2010.

d) Institutional cooperation

The institutional cooperation between the Ministry of Lands, Mines, Energy (MLME) in Liberia and the Norwegian Water Resources and Energy Directorate (NVE) will be concentrated on the following planned 7 main topics.

The main objectives are as follows:

Objective 1: *Existing laws and regulations in the power sector and water resources sectors to be revised if required, and new regulations and laws proposed, including licensing procedures for new hydropower projects*

Objective 2: *Increased professional level and knowledge of the staff at MLME, and sufficient capacity to reach the goals set in the National Energy Policy. Increased professional level, knowledge and capacity at other departments and agencies under the MLME, like LHS and LEC.*

Objective 3: Assist the MLME in ensuring that sufficient, low cost and timely generation is made available

Objective 4: *A minimum hydrometric network for high-quality data established. The data, which is necessary for all integrated water resources management, will be provided to all relevant users of such data, including data for design purposes.*

Objective 5: *To promote renewable energy and modern energy services to rural areas.*

Objective 6: *Contribute to women being direct and indirect beneficiaries of the development of the power sector in Liberia, particularly developments associated with Norwegian development assistance to the sector.*

Objective 7**:** *Secure an efficient execution of the project based upon a contract on institutional cooperation between MLME and NVE*

2. PURPOSE OF THIS ASSIGNMENT

The objectives of this assignment are to;

i) provide technical support to GON´s implementing partners in assessing, updating and revising the proposed results matrices for the four projects

ii) provide a quantitative and qualitative description of the baseline situation for Monrovia to allow for a future cost-benefit analysis (CBA) and impact assessment

iii) provide stakeholders with a system for future monitoring, reporting and evaluation of the projects

The planned outputs of the assignment are:

1) Revised results matrix, including indicators proposed for all four projects
2) Baseline situation summarized and analyzed for all projects
3) A practical, reliable and sustainable system for monitoring, reporting and evaluation proposed

3. SCOPE OF WORK

Activities under Output 1:

- Assess whether the proposed results matrices: including planned impact, outcomes, outputs and indicators for each project are as simple as possible, measurable, achievable and realistic within the frameworks of the projects.

  Assess the relevance of existing data - national statistics, implementing partners' systems and databases, and international data (UN, WB, etc). Assess the relevance and appropriateness of existing reporting systems of MLME and LEC.

- Based on the analysis above and in close cooperation with the implementing partners, propose revised results matrices for all four projects. The results matrixes must include planned impacts, outcomes, outputs and a limited number of revised indicators, both qualitative and quantitative. The results matrices should be Simple,

Measurable, Achievable, Realistic and Time-Bound, given the systems in Liberia, for each project.

Regarding the MLME-NVE institutional cooperation project, the consultant should consider assisting MLME in carrying out a condensed strategy process which establishes the priorities for the institutions role in implementing the National Energy Policy (NEP), e.g. by means of a (participatory) SWOT analysis or similar.

When developing indicators, particular focus should be placed on the outcome level. In addition , when possible, indicators at the impact level should be proposed and when relevant indicators at the output level should be proposed.
The Consultant should ensure a good link between the four projects and strive to design individual project indicators which allows for the aggregation of information from the four projects.

Where applicable, select indicators for crosscutting issues should be included: gender, corruption, environmental and climate sustainability, HIV and AIDS.

Activities under Output 2:

- Based on a good understanding of the objectives and scope of the four programs and the revised results matrices, the consultant will provide a description of the baseline situation in the sector, by means of both quantitative and qualitative methods.

  The data collection will involve the review and analysis of existing data, targeted interviews with key stakeholders, review of competencies particularly at MLMLE, collection of data stored on local IT systems, and carrying out an end user survey. The resulting baseline situation should cover revised indicators at the levels of outputs, outcomes and impacts of the above mentioned projects, whereof outcome is the most important level of results. Data collection will be organized around three key activities:

  - Of particular importance will be the **end-user survey**. The consultant should aim to establish the data basis for a full and accurate cost-benefit analysis CBA, covering donor investments in expanding the distribution system of LEC in Monrovia. This implies that the survey must apply well-established methodologies and be designed in a professional and statistically representative manner. Sampling methods must secure representative data, and be based on explicit assessments of seasonal and geographical variations locally.The survey will have to collect data on all aspects where the program will have an impact, and to the extent possible, place a monetary value on each variable.

  - Additionally, a key data collection activity will be to determine the baseline which is relevant for the planned **institutional cooperation between MLME and NVE**. It is expected that this will largely be a qualitative baseline. Nonetheless, the consultant will be expected apply the revised results matrix and propose innovative ways to measure progress, achievements and/or under-performance.

- Finally, the consultant will be expected to present the baseline for the **economic and financial situation in the sector and at LEC, specifically**. For the sector, the primary issue is the cost level of service and the associated tariff, with particular focus on the average and marginal cost of electricity in Monrovia, broken into generation, transmission and distribution. Regarding LEC, the consultant should summarize MHI´s own reports regarding the financial situation at LEC. Indeed, LEC/MHI should have most of the data already collected and summarized for both LEC and the sector.

Establish targets for each indicator

Summarize and analyze the baseline situation.

Activities under Output 3:

- Based on the assessment of existing reporting systems and the revised indicators, the Consultant will propose a practical, sustainable and reliable system for monitoring, reporting and evaluation for each project at appropriate institutional/organizational levels in Liberia by the local employees. A key challenge will be the low level of capacity/competence in the sector, combined with a rapidly increasing level of activity which demands the attention of stakeholders. This implies that this system should be particularly simple, and to the extent possible, aim to utilize existing systems, for example the reporting requirements already included in the bilateral agreements.

  The methodology must identify major factors that may affect collection of data during the implementation of the projects and after the termination of the projects, and propose measures on how to handle these issues methodically (e.g. other donors input to the sectors).

  The system for monitoring, reporting and evaluation should include for each revised indicator:
  - means of verification
  - collection methods. This includes the development of interview guides when needed.
  - how often (frequency)
  - by whom (responsibility). Definition of the roles and responsibilities of the stakeholders involved in the monitoring, reporting and evaluation at the various levels.
  - A system for risk identification, assessment and mitigation at the project level.

  The system(s) should make it possible to carry out monitoring and reporting at least annually at the output level. To the extent possible, it should also be possible to carry out monitoring and reporting annually at the outcome and impact level. Evaluations should be planned for midterm and when the projects are finalized. The consultant will

also propose a Terms of Reference for the future CBA and impact assessment to be carried out shortly after project completion.

- The Consultant is strongly encouraged to engage local consulting firm(s), institution(s) and/or specialists under subcontracts, to assist in carrying out the work in Monrovia, especially the field work.

4. DELIVERABLES/SCHEDULE

All programs will, in effect, already be initiated by the time the study is completed. However, it is expected that the actual impacts of these projects will still be limited. Nonetheless, it is critical to begin work immediately. Accordingly, Norad proposes the schedule below for discussion.

Reports	**Deadline**
Contract Signing	June 4th
Proposed outline for inception report	June 30th
Draft inception report and revised results matrices. - Proposed new results matrices - An overview of relevant existing baseline data, - Revised work plan, including methodology for end-user survey - Interview list and guides - Revised, detailed budget.	July 23rd
Detailed presentation of inception report with Norad reference group	August 17th
Final inception report	August 23rd
Draft baseline report with attached electronic data files	October 8th
Final baseline report with attached electronic data files	October 31st

The reports shall be written in English and include recommendations and conclusions to Norad and the Norwegian Embassy in Abidjan, as well as a summary of main findings.

The final baseline report shall present analysis, findings and recommendations and preferably not exceed 50 (effective) pages. Beyond this, the consultant should look to provide annexes and data files. It will be critical that the data file for the end-user survey is well documented, organized and easily understood and replicated.

The reports shall be furnished in electronic format.

5. BUDGET

The tentative budget is estimated at NOK 1.5 million, including all fees, expenses, sub-contractors and a 10% contingency. The consultant should propose a more detailed budget within this frame.

6. PERSONNEL

The team shall consist of a team leader who has the overall responsibility for the assessment, methodology, selection of indicators, work methodology and quality assurance.

The team leader shall be assisted by local, and possibly international, experts complementing the team leader's main competence so that the team altogether covers the following disciplines:

- **Evaluation and results management methodology**. It is critical that the team employ an individual with documented experience in creating results management systems, and carrying out surveys in developing countries which are to form the basis for future CBA or impact assessments. Experience in planning for, managing and carrying out a representative and informed survey in cooperation with local partners is of utmost importance. This person should be a researcher which is well versed in the academic literature pertaining to representative surveys and impact assessments.

- **Technical competence within the power supply sector.** At least one member should have at least 5 years of experience from the power sector and be able to demonstrate the ability to identify the wide range of outputs/impacts which could be expected from the support programs.

- **Economics.** The team should be supported by an economist with CBA and econometric skills which can identify the critical elements of the data collection to allow for the future CBA and impact assessment, including the monetization of expected benefits, including health and environmental benefits.

- **Social science**. Finally, the team should have a member which can effectively manage and supervise the end-user survey, recognizing cultural sensitivities and the challenges presented by a post-conflict situation.

As there are various disciplines to cover within the scope of work, the tenderer is expected to present their best team composition. The proposed composition of the team will be given particular attention in the evaluation of the tender. It is expected that the team will consist of an appropriate blend of international and local experts to optimise the outcome of the work.

It is envisaged that the main part of the work will be carried out of local experts. This is however the decision of the tenderer.

It is expected that the team leader shall present a proven track record of having carried out similar assignments. It is also expected that that majority of the chosen team members have a minimum of 5 years professional experience.

Experience from Liberia is an advantage, and the team should consist of both women and men.

7. WAY FORWARD

Norplan is hereby requested to;

i) Review ToR and come with immediate comments
ii) Propose a qualified team for the assignment
iii) Provide initial remarks on proposed budget and time frame

Assuming that Norad and Norplan can reach agreement on the above, Norplan should provide an initial more detailed budget. Following final discussions/negotations, the contract can be signed.

8. BACKGROUND DOCUMENTS

1. The Monrovia gaps project.
    a. Project Document
    b. Norad Appraisal
    c. 2-3 supporting documents
2. The Management Contract
    a. Signed Management Contract
    b. Norad Appraisal
    c. Bilateral Agreement (GOL-GON)
3. Transmission and distribution investment
    a. Signed Management Contract (2.a.)
    b. Norad Appraisal for (2)
    c. MoU (GOL-GON)
    d. Monrovia Master Plan and/or Investment Plan (if available in time)
4. Institutional Cooperation
    a. Project Document
    b. External Appraisal
5. General
    a. 2008 population and housing census report (dated May 2009)
    b. Recent Monthly Reports for EPP Steering Committee
    c. Recent Monthly Reports for Monrovia Gaps

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