INDEPENDENT EVALUATION DIVISION
OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

Independent Terminal Evaluation

Sierra Leone and Liberia

Promoting Mini Grids Based on Small Hydro Power for Productive Uses in Sierra Leone

and

Installation of Multi-Purpose Mini-Hydro Infrastructure (for Energy and Irrigation) in Liberia

UNIDO Project ID: 100328 and 100330

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Abbreviations and acronyms

APR	Annual Project Reports
AWP	Annual Work Plan
EBID	ECOWAS Bank for Investment and Development
EDSA	Electricity Distribution and Supply Authority
EE	Energy Efficiency
EGTC	Electricity Generation & Transmission Authority
EPA	Environmental Protection Agency
EU	European Union
ET	Evaluation Team
ETL	Evaluation Team Leader
EWRC	Electricity and Water Regulatory Commission
FBC	Fourah Bay College
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GHG	Greenhouse Gases
HQ	Head Quarters
IED	Independent Evaluation Division
IEO	Independent Evaluation Office
IFIs	International Financial Institutions
ITE	Independent Terminal Evaluation
MRHPC	Mein River Hydropower Company
MHP	Mini Hydro Power
MOE	Ministry of Energy
M&E	Monitoring and Evaluation
MoU	Memorandum of Understanding
NPD	National Project Director
OECD	Organisation for Economic Co-operation and Development
PAC	Project Advisory Committee
PD	Project development

PIR	Project Implementation Reports
PMU	Project Management Unit
PSC	Project Steering Committee
RE	Renewable energy
RBM	Results-Based Management
SIM	Stakeholder Identification Matrix
SL	Sierra Leone
SHP	Small Hydro Power
SMART	Specific, Measurable, Attainable, Relevant, Trackable
SC	Steering Committee
SL	Sierra Leone
TA	Technical Assistance
TE	Terminal Evaluation
UNIDO	United Nations Industrial Development Organisation
USL	University of Sierra Leone
MEWR	Ministry of Energy and Water Resources
MLME	Ministry of Land, Mines and Energy

Glossary of evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change due directly or indirectly to an intervention.
Effectiveness	The extent to which the development objectives of an intervention were or are expected to be achieved.
Efficiency	A measure of how economically inputs (through activities) are converted into outputs.
Impact	Positive and negative, intended and non-intended, directly and indirectly, long term effects produced by a development intervention.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Intervention	An external action to assist a national effort to achieve specific development goals.
Lessons learned	Generalizations based on evaluation experiences that abstract from specific to broader circumstances.
Logframe (logical framework approach)	Management tool used to guide the planning, implementation and evaluation of an intervention. System based on MBO (management by objectives) also called RBM (results based management) principles.
Outcomes	The achieved or likely effects of an intervention's outputs.
Outputs	The products in terms of physical and human capacities that result from an intervention.
Relevance	The extent to which the objectives of an intervention are consistent with the requirements of the end-users, government and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	The specific individuals or organizations for whose benefit an intervention is undertaken.

Executive summary

This report summarizes the findings of independent terminal evaluation of GEF financed projects “Promoting Mini Grids Based on Small Hydro Power for Productive Uses in Sierra Leone” and “Installation of Multi-Purpose Mini-Hydro Infrastructure (for Energy and Irrigation) in Liberia”.

The evaluation was conducted in the period of November 2019 – April 2020, by an independent evaluation team contracted by UNIDO. The evaluation is conducted in accordance to the given TORs and the relevant GEF guidelines.

Evaluation purpose and methodology

The purpose of the evaluation is to independently assess the two projects to help UNIDO improve performance and results of ongoing and future programmes and projects. The terminal evaluation (TE) covers the whole duration of the projects, from its starting dates in January / June 2012 to the estimated completion date in August / December 2019.

The evaluation has two specific objectives:

(i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact; and

(ii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

Key findings

The key findings of this terminal Evaluation Report are summarized upon evaluation criteria.

Design. Proved to be relevant to the country context and addresses key sector needs and market barriers for both countries. However, the time dedicated time to the implementation in Sierra Leone does not match the real needs for implementation of such projects, on other hand the change that occurred during the implementation in Liberia was not reflected in the results framework.

Relevance*.* The Project is very relevant to the national development and environmental priorities and strategies and the needs of the target groups.

Effectiveness. Both projects made noticeable achievement of outputs and outcomes in terms of capacity building and policy improvements, however failed to deliver demonstration in Sierra Leone, and Liberia succeeded to deliver different than planned demonstration.

Efficiency. Although initially foreseen to last 5 years, both projects had two extensions ending in August 2019 in Liberia and in December 2019 in Sierra Leone.

Impact*.* The Projects succeed to initiate an intensive processes of cooperation among different stakeholders in working on a same RE agenda, evident awareness and behavioral changes resulting with significant effects on the policy and capacity side enabling sustainability grounds in the countries, which having in mind the identified HE potential will inevitably lead to replication in the future.

Sustainability. No significant risks to the sustainability of project results are identified. There is markable potential of replicability in both countries.

Monitoring and Evaluation. Well defined Monitoring and Evaluation plan duly implemented over the implementation period.

Implementation. There is good to excellent communication and coordination with the stakeholders by UNIDO, very good acceptance and response from the partners and stakeholders, highly embraced by the beneficiaries and in particular by the target communities.

Conclusions and recommendations

Recommendations

Based on the findings, the report provides several recommendations to UNIDO and project stakeholders. The aim of these is 1) to help improving the selection, enhancing the design and implementation of similar future projects and 2) ensure sustainability and replicability process in the country.

Conclusion

The UNIDO projects were significant driving force that have assisted the partnering governments or follow-through with the relevant national authorities in formulating and/or updating strategies and provided substantial capacity building in overcoming barriers in the countries, paving the path toward sustainable economic growth.

Project ratings

The evaluation is made separately for both projects, in accordance to five different evaluation criteria given in the TORs: Impact, Project design, Project performance, Cross-cutting performance criteria and Performance of partners. Ratings are mandatory for all five criteria. The rating uses a six-point rating system, where 6 is the highest score (highly satisfactory) and 1 is the lowest, suggested by UNIDO Independent Evaluation Division.

Table 1 Summary of Project performance ratings for both projects

Project evaluation, Sierra Leone

#	Evaluation criteria	Rating
A	**Impact**	Satisfactory
B	**Project design**	**Moderately satisfactory**
1	Overall design	Moderately satisfactory
2	Logframe	Satisfactory
C	**Project performance**	**Moderately satisfactory**
1	Relevance	Very satisfactory
2	Effectiveness	Moderately satisfactory
3	Efficiency	Moderately satisfactory
4	Sustainability of benefits	Satisfactory
D	**Cross-cutting performance criteria**	**Satisfactory**
1	Gender mainstreaming	Very satisfactory

2	M&E • M&E design • M&E implementation	Satisfactory
3	Results-based Management (RBM)	Satisfactory
E	**Performance of partners**	**Satisfactory**
1	UNIDO	Highly satisfactory
2	National counterparts	Satisfactory
3	Donor	Highly satisfactory
F	**Overall assessment**	

Project evaluation, Liberia

#	Evaluation criteria	Rating
A	**Impact**	Satisfactory
B	**Project design**	**Moderately satisfactory**
1	Overall design	Satisfactory
2	Logframe	Moderately satisfactory
C	**Project performance**	**Moderately satisfactory**
1	Relevance	Very satisfactory
2	Effectiveness	Moderately satisfactory
3	Efficiency	Moderately satisfactory
4	Sustainability of benefits	Satisfactory
D	**Cross-cutting performance criteria**	**Satisfactory**
1	Gender mainstreaming	Satisfactory
2	M&E • M&E design • M&E implementation	Satisfactory
3	Results-based Management (RBM)	Satisfactory
E	**Performance of partners**	**Satisfactory**
1	UNIDO	Satisfactory
2	National counterparts	Satisfactory
3	Donor	Highly satisfactory
F	**Overall assessment**	

1. Introduction

The Terminal evaluation (TE) refers to two separate GEF supported medium-sized projects implemented by UNIDO in a same region, Western Africa, “Promoting mini grids based on small hydropower for productive uses in Sierra Leone” and “Installation of multi-purpose mini-hydro infrastructure in Liberia”.

1.1. Evaluation objectives and scope

The purpose of the evaluation is to independently assess the project to help UNIDO improve performance and results of ongoing and future programmes and projects. The terminal evaluation (TE) covers the whole duration of the projects, from its starting dates in January 2012, i.e. June 2012 to the estimated completion date in August 2019 and December 2019, respectively.

The evaluation has two specific objectives:

(i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact; and

(ii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

An additional objective of the evaluation, agreed upon the initiation of the evaluation[1] is to make project comparison.

1.2. Overview of the Project Context

Both projects share a same overall goal to remove the institutional, technical, policy and economic barriers to the promotion of small/mini hydro power for productive applications in Sierra Leone and Liberia and reduce GHG emissions from fossil-based power by accelerating the development of small/mini hydro resources.

The objective of the Sierra Leone project is to develop a market-based approach, through public private partnerships, for promoting small hydro power based mini-grids to stimulate productive capacities in the country.

The objective of the Liberia project is to develop the market environment for improving the access to mini hydro-based modern energy services and productive uses in rural areas of the country.

The UNIDO/GEF intervention at the both projects aim to demonstrate the viability of small/mini hydro power and establish policy guidelines, institutional linkages, responsibility and capacity within the government, the private sector and local community through an integrated approach.

Both of the projects belong to a same:

GEF FOCAL AREAS: Climate Change

GEF-4 STRATEGIC PROGRAM(S): CC-SP3: Promoting Market Approaches for Renewable Energy

PARENT PROGRAM/ UMBRELLA PROJECT: GEF Programmatic Approach on Access to Energy in West Africa

[1] The evaluation process initially was planned to be performed as two different evaluations for both of the project, according to the two different ToRs.

1.3. Overview of the Projects

Electricity production in both countries is below the levels required for the socio-economic development of the country. Countries energy needs are under resourced and the scarcity of a reliable energy supply is one of the key impediments to Sierra Leone and Liberia's economic and social development.

Liberia: Only about 10% of urban residents and less than 2% of rural Liberians have electricity access.

Sierra Leone: Less than 10 percent of the total population has access to electricity; in rural areas, where the bulk of the country's population resides, less than 1 percent of the population has access to electricity.

Furthermore, electricity supply is characterized by poor investments in generation, transmission and distribution resulting in very low generating capacity, rising high transmission and distribution losses, poor revenue collection and restricted distribution systems in major towns or no generation capacity outside the capital city except for a handful of privately-owned generators and scattered donor-funded pilot projects. The civil wars in both countries almost completely destroyed the original generation capacity and related infrastructure.

Liberia: At the project start, the energy system had only about 20 MW of diesel - based generators and about 100-km transmission and distribution network. Since, the Mount Coffee hydropower added 64 MW to the energy system.

Sierra Leone: the installed capacity is 113 MW and functional capacity is only 52.96 MW; the national grid is very limited, essentially consisting of 200 km of lines under construction.

Sierra Leone

The Project has an objective to develop a market - based approach, through public private partnerships, for promoting Small Hydro Power (SHP) based mini-grids to stimulate productive capacities in the country.

Table 2 Project factsheet, Sierra Leone

Project title	Promoting Mini Grids Based on Small Hydro Power for Productive Uses in Sierra Leone
UNIDO ID	100328
GEF Project ID	3937
Region	Western Africa
Country	Sierra Leone
Project donor	GEF
Project implementation start date	January 2012
Expected duration at project approval	60 months
Expected implementation end date	December 2019
GEF Focal Areas and Operational Project	Climate Change - CC-SP3: Promoting Market Approaches for Renewable Energy
Implementing agency	UNIDO
Executing Partners	Ministry of Energy and Water Resources, Ministry of Lands Planning and Environment
Donor funding	USD $1,758,182
Project GEF CEO endorsement / approval date	November 2011
UNIDO input (grant, USD)	USD $ 50,000

Co-financing at CEO Endorsement, as applicable	USD $29,992,068
Total project cost (USD), excluding support costs and PPG	USD $31,750,250
Planned terminal evaluation date	September – November 2019

Table 3 Project design, Sierra Leone

Project Components	Expected Outcomes	Expected Outputs
1.Development of Institutional Capacity	Strengthened institutional capacity at national and local levels for implementation of mini hydro power (MHP) system and local distribution grid	**1.1:** Capacity of national and local energy sector agencies strengthened to promote micro and mini hydropower for improved electricity access **1.2:** Public-Private partnership model developed for renewable energy projects **1.3:** Best practices and standard operating practice manual for implementation of micro and mini hydro power projects developed
2. Installation and commissioning of mini hydropower system and local distribution grid	MHP system providing electricity access to rural areas	**2.1**: Detailed project report including engineering design developed for the identified site **2.2:** Erection and commissioning of the SHP plant (1 MW) and local mini grid completed
3. Technical capacity building for operation, repair and maintenance of mini hydro power and local mini grid	Renewable and Rural Energy Agency and local energy enterprises capacitated for operation, maintenance and repair of MHP systems.	**3.1:** Local agencies fully trained for proper operation and maintenance of mini hydropower system and local distribution grid **3.2:** Private service providers capacitated to maintain micro and mini hydro power equipments **3.3:** Core technical capacities for management, operation and maintenance for micro and mini hydro power system created **3.4:** Local entrepreneurs trained for productive use of hydro electricity
4. Policy and regulatory framework for mini hydro Power development	Enabling policy and Regulatory framework and appropriate incentive structure facilitating faster growth of MHP for improved electricity access and irrigation	**4.1:** Enabling institutional, policy and regulatory mechanisms/ framework for MHP formulated and such framework adopted by local institutions **4.2:** Financial instruments for promotion and sustainability of mini hydro power created **4.3**: Government energy programmes incorporate mini hydro power development in the planning process **4.4:** Financial incentives for private actors provisioning mini hydro energy services put in place

Table 4 Financing plan, Sierra Leone

Name of co-financer (source)	Classification	Type	Project (USD)	%[2]
Ministry of EWR	Government	In-Kind	2,000,000	6.7%

[2] Percentage of each co-financier's contribution at CEO endorsement to total co-financing

Name of co-financer (source)	Classification	Type	Project (USD)	%[2]
Ministry of EWR	Government	Cash	17,942,068	59.8%
EBID	Multilateral	Soft loan	10,000,000	33.3%
GEF Agency, UNIDO	UN agency	Grant	50,000	0.2%
Total co-financing			29,992,068	100%
GEF grant			1,758,182	
Total			**31,750,250**	

The project implementation period is 4 years from beginning of 2012 to end of 2015, and one - year project preparation period (i.e. PPG stage). Due to the challenges faced, the project ended in December 2019.

Project implementation arrangements

The project is co-financed with funding from the GEF and UNIDO acts as the GEF Executing Agency. The project is implemented by UNIDO in collaboration with Ministry of Energy and Water Resources as the local implementing partner (GEF Local Executing Agency). UNIDO provided overall management and guidance from its Sierra Leone Country Office and the Headquartered in Vienna and is responsible for the delivery of the planned outputs, the achievement of the expected outcomes, monitoring and evaluation of the project as per normal GEF and UNIDO requirements. MEWR designated a senior official as the National Project Director (NPD) for the project. The NPD is responsible for overall guidance of the project management, including adherence to the Annual Work Plan (AWP) and achievement of planned results as outlined in the Project Document, and for the use of UNIDO.

GEF funds through effective management and well-established project review and oversight mechanisms. The NPD also ensures coordination with various ministries and agencies provide guidance to the project team to coordinate with UNIDO, to review reports and to look after administrative arrangements required under the Government of Sierra Leone and UNIDO. UNIDO is in charge of procuring the international expertise needed to deliver the outputs planned under the four project components, and also management, supervision and monitoring of the work of the international teams and ensures that deliverables are technically sound and consistent with the requirements of the project. The Ministry of Energy and Water Resources has overall coordination responsibility including the responsibility for most of the substantive work to be performed under Project Components. The Project Steering Committee (PSC) is responsible for making management decisions for the project and a Project Advisory Committee periodically reviews project implementation progress, facilitates co-ordination between project partners, provides transparency and guidance, and ensures ownership, support and sustainability of the project results.

Liberia

The Project objective is to develop the market environment for improving the access to mini-hydro based modern energy services in rural areas.

Table 5 Project factsheet, Liberia[3]

Project title	Installation of Multi-Purpose Mini-Hydro Infrastructure (for Energy

[3] Source: Project document

	and Irrigation)
UNIDO ID	100330
GEF Project ID	3944
Region	West Africa
Country	The Republic of Liberia
Project donor	GEF
Project implementation start date	1/06/2012
Expected duration at project approval	48 months
Expected implementation end date	31/12/2019 (revised)
GEF Focal Areas and Operational Project	Climate Change – CC SP3: promoting Market Approaches for Renewable Energy
Implementing agency	UNIDO
Executing Partners	Winrock International/USAID, Rural and Renewable Energy Agency of Ministry of Land, Mines and Energy
UNIDO RBM code	
Donor funding	USD $1,758,182
Project GEF CEO endorsement / approval date	March 2012
UNIDO input (grant, USD)	USD $ 60,000
Co-financing at CEO Endorsement, as applicable	USD $ 4,054,152
Total project cost (USD), excluding support costs and PPG	USD $ 5,812,334
Mid-term review date	
Planned terminal evaluation date	September-November 2019

Table 6 Project design, Liberia

Project Components	**Expected Outcomes**	**Expected Outputs**
1.Development of Institutional Capacity	Strengthened institutional capacity at national and local levels for implementation of mini hydro power (MHP) system and local distribution grid	**1.1:** Capacity of national and local energy sector agencies strengthened to promote micro and mini hydropower for improved electricity access **1.2:** Public-Private partnership model developed for renewable energy projects **1.3:** Best practices and standard operating practice manual for implementation of micro and mini hydro power projects developed
2. Installation and commissioning of mini hydropower system and local distribution grid	MHP system providing electricity access to rural areas	**2.1**: Detailed project report including engineering design developed for the identified site **2.2:** Erection and commissioning of the SHP plant (1 MW) and local mini grid completed
3. Technical capacity building for operation, repair and maintenance of mini hydro power and local mini grid	Renewable and Rural Energy Agency and local energy enterprises capacitated for operation, maintenance and repair of MHP	**3.1:** Local agencies fully trained for proper operation and maintenance of mini hydropower system and local distribution grid **3.2:** Private service providers capacitated to maintain micro and mini hydro power equipment

Project Components	Expected Outcomes	Expected Outputs
	systems.	**3.3:** Core technical capacities for management, operation and maintenance for micro and mini hydropower system created **3.4:** Local entrepreneurs trained for productive use of hydro electricity
4. Policy and regulatory framework for mini hydro power development	Enabling policy and regulatory framework and Appropriate incentive structure facilitating faster growth of MHP for improved electricity access and irrigation	**4.1:** Enabling institutional, policy and regulatory mechanisms/framework for MHP formulated and such framework adopted by local institutions **4.2:** Financial instruments for promotion and sustainability of mini hydro power created **4.3**: Government energy programmes incorporate mini hydro power development in the planning process **4.4:** Financial incentives for private actors provisioning mini hydro energy services put in place

Table 7 Financing plan, Liberia

Name of co-financer (source)	Classification	Type	Project (USD)	%[4]
MLME	Government	In-Kind	500,000	12.3
GEF Agency, UNIDO	UN agency	Grant	60,000	1.5
Winrock/USAID**	Bilateral	Grant	3,494,152	86.2
		Total co-financing	4,054,152	100%
GEF grant			1,758,182	
Total			**5,812,334**	

The project implementation period is 4 years from beginning of 2012 to end of 2015, and one - year project preparation period (i.e. PPG stage). Due to the challenges faced, the project ended in August 2019.

Project implementation arrangements

The project is co-financed with funding from the GEF and UNIDO acts as the GEF Executing Agency. The project is implemented by UNIDO and USAID[5] in collaboration with Rural and Renewable Energy Agency of Liberia of Ministry of Land, Mines and Energy (MLME) (GEF Local Executing Agency). Mein River Power Company, as planned, was formed so as to be handed over the project after completion of installation of the MHP project.

[4] Percentage of each co-financier's contribution at CEO endorsement to total co-financing

[5] As per the Memorandum of Understanding (MOU) signed between the two agencies for the purpose of joint cooperation in implementing the project

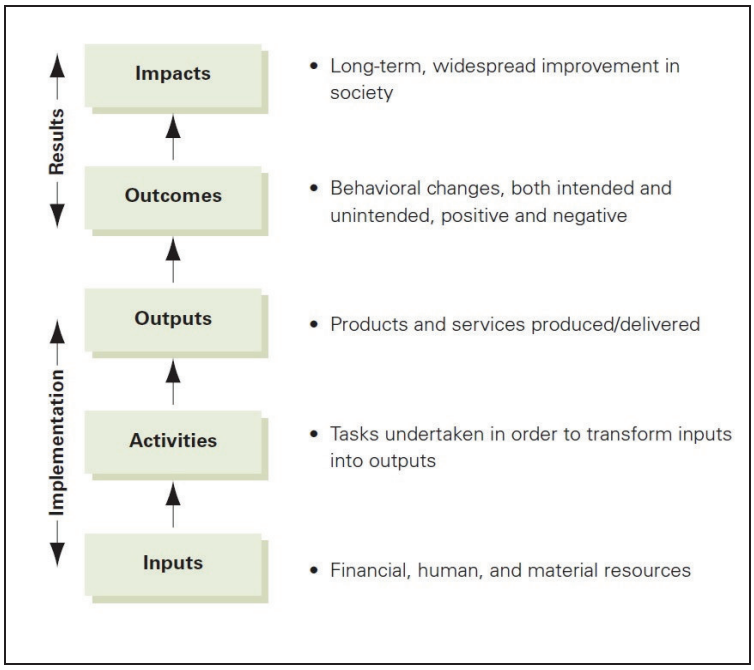
Winrock International, a long-term partner of USAID, is local implementing partner responsible for most of the substantive work related to the execution of civil and electrical components of the MHP project. As per the MoU, Winrock International was execution partner of both agencies, UNIDO and USAID, as per the specification set in the MoU.

UNIDO provides overall management and guidance from its Field Office at Guinea or its Headquarters in Vienna. UNIDO and Winrock International are responsible for the delivery of the planned outputs to GEF and USAID, the achievement of the expected outcomes, monitoring and evaluation of the project as per GEF, UNIDO and USAID requirements. UNIDO is also in charge of procuring the international expertise needed to deliver the outputs planned under the four project components, and also to manage, supervise and monitor the work of the international teams and ensure that deliverables are technically sound and consistent with the requirements of the project.

Winrock International, as the local implementing partner is responsible for most of the substantive work related to the execution of civil and electrical components of the MHP project. A Project Management Unit (PMU) is established by UNIDO and Winrock International, headquartered in Monrovia and its extension office in Gbarnga city, to implement the project. The PMU is headed by a National Project Manager (NPM) and responsible for implementing day-to-day activities in coordination with the Project Steering Committee (PSC).

The PSC periodically review project implementation progress, facilitate co-ordination between project partners; provide transparency and guidance, and ensuring ownership, support and sustainability of the project results. The PSC will also be responsible for overall guidance to project management, including adherence to the Annual Work Plan (AWP) and achievement of planned results through effective management and well-established project review and oversight mechanisms.

1.4. Theory of Change



A project's theory of change provides a basis for evaluation of the theory and results. It is an important part of front-end analysis and it is considered as a tool for understanding how the project is expected to achieve results and an identification of the underlying assumptions made.

Figure 1 Graphical depiction of Theory of change[6]

The development projects, subject of this evaluation, are considered to be change processes bearing their own specific logic. Implemented in an own local context, they both have an environment of factors that make the changes more complex (forming a system). For each of the interventions (projects), there are specific assumptions that are reflecting on the change process.

Both project documents contain clear Project Results Frameworks which represent a form of a theory of change for each of the projects[7], appearing rather linear. In this case, the theory of change is visually represented as a table laying out a casual chain showing the project strategy (what's planned to do), indicators, baseline, targets (what's intended to achieve), outcomes and key assumptions (a system). All these sides are operating in a specific environment. This environment (political, macroeconomic, policy, and so forth) influences all parts of the system (Figure 2).

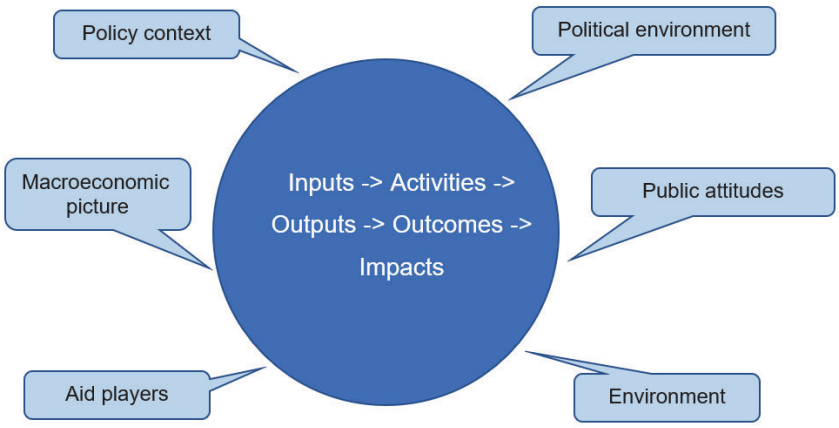


Figure 2 Potential Environmental Influences on Project Results

A theory of change is given bellow for each of the projects to depict the initial planning.

Sierra Leone

[6] The road to results, Designing and conducting effective development evaluations (Binnendijk 2000) / Linda G. Morra-Imas, Ray C. Rist

[7] The road to results, Designing and Conducting Effective Development Evaluations (page 153), Linda G. Morra Imas, Ray C. Rist

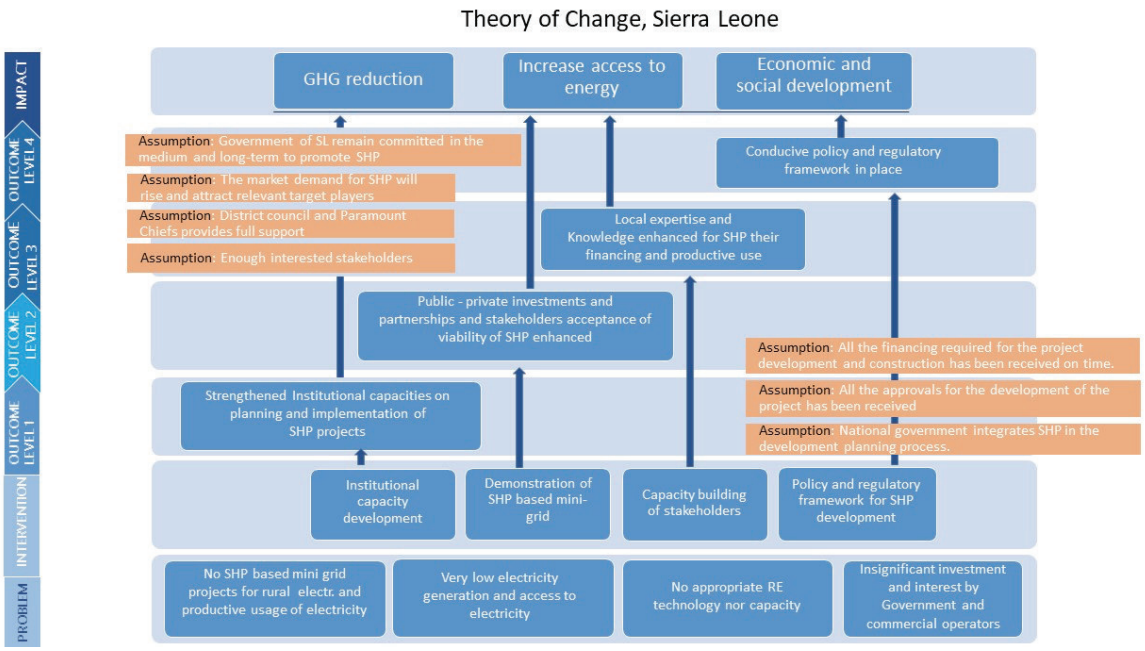


Figure 3 Theory of Change, Sierra Leone

Liberia

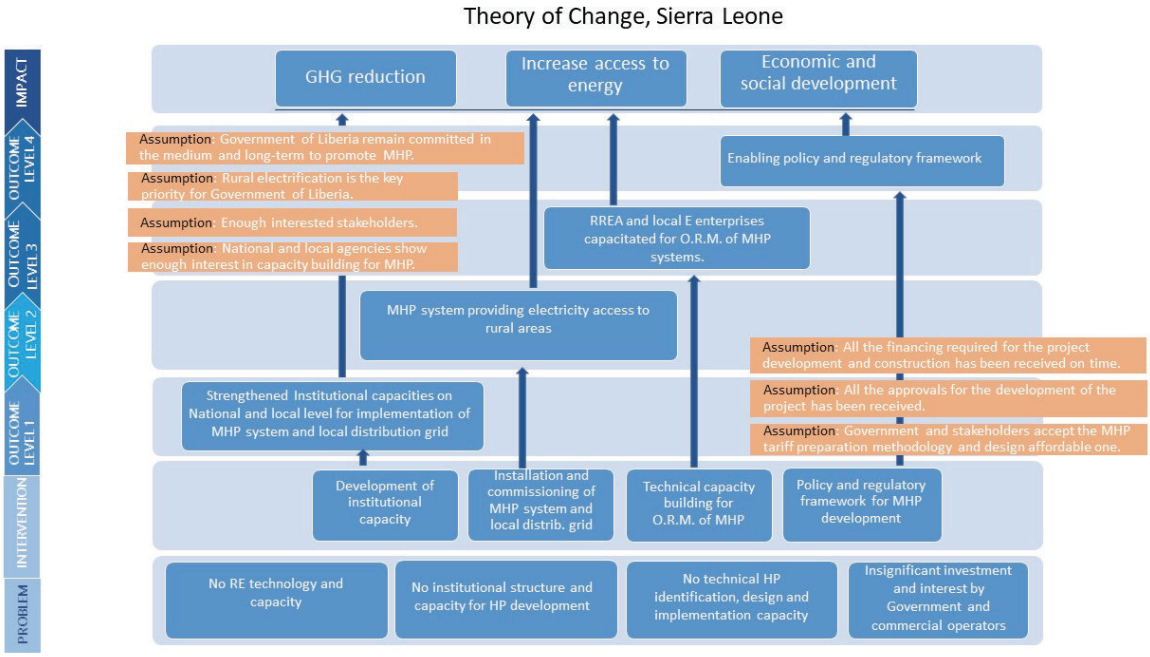


Figure 4 Theory of change, Liberia

1.5. Evaluation Methodology

The TE is conducted in accordance with the UNIDO Evaluation Policy[3] and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[4]. In addition, the GEF

Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies are considered.

The evaluation is carried out as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the project are informed and consulted throughout the evaluation.

From a time perspective, the evaluation is conducted few months before the project completion in Sierra Leone as the budget allocation can be only accessed within the project operating period, but several months after the completion in Liberia.

The evaluation approach largely reflects recognition and acceptance of the TOR's directions. It also includes an agreed amendment[8] for combined project evaluation since both project evaluations started with an individual evaluation's TORs. Upon the first introductory meeting of the ETL with the representative of the UNIDO's Independent Evaluation Division, based on the project's similarities, it was agreed it would be more beneficial for all stakeholders if a joint evaluation is conducted.

Use of evaluation

The TE is expected to help beneficiaries and implementing agencies to improving the selection, enhancing the design and implementation of similar future projects and activities in the country or worldwide or in rolling out similar projects within a program. The information gained in the report is to be used by all project stakeholders, donor, implementation agencies, management, users etc.

It aims to improve the management effectiveness and accountability thus contributing to the overall Results-Based Management system. Furthermore, TE should ensure the alignment of objectives and indicators with GEF focal strategies, goals and broader corporate results of GEF and implementing agencies.

Data collection methods

Following are the main instruments for data collection used for the purpose of the evaluation process:

(a) Desk and literature review of project documents. Set of documents for both projects was provided to the ET by the management team. The process of providing additional data continued during the evaluation process.

(b) Stakeholder consultations. The evaluators conducted series of meetings and interviews with the key stakeholders:

- Debriefing mission in UNIDO HQ. The ETL met the UNIDO project management team, representatives from the UNIDO evaluation office, and other UNIDO staff of interest that might provide information of interest to the process.
- Local project teeam, representatives of donors, counterparts and stakeholders were met during the country visits. During the visits, the evaluation team had more than 24 meetings and 46 interviewed persons in both countries.

(c) Field visit to project sites in Sierra Leone and Liberia to observe the results achieved. These visits were done in November 2019, 10-17.2019 in Sierra Leone and 17-25.2019 in Liberia.

[8] Agreement made on the preparatory meetings between UNIDO EVAI office representative and evaluaion team leader.

Field visitation to the ongoing SHP/MHP project sites at Singimi, Moyamba District and Suakoko district was done to collect success stories, failures, deviations, challenges, best practices and lessons learnt from the implementation of the SHP/MHP projects in Sierra Leone and Liberia.

Key evaluation questions are:

- What are the key drivers and barriers to achieve the long - term objectives?
- How well has the project performed?
- What have been the project's key results (outputs, outcome and impact)?
- What lessons can be drawn?

Theory of Change

A ToC is constructed as a representation of how the projects expected to achieve results, to better understand the projects itself, to lay out a casual chain, show influences, and identify key assumptions.

Stakeholder consultation

The consultations process started with a stakeholder mapping and prioritization based on their strategic positioning regarding the implementation of the SHP/MHP projects implemented by UNIDO. An initial prospective stakeholders' lists were developed by the UNIDO staff, further amended and matched against the main components of the projects such as the location features, the project environment and the potential impacts in a matrix (Stakeholder Identification Matrix, SIM). The SIM was used to identify the various institutions with respect to their relevance to be involved in the stakeholder consultations and evaluation.

The consultations were stratified into institutional and community levels and lasted for six days per country. The targeted respondents were heads of Ministries, Departments and Agencies (MDAs), representatives of CSOs and NGOs, District Council and Chiefdom Authorities at the community level. The representatives interviewed were from the following organizations/institutions:

- UNIDO staffs working on the project,
- National Steering Committee members of the project,
- Environment Protection Agency - Sierra Leone (EPA-SL),
- Electricity Distribution Service Authority - (EDSA),
- Ministry of Energy,
- Electricity Generation (EGTC),
- Ministry of Trade and Industry,
- Local experts on the project implementation phases,
- Fourah Bay College-Engineering Department,
- Njala University Agricultural Engineering Department,
- Local Councils (Moyamba District Council Chairman, Paramount Chiefs, and community members).

In total, sixty-seven respondents were interviewed in Sierra Leone and Liberia, from different institutions that took part in the implementation of the projects.

Table 8 Stakeholder Identification Matrix (SIM) for project activities during the course of implementation (Sierra Leone)

No.	Institutions / Issues/Project Activities	MOE	UNIDO	PSC	EPA-SL	MT&I	EDSA	EGTC	FBC	Njala Uni.	Moyamba Dist Councils	Community rep.	Local experts	International experts

No.	Institutions / Issues/Project Activities	MOE	UNIDO	PSC	EPA-SL	MT&I	EDSA	EGTC	FBC	Njala Uni.	Moyamba Dist Councils	Community rep.	Local experts	International experts
1	Feasibility study		√										√	√
2	Site Visits/Consultations	√	√	√							√	√		
3	Awareness Building	√	√	√	√	√	√	√	√	√	√	√		
4	Project financing	√	√											
5	Project management	√	√	√	√	√					√	√		
6	EIA training	√	√		√	√	√	√	√	√	√	√		
7	Environment, Social and Health Impact Assessment (ESHIA)	√	√	√	√	√	√	√	√	√	√	√	√	
8	SHP training	√	√		√	√	√	√	√	√	√		√	
9	SHP technology training	√	√		√	√	√	√	√	√	√		√	
10	Sierra Leone Regional Hydrological Geodatabase		√										√	√
11	Office space	√									√			
12	Independent Mid-Term Review		√										√	√
13	International Workshop on Renewable Energy	√	√		√	√	√	√	√	√	√			
14	Development of Detailed Project Report		√										√	√
15	Land Demarcation		√								√	√		
16	Financial resource mobilization plan developed	√	√											
17	Geotechnical Assessment Development organized		√										√	√
18	Training on Enterprise Development Organised	√	√			√	√	√	√	√	√	√		
19	Training on Renewable Energy Policy Development and implementation Organized	√	√		√	√	√	√	√	√	√			
20	Training on Enterprise Development in the Renewable Energy Sector in Sierra Leone	√	√		√	√	√	√	√	√	√	√		
21	Training on Energy and Gender	√	√		√	√	√	√	√	√	√	√	√	
22	Exposure Tour in Kenya	√	√		√				√	√	√			
23	Small Hydropower Technology Center		√										√	√

Table 9 Stakeholder Identification Matrix (SIM) for project activities during the course of implementation (Liberia)

No.	Institutions / Issues/Project Activities	MLME	UNIDO	PSC	USAID	EPA	RREA	LEC	WinRock/UIP /NRECA	CARI/Phebe	Suakoko / Bong	Community rep.	Local experts	International experts
1	Feasibility study		√										√	√
2	Site Visits/Consultations	√	√	√							√	√		

No.	Institutions / Issues/Project Activities	MLME	UNIDO	PSC	USAID	EPA	RREA	LEC	WinRock/UIP /NRECA	CARI/Phebe	Suakoko / Bong	Community rep.	Local experts	International experts
3	Awareness Building	√	√	√	√	√	√	√	√	√	√	√		
4	Project financing	√	√											
5	Project management	√	√	√	√	√					√	√		
6	EIA training	√	√		√	√	√	√	√	√	√	√		
7	Environment, Social and Health Impact Assessment (ESHIA)	√	√	√	√	√	√		√		√	√	√	
8	MHP training	√	√		√	√	√	√	√	√	√		√	
9	Independent Mid-Term Review		√										√	√
10	International Workshop on Renewable Energy	√	√		√	√	√	√	√	√	√			
11	Development of Detailed Project Report		√										√	√
12	Mein River Power Company (MRPC)	√	√		√		√		√	√	√	√	√	
13	Small Hydropower Technology Center		√										√	√
14	Sustainable Energy Leadership Programme Training, India	√	√			√	√	√	√	√	√	√		
15	Renewable Energy as a Catalyst for Regional Development, Israel	√	√		√	√	√	√	√	√	√			

Several other activities have been conducted such as the establishment of the Winrock like project office (on site), the completed detailed engineering work design, several trainings and awareness raising on electricity access and benefits, social mobilization, etc.

1.6. Limitations of the Evaluation

The evaluation took place upon completion of the Liberian project which resulted in certain constraints that reflected the evaluation: some of the stakeholders could not have been reached, some of them were not able to remember all the details etc.)

During the time the evaluation is conducted, COVID-19 pandemic occurred and extensive restrictions were applied thus reflecting on the process and the duration, causing a delay.

2. Project's contribution to Development Results - Effectiveness and Impact

2.1 Project's achieved results and overall effectiveness

This subchapter gives an overview to what extent have the expected outputs, outcomes and long-term objectives been achieved or are likely to be achieved. The assessment gives an indication of the extent to which the projects attained their objectives. The assessment is made against the existing log frame and corresponding targets.

In evaluating the effectiveness of the two projects, the following questions are also considered:

- To what extent were the objectives achieved/are likely to be achieved?
- What were the major factors influencing the achievement or nonachievement of the objectives?

The evaluation of results and effectiveness in this subchapter is done by analysis of several relevant aspects: achievement of results for both projects (per individual project component

also), meeting targets, achievement оф outcomes, meeting objectives. The subchapter also discusses the results in demonstration components, gives an analysis of barriers and makes project comparison.

Achievement of results and meeting targets

The activities are grouped in four different components. Breakdown of achievement of results per year for each project is given in Annex 6 and 7, respectively.

The projects delivered results in same four components, as the design for both projects is almost identical. The delivery of the outputs and achievement of the targets as set for each output in the project documents has been assessed and quantified. Based on that, a score has been given and appropriate category identified for each project. The assessment is a comparison of what has been expected and what was delivered/achieved over the project periods (see table 3 and table 5 for project outputs, respectively).

Brief overview of the effectiveness per project component and per project is given in Table 10 bellow.

Table 10 Overview of effectiveness per project component and per project

Project component / results	Sierra Leone	Liberia
Institutional capacity development	Dedicated units established.	40 persons from across 13 government ministries and agencies, including private sector institution capacity strengthened in 'Small Hydropower Project Development in Liberia'
	Business model developed.	
	Several training programmes conducted.	SOPs developed.
	SOPs developed.	
Demonstration	Detailed Project Design for SHP prepared. Detailed Geological, Geophysical and Geotechnical assessment prepared. Land marking completed. Tendering documents prepared.	Detailed Project Design for MHP prepared. MHP abandoned. Detailed Project Design for transmission and distribution prepared.
	SHP plant not yet constructed. Strong commitment by the Government in locating investors. Private investor engaged; construction is expected to commence upon lift of ban on international travel.	MHP abandoned, not constructed. Instead, connection to WAPP together transmission and distribution line constructed and tested, ready to deliver electricity to Suakoko District (10 targeted communities, approximately 2,500 homes, Hospital, University, Research Centre, small businesses)
	Training manual for plant operation and Maintenance not prepared.	
Technical capacity building	Nearly 600 persons trained through various training programmes and data collection	Work with LEC on connection to WAPP.
	Local communities at district and village levels sensitized. A local mini grid facility constructed at Palima village and street lighting at Singimi	MRHPC established and trained.
	Small Hydropower Technology Training Centre established and hydropower equipment donated. Technicians capacitated.	Small Hydropower Technology Training Centre established and hydropower equipment donated.
	Bank financing institutions officials trained in financing RE projects.	
	A one year Financial Resource Mobilization	

Project component / results	Sierra Leone	Liberia
	Strategic Plan developed. About 100 entrepreneurs trained.	
Policy development	RE and EE policies and the EWRC documents have been enacted in parliament.	Government incorporated RE strategy into its national agenda. Set strategic Renewable Energy Targets
	Rural Energy Master Plan of Sierra Leone has been passed that captures SHP applications for productive uses	The Electricity and Water Regulatory Commission has developed legal and regulatory frameworks to promote renewable energy technologies
	Training report on the Development and Implementation of Renewable Energy Policy in Sierra Leone prepared. Report on an international exposer tour of 14 Sierra Leonean decision makers prepared	5 Programs for rural electrification of Liberia
	SHP generation tariff reduced to US$ 10 cents/kWh from 16 Cents/kWh	Tax Policy and Government Incentives.

More details about the achievement in terms of capacity building is given in the subchapter related to replication potential.

Based on the comparison and the assessment, scores have been given for each project. Following table presents the scoring for delivery of outputs and meeting targets for both projects. The screening is done against each and existing project log-frame and the scoring is done in accordance to the TOR rating system.

Table 11 Delivery of outputs and meeting targets

	Sierra Leone	Liberia
Score	Satisfactory	Moderately satisfactory
Comment	Level of achievement presents minor shortcomings (70% - 89% achievement rate of planned expectations and targets).	Level of achievement presents moderate shortcomings (50% - 69% achievement rate of planned expectations and targets).
Category	SATISFACTORY	SATISFACTORY

Results in demonstration components

The Sierra Leone project as part of its demonstration of SHP based mini-grid component foreseen construction and commissioning of 10 MW SHP plant and local mini grid. Based on the extensive hydrology investigations, it was decided that the project site has almost twice bigger potential. However, to be on a safe side, it was decided that 16MW would be an optimum for harnessing the hydro potential. Moyamba SHPP project is located at the Gbangba River just downstream of the confluence point with the Kapui River, approx. 29km straight line south of Moyamba town, in the proximity of the village Singimi.

For this purpose, Detailed Project Report (DPR) was developed in 2016, land demarcation was conducted and detailed Geological, Geophysical and Geotechnical assessment of the SHP dam site made. In order to provide further assistance to the Goverment of Sierra Leone who has the responsibility in providing the funding for the construction of the project, UNIDO developed tender documents.

Awareness building was made through a series of workshops, mass media and briefings to the stakeholders in 2009, 2010, 2012 and 2013 having some positive results in perception changing.

The total estimation of the capital related to the construction is as following: 1) Civil works = 53.147.000, 2) Mechanical equipment = 13.630.000$, 3) Electrical equipment = 11.575.000$, 4) Other project costs = 25.923.000$, which equals to a total of 104.280.000$. The direct generation costs have been estimated to be 70.80.000$.

The Government of Sierra Leone, as a national execution partner, made good efforts in attracting investors to provide the necessary funding for the project, however until the completion of the project (December 2019) no funding was secured and construction was commenced. The latest information says that private investor has been engaged and activities are about to start as soon as ban on international travels is lifted.

Figure 5 Community center in Palima (left) and lightning in Singimi village (right)

For the purpose of sensitizing the most affected communities at the site, but also to offset the tolerance, UNIDO constructed a community center in Palima and light house and street lightning in Singimi village (considered as an interim compensation).

The Liberia project as part of its demonstration component of SHP based mini-grid had foreseen construction and commission of 1 MW MHP plant and local mini grid. According to the chosen implementation model, UNIDO was responsible for construction of the electricity distribution grid and USAID was responsible for construction of the MHP plant. Detailed project design was prepared and USAID started its construction activities (road was constructed, site cleared etc). However, due to new circumstances (updated financing plan and environmental constraints), it turned out that the capital for the MHP construction would be much higher than expected, but also it was revealed that the site belongs to a nature protected area. Due to that, USAID brought a unilateral decision to cancel the MHP construction and instead of that to connect the project location to the available WAPP energy infrastructure[9] at the border with Ivory Coast. In such circumstances, UNIDO could not do anything but to accept USAID's decision and continue with the project.

The responsibilities of both partners and their partnership (UNIDO and USAID) were set in an execution agreement by which UNIDO engaged the services of the Partner Organization for the efficient and effective delivery of the Project inputs, in accordance with the outputs and

[9] According to the available documents, this infrastructure carries out energy from a renewable (hydro) source – statement of USAID / NRECA team, BACK-TO-OFFICE REPORT: Feedback from the Mein River Project Stakeholders Meeting Held in the Conference Room of the Phebe Medical Hospital Compound on August 16, 2017, Suakoko District, Bong County, 27 August 2017

outcomes described in the Project Document. According to this, UNIDO made a financial commitment to initially disburse to the Partner Organization USD 1,200,000. Finally, USD 1,200,000 was disbursed. Winrock international in the beginning, and UIP in the second period was execution partner to both parties, responsible for the delivery of the construction whereas NRECA was a supervisor.

However, the project change (cancellation of the generation component and connection to WAPP) was not reflected in the log-frame and it remained the same, thus reflecting on the other project components.

In 2019, the construction activities responsibility of UNIDO were completed providing distribution network and access to energy to 14 rural communities in Bong county, encompassing 2500 households, Phebe Medical Hospital, Cuttington University and the Central Agriculture Research Institute (CARI), as well as a number of primary and secondary school facilities, market places, clinics and other medium business enterprises. Upon completion of the transmission line responsibility of USAID which is expected to be done any moment, all beneficiaries would start enjoying the benefits.

Achievement of outcomes

Bearing in mind the status of the implementation of project activities, the delivery of the outputs and the achieved targets, it is safe to say that both projects have contributed significantly to the achievement of the expected outcomes, except for the demonstration part in Sierra Leone (interim compensation made).

In the case of the Liberia demonstration component, when screened against the actual log-frame and related outcome and target (no change was done due to cancelation of generation), no construction of 1MW MHP was made. However, the fact is that electricity access to the targeted rural areas had been provided as a result of the project, after all.

Table 12 Summary on achievement of outcomes, Sierra Leone

Project component	Expected outcomes	Achievement
Institutional capacity development	Strengthened institutional capacities at various levels on the planning and implementation of SHP based mini grids projects for enhancing electricity supply and productive applications	- NPA, Ministries, Universities, Council, PC, Fin. Inst., presidential committee, interacted on different models in the country. - Dedicated unit established. - Private Public Partnerships Unit within the Office of the President - Worked on resource identification and mobilization. - Exposed and trained. - SOPs developed. - Electricity and Water Regulatory Commission has been enacted by parliament. - Manuals and publications on best practices in design and development of small hydro projects were prepared.
Demonstration of SHP based mini-grid	Public – private investments and partnerships and stakeholders acceptance of viability of SHP	- DPR developed. - 8 private and 1 public companies interested and negotiating. - Private investor engaged (2020).

Project component	Expected outcomes	Achievement
	based mini-grid enhanced	
Capacity building of stakeholders	Local expertise and knowledge enhanced for SHP based mini-grids (installation, operation and maintenance), their financing and productive use	- Nearly 600 persons trained through 12 trainings
Policy and regulatory framework for SHP Development	Conducive policy and regulatory framework in place	- Contributed and several improvements shown at national strategies and plan. - Drafted Mini Grid Regulations. - Zero Taxation for RE technologies. - Electricity tariff regime under review.

Table 13 Summary on achievement of outcomes, Liberia

Project component	Expected outcomes	Achievement
Development of institutional Capacity	Strengthened institutional capacity at national and local levels for implementation of mini hydro power (MHP) system and local distribution grid	- Deputy Minister for Energy set. - Liberia Electricity Regulatory Commission established; commissioners appointed. - The energy sector is encouraging Public Private Partnership (PPP) as a means of de-monopolizing the electricity sector. - There is PPP operating within a nearby city (Ganta City). - Manuals and publications on best practices in design and development of small hydro projects distributed.
Installation and commissioning of mini hydropower system and local distribution grid	MHP system providing electricity access to rural areas	- Ganta-Gbarnga 33kV line and associated distribution, protection, and control facilities constructed (77.28 km), including grounding transformer bank, a voltage regulator, a main disconnect switch, a primary metering set, three vacuum reclosers, two capacitor banks, approximately 25.5 km of single-phase distribution line and associated transformers, approximately 10km of low voltage line, 500 single phase consumer service drops and 11 three phase consumers service drops. - 25km of 19KVA and 10Km of LV distribution lines constructed and tested.

Project component	Expected outcomes	Achievement
Technical capacity building for operation, repair and maintenance of mini hydro power and local mini grid	Renewable and Rural Energy Agency and local energy enterprises capacitated for operation, maintenance and repair of MHP systems.	- Proactive and determined Rural and Renewable Energy Agency, capacitated. - Established local company to manage the initially foreseen off grid facility - Mein River Hydropower Company, MRHPC. - Capacity building of staff from different relevant institutions[10] and stakeholders.
Policy and regulatory framework for mini hydro power development	Enabling policy and regulatory framework and appropriate incentive structure facilitating faster growth of MHP for improved electricity access and irrigation	- Tax Policy and Government Incentives. - The Renewable Energy and Energy Efficiency Policies are being reviewed by the Ministry of Energy. - Mini-Grid Code for Liberia11 (drafted in 2017)

Meeting the objectives

Sierra Leone.

Project Objective: To develop a market - based approach, through public private partnerships, for promoting Small Hydro Power (SHP) based mini-grids to stimulate productive capacities in the country, to bring small hydro energy in the mainstream of sustainable energy supply systems by demonstrating successful project experiences, which should induce the government's sustained development program and increase private sector investment support.

The achievement of the project objective has been seen to be done, as set in the project document, by implementation of series of project activities divided into four project components - demonstration and capacity building and policy. The SHP plant was not constructed nor works have started thus failing to demonstrate successful project experience in terms of demonstration. However, the achievement on other three components was high, as discussed before, making important impact on the beneficiaries and partners, thus contributing to the achievement of the objective, SHP promotion and bringing small hydro energy in the mainstream of sustainable energy supply systems:

- Strengthened human capacity for future replication (more than 600 people trained during the entire course of the project and SHP Centre established, equipment donated and

[10] Training for 1 technical staff from the Rural and Renewable Energy Agency (RREA), at the 'Sustainable Energy Leadership Programme,' at TERI University, New Delhi, India, from 8-19 February; Training for 1 technical staff from the Ministry of Lands, Mines and Energy (MLME), at 'Renewable Energy as a Catalyst for Regional Development,' at the Arava Institute in Israel, from 7-23 May

[11] The document establishes technical, safety, quality of services and performance standards, etc., that will be required of applicants for electricity licenses for rural electrification.

strong potential for education, research and application through public private partnerships),
- Identified and mapped hydro potential in the country (5000MW potential),
- Clear strategic energy vision set based also on RE/HP, set targets, revised feed-in tariffs, tax incentives,
- Behavioral change at decision makers, project planners, designers and executors,
- Personal impressions of stakeholders picked up during the interviews.

Liberia.

Project Objective: To develop the market environment for improving the access to mini-hydro based modern energy services in rural areas, to bring mini hydro energy in the mainstream of sustainable energy supply systems by demonstrating successful project experiences, which should induce government's sustained development program and increased private sector's investment support.

Again, as both projects share a design, the achievement of the project objective has been also seen to be done by implementation of series of project activities divided into four project components - demonstration and capacity building and policy. The MHP plant was not constructed nor works have started thus failing to demonstrate successful MHP project experiences in terms of demonstration. But, in this case this was result of a decision of the partner and UNIDO could not do anything about that. Nevertheless, it is a fact that the target location has been given an access to renewable energy and there is an achievement in the other three components, as discussed before, making impact on the beneficiaries and partners, thus contributing to the achievement of the objective and inducing government's sustained development program:

- More than 10 policy and law acts have been updated/revised to include RE/HE strategy,
- Legal and regulatory frameworks have been developed to promote renewable energy technologies,
- Strategic goals for rural electricity access and Renewable Energy Targets,
- Government incentives introduced etc.

GEF outcomes

The global benefits of the project set as GHG reduction have not been achieved within the given project timeline. However, all construction activities in Liberia should be completed by now and the benefits are to arrive any time, since the source of the energy coming to the project area is renewable and at 50% more than it was initially planned in the project document (1.5MW total capacity). Bearing in mind that a private investor had been engaged for the project in Sierra Leone, global benefits are very likely to arrive soon and again at 60% more than it was initially planned in the project document (16MW compared with the initial 10MW).

The achievement of the GEF outcomes as set in the project documents is commented in the following tables.

Table 14 Achievement of GEF outcomes, Sierra Leone

GEF outcomes/indicators		Achievement
Applicable GEF expected	Increased number of small hydro projects for productive	No available information about this.

GEF outcomes/indicators		Achievement
outcomes:	uses, developed through public private partnerships and market-based approach, in Sierra Leone	
Applicable GEF outcome indicators:	(a) Tonnes CO_{2eq} avoided. (b) kWh saved from adoption of small hydro power and best practices of electricity management	No achievement has been made so far because SHP is not constructed yet. 60% more CO_2 reduction per year than it was initially expected will happen upon SHP commissioning due to the increased SHP capacity. (Initially 26,170 tCO_2 emission reduction was planned within one year of plant commissioning for 10MW capacity).
GEF Tracking Indicator	Indicator 1. Adaptation/Creation/ Enactment of policy framework for micro and small hydro power Development	National Renewable Energy Action Plan (NREAP) of the Republic of Sierra Leone, 2015. Renewable Energy Policy (2016). Electricity Sector Reform Roadmap 2017 – 2030 Target score: 3
	Indicator 2. Electricity Production in the Reporting Period from grid-connected renewable energy installations installed under the influence of the project (MWH/year)	Community centre and lightening house with street lightning were constructed and work commenced in Palima and Singimi village in 2019. These two facilities are productive and providing benefits to the local communities. 63.2 GWh/a id expected annual production of electricity production of the Moyamba SHP.
	Indicator 3. Number of business and households served by renewable energy beyond those receiving service at the time of project inception	Expected connections: MOYAMBA District and NJALAH University; about 50 government departments are in the downtown of MOYAMBA District, including the town government, post offices, police stations, schools, cinemas, small stadiums, Internet coffee bars, hotels, agricultural irrigation facilities and research institutes, about 50 villages around Moyamba plant

Table 15 Achievement of GEF outcomes, Liberia

GEF outcomes/indicators		Achievement
Applicable GEF expected outcomes:	Increased number of micro/mini hydro projects for productive uses, developed through public private partnerships and market-based approach, in Liberia	For a project previously identified and initially developed by UNIDO, the Government of Liberia signed[12] an agreement with the African Development Bank (AfDB) Group to finance the Gbedin Hydroelectric Project on the St John River in Nimba County in the east of the country.
Applicable GEF outcome indicators:	(a) Tonnes CO_{2eq} avoided. (b) kWh saved from adoption of mini hydro power and best practices of electricity management	1.5MW capacity transmission and distribution network constructed and tested any minute will start providing 50% CO_2 saving than initially planned with 1MW MHP.

[12] https://www.afrik21.africa/en/liberia-afdb-finances-gbedin-waterfalls-hydropower-project/

GEF outcomes/indicators		Achievement
GEF Tracking Indicator	Indicator 1. Adaptation/Creation/ Enactment of policy framework for micro and small hydro power Development	The Government has incorporated RE strategy into its national agenda. Target score: 3 The Electricity and Water Regulatory Commission has developed legal and regulatory frameworks to promote renewable energy technologies. Set strategic Renewable Energy Targets. Rural Energy Strategy and Master Plan (adopted in 2016). Mini-Grid Code for Liberia (drafted in 2017) Tax Policy and Government Incentives.
	Indicator 2. Electricity Production in the Reporting Period from grid-connected renewable energy installations installed under the influence of the project (MWH/year)	/
	Indicator 3. Number of business and households served by renewable energy beyond those receiving service at the time of project inception	14 rural communities, 2500 households, CARI, University, Hospital, 5 schools, small shop businesses, market places, clinics and other medium business enterprises are about to benefit any minute, upon completion

Analysis of barriers

The situation with the barriers at the end of the projects has been analysed in respect of the implementation of the project activities and the delivery of the outputs (Table 16 and 17).

Table 16 Barriers analysis upon project completion, Sierra Leone

Type of Barrier	Key Issues	Corresponding project measures	Situation upon project completion
Institutional and Policy barriers	National Energy Policies are yet to be translated to specific guidelines, rules and regulations with particular focus on renewable energy including small hydro and its applications for rural electrification and productive applications. There exists no integrated renewable energy or small hydro power policy and program which can guide policy coordination among the national and provincial institutions for promotion of small hydropower development	Outputs 4.1, 4.3 Outputs 1.1, 1.3, 4.2	The government has already taken the initiatives in this direction by including the renewable energy sector in the National Energy Policy and strategy document which include the development of SHP with the mention in the policy statement that "Government of Sierra Leone will continue to promote the development of the hydropower resources in the country, including development of micro hydro schemes". The strong 'buy in' of the government for promotion of SHP is expected to minimize any political or security risks of investments in the proposed SHP. Government energy programmes now incorporate SHP applications for productive uses Reviewed the existing policy and regulatory framework formulated and adapted for renewable energy regulations/institutional framework
	Inadequate national capacity to explore small hydro	Outputs 1.1, 3.1,3.2,3.3	Over 100 Sierra Leoneans have been trained in small hydropower related technologies.
Market and technology barriers	No fully functional focal point for the provision of market development services for small hydropower	Outputs 1.1	The baseline survey and stakeholder's consultations/ workshops has identified opportunities for the productive applications and use of generated electricity in areas such as cassava processing, fish cold storage, palm oil extraction units, wood works etc. It is further envisaged that Rutile mining industry, that is currently dependent on diesel generation, will also be a probable end user of SHP.
	Lack of effective technical support services and implementation guidelines for undertaking small hydro development	Outputs 1.4, 3.1 ,3.3	Technical capacities at various levels on the planning and implementation of SHP based mini grids projects for enhancing electricity supply and productive applications strengthened.
	No prior experience of implementation and management of small hydropower projects based mini grids for rural electrification and productive use.	Outputs 1.1, 3.2	The project involved a number of international and national experts for capacity building programmes.
	Limited local technical capacity and lack of small hydropower equipment product standards to support small hydropower development in the country	Outputs 1.2, 3.3	International small hydropower equipment owners and operation and maintenance service providers will cooperate and are willing to share valuable information.
Financial barriers	Apprehension by the bank and financing institutions about inadequate returns on small hydropower investment	Outputs 1.2, 3.4, 4.4	The project has created an enabling environment for the private sector participation/investment in development of mini grid through removal of barriers and appropriate design of policy, regulatory and financing mechanisms.

Type of Barrier	Key Issues	Corresponding project measures	Situation upon project completion
			Financing instruments put in place for private actors participating in promotion of SHP projects
	Unavailability of credit facilities for low-income communities to support productive uses of small hydropower generation	Outputs 3.2, 3.5	The Government has stressed the need to unlock access to finance especially engagement with the Bank of Sierra Leone to provide a policy where Forex lending will be made to low-income communities for productive use of energy.
Information barriers	Insufficient information and dissemination of policies and regulations	Outputs 4.3	Reviewed and adopted International policy and regulatory frameworks of successful SHP programs including international best practices for SHP promotion in Sierra Leone.
	Lack of documentation and publication of existing small hydropower achievement	Outputs 1.1, 1.4	Manuals and publications on best practices in design and development of small hydro projects were prepared. These manuals will be useful for future projects.

Table 17 Barriers analysis upon project completion, Sierra Leone

Type of Barrier	Key Issues	Corresponding project measures	Situation upon project completion
Policy barriers	National energy policy lacks specific regulations and strategic programs that would promote renewables (and mini hydro power more specifically).	Outputs 4.1, 4.2	Significant upgrade of the relevant RE policy and set strategic RE/HE targets. Tax Policy and Government Incentives set. Renewable Energy and Energy Efficiency Policies being reviewed.
	No framework for national and county-level coordination of mini hydro power development.	Outputs 4.1, 4.3	RREA established with a mandate to foster rural electrification, with strong focus on HE
Institutional barriers	Capacity of national and local energy sector agencies to develop and promote mini hydro power and mini-grids – specifically technical, managerial, and planning capacity -- is lacking.	Outputs 1.1, 3.1, 3.3	RREA established, capacity building. Liberia Electricity Regulatory Commission established, commissioners appointed.
Market and technology Barriers	Lack of technical support services (i.e. trained private sector technicians) and technology guidelines for proper installation, operation, and maintenance of facilities. Lack of technical standards may lead to importing low-quality equipment, leading to poor results.	Outputs 1.3, 3.2, 3.3	MRHPC established and trained. There is still limited publicity and low national interest in development services for small hydropower. The country still lacks limited exposure in the

Type of Barrier	Key Issues	Corresponding project measures	Situation upon project completion
	No existing experience in operating mini hydro power for mini grids.	Outputs 4.1 ,3.4	implementation and management of small hydropower project based mini grid for rural electrification. Technological exposure
	No in-country producers of hydro power equipment.	Outputs 1.2, 3.2, 3.3	
Financial barriers	Banks are reluctant to lend to the hydro power sector because of the perceived low return on investment.	Outputs 4.2, 4.4	Government of Liberia signed a agreement and received a loan for development of Gbedin Hydroelectric Project on the St John River in Nimba County in the east of the country. Still lot needs to be done.
	Banks are not familiar with the technology involved and therefore perceive hydro power investments as risky from a technological standpoint, too.	Outputs 4.2, 4.4	
	Lack of credit for entrepreneurs limits the potential market of hydro power for productive uses.	Output 3.4	
Information barriers	Local governments lack information on hydro power strategies and planning and cannot incorporate information into their development strategies.	Outputs 1.3, 4.1	Good effort was done by establishing and working with the MRHPC by the time this activity was active. Still lot needs to be done.
	Awareness of hydro power options and benefits is very low among all stakeholders, including engineering firms.	Outputs 4.1, 1.3	There is still limited resources and publication on the existence of small hydropower achievement in the country, except for donor sponsored interventions which has provided assistance in this area. More needs to be done by national government in documenting and publishing of existing small hydropower achievement.

Project comparison

Table 18 Policy comparison, before and after

Policy aspect comparison	Before	After
Sierra Leone	National Energy Policies are yet to be translated to specific guidelines, rules and regulations with particular focus on renewable energy including small hydro and its applications for rural electrification and productive applications. There exists no integrated renewable energy or small hydro power policy and program which can guide policy coordination among the national and provincial institutions for promotion of small hydropower development	Strong political will to increase investment in the renewable energy sector, a strategic priority of the Government. Government of Sierra Leone is highly committed to the implementation of the SHP project and has prioritize its construction in the Sierra Leone's Medium-Term National Development Plan (2019 - 2023), including the renewable energy sector in the National Energy Policy and strategy documents. The strong 'buy in' of the government for promotion of SHP is expected to minimize any political or security risks of investments in the proposed SHP. More analysis on the policy matter in Table 13 Before and after, Sierra Leone.
Liberia	National energy policy lacks specific regulations and strategic programs that would promote renewables (and mini hydro power more specifically). No framework for national and county-level coordination of mini hydro power development.	Several new and others strategic documents updated to include RE/HE targets for promotion of RE. Development of specific regulations underway. More analysis on the policy matter in Table 14 Before and after, Liberia.

As part of the capacity building component in both projects, small hydropower technology centre centres were established in Sierra Leone and Liberia. The objective was these centres to be used to implement targeted and effective Research and Development (R&D) programmes which can spur local SHP innovation and ultimately support the development of a resilient local green energy technology industry.

Table 19 Hydro Power Technology center comparison

Sierra Leone **Small hydropower Technology Training Centre**	**Liberia** **Small Hydropower Technology Center**
• Established at Fourah Bay College in 2014. • Modern training and reasearch facility. • UNIDO donated various Small Hydropower equipment worth about US$150,000. • Result – hosts a programme on Postgraduate Degrees on Renewable Energy - offers courses on postgraduate Masters, MPhil and PhDs in renewable energy studies. • Already producing postgraduate students.	• Established at the Monsignor Stephen Kyne Technical College, Stella Maris Polytechnic University in 2014. • Aimed at becoming a one-stop solution offering technical consultancy and advice, enabling public-private partnerships, and all other things related to small hydro power projects. • Necessary equipment worth over $ 111,820

Sierra Leone Small hydropower Technology Training Centre	Liberia Small Hydropower Technology Center
• The center is combining hydro and solar energy to produce a new concept called Hybrid systems. • Acts as local hub for SHP knowledge building and sharing, SHP research and application. • The centre is working on bulding strong relations with regional centres. • The sustainability of the centre is not at question as being part of the Forauh Bay College securing continuity and progress.	donated to the Centre. • Lack of capacity: the key beneficiary is no longer part of the centre, due to unfortunate incident. • The equipment is all available with minimum use, with the surveying equipment being the most used. • Sourcing a staff to manage the center and have it fully operational is expected as soon as the new premises are constructed.

Table 20 Key results of the projects

What have been the project's key results (outputs, outcome and impact)?	
Sierra Leone	Liberia
• High outputs delivery performance. • High capacity delivery. • Behavioral change at various level accepting HE as key driver for social and economic development. • Recognizing UNIDO as reliable partner. • Very good in-country management grip.	• Transmission and distribution network constructed and tested. • Significant policy improvement. • Mein River Hydropower Company established and trained. • High awareness among local stakeholders and sensitized local public welcoming the benefits of the access to electricity.

Criterion: Overall effectiveness	
Rating	
Sierra Leone	Liberia
Moderately satisfactory	Moderately satisfactory

2.2 Progress towards impact

The positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended. This involves the main impacts and effects resulting from the activity on the local social, economic, environmental and other development indicators. The examination should be concerned with both intended and unintended results and must also include the positive and negative impact of external factors, such as changes in terms of trade and financial conditions.

When evaluating the impact of a programme or a project, it is useful to consider the following questions:

- What has happened as a result of the projects?
- What real difference has the activity made to the beneficiaries?
- How many people have been affected?

2.2.1 Behavioral change

Project outcomes are the behavioral changes that result from the project outputs and are expected, as set in the planning. Behavioral change refers to transformation or modification of

the human behavior of the concerned project parties (beneficiaries, stakeholders and public). These types of changes can be both intended and unintended, positive and negative.

Outcomes are actually individuals' behavioral responses to project activities given the particular contexts and factors present, and outputs achieved. While the first level of behavioral change is often at the institutional level, other also happens at the side of different concerned parties of the intervention (project).

Behavioural changes on the stakeholder's side are noticeable seeing development of interest, awareness and cooperation.

Beneficiaries/partners

This group is mainly represented by decision makers, management people, directors, chief at national and regional level. The behavioral changes can be seen through the policy and legislation prism, comparing the two periods, before and after project. Based on period of good engagement, awareness and capacity building activities this group was convinced in the potential of transformational change of the hydropower, potential that can bring social and economic development and dived into a series of policy and legislation improvement including serious and significant changes and targets.

Stakeholders

This is a group of various types of executioners, private sector representatives, education sector and others, who also convinced in the HE potential, but leaded by the decision makers and supported by the policy and law changes are contributing in the transformation story by accepting the capacity building activities, investing in their knowledge etc.

Public

This are the real beneficiaries of the changes, enjoying at the end the benefits of the access to energy. They are willing to hear and ready to support the project activities, actively contributing anyway they can: ready to relocate, giving their land free, spreading the good word about the projects and acting as ambassadors, assisting the project surveyors and constructors, maintaining the roads, acting responsibly toward the new installed equipment etc.

2.2.1.1 Economically competitive - Advancing economic competitiveness

2.2.1.2 Environmentally sound – Safeguarding environment

Environmental impact assessment

For both projects, an environmental impact assessment had been carried out, in accordance to the national requirement for such type of projects.

An EIA was conducted and EIA study was prepared for the proposed project and dam location, to assess the environmental impact of the proposed project. This study led to the issuance of an EIA license by the Environment Protection Agency – Sierra Leone (EPA-SL) as a project that is environmental friendly (21.05.2015, EPA SL 099).

The evaluation team met with an environmental local expert[13] that worked on the biodiversity aspect (flora and fauna study) of the project area. He revealed that the total land area covered

[13] Interview with Dr. Jinnah S. Momoh, USL, 12.11.2019

by the project was a degraded soil, with farm bush vegetation and pockets of forests along the river basins. The project land area also had sacred bushes for secret societies and the area is sparsely populated with people. Most of the people heavily depended on the river for their survival, as so many of them were fisher men. The major crop cultivated by the inhabitants is cassava.

The expert highlighted some challenges as key towards the successful implementation of the project .i.e. the dam construction; the issue of ecosystem services was key for the relocation of those six communities, the cultural and traditional issues like the relocation of their societal bushes and lastly the leadership issues when they might relocated.

An EIA was also conducted and EIA study was prepared for the proposed project for construction of 1 Megawatt Hydropower Electric Mechanical dam in Suakoko District, Bong County, Liberia by harnessing the Mein River hydropower energy potential along the Kpatawee Waterfall. The EIA had been prepared on the based on the first initial project desing and consent was granted by the authorities in 2013. However, according to the statements of the EPA representatives[14], the consent was not renewed in 2016. The explanation for this was that the project location is part of nature protected area (Kpatawee Wetlands Ramsar site).

An EIA was also preparad for the distribution and transmission part (desing) and consent was granted for project construction according to revised design.

Environmental benefits

In an absence of wide, sustainable and reliable electrification, more than 90 % of the population in both countries relies on diesel generators or firewood, charcoal, and palm oil for their energy needs. These traditional fuels are not harvested sustainably and their use threatens biodiversity and leads to forest cover loss that reduces carbon sequestration. Furthermore, the fossil fuel used by these generators pollutes the environment and contributes to the country's emissions of greenhouse gases.

The environmental benefits of both projects are a reduction in GHG emissions brought by the replacement of existing fossil fuels and other sources of electricity generationfor meeting the power and energy needs in the both targeted regions. Additional indirect GHG reductions are also expected through replication SHP projects influenced by the project.

2.2.1.3 Socially inclusive – Creating shared prosperity

The idea of both projects is to provide longterm and sustainable access to electricity to an entire district. That includes a considerable number of households in few towns and villages, small enterprises, public buildings and commercial buildings, educational, research and medical institutions.

Access to energy affects quality of life. Access to energy or lack thereof, affect human health, access to education, socioeconomic status, gender equality and lot more related issues.

Electrification provides a solid basis for development of local communities. Once a community has access to electricity, it can also have access to safe potable water, better health conditions, food security, as well as lighting and information. Access to energy in communities increases overall productivity and creates jobs.

[14] Interview with EPA representatives Mr. Levi Z. Piah and Mr. Jerry T. Toe, 18.11.2019

Electrification has been considered as a key benchmark for economic development and social progress since the 1930s. Universal access to electricity is not only critical for improving living standards but deemed indispensable for eradicating poverty and achieving sustainable development (GNESD 2007). Because of this, ensuring universal access to affordable electricity by 2030 was incorporated directly in the Sustainable Development Goals (UNGA 2015)[15].

Furthemore, the importance of the provision of energy is underlined in the key role it has in the delivery of many of the other SDGs, including those regarding gender equlity, poverty and nger reduction, provision of clean water, sanitation and climate mitigation.

Small communities and households relying on biomass for cooking dedicate several hours per day collecting firewood and hours for cooking, a burden that largely falls on women and children. It is obvious that this time allocated differently would allowed women to invest in income generating activities or education, they would be able to improve their overall well-being.

Medium and long-term impacts that electrification has on a community should also be considered although it can take years if not decades to manifest, for example increased political awareness and improved educational standards. It is not uncommon, that it is the children of a household that have the greatest advantage from electrification – it helps children to attend school, study with proper lighting in the evening, become more socially and politically aware and eventually establish themselves with jobs which will allow them to provide their children further improved conditions. This is a cycle that takes decades, but constantly increases socio-economic development and overall well-being.

As a result of the construction of the SHP, relocation of about six villages in Moyamba District would be unavoidable as studies shown to ascertain what it takes to undertake such drive in the project implementation phase i.e., the construction of the dam. The discussion with the local population[16] likely to be directly affected with the construction revealed that they accept and support the project very much as they are very aware of the future benefits for them, but most important for the future generations. The people received the evaluation team in jubilant form covered with glamour and fanfare, overwhelmed for the community center construction and lightning system in their villages.

They understand the responsibilities coming with the project and they are willing to be relocated for the needs of the project implementation. However, compensation is expected for the loss of their homes, crops, socially and religiously important places. Furthermore, the chiefs are aware of the project importance and they accept the role of project ambassadors and project support in their communities.

The Moyamba District Council together with the Paramount Chief and stakeholders[17] (NGOs, radios etc.) are also very sentized about the project, very welcoming and supporting, as they are more than aware of the social, educational and economic benefits. The interview revealed that Moyamba District needs the dam seriously, as it is the darkest district in Sierra Leone. The team also noted that the Paramount Chiefs were in readiness to support the establishment of the dam, as the dam will bring save and pure drinking water for the District and boosting economic

[15] SDG number 7 is “to ensure access to affordable, reliable, sustainable, modern energy for all by 2030”.
[16] Focus group interviews with Palima and Singimi village inhabitants, 15.11.2019
[17] Focus group interview with Moyamba District Council together with the Paramount Chief and stakeholders (NGOs, radios etc., 15.11.2019

activities in the District. The Paramount Chiefs agreed to accept the dam construction, and they were willing to give their land freely to the project.

2.2.1.4 Transformational change

The potential of a transformational change in these two projects has not been set in the evaluation scope of the relevant terms of reference. However, bearing in mind the trends and the importance this question might take in this evaluation report, but also rising as a question during the consultations with the stakeholders, it was decided that this aspect should be aslo considered in the report. This section makes an effort of (basic) screening and evaluation of the potential of transformational change that these two project might have.

Transformational change refers to deep, systemic, and sustainable changes with large-scale impacts in a significant area of concern, in climate change, other global environmental issues, social, educational, economic.

In development two kinds of transformational change were recognized, societal change and a second perspective on transformational change that emerged from the development and environment arena. Transformational change can happen in many contexts, but that transformations for achieving the Sustainable Development Goals should be changes of society. Transformational change of society makes a major and durable difference. In the context of the (long) march towards the SDGs, transformational change of society could amount to a significant advance in the achievement of one or more SDGs.

The Independent Evaluation Office of the Global Environment Facility (GEF) developed a theory of transformational change for GEF supported interventions. Key factors turned out to be a transformative ambition in the design, a focus on market and system changes through policies, inclusion of mechanisms for financial sustainability and a high quality of implementation. GEF IEO had evaluated a sample of GEF projects to test this out – a hopeful note is that although bigger projects scored well, even smaller projects with limited duration were able to support transformational change through tackling key barriers and involving key stakeholders[18].

This chapter looks at one particular aspect and that is what's the transformational change potential of access to energy in these two projects.

In general, access to energy contributes to the achievement of maybe more than 8 Sustainable Development Goals.

Figure 6 Concerned Sustainable Development Goals

Access to energy in such rural areas would significantly contribute towards decreasing the powerty and eliminating hunger throgh the support of the local and regional development, supporting the bussiness and commercial opportunities to harness the local resources. These would lead to improving the general health conditions and well being in the communities, but also improved access to education and clean water and sanitation. An access to renewable energy would also significantly contribute in the pollution prevention and climate change mitigation. All these had been confirmed by the concerned parties (stakeholders) during the interviews.

When assessing the potential, evaluations need to include not only the standard evaluation criteria (relevance, effectiveness/efficiency, efficiency, sustainability and impact), as well as significance.

Specifically, for Moyamba and Suakoko districts, the transformational change is based on the strengthened capacities at the institutions and the private sector together with adequate policy and commitments at the side of decision makers, would result with long-term benefits on the field.

The transformational change could be seen in the following.

Moyamba and Suakoko districts are maybe one of the darkest districts in Sierra Leone and Liberia. The universities (Njala and Cuttington) and CARI research centre and Phebe Hospital rely on electricity based on fossil fuels. This means large monthly bills for fuel, limited access to electricity during the day, limited development and services. For the communities that means darks streets unsafe for the population, limited access to education (there are no schools in every communities), significant poverty, unhealthy and unreliable environment at each for the homes based on kerosene or biomass fuel, limited possibilities for development of economic sector in the area.

Reliable and long-term access to energy is expected to provide better education, improved knowledge and know-how, better curriculums, better lecturing environment, improved access for education, development of the universities, more research, more networking[19]. For the commercial / private sector that would mean more opportunites more knowldged and know hoe for development of new ideas, opportunities for harnessing the local capacities and local resources (casava)[20]. It will mean an opportunity for transformation of CARI research centre, improved efficiency, more and better services for the local farmers, more research, more development. It will mean significant cut in the monthly bill for fuel consumption, more money for improving the capacity and services for the patients at Phebe hospital[21].

Access to energy is been understood by the local government, but also communities as driving force for social and economic growth, bringing safety on the streets in both districts but also in the individual homes, but also as an access to education, development of the families, use of

[19] Focus groups meetings with Njala and Cuttington universities, 14.11.2019, 21.11.2019
[20] Focus groups with Moyamda district council, NGOs and interviews Suakoko District Commissioner and Youth President with 15.11.2019, 21.11.2019
[21] Focus groups meetings with CARA research centre and Phebe hospital, 21.11.2019

the local casava resources, more schools, better education, development and opportunities for the youth[22].

Bearing in mind what has been said, it is safe to say that both projects have a potential for transformational change in the affected regions. The potential for such change on a national scale is related to the replicability potential of the projects. But off course, since the electricity is almost there in Suakoko district, the transformational potential is to be seen there faster than in Moyamba.

2.2.2 Broader adoption

2.2.2.1 Mainstreaming

The primary objective is to bring small/mini hydro energy in the mainstream of sustainable energy supply systems by demonstrating successful project experiences, which should induce the government's sustained development programs and increase private sector investment support.

Mainstreaming environment and climate change in national development planning, policies and implementation leads to reducing poverty and achieving the MDGs.

Sierra Leone

The Government of Sierra Leone has recognized that: *"the application of renewable energy has the potential not only to raise Sierra Leone's growth rate, but also to deepen its effect on real sectors of the economy. More adequate, reliable and affordable power supply will for instance enhance the modernization of agriculture and in turn support the increasing quality of life. Job creation, productive use and business development as well as improved social service delivery for the poor are likely achievements of applying the policy."*[23]

Table 21 Before and after, Sierra Leone

Barrier	What has changed since the beginning
Policy: National Energy Policies are yet to be translated to specific guidelines, rules and regulations with particular focus on renewable energy including small hydro and its applications for rural electrification and productive applications. There exists no integrated renewable energy or small hydro power policy and program which can guide policy coordination among the national and provincial institutions for promotion of small hydropower development	• Developing a strategic vision to make Sierra Leone Africa's first Zero-Carbon middle-income economy by 2040. • National Renewable Energy Action Plan (NREAP) of the Republic of Sierra Leone, 2015. • Targets set for grid-connected renewable energy and stand-alone systems and mini-grids. • "Electricity Sector Reform Roadmap 2017 - 2030" launched in August 2017, with the major aim of identifying the most important actions required in the short, medium and long term that will successfully develop the electricity sector and expand electricity generation and access. • Agenda for Prosperity (AfP, 2013)[24]. • National grid development plan to 2030, drafted by the Ministry of Energy. • Renewable Energy Policy (2016). • Zero Taxation for RE technologies.

[22] Focus groups meetings with communities in Palima and Singimi villages and interviews with people in Bong county, 15.11.2019, 22.11.2019
[23] Renewable Energy Policy (2016).
[24] Concireds also renewable energy issues.

Barrier	What has changed since the beginning
	• Introduction and development of optimal feed-in tariffs (FiT) for small hydro schemes not exceeding 10MW[25]. • Public private partnership (PPP) are consdered as an tool to promote investments and development of the renewable energy sector[26]. • Drafted Mini Grid Regulations[27] • Electricity tariff regime under review.
Institutional: Inadequate national capacity to explore small hydro	• An Electricity and Water Regulatory Commission has been enacted by parliament. This Commission has instituted a rigorous screening process to ensure renewable energy dealers only import and sell products that meet international quality standards. • Private Public Partnerships Unit within the Office of the President of Sierra Leone has been established in 2013. • Electricity and Water Regulatory Commission. • Conducted 25 workshops and trained approximatelly 800 women and men during the project implementation.

Table 22 Before and after, Liberia

Barrier	What has changed since the beginning
Policy: National energy policy lacks specific regulations and strategic programs that would promote renewables (and mini hydro power more specifically). No framework for national and county-level coordination of mini hydro power development	• The Government has incorporated RE strategy into its national agenda. • The Electricity and Water Regulatory Commission has developed legal and regulatory frameworks to promote renewable energy technologies. • Set strategic goals for rural electricity access: - Electrification rate for the population outside of Monrovia of 10% in 2020, 20% in 2025 and 35% in 2030. - Minimum rural electrification rate per County of 15%. • Set strategic Renewable Energy Targets: - Total share of renewable electricity in the electricity mix from renewable energies excluding large hydro (mini-hydro, solar and biomass) of 10% in 2020 and 19% in 2030. - Develop a Renewable Atlas and Strategy for Liberia, including a more detailed and comprehensive hydro potential assessment. - Installation of at least 150 MW of renewable generation - excluding large hydro - by 2030 and 45 MW already by 2020. • 5 Programs for rural electrification of Liberia, according to the Master Plan. • Rural Energy Strategy and Master Plan (adopted in 2016). • Electricity Law of Liberia (adopted in 2015). • Mini-Grid Code for Liberia28 (drafted in 2017)

[25] Measure for achieving the targets of the National Renewable Energy Action Plan
[26] Overall renewable energy policy objective.
[27] Sierra Leone Electricity and Water Regulatory Commission Mini-Grid Regulations, 2018
[28] The document establishes technical, safety, quality of services and performance standards, etc., that will be required of applicants for electricity licenses for rural electrification.

Barrier	What has changed since the beginning
	• Tax Policy and Government Incentives. • ECOWAS policies on Renewable Energy and Energy Efficiency (RE&EE) adopted. • Rural Energy Fund (REFUND) (to be set in place). • The Renewable Energy and Energy Efficiency Policies are being reviewed by the Ministry of Energy.
Institutional: Capacity of national and local energy sector agencies to develop and promote mini hydro power and mini-grids – specifically technical, managerial, and planning capacity -- is lacking.	• Deputy Minister for Energy at the Ministry of Mines and Energy, special position created to facilitate policy adoption and implementation. • Proactive and determined Rural and Renewable Energy Agency, capacitated. • Liberia Electricity Regulatory Commission established. Newly appointment of commissioners for the LERC and employment of key regulatory staffs. • Established local company to manage the initially foreseen off grid facility - Mein River Hydropower Company, MRHPC. • Capacity building of staff from different relevant institutions[29] and stakeholders.

2.2.2.2 Replication and scaling-up

Both interventions are expected to lead to innovative and concrete experiences towards increased replication of small/mini hydro projects in Sierra Leone and Liberia. GEF assistances should catalyze market based scale up and replication of renewable energy in rural areas by addressing barriers related to capacity building and awareness creation and increased appreciation of the technical feasibility and economic viability of small/mini hydro technologies, financial mechanisms promoting private sector involvement, etc.

Replicability is planned to be ensured through the documentation and widespread dissemination of the project demonstration results. The dissemination of the results of the various capacity building and barrier removal activities will also provide a better understanding of the success/failure factors and issues regarding particular small hydro installations. Likewise, the pilot projects will showcase the ownership and management structures employed for consideration by the future project. Standard guidelines and best practices operating manual proposed to be developed under this project can be used for future project development.

Sierra Leona and Liberia, based on their hydrological profiles are endowed with significant natural resources in the form of hydropower holding great promise for future exploitation and utilization. With the country having initially reported potential of about 1150 MW SHP capacity untapped and later on during the project implementation updated to 5000 MW[30], similar capacity range SHP projects have potential for replication in Sierra Leone. As part of the project activities, Sierra Leone Regional Hydrological Geodatabase Developed moblizing local human resources. This geodatabase will form the warehouse for importing and storing information on

[29] Training for 1 technical staff from the Rural and Renewable Energy Agency (RREA), at the 'Sustainable Energy Leadership Programme,' at TERI University, New Delhi, India, from 8-19 February; Training for 1 technical staff from the Ministry of Lands, Mines and Energy (MLME), at 'Renewable Energy as a Catalyst for Regional Development,' at the Arava Institute in Israel, from 7-23 May

[30] Quoted in the Renewable Energy Policy of Sierra Leone, 2016 (Chapter 2.1 Hydropower)

Sierra Leone hydrology and hydro potentials, and also for developing a Sierra Leone Rainfall-Runoff Model in the future.

In Liberia, the hydro potential has been identified[31] to be 2300 MW.

Development of local expertise would enable the government and local communities to self-plan, design, implement and run new projects, thereby requiring less international technical support and hence making the new projects more economically viable.

In this context, several capacity building activities had been implemented.

Sierra Leone:

- Training on Environmental Impact Assessment for Small Hydropower Development in Sierra Leone, 23.09.2013 – 02.10.2013. Thirty Sierra Leoneans had been trained to desing and conduct environmental Impact Assessment. Mr. Anthony Davis was one of them, rarticipated on the training workshop and was also involved in the development of the project ESIA report. He is now running local consultancy, able to independetly conduct such activities and trainings.
- Training Workshop on Small Hydropower Development in Sierra Leone organized for 40 participants, 03 – 12.07 2013.
- Land Acquisition - Quantum of land required by the project (8.02 km2) has been surveyed and demarcated by local resources. Survey plan prepared and land registered.
- Detailed Geotechnical assessment conducted to address the lack of geological data of the dam site, involving local staff. Engineering properties of rock and rock mass by in-situ and laboratory testing.
- Training on Renewable Energy for Enabling Innovative Entrepreneurs in Sierra Leone, 28 participants, 08 – 12.07.2019.

  Objective: Develop skills to identify high growth opportunities for Entrepreneurial success using renewable energy to contribute to social and economic development.

  Target Groups: 1) Policy makers representing the Government, 2) SME Development and support agencies, 3) Civil Society Organizations, 4) Academia and Training Institutions, 5) Entrepreneurs – Existing and New startups, 6) Business Development Support Agencies
  Experience:
    - 28 participants,
    - 20 interactive sessions offered,
    - Sectors focused: Renewable Energy, Agriculture, Poultry and Cattle Farming and Manufacturing,
    - 4 mock business plans prepared,
    - 20 business ideas identified (at least).

- Training on Renewable Energy Policy Development and Implementation, 28 participants. 23 – 24.07.2019.

[31] According to the Rural Energy Strategy and Masterplan for Liberia until 2030.

Objective: Identify major barriers for implementation of renewable energy policy based on review of country's strategies and policies, documents about their implementation and feedback from participants

Target Groups: 1) National ministries, 2) Electricity supply, transmission and distribution authorities and companies, 3) Scientific and educational organisations, 4) District government

- Training workshop on enterprise development in the renewable sector, 36 participants, 19-23.08.2019.

  Objective: Raise awareness and build capacity to identify, promote and support renewable energy SMEs.

  Target groups who attended: 1) Entrepreneurs (potential and existing), 2) Start up promoters and financial institutions, and 3) Government representatives, academia and vocational training institutions.

  Experience:
  - 20 collaborative sessions offered
  - 233 potential businesses identified
  - 3 group sectors for business development
    - 24 potentials in Renewable energy
    - 20 potentials in Agriculture - Food - Water
    - 36 potentials in Productivity - Efficiency – Others

- Training workshop on energy and gender, 30 participants, 26-30.08.2019. The workshop had been organized in cooperation with Barefoot women training centre.

  Interactive and participatory training with several elements including access to energy as an empowering process for women, energy needs, gaps and opportunities, productive use of energy, energy technologies and Gender, mapping opportunities for linking with ongoing programmes working with Women Enterprises, business opportunities, financing, partnerships, team buildings and leadership skills development.

- Exposure Tour in Kenya, 14 participants, 24 – 28.09.2019.

  Objective: To familiarize with the impact and achievements Small Hydro Power (SHP) could bring to local populations and Nations, to learn about examples from the practice of successfully implemented small hydropower projects in Kenya.

  Some outcomes/benefits of the study tour include:

  - Provision of the Sierra Leone delegates with an opportunity to engage and learn from a practical perspective on small/mini/micro hydropower technology. Delegates had a chance to interact, socialize and ask educative questions to engineers and other staff who operate the power plants.
  - Learning the Kenyan's successful experience through the study tour strengthened the capacity of the Sierra Leone delegates; an institutional and individual capacity to develop the Sierra Leone´s vast small hydropower potential.

- Reinforcement of the view that community-targeted projects can only be successful and sustained when the communities and industries in those communities are fully involved from the inception of the project. This establishes a sense of ownership and buy-in by all parties in the true sense of the word 'stakeholders.'

It is an added advantage to target the installation of SHP in a rural setting where there is already some industrial activity requiring significant power that also has a strong community benefit. These interest groups can provide a strong guarantee of the success of the project due to their vested interests.

- Small hydropower Technology Training Centre – Fourah Bay College

Small Hydropower Technology Training Centre established at Fourah Bay College (FBC) through an MoU signed between UNIDO and FBC in 2014 to promote clean energy innovations. UNIDO donated various Small Hydropower equipment worth about US$150,000 to the Centre.

UNIDO through its objective on capacity building supported an establishment of modern training and reasearch facility at the Fourah Bay College, University of Sierra Leone to host the programme on Postgraduate Degrees on Renewable Energy. This aspect had been completed and the facility is already producing postgraduate students in that particular area. The facility was also capacitated with equipment to enhance the practical aspect of the learning. The programme is servicing staffs from EDSA, EGTC, and the Ministry of Energy for adequate and advance knowledge on renewable energy.

About the project's capacity building, the evaluation team talked to professor Redwood Sawyer[32], head of the newly established Postgraduate Center of Hydro-Energy Studies at University of Sierra Leone. It was revealed that the center is offering courses on postgraduate Masters, MPhil and PhDs in renewable energy studies. The center is combining hydro and solar energy to produce a new concept called Hybrid systems – hydro and solar energy. In the same context, the professor also went on to underscore the importance of the tour to Kenya on hydro potential as the tour exposed him to learn great deal of ideas on renewable energy, and most of the experiences may be replicated in Sierra Leone he said. He further stressed some key notes related to the capacity building mission of the centre as a local hub for SHP knowledge building and sharing, SHP research and application, building the man power potential for the hude hydro potential in the country and also upgrading the hydro mapping. They as a centre are working on bulding strong relations with regional centres. At the end the stressed the sustainability of the centre as being part of the Forauh Bay College securing continuity and progress.

- Identification and mapping of the hydropotential in the country - 5000MW[33] (instead of the initially known 1500MW).
- Barefoot women training centre

[32] Interview with Prof. Jonas A. S. Redwood-Sawyer, 12.11.2019

[33] Sierra Leone Hydropower Potentials Profile dated: September 2012

Mission: To identify rural, poor, illiterate women, train them in solar technology and to solar electrify all remote inaccessible villages in Sierra Leone, adopting the Barefoot approach

Objective: 1) Identify remote rural inaccessible villages all over the country with a view to providing simple basic and clean light through the use of Solar Photovoltaics (SPVs), 2) Sensitize the poor communities in each village to pay a monthly contribution for the repairs and maintenance of the Solar units, 3) Establish Village Solar Committees (VSCs) to take responsibility in the implementation, supervision and administration of the project in their village, 4) Establish Rural Electronic Workshops (REWs) for graduating trainees.

Barefoot center is supported by UNIDO as it supports Sierra Leone in building the capacity of Women for better and larger access to energy.

The center lavishes praise on UNIDO for giving them support to establish their center and acclaimed that without UNIDO, they would have not done so much as they are currently impacting lots of lives in Sierra Leone[34].

Table 23 Comparison

Aspect	At the beginning of project	At the end of project
Existence of local production of turbines or spare parts	Not Available	Not Available
Existence of institutional Renewable Energy Policy Development and Implementation capacity	N/A / low	Available
Existence of institutional capacity for SHP planning and implementation	N/A	Available
Existence of local consultancy capacity for GIS	N/A / low	Available
Existence of local consultancy capacity for EIA	N/A	Available
Existence of local capacity for hydrology	N/A	Available
Existence of hydrology departments at university/training institutes in the country	N/A	Available
Existence of local awareness for SHP	Low	Available
Existence of local interest for SHP (Entrepreneurs)	Low	Available
Existence of hydrology potential mapping	N/A	Available

Liberia:

- Established Small Hydropower Technology Center (SHTC). In 2014 the first SHTC was established at the Monsignor Stephen Kyne Technical College, Stella Maris Polytechnic University, through a partnership agreement with the institution for the purpose of

[34] Interview with representative of Barefoot center, 15.11.2019

promoting and upscaling small hydropower development in Liberia. This Centre is aimed at becoming a one-stop solution offering technical consultancy and advice, enabling public-private partnerships, and all other things related to small hydro power projects. All necessary equipment worth over $ 111,820 was provided to the Centre.

The Dean of the College[35] confirmed receiving set of equipment for the establishment of Small Hydropower Center. The center was established and a staff, Mr. Nelson Gargard one of the beneficiary of the SHP Training, was designated to manage the facility. Unfortunately, he was involved into accident that took away the life of his daughter and himself got burned extremely. Mr. Gargard departed the country for further treatment in the USA. Since the departure of Mr. Gargard, the University has not been able to appoint a replacer. As such, the equipment is all available with minimum use, with the surveying equipment being the most used. The lack of capacity is the problem of designating another staff to efficiently manage the center. The Dean indicated that upon the completion of the construction work at the Center's location, the university will source a staff to manage the center and have it fully operational; more awareness will be carried out.

- Capacity of national and local energy sector agencies strengthened to promote micro and mini hydropower for improved electricity access. In 2013 December, recruited and trained over 41 engineers and professionals from across various government ministries and agencies as well as private institutions, in the development and management of small hydropower projects in Liberia.

- Ministry of Mines and Energy – Prince Nanlee Johnson: The meeting with Mr. Johnson did last during to his busy schedule. Mr. Johnson attended a capacity building training for the energy sector in Israel, he was sponsor by the UNIDO recommendation from the Minister of Energy as requested by UNIDO. He indicated that the training was more practical (about 75%) and 25% theoretical. He indicated that during the training, real-time energy projects were designed and implemented to showcase lesson learned during the training. He further indicated that based on knowledge gained from the training through the MME, he has been partnering with the GIZ to conduct renewable energy training for individual and businesses involved into renewable energy activities. Such establishment provided the donation of few pieces of solar models that are installed at the MME.

- Best practices and Standard Operating Practices (SOP) manual for SHP was prepared by IITR and was shared with all the other stakeholders.

- Thirty participants were trained in the Operation and Maintenance (A&M) aspects of the MHP plant.

- Mein River Hydropower Company, MRHPC was organized for the for the management of the project upon completion. Members of this company were local stakeholders, such as Cuttington University, Phebe Hospital, Central Agricultural Research Institute (CARI).

[35] Interview with Mr. Jay Exodus Flanjay, Dean, Monsigar Stephen Kyne Technical College, 18.11.2019

The MRHPC was duly registered with the Liberia Business Registry and management training for its members was implemented to build core technical capacities. WinRock and NRECA jointly provided training to MRHPC on the entity management and other business - related issues. Due to the decision to cancel the generation component and replace it with connection to WAPP, the MRHPC became inactive and abolished. This company was established as a mean of sustainable action for the project, however it still remains as replication potential.

- Local entrepreneurs were trained in technical known-how and on the productive use of SHP, mainly to provide opportunities to locals and to promote local industry.

- One staff member from Rural and Renewable Energy Agency (RREA) was facilitated and sponsored by UNIDO to attend a 11-day training on "Sustainable Energy Leadership Program" from February 8-19, 2016 at Teri University and Partner institutions in India.

- One staff member from Ministry of Lands, Mines & Energy, was facilitated and sponsored by UNIDO to attend a 16-day training program in "Renewable Energy as a Catalyst for Regional Development" from 7-23 May 2017 at the Arava Institute of Environmental Studies in Israel.

- In the absence of co-financing and private sector in the country in the project conceptualizing stage, the project was down-sized from actual 10MW to 1MW by changing site location from Ganta to Mein River. However, now the initial project site is being developed as 9.34 MW by the international finance sector[36] which is big achievement for the country and UNIDO as it was identified and initially developed by UNIDO[37].

General note: The capacity building activities conducted throughout the project, together with awareness raising activities has increased the replication opportunities in the country. One confirmation for this is the ongoing interest of banks and private investors for this type of projects in Sierra Leone, and the agreement and approved loan from African Development Bank (AfDB) to finance the Gbedin Hydroelectric Project on the St John River in Nimba County in the east of the country.

Criterion: Impact	
Rating	
Sierra Leone	Liberia
Satisfactory	Satisfactory

3. Project's quality and performance

3.1 Design

Both projects share almost the same designs (Table 23), covering four aspects:

[36] https://www.afrik21.africa/en/liberia-afdb-finances-gbedin-waterfalls-hydropower-project/

[37] http://www.renewables-liberia.info/index.php/projects-new/project-plants/132-feasibility-studies-for-hydropower

- Institutional capacity building,
- Demonstration projects,
- Technical capacity building,
- Policy development/review.

Table 24 Design comparison

Project	Sierra Leone	Liberia
Project components	1. Institutional capacity Development	1. Development of Institutional Capacity
	2. Demonstration of SHP based mini-grid	2. Installation and commissioning of mini Hydropower
	3. Capacity building of Stakeholders	3. Technical capacity building for operation, repair and maintenance of mini hydro power and local mini grid
	4. Policy and regulatory framework for SHP Development	4. Policy and regulatory framework for mini hydro power Development

Project results framework

A results framework represents the underlying logic that explains how the development objective of a project is to be achieved, achieved by translating the results chain into indicators that measure the degree to which inputs are being transformed into specific activities and outputs.

Project's results framework is shown as matrix and it gives a detailed and clear description of the project showing how the activities will lead to outputs, i.e to outcomes, tracked by appropriate targets. It is easy to follow and understand.

There are no changes to the both results frameworks, although a change in the project implementation in Liberia happened that resulted with cancellation of the generation component.

Indicators

As indicated before, in terms of monitoring, the project document sets out two type of performance indicators:

Applicable GEF outcome indicators:	(a) Tonnes CO2eq avoided. (b) kWh saved from adoption of small hydro power and best practices of electricity management
GEF Tracking Indicator	Indicator 1. Adaptation/Creation/ Enactment of policy framework for micro and small hydro power development Indicator 2. Electricity Production in the Reporting Period from grid-connected renewable energy installations installed under the influence of the project (MWH/year) Indicator 3. Number of business and households served by renewable energy beyond those receiving service at the time of project inception

Analysis of the achievement of the indicators is given in table 14 and 15.

Despite the significant change related to cancelation of generation component, the tracking indicators seems to remain still relevant to the project.

The indicators set in a form of a targets in the project results frameworks are mainly clear and measurable. They describe fine the expected results, easy to measure the progress.

According to the Sierra Leone project design and the relevant work plan, the implementation of the demonstration part is foreseen to take total time of 2 years, including selection of vendors, technology and constructors, and civil works for construction. On other hand, the feasibility study foresees two years for construction only. Additionally, according to the DPR the total implementation time for the Moyamba SHPP is assumed as roughly six years, from tendering to the start of commercial operation. This includes the following activities:

- Preparation of the tender for the EPC contract, followed by the tendering, tender evaluation and procurement of the EPC contractor for the civil and E&M works - estimated to last 11 months.
- After the tender evaluation and contract awarding the awarded EPC contractor has 18 months time for the full detailed and construction design.
- Obtaining of the required permits and the preparations for land acquisition and compensation payments, the preparation and implementation of the detailed resettlement action plan.
- Construction / civil works.
- Commissioning.

In regards to financial commitments of the project partners, it is obvious that stronger mechanism is necessary that will secure the funding before the project is approved, in order not to reflect adversely on the achievement of the project objectives.

In this manner, regarding the project change in Sierra Leone, the increased capital budget (related to increased SHP capacity), should have been followed by secured additional funding to match the difference between the new and the initial budget.

Following table summarizes the conclusions related to this aspect.

Table 25 Design related conclusions

Sierra Leone	Liberia
Consistent with Country's priorities and adequate to address the identified barriers	Consistent with Country's priorities and adequate to address the identified barriers
Still valid and relevant	Still valid and relevant
Clear and understandable Project Result Framework	Clear and understandable Project Result Framework

Sierra Leone	Liberia
Not adequate timing for SHP implementation	Project's change[38] not reflected in the Project Results Framework Generation => Connection to WAPP and transmission to project site

	Criterion: Design	
	Rating	
	Sierra Leone	Liberia
Overall design	Moderately satisfactory	Satisfactory
Logframe	Satisfactory	Moderately satisfactory

3.2 Relevance

Sierra Leone and Liberia share a very similar background context of countries of extreme energy poverty and electricity production considerably below the levels required to meet requirements for socioeconomic development, but yet endowed with significant natural resources in particular of hydropower. They both share similar policy, institutional and capacity context underdeveloped to make sufficient use of the resources and use it for local development. These made the suggested SHP/MHP project concepts very relevant for the countries.

Mid-term Review finding on the relevance:

"Sierra Leone - The project is fully relevant to national energy priorities, policies and strategy of the Government of Sierra Leone, and to UNIDO promoting industrial development and ISID in the energy sector by promoting local capacity building on SHP. Moreover, the project is fully relevant to the GEF focal area of climate change and SP3 - Promoting market approaches to renewable energy."

"The project is fully relevant to national energy priorities, policies and strategy of the Government of Liberia, and to UNIDO promoting industrial development and ISID in the energy sector by promoting local capacity building on SHP. Moreover, the project is fully relevant to the GEF focal area of climate change and SP3 - Promoting market approaches to renewable energy."

At the completion, the relevance seems to be even bigger for both projects. This is a result of the increased awareness at the all stakeholders, particularly for the decision makers. It is also result of recognizing and embracing the potential and the importance of hydropower in transforming the social economic situation in both countries on long-term.

Following table makes a brief depiction of the relevance for both countries.

Table 26 Project relevance

Sierra Leone	Liberia

[38] Cancellation of generation component

• Very relevant and timely to assist in the implementation of SL's National Determined Contributions and Paris Climate Change Agreement *(SL vision 2035 to put the country in the path of green growth in its development trajectory)*. • Very relevant in promoting socio-economic development in that part of the country.	• Energy access is a key component of Liberia's Agenda for Transformation (AfT) and post-Ebola recovery strategy. • In line with National Energy policy, • Aligned with country's national and regional development and climate priorities and strategies, with the nation rural electrification access target and poverty reduction strategy. • Recognized driving force for economical and social growth
• Huge business and social impact	• Enormous spillover effect once done (in educational, social, economic, financial, developmental terms)

Following is a summary on the relevance view picked up from the interviews conducted in Sierra Leone and Liberia.

Sierra Leone.

Discussions with the Environment Protection Agency (EPA) revealed the following: Access to modern energy services is one of the fundamental prerequisites for economic and social development and thus vital requirement for poverty reduction. However, Sierra Leone's energy needs are under resourced and the scarcity of a reliable energy supply is one of the key impediments to Sierra Leone's economic and social development. The country's installed power capacity per capita is among the lowest in the world with approximately 105 MW available for a population of over 7 million in 2018. The Government of Sierra Leone had recognised an urgent need for access to electricity for the people of Sierra Leone. Only 15% of the total population of Sierra Leone currently has access to electricity, and only 2.5% of its rural population had access in 2016, according to World Bank data. This is well below the average of 42.8% for the population of Sub-Saharan Africa.

It is therefore substantially interrelated to most of the SDGs. The increased use of renewable energies sources in the supply system also helps to reduce CO_2 emissions and thereby contributes to the global fight against climate change. The Moyamba hydroelectric power facility that will be constructed on the Gbangbaia River, near Singimi Falls on the boundary between Baruwa and Lower Banta Chiefdoms in the Moyamba District of Sierra Leone, will generate and supply power to various private owned business operating in the district, Njala University and Moyamba Town. The project from the Environment Protection Agency stand point is very relevant and timely to assist in the implementation of Sierra Leone's National Determined Contributions and Paris Climate Change Agreement the country has ascribed to fight against global climate change; and in promoting socio-economic development in that part of the country. In view of the aforementioned, the Agency has indicated the following points in support of the viability of the project and why the Government of Sierra Leone must invest in this project and make it a reality:

> Hydroelectricity helps fight climate changes. As Sierra Leone vision 2035 intends to put the country in the path of green growth in its development trajectory, investing in

renewable energy like hydroelectric power will assist the country in achieving that vision. The hydroelectric life cycle produces very small amounts of greenhouse gases (GHG). In emitting less GHG than power plants driven by gas, coal or oil, hydroelectricity can help retard global warming and hence mitigate climate change.

Hydroelectricity improves the air quality and reduce the over reliance on biomass energy in the country. Hydroelectric power plants don't release pollutants into the air. They very frequently substitute the generation from fossil fuels, thus reducing acid rain, smog and other noxious gases in the atmosphere and hence reduces the risk of respiratory related illnesses. In addition to this, hydroelectric developments don't generate toxic by-products.

Currently the country is largely reliance on biomass as major domestic energy source in the country. The largest source of biomass energy is wood fuel, followed by charcoal; the 2015 Population and Housing Census found that wood and charcoal were used for 96.9% of households' cooking needs. According to a UNDP report, energy consumption in the country is dominated by biomass, accounting for approximately 80% of energy used. The increase pressure on the limited forest we have in the country, leading to environmental degradation. The availability of hydroelectric plant will help reduce the growing pressure on wood and charcoal for domestic energy use.

Hydroelectricity offers a significant contribution to development. Hydroelectric installations bring electricity, highways, industry and commerce to communities, thus developing the economy, expanding access to health and education, and improving the quality of life. Hydroelectricity is a technology that has been known and proven for more than a century. Its impacts are well understood and manageable through measures for mitigating and compensating the damages. It offers a vast potential and is available where development is most necessary.

Hydroelectricity means clean and cheap energy for today and for tomorrow. With an average lifetime of 25 to 50 years, hydroelectric developments are long-term investments that can benefit today and future generations. They can be easily upgraded to incorporate more recent technologies and have very low operating and maintenance costs and hence produces reliable and affordable energy for the many rural poor.

Hydroelectricity is a fundamental instrument for sustainable development. Hydroelectric ventures that are developed and operated in a manner that is economically viable, environmentally sound and socially responsible represent the best concept of sustainable development. That means, "development that today addresses people's needs without compromising the capacity of future generations for addressing their own needs" (World Commission on the Environment and Development, 1987). The Moyamba project when developed and fully operational will enhance sustainable development for the business enterprises, Njala University and the people of Moyamba District.

The interview with the former minister of energy, prof. Oganlade Davidson[39], revealed that the Moyamba hydro project was a key project for the Sierra Leone government at the time of conceptualizing and planning as there was high interest in rural mini-hydro electricity generation in the country to boost the economy of the rural people. At that time, then government initiated

[39] Interview with prof. Oganlade Davidson, 12.11.2019

the Moyamba mini hydro project, Shalock and the Bankasoka project in Port Loko. All of the above projects' visibility studies were done with the support of UNIDO[40]. It was revealed that the Moyamba hydro project has huge business and social impact as the district is dominated by mining activities (Sierra Rutile, and Vimetco) and an academic institution (Njala University).

Deputy Minister of Energy[41], Dr. Eldred Taylor stressed that the Moyamba Hydro project is one of the Government's top priority project currently. He said from all hydro potential projects that have not yet started in Sierra Leone, only the Singimi hydro project in Moyamba has a visibility done, ready to be implemented. He referred to the project as an only bankable project, meaning the project only awaits investor to start the construction as all necessary works before the dam construction has been done by UNIDO, providing the evaluation team Government's priority project list[42]. He mentioned that UNIDO has been playing an incredible role in the energy sector in Sierra Leone citing the Bankasoka and Shallotte projects as an indelible accomplishment of UNIDO. He said the only document missing in the Moyamba project was a tender document, which he said was very easy to make at this stage. He further pointed out that the only delay for the project was not having investors for the project. He faithfully promised that investors will surely come for the Moyamba Singimi project, as the Ministry is on serious drive to get investors for the Moyamba project, taking in cognisance of the high economic impact of the project on the economy of Sierra Leone.

The importance of the project was also stressed and confirmed by the Minister of Energy, Dr. Kanja Sesay[43] revealing that the government has huge interest in the Moyamba project. The present government wants to see the implementation of the Moyamba Singimi project, as one of the oldest projects in the Ministry. He said all what the deputy minister said about the project was the gospel truth stressing that the deputy minister was appointed by him to be in charge of the Moyamba project. He was very clear in his statements that there is clear understanding the Government is responsible to secure the funding. He reaffirmed the government commitment and stance on the Moyamba Sigimi small dam project, as a top priority project for this government and there is no other obstacle in realization of the project other than the funding. He further emphasized the Government's efforts in providing funding pointing out Government's bilateral engagements in Morocco and China discussing potential cooperation and looking for investors.

Liberia.

Before the Liberian civil war, the estimated total installed electricity generation capacity was 412 MW, of which over half was owned by the private sector. The Liberia Electricity Corporation (LEC) had about 191MW of which 64MW was hydro power, accounting for 33% of its total pre-war capacity. The conflict resulted in collateral damage, looting and vandalism of all energy infrastructure, including power plants, substation, transmission lines, petrol storage tanks and depots. Liberia's civil war ended in 2003, with no national electricity grid but there were few skeleton electrical infrastructures seen few places in central Monrovia. Earlier in 2006, after the inauguration of an elected government lead by President Ellen Johnson-Sirleaf, the government

[40] UNIDO's contribution and significance is recognized in the Renewable Energy Policy of Sierra Leone, 2016 (chapter 2.1. Hydropower)
[41] Interview with Deputy Minister of Energy , Dr. Eldred Taylor, 14.11.2019
[42] List of priority projects for the Ministry of Energy, Government of Sierra Leone, Ministry of Energy, 12th April, 2019
[43] Interview with Minister of Energy, Dr. Kanja Sesay, 14.11.2019

formulated the Emergency Power Program (EPP) working along with few development partners, namely the USG, United States Agency for International Development (USAID), the World Bank (WB), Norwegian Government, the European Union and Ghana in order to restore electricity to Monrovia. This process was initiated with the generation of 2.6 MW of electricity which later increased to about 9.6 MW in 2009 all from diesel generation plant with the cost per kilowatt-hour ranging from 0.75¢ – 0.50¢ [44]. Later came the overwhelming Ebola Virus episodes in 2014; this situation hindered the ever-growing development arrangements with the GoL and its development partners for sometimes which was later restored. Meanwhile, The Government of Liberia is working closely with development partners (EU, USAID, United Nations Originations, The World Bank, the Chinese's Government, etc.) to undertake determined measures in continuing reestablishment of its electricity infrastructure. At present Liberia electricity rate is about 39¢ per kilowatt-hour which is high for most of citizenry. In the capital city of Monrovia, less than 20% of the population has access to electricity. By 2030, the Government of Liberia aims to meet an anticipated peak demand of 300 MW and serve 1 million customers, connecting 70% of the population in Monrovia and providing access to 35% of the rest of Liberia[45]. The current installed capacity of the LEC is about 126M with hydropower plant accounting for 88M and 38M for diesel plants[46].

Additionally, the Government of Liberia is implementing the cross-border electricity connection project with Cote d'Ivoire and develop renewable energy sources including small hydropower (SHP) generation and assess other energy sources. Both the plans for developing SHP and implementing the cross-border connection form integral parts of the project being evaluated. The SHP being the project's initial plan; that is constructing a 1 MW of hydropower plant on the Mein River, therein being referred to the Mein River Hydropower Project within the project document. While the latter being the cross-border connection, the connection from Ganta, Nimba County to Suakoko District, Bong County.

Subsequently, the Government of Liberia developed the National Energy Policy from subsequent developed Energy White Paper in 2007. These documents lay the foundations for the creation of a Deputy Minister for Energy at the Ministry of Mines and Energy, the Creation of the Rural and Renewable Energy Agency, the RREA and the Liberia Electricity Regulatory Commission, the LERC. With the creation of the RREA, the RREA supervised the development of the Rural Energy Strategy and Master Plan (RESMP). The RESMP represents Liberia's intentions and plans towards the objectives of the National Energy Policy, as well as regional and global initiatives such as the ECOWAS Renewable Energy and Energy Efficiency Action Plan, Sustainable Energy for All and Sustainable Development Goals. The RESMP also represents the firm intention of the Government of Liberia to provide the necessary infrastructure to enable the country's development and to contribute to the improvement of life for all Liberians[47]. Also, RESMP addresses specific measures in line with gender equality. It emphasizes on ways to promote gender equality by the involvement women in the decision - making process regarding rural electrification, as well as educate women with regards to electrification so that they are able to be part of the construction and maintenance of the electricity grid.

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[44] Ministry of Lands, Mines and Energy, National Energy Policy, May 2009

[45] International Monetary Fund, Liberia: Poverty Reduction Strategy Paper, IMF Country Report No. 08/219, 2008

[46] USAID, (December 1, 2019), Liberia Power Africa Fact Sheet

[47] The Rural Energy Strategy and Master Plan for Liberia, Rural and Renewable Energy Agency

On the other hand, specific policies and guidelines on renewable energy development and implementation are yet to be established. With the newly appointment of commissioners for the LERC and the employment of key regulatory staffs, it's expected these guidelines and policies will be addressed in the nearer possible future with the resilient supports from both the Government of Liberia and the USAID through the Millennium Challenge Account-Liberia.

Rural electrification stands as one of the Government of Liberia priorities for national development considering that most parts of Liberia lack access to electricity. The lack of electricity in most parts of the country stalled the process of rapid growth activities within the country, as electricity is the hub-line for nation growth and developmental activities. As a matter of fact, as mentioned in [6], the Rural Energy Strategy and Master Plan (RESMP) for Liberia, in line with the nation rural electrification access target, electrification rate for the population outside of Monrovia access to electricity is expected at the following rate: 10% of the population in 2020, 20% in 2025 and 35% in 2030. As per the plan for the RESMP, it's intended that more than 65,000 customers outside of Monrovia be electrified by 2020, 140,000 customers by 2025 and 265,000 customers by 2035. Indeed, this make the project very relevant considering that the project implemented in Suakoko District, Bong County, which is a rural area and it's also outside of Monrovia. Thus the project connections account for portion of the 65,000 customers to be connected outside Monrovia before 2020. With the more than 2000 households, health facilities, university, primary & secondary school connections made within that rural part of Liberia make the project very relevant.

Criterion: Relevance	
Finding	
Sierra Leone	Liberia
Rating	
Sierra Leone	Liberia
Very satisfactory	Very satisfactory

3.3 Efficiency

This subchapter gives an overview on the extent to which the Projects have produced the results (outputs and outcomes) within the expected time frame. The progress of the project was assessed against the existing log frame and corresponding targets and indicators.

In regards to the manner of project implementation, Sierra Leone and Liberia have two different implementation models.

Executing partners in Sierra Leone are Ministry of Energy and Water Resources and Ministry of Lands Planning and Environment. The co-financing was expected to come from the execution partner (MEWR) and EBID[48].

In Liberia the execution was done in partnership and joint cooperation with an international development agency (USAID) who has a strong presence in the country, who is also responsible for the co-financing of the project. National execution partner was Rural and Renewable Energy Agency (RREA) of Ministry of Land, Mines and Energy. According to the

[48] ECOWAS Bank for Investment and Development

project document, RREA had a responsibility to take care of the capacity development, policy and regulatory framework of the overall project.

Mid-term findings

Following are the findings of the mid-term reviews about efficiency.

Sierra Leone: *"Project efficiency is satisfactory as all efforts were undertaken to ensure cost-effectiveness of project implementation. The shortcoming is due to the Force Major, the Ebola epidemic in Sierra Leone, which has paralyzed the activities for almost two years, and therefore the evaluator proposes an extension of the project of two years until December 2018."*

Liberia: *"Project efficiency is excellent as all efforts were undertaken to ensure cost-effectiveness of project implementation, and the co-financing doubled. The shortcoming is due to the Force Major, the Ebola epidemic in Liberia, which has paralyzed the activities for almost two years, and therefore the evaluator proposes an extension of the project of two years until May 2018."*

Latest available PIRs conclude the following in regards to the implementation and execution of the projects.

Sierra Leone

There is a change of government and the Minister of Energy in the past government who was the chairman of the Project Steering Committee has been replaced. However, this did not affect the implementation process as the new Minister of Energy has assumed the role of chairman of the committee.

There are no issues reported that will delay the project activities and the successful completion of the project.

Liberia

To date, the project is progressing well which is due to the strong cooperation between the partners (USAID and UNIDO), while United Infrastructure Projects (UIP) continues to be the sole Contractor in execution. The project is well coordinated with the involvement and participation of key government counterparts and local stakeholders.

Co-financing arrangement is still in place and USAID continues to remain committed to the financing and execution of the project. Contractor has been recruited and implementation is still ongoing with major milestones of the project completed. The beneficiaries remain in support of the project and fully anticipate its completion due to the economic benefits it brings to these underprivileged communities.

Delays and extensions

Although it was initially foreseen both projects to last 5 years, both of them had two extensions of the implementation periods.

The first one was due to the Ebola outbreak, extending the project till 2018. The second extension prolonged the Sierra Leone project until December 2019 and the one in Liberia until August 2019. The extension was done on a request of the stakeholders and with an agreement with the key project counterparts.

The reasoning behind this delay that reflected on the efficiency on the project in Liberia would be:

- Ebola outbreak, 2014-2015.
- Selection and mobilization of new contractor (execution company), 2015.
- Revision of project designs, 2017. As a result of the revision, USAID brought a decision to cancel the generation component and go for a connection to the nearest WAPP. New project designs were prepared and implementation started accordingly.
  Winrock prepared a design for construction of MHP.

Co-financing

Sierra Leone: The co-financing originally planned in the project document amounted US$ 29,992,068. At the time of the mid-term review, the materialized amount of co-financing was US$ 50,000 from UNIDO and some in-kind contribution from the Government of Sierra Leone of the planned co-financing. The securing of the co-financing is one of the crucial questions for the success of this project. In case it will not be secured, Moyamba hydro power plant will not be constructed.

Liberia: The co-financing planned in the project document amounted US$ 4,054,152. At the time of the mid-term review, the materialized amount of co-financing was more than US$ 8,000,000 from USAID and UNIDO (whereas UNIDO still did not transfer the amount of US$ 1,250,000 to USAID and therefore the expenditure of 25% of the GEF Grant is low). At the end, the project succeeded to mobilize co-financing twice more than initially planned, 10.000.000$.

Below is a simple USAID co-financing breakdown from USAID:

- Total USAID payment to UIP for Substantial Completion - $9,727,031
- Total cost of Distribution Line - $4,900,000
- Total payment to USAID from UNIDO - $600,000
- Pending payment from UNIDO to USAID - $500,000[49].

Annual realization of project finances

Sierra Leone

Name of co-financer (source)	Annual realization of project finances							
	2012	2013	2014	2015	2016	2017	2018	2019
Ministry of EWR	100,000	100,000	100,000	100,000	100,000	900,000	100,000	500,000
Ministry of EWR[50]								
EBID[51]								

[49] Information from USAID representative Ms. Anita Nzeribe received on 03.12.2019.

[50] The Govt. of Sierra Leone was very supportive to this project though they are cash contribution was not available at least during the implementation of this project. We are sure they will contribute specially in transmission and distribution sectors once the Private sector will be involved.

[51] Similarly, the Govt. has not approached to any multilateral banks like EBID or AfDB for the soft loan and they are still expecting grant from multilateral or bilateral agencies. UNIDO is still pursuing this matter and requesting the

Name of co-financer (source)	Annual realization of project finances							
	2012	2013	2014	2015	2016	2017	2018	2019
GEF Agency, UNIDO	10,000	5,000	5,000	2,500	2,500	5,000	10,000	10,000
GEF	25,550.67	391,991.1	402,374.02	29,900.42	148,731.74	46,274.15	399,874.86	289,606.50

Liberia

Name of co-financer (source)	Annual realization of project finances							
	2012	2013	2014	2015	2016	2017	2018	2019
Ministry of ME[52]	-	-	-	-	-	-	-	-
USAID								
GEF Agency, UNIDO	5,000	15,000	10,000	3,500	3,000	5,000	15,000	3,500
GEF	10,370.31	639,256.56	971,473.41	43,981.37	57,220.64	-48,818.14	49,595.51	35,102.33

Materialization of co-financing was administered by the project management related to the Sierra Leone project. In the case of Liberia, the materialization of co-financing was administered by USAID as both partners shared the same execution company.

Criterion: Efficiency	
Finding	
Outputs and outcomes were achieved outside the time frame, using time extensions. Demonstration output is not achieved.	Outputs and outcomes were achieved outside the time frame, using time extensions.
Rating	
Sierra Leone	Liberia
Moderately satisfactory	Moderately satisfactory

3.4 Sustainability

This part of the report discusses the likelihood of sustainability of the project results after the project completion. The sustainability is understood as the likelihood of continued benefits after the projects end. The analysis is made through assessment of four aspects of risks that are likely to affect the persistence of the outcomes of the projects: financial, sociopolitical, institutional and governance and environmental risks.

decision maker in the country to do not depend on the external grant as it will be not sufficient, instead approach to the development bank for this high investment project.

[52] The Govt. of Liberia was very supportive to this project though the cash contribution was not available at least during the implementation of this project. The in-kind contribution was mainly in terms of administrative supports during project implementation and Govt. land for the project works.

Table 27 Project Sustainability risk analysis

Risk	Sierra Leone	Liberia
Financial	The SL Government expressed strong commitment in providing the necessary finance and is doing so for some time[53]. There is an interest among the private investors as there have been discussions and negotiations and signed Memorandum of Understanding.	No financial risk that may jeopardize as all capital expenditures have been made so far.
Sociopolitical	There are no any social or political risks that may jeopardize the sustainability. MHPs are part of the governmental strategy in proving access to energy. Hydro energy, SHP and this particular project have been recognized by the public, NGOs and all stakeholders as prime long-term focus in achieving social and economic development.	No political risk is associate with the project. Access to energy for a first time in the communities comes with a health and fire risks due to lack of knowledge and improper use.
Institutional and governance	The Government of SL is very committed to the project, as it is on the Government's priority list for investment. This project is part of every strategic document and action plan. Substantial capacity building activities have been conducted in the past 5-10 years raising the awareness, skills and capacity at the side of the institutions.	A dedicated unit was established at the ministry to address the needs of the small hydro power projects.
Environmental	According to the available environmental documentation, there are no significant environmental risks that may jeopardize the sustainability.	According to the available environmental documentation, there are no significant environmental risks that may jeopardize the sustainability of the project itself. However, as discussed in this report, the initial site intended for hydropower harnessing (Gbarnga Kpatawee Waterfall) is part of a nature protected area. Contrary to this information, RREA standing is that this site is still of interest for hydropower harnessing[54].

The Mid-term review for Liberia project had not identified any environmental, sociopolitical, institutional ang governance, nor financial risks to the sustainability of the project.

Mid-term review for Sierra Leone has the following finding on the sustainability matter: *"There are no identified socio-political, institutional framework and governance, and environmental risks to sustainability. The only identified risk to the sustainability of the project is of financial nature, and it is if the co-financing of about US$ 30 million for the building of the Moyamba Small Hydro Power Plant will not be secured."*

[53] Interviews with representatives of MoE

[54] Interview with Stephen V. Potter, Sr., Deputy Executive Director, Rural and Renewable Energy Agency of Liberia

Compared to the mid-term time, the likelihood of the project is much higher now, due to the following facts to which UNIDO project contributed significantly and the risk had been mitigated:

- Policy has been improved and clear RE/HP/MHP goals had been set,
- The project is part of every governmental strategy and action plans, as well as part of Government priority investments list,
- Institutional and private sector capacity strengthened,
- Awareness raised at institutional decision making and public side,
- Banks and private sector sensitized and interested in MHPs.

Note: Latest information[55] from Sierra Leone says that the Government has engaged private investor to implement the project, but work has not yet commenced due to the restrictions on the international travel.

Furthermore, on the financial matter.

What has been done

- ❖ During the interviews, the deputy minister of energy and the minister of energy emphasized the strong commitment of the Ministry and the Government to complete the Moyamba project and construct the dam. They indicated that this project is on the top priority projects list of the Ministry (Annex 3 List of priority projects for the Ministry of Energy) and also very important it is the only bankable project[56] on that list. They also pointed out that there is an interest for this project among the private investors, there had been a lot of discussions and even MoU have been signed. Furthermore, they are active in bilateral engagements to seek for investors and fundings (trips to Marocco, China).

- ❖ Financial arrangements through interested parties, such as EBID and OFID has already been committed although several other requirements are ongoing in order to receive this funding. However, the interest been expressed by three private firms in implementing the project may bolster this implementation issue. Representatives of the firms have expressed high interest in the project and claimed to have the financial and human capacity to handle the remaining project components.

- ❖ The Government has stressed the need to unlock access to finance especially engagement with the Bank of Sierra Leone to provide a policy where Forex lending will be made to renewable energy projects developers.

- ❖ UNIDO had also prepared Procurement documents, Bidding Document for Procurement of Plant Design, Supply, and Installation for Procurement of Moyamba SHPP to assist the Government in providing funding.

Increase of related investments due to increase of project capacity

[55] Conversation between the Minister of Energy and the former national project coordinator

[56] Ready to be financed by IFIs.

In order to have better and sufficient hydro power harnessing at the project site, detailed project report for 16MW had been prepared which resulted with increase of the necessary and related investments. In order to assess if this increase has reflected on the providing of the finances, relevant stakeholders had been given such question.

- Mr. Mikail Milton Turay, Director of Domestic Commerce and Industry (DCI) said that the increase of the project capacity would only bring more benefits to the country and the communities. As a member of the Steering committee (SC), hi stressed that amendment of the capacity was presented to the SC[57] and acknowledged the higher benefits.
- The deputy Minister (dM) of Energy and Minister (M) of Energy do not see any obstacle in the amendment, as there will be more benefits for the country.
- Dr. Patrick Tarawally, technical Adviser at the Ministry of Energy (MoE) sees the amendment as more potential.
- Njala University (NU), Moyamba District Council (MDC) and communities (Co) are also aware of the increased project capacity and they welcome it, as they acknowledge more energy coming to the area, more benefits.

Eight out of eight stakeholders responded that the increase of the capital related to the increase of the capacity is not seen as obstacle, but is only regarded as benefit.

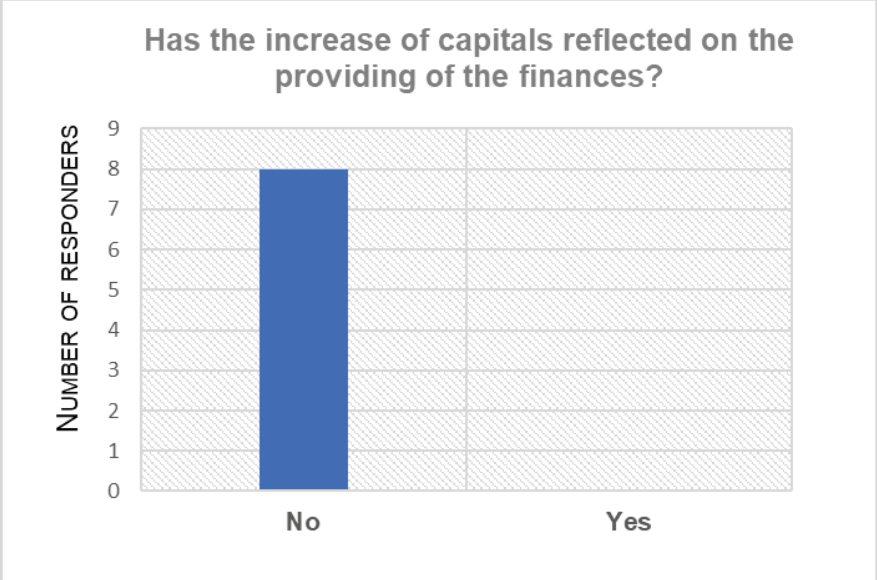


Figure 7 Result from a poll

Opportunities

The baseline survey conducted by UNIDO had identified various opportunities for the productive applications of electricity use such as cassava processing, fish cold storage, palm oil extraction units, wood and carpentry works to name a few. With adequate capacity building conducted for prospective entrepreneurs in line with UNIDO's mandate and development of financial incentives as part of the GEF project, these industries would get a boost after the establishment

[57] Situational report of the Moyamba small hydropower project held on the 11 September, 2017 at the Moyamba district council committee room, Moyamba town, 11.09.2017

of the small hydropower project. UNIDO may also support industrial growth centers in Moyamba district where the productive load can be run on the hydroelectric power.

SHP-based mini-grids can strengthen the local economy by supporting income-generating activities powered by the electricity produced. The people of Moyamba District can establish community run industries such as food processing, fabrication workshops, carpentry shops and others.

Willingness and ability to pay

This is very relevant issue related to the sustainability of both projects. It involves two aspects, one, if consumers are able to pay which is related to their financial situation and the second that is more social and it is related to how new consumers observe this new responsibility.

The aspect of ability to pay has been analysed in the very beginning, in the conceptualizing of the both projects in regards to the average cost of the actual cost of using kerosene and similar. The conclusion was that commercial enterprises could be probable and households would be able to bear to costs of the upcoming benefits.

Energy access in real life goes beyond simply providing the population with access to an energy source. In order to benefit, the population would have to afford the electricity. In the project planning and the analysis of the sustainability, this is related to two possible issues. An unused connection means a lower number of beneficiaries, but on other hand it also increases the cost of serving the remaining consumers. Furthermore, high electricity prices increase the incentives for customers to tap into the network illegally or bypass meters. It is, therefore, crucial to understand but also to discuss the relationship between prices, consumption, and theft with the stakeholders. The access to energy comes with a responsibility to manage the ability in a safe way but also to accept the obligation to pay for it.

The aspect of willingness to pay was discussed with the future beneficiaries of the both projects. It is an understanding that this issue has been discussed with the communities, the private sector, the council and the other user in Moyamba district. They understand the fact that the new benefits come with a price. The beneficiaries in Bong country are also very aware of it, how ever they stressed that the price nor the billing was not much discussed with them, as they didn't have any information about this[58]. Communities in Bong county were also informed[59] about the upcoming responsibilities and are aware of it. Furthermore, the elders and communities members embraced the project ever-so-much that they are taking ownership of the equipment, in addition, the District Commissioner asked the District Security to provide maximum security for the project installed equipment.

Speaking about the sustainability of the network in regards to the ability to pay and collection rates, the execution partners of USAID and UNIDO (UIP, NRECA) stressed that an effort was made to include another 0,5MW capacity in the network to include an additional portion of the private sector that is considered able to bear the costs without problem.

Capacity to manage

[58] Cuttington University, Phebe hospital

[59] Interview with Development Superintendent and Bong County Administrative Office

The Liberia Electricity Corporation is a public utility with a mandate to produce and supply economic and reliable electric power to the entire nation. The total electricity network constructed both by UNIDO and USAID (77km 66kV transmission line from Ghanta, Nimba Country and distribution network to all consumers in Gbarnga, Bong Country) is to be turned over to the Government of Liberia. In the behalf of the Government, LEC as public utility will be engaged to manage the network. For this purpose, USAID had already signed a Memorandum of Cooperation[60].

The electricity sector in Liberia is in a difficult situation, with very low human resource capacity and system infrastructure incomplete. There are not specific national electrical standards for Liberia, resulting with a situation where every donator has brought his own standards, which on other hand results with difficulties in connecting, managing and servicing. Additionally, the financial condition of the company is not very bright. The new network would mean additional investments costs in developing local capacities, but LEC is willing to take over the responsibilities as they very successfully cooperation so far with UIP and NRECA on the connection of the transmission line with the WAPP infrastructure on the border[61].

The network is well constructed and it had been tested by LEC using mobile generator. According to the relevant law propositions, a Private-Public Partnership (PPP) will be contracted to operate the network procured suing the regular tendering bidding process, both national and international entities will be invited to participate in the process[62].

Criterion: Sustainability	
Finding	
Sierra Leone	Liberia
Rating	
Sierra Leone	Liberia
Satisfactory	Satisfactory

3.5 Gender mainstreaming

At the time of the projects design stage, there were no explicit recommendations or requirements for gender mainstreaming or for gender disaggregated targets.

Electrical energy, particularly the access to reliable and affordable electricity provides enabling gender equity balance for society. Practice in both countries, including the targeted districts, women are mostly the implementers of the daily household activities, such as, cooking, washing, housekeeping, among others. With the access of reliable and affordable energy, an improved environment is being created to perform the listed household responsibilities under comfortable circumstances thus providing gender sensitivities for women within the project communities. Currently, near all cooking in the communities is mostly done by females and cooking in rural areas requires largely preparation of dry wood or charcoal[63]. Obtaining the

[60] Memorandum of Cooperation between the US Agency for International Development (USAID) and Liberia Electricity Corporation (LEC), 12.01.2018

[61] Interview with Mr. Paschal Buckley, CEO of LEC

[62] Interview with Mr. Stephen V. Potter, Deputy Director, RREA

[63] According to the Rural Energy Strategy and Master Plan for Liberia, in 2013 the percentage of the population of Liberia that relied on traditional use of biomass for cooking was 98%.

wood requires walking long distances by women and children on a daily basis thus imposing health and safety issues. In a view, the national governments and most homes have never designed economic related value means for women to perform cooking activities, that's investing in improved cooking technology is neither prioritized at household nor at national levels. As such, with the electricity being provided by the projects is expected to alleviate the use of biomass related materials for cooking and lighting purposes. As the electricity in the district become reliable and affordable, residents will become to invest in electrical appliances such as refrigerators and freezers to conserve food. Other residents may later purchase washing machines for washing clothes and electric irons for pressing clothes. All these help the females and children to perform their household tasks efficiently and effectively thus solving some of the many gender issues within the project communities. Additionally, with the access to electricity in the targeted districts will provide unfortunate women that dropped from school due to marital related and other situations to get back in school to improve their livelihood. The later doesn't only apply to the females but also to their males' counterpart that dropped from school activities due to others unfortunate situations. Many rural males got involved into early marital affairs thus enabling them to have children at earlier ages while males' children are being constrained by their male parents to support them in performing farming activities. Additionally, the ended civil crisis in the country introduced the taking in of abusive drugs by children and youths, both males and females with the male being the most dominated affected. This action has affected most youths until they left their youthful ages thus affecting their educational activities. With access to electricity and creation night school sessions at the primary and secondary schools, most of those affected youths that have turned young adults will have the opportunity to continue the education as they will be sitting along with their peers in class. This effort will enable abused individuals particularly women to gain capacity that will enable them being positive states actors.

Thus, the projects manageably induce gender sensitivities balances within the both districts, Suakoko and Moyamba.

Sierra Leone

Although, the design does not explicitly bear gender mainstreaming requirements, the project has striven and proactively worked to ensure the highest possible participation of women through targeted research of different expert candidates and encouragement to enterprises' management to appoint also women to attend training.

Female engineers and scientists have received training on Small Hydropower Development and Environmental Impact Assessment. About 40% of the participants were women in the International Workshop on Renewable Energy with a special focus on Small Hydropower Development organized by UNIDO in November 2016 in Freetown, Sierra Leone. A female Geologist was recruited as a consultant on the development of the Detailed Project Report.

Women are also represented adequately in the Steering committee, for example members are the head of women in Moyamba and the Market women head.

In addition, a workshop on "Women and Energy" with the major aim of training women on the productive use of electricity from the SHP plant upon commissioning was conducted in the period of 26-30.08.2019. The workshop had been organized in cooperation with Barefoot women training centre for 30 participants. The event provided interactive and participatory training with several elements including access to energy as an empowering process for women, energy needs, gaps and opportunities, productive use of energy, energy technologies

and Gender, mapping opportunities for linking with ongoing programmes working with Women Enterprises, business opportunities, financing, partnerships, team buildings and leadership skills development.

Thirty female participants from Freetown and the rural areas across Sierra Leone actively participated in a five-day training. The design and implementation of the learning sessions revolved around productive use of renewable Energy and the existential energy gaps amongst women in rural communities in Sierra Leone. The workshop was designed to train a core group of women at the grassroots on how to become beneficiaries of productive uses of energy and possible future trainers and to replicate the training when they go back home. Going beyond the benefits of economic participation, the profound effects of energy services on health, education, climate change, food and water security, and communication services was also discussed with the view to changing the way clean energy is considered by women in Sierra Leone.

Liberia

The project came into light with no specific conditions or target for gender mainstreaming. However and since the commencement of the project, according to the PIRs there had been numerous efforts being put in place that concentrate on the involvement and development of women through significant capacity building exercises in FY 2018.

FY2018 PIR notes the following:
The project was committed in ensuring the following:

- Women are employed at every level of the project, serving in administrative capacities, skilled and unskilled laborers at the project site,
- Women continue to gain training and exposure in hydro project development and implementation,
- The recruitment of women had been a priority in the execution of the project,
- Women are being encouraged and given equal opportunities as their male counterparts in the display of their skills and participation in the project.

Project's progress and efforts in providing equal opportunities to women and opportunity to demonstrate their skills as compared to their male counterparts are evident through the following:

- Women had been trained in Small Hydropower development skills,
- Women were employed as skilled and unskilled laborers,
- Women were employed in administrative capacities.

Criterion: Gender mainstreaming	
Finding	
Sierra Leone	Liberia
Although there weren't explicit gender mainstreaming requirements, the project provided equal opportunities to women and demonstrated significantly their engagement in different instances.	Although there wasn't explicit gender mainstreaming requirements, the project provided equal opportunities to women and demonstrated their engagement in different instances.
Rating	
Sierra Leone	Liberia
Very satisfactory	Satisfactory

4. Performance of Partners

This chapter comments on the performance of the partners in the project implementation. The assessment includes the quality of implementation and execution of the GEF Agencies and project executing entities in discharging their expected roles and responsibilities.

Sierra Leone and Liberia don't share the same implementation model, but rather have two different models. In Sierra Leone the execution partners are governmental bodies, however in Liberia execution partner is another development agency jointly implementing the project. In the absence of co-financing, low financial sector interest and private sector in the country, a partnership was established with a strong international partner with a strong presence in the country (USAID). National execution partner was Rural and Renewable Energy Agency (RREA) of Ministry of Land, Mines and Energy. According to the project document, RREA had a responsibility to take care of the capacity development, policy and regulatory framework of the overall project.

The difference in the implementation models obviously resulted with a different visibility of UNIDO in the countries and in the field. In Sierra Leone, the visibility of UNIDO and its work is high and highly recognized both by government and regional partners and communities as well. On the other side, working with a strong and influential partner (USAID) had resulted in shadowing the presence and the results of UNIDO.

The timing of the evaluations turned out to make some difference. The evaluation of Sierra Leone project was few months before its end making all partners available, as well as with fresh memory of their experience in the project implementation. The evaluation of Liberia project was several months after the completion which reflected on the assessment of the involvement and availability of the partners. Some were not available for interview, some were replaced due to political changes, some were not able to remember details etc.

4.1 UNIDO

Sierra Leone

UNIDO has a country presence (representative) and a field office for a long period and track record of successfully implemented projects, for which the national and regional institutions but also the communities are aware.

According to the available PIRs, the government of Sierra Leone and the other relevant stakeholders had been regularly updated and appraised about the project progress and the importance of their involvement in this project. Regular consultations had been held with the government counterpart and implementing partners of the private sector, as well as regular meetings of the PSC to ensure national ownership and provide platforms for stakeholders to express their views. A familiarization meeting was held with the new appointed senior officials of the Ministry of Energy and the Environment Protection Agency where the status of the SHP project had been presented and experiences in the implementation of the project shared.

The interviews with the different project parties confirm UNIDO's performance in the country and on the field.

- Interview with the former minister of Energy: Professor Davidson highlighted the contribution of UNIDO in country's initiative for rural mini-hydro electricity generation, stressing Shalock and the Bankasoka project in Port Loko.

- Interview with the Deputy Minister of Energy, Dr. Eldred Taylor: “UNIDO has been playing an incredible role in the energy sector in Sierra Leone citing the Bankasoka and Shallotte projects as an indelible accomplishment of UNIDO.”

- Interview with the Director of Energy at the Ministry of Energy, Ing. Benjamin Kamara: The Moyamba mini hydro project has received a lot of attentions from UNIDO over the years. He noted that UNIDO has done a lot of capacity building trainings for staffs of the Ministry of Energy and the Moyamba District Councils respectively. Due to that, it is his opinion that UNIDO has contributed significantly to strengthening institutional capacities at various levels on the planning and implementation small hydro power based mini grids projects. UNIDO sponsored a trip to Kenya to go and under study hydro potential in Kenya - an insight to open the eyes of the participants to the other parts of the world on renewables. Many lessons were learnt from the trip, and those lessons will impact the energy sector.

  UNIDO should continue to play a leading role to collaborate with the government in looking out for investors for the implementation of the project; to see a replica energy and zest that was demonstrated by UNIDO on the Bankasoka and Shallotte project for their completion as well for the Moyamba District project. The director made an emphasis that the role that was played by Rana P. Singh in the Bankasoka and Shallotte dams to their completion should be replicated for the Singimi dam.

  Interviews at University of Sierra Leone: the professors emphasized the excellent cooperation with UNIDO and the gratitude they have for the attention they received from the project.

- Focus group in Palima village: They have been cooperating with UNIDO for 5 years and for the entire period there has been very good communication. The project had been informing the communities on a regular base on various project aspect, discussing the benefits, but also the responsibilities. Everything they had been promised, was delivered. They see a trusted partner in UNIDO.
- Interview with Anthony Davis, local EIA trainer: Impressed by the motivational potential of the project manager and its willingness to contribute in capacity building in Sierra Leone/

Liberia

Although, UNIDO is present in the Liberia since 2007, it does not have a country representative nor a field office. It’s work in this country has been covered by the UNIDO Field Office in Ghana.

Reviewing the available back to office and inspection reports indicates regular field presence of the project team and overall all-parties coordination, in particular in the construction period.

The objective of the bi-weekly meeting is strengthening of coordination among the partners associated with the financing and implementation of the Mein River Project, consistent monitoring and evaluating progress in collaboration with the project documents, which include the technical specifications, scope of works, construction drawings and work plan. These meetings had objective also to held to abreast the partners with unfolding developments on

implementation, while at the same time amicably resolving technical issues and other challenges that may trigger, which tend to hinder progress, during the period of execution.

USAID

- Interview with USAID, Senior Engineering Advisor, Ms. Anita Nzeribe: USAID is assessing the cooperation with UNIDO as very good and constructive, both on management and field level, with occasional bumps on the road that were cleared together.

- Interview with Guan Kennedy, hydrometric supervisor, Liberian Hydrology Service, Ministry of Mines and Energy: Mr. Kennedy had nothing but nice words for the work of UNIDO, explaining that he heard about the project and UNIDO in 2012 when receiving a request for hydrology investigations. He emphasized the objective of the project in local capacity building mentioning the Training workshop on Hydrology project development in 2013, but as well another training in Nigeria also supported by UNIDO, but nor part of this project. He expressed his gratitude and the importance of the capacity building activities and excellent cooperation in strengthening his own but also the capacity of his institution in hydrology matters.

- Stella Maria Polytechnic University, Monsignor Stephen Kyne Technical College (MSKTC) beneficiary of the UNIDO Project: very grateful for the excellent cooperation they had with UNIDO.

- Interview with Prince Nanlee Johnson from Ministry of Mines and Energy: Mr. Johnson also indicated the great cooperation he had with UNIDO during the project implementation expressing his gratitude for the given 20-days capacity building in Israel sponsored by UNIDO, stressing the huge importance of UNIDO recognizing the role of the local staff and institutions in the hydrology project development and implementation.

- Rural and Renewable Energy Agency of Liberia, Deputy Director, Mr. Stephen V. Potter: He indicated the he was not fully aware of the part play by UNIDO on the Project but was aware of USAID overseeing the Project.

- Ministry of Mines and Energy – Deputy Minister for Operations, Hon. Emmanuel O. Sherman: is not well acquainted with the UNIDO Project in relation to the Mein River Project, he is not also aware of other ongoing UNIDO Project within the country. Hon Sherman is new at the Ministry, not only him but all other appointed officials at the ministry are also new.

- Suakoko Town, Suakoko District, Bong County, Suakoko District Commissioner, Hon. Daniel Dudu and Suakoko District Youth President, Mr. Najuwah F. Toniee.. The District Commissioner expressed he didn’t know that the project was initially sponsored by both UNIDO and USAID but it was USAID highlighted lonely. On the other hand, the Youth President was fully aware that the project is being sponsored by two donors, USAID and UNIDO.

- Local communities argued the passive engagement of USAID after the Ebola period and requested continuation of the project activities.

- Although all construction activities responsibility of UNIDO were completed in the field in 2019, due to the delays and incomplete work related to the transmission line (USAID part), the beneficiaries of the project were not able to get access to the network.

In the shadow

Based on the interviews conducted with the project partners and beneficiaries, there is a general perception that 1MW Mein River Hydropower project in Suakako is a USAID project. This comes with the much stronger presence in the country by USAID and the domination of USAID.

USAID is at the full front of providing updates to the Government of Liberia Representative such as the MME, RREA and LEC. These government institutions are aware that both USAID and UNIDO are undertaking the Mein River Project but with USAID being a major stakeholder on most of GoL Electrification projects thus overshadowing UNIDO involvement in the joint project.

The dominant status in the project by USAID had been very evident at the time of the cancellation of the generation component (construction of MHP). Due to an updated information about the project cost (increased costs for generation), USAID had brought a decision to cancel this component and instead of that decided to connect the project location to the nearest West Africa Power Pool (WAPP) energy infrastructure on the border with Ivory Coast. This was a decision that had changed significantly the project, but UNIDO could not do anything about that.

Comparison

It seems like that strong country presence, field office, track record of successful projects and good visibility is a performance leverage, which was the case in Sierra Leone.

On other hand, cooperation and joint implementation with a strong partner brings financial stability and assures delivery of final results, but also comes with high dependence on the partner itself, which was the case in Liberia. Additionally, the partnership and co-financing mobilized more than US$10m under this project, which 2.5 time more than initially planned.

4.2 National counterparts

The interviews with the Vienna management team and local management teams indicated a good communication and coordination, but most important great cooperation with the project partners, stakeholders and beneficiaries from the Government, also with those from the regions (districts and counties).

Sierra Leone

National executing partners in Sierra Leone are the Ministry of Energy and Water Resources and Ministry of Lands Planning and Environment. On a regional and local level, partners/stakeholders are Moyamba district council and Chiefdoms and Paramount Chiefs. Government counterparts including the Ministry of Energy, Ministry of Lands, Country Planning and the Environment, Ministry of Agriculture and Forestry, Ministry of Finance, the Environment Protection Agency and Moyamba District Council had been active in the project activities,

contributing to the extent possible and participating in the PSC and project events. Regular correspondence had been established with the Project Coordinator and UNIDO Headquarter.

In regards to the cooperation with the leading national execution partner MEWR, it was indicated[64] there had been excellent cooperation and support that provided successful implementation of the project activities. At the end, it is the responsibility of the Ministry and the Government to take the decision and go for bidding. UNIDO had already offered their assistance in the bidding and UNIDO remains available to the Government in providing support as it is a long-term strategy to be present in the country.

Liberia

Executing partner is USAID represented by a contractor in execution, Winrock International in the first and UIP and NRECA in the second project implementation period[65]. On the national institutions side partners are Rural and Renewable Energy Agency and the Ministry of Land, Mines and Energy. On a regional and local level, partners/stakeholders are Suakoko district council and Bong country.

Annual reports have noted well progressing due to a strong cooperation between the partners (USAID and UNIDO) and well project coordination with the involvement and participation of key government counterparts and local stakeholders.

Due to the Ebola epidemic, activities in the field had slowed down in 2014 and 2015. Despite the slowed but still active engagement on the field by UNIDO, USAID had suspended the execution activities. As soon as the Ebola risk was contained, the local communities had asked for the execution to be resumed which resulted with an intensive communication between UNIDO and USAID. In September 2014, Winrock had informed[66] UNIDO that they are no longer in position to undertake the services and works as per the agreement due to the decision of USAID to discontinue funding of the 1MW Mein River Mini Hydropower project in Suakoko[67].

Annual Liberia PIRs have noted the following: “UNIDO/USAID are closely working in coordination with key government counterparts to ensure that proper management structures and measures are put in place to spearhead the operations of the project in a well-coordinated faction, making the impact to be felt by the communities that are to benefit when completed.”

Stakeholders and communities

Since the tis inception, the project received immeasurable support from the target communities, the local county authority and citizens of Bong County, recognizing the importance of the project for their social and economic development.

Local project partners and as well beneficiaries are the Phebe Medical Hospital, Cuttington University, Central Agriculture Research Center (CARI), District and County officials. The reports indicate excellent communication and cooperation and strong commitment from their side. During the interviews, all parties stressed that had recognized the importance of the project and confirmed their commitments.

[64] Interview with project manager Rana Singh, UNIDO, 28.10.2019

[65] According to the MoU, these are executors of UNIDO, also.

[66] Note for the file, Cancellation of purchase - Winrock, 22 September 2014

[67] No execution issues were reported in PIR FY2015

Furthermore, the county leadership established a 21-Members Standing Committee consisting of all stakeholders that meets every Tuesday of every week to discuss updates and management issues relating to the project.

4.3 Donor

According to the annual project reports, the financing of this projects by GEF has been very timely, no delay or other issues were evidenced during the implementation.

Criterion: Performance of partners		
	Finding	
	Sierra Leone	Liberia
UNIDO		
National counterparts		
Donor		
	Rating	
	Sierra Leone	Liberia
UNIDO	Highly satisfactory	Satisfactory
National counterparts	Highly satisfactory	Satisfactory
Donor	Highly satisfactory	Highly satisfactory

5. Factors facilitating or limiting the achievement of results

5.1 Monitoring & evaluation and Results-Based Management

Both projects have well-defined monitoring and evaluations plans with dedicated budgets for its implementation. M&E plan consist of the following activities:

- Measurement of means of verification for project progress and performance (baseline and impact analysis);
- Annual project reporting, including project implementation review (PIR);
- Project review meetings;
- Periodic status reporting;
- Audits;
- Mid-term external review;
- Final (Terminal) external review; and,
- Visits to field sites.

Mid-Term reviews had been conducted and reports prepared for Sierra Leone[68] and Liberia[69] to assess the projects achievements at the time of the mid-term review and reports are available.

Terminal evaluations had been initiated for both projects, at the end of the project for the Sierra Leone project, however 5 months upon the completion for the Liberia project.

[68] Mid-Term Review of the UNIDO GEF Project "Promoting mini grids based on small hydropower for productive uses in Sierra Leone", May 2016
[69] Mid-Term Review of the UNIDO GEF Project " Installation of multi-purpose mini-hydro infrastructure (for energy & irrigation) in Liberia", May 2016

The Results-Based Management (RBM) system aims to improve management effectiveness and accountability. It defines realistic expected results, monitors progress toward achievement of expected results, integrates lessons learned into management decisions and reports on performance. The operationalization of the RBM system is based on reporting requirements coming from two complementary sources, a monitoring system and an evaluation system.

The report submission process is divided into two steps, the first involves submitting annual project information and the second relevant Project Implementation Reports (PIRs), Mid-term Reviews or Evaluations (MTRs/MTEs), Tracking Tools (TTs) and Terminal Evaluations (TEs). The following figure depicts the process itself.

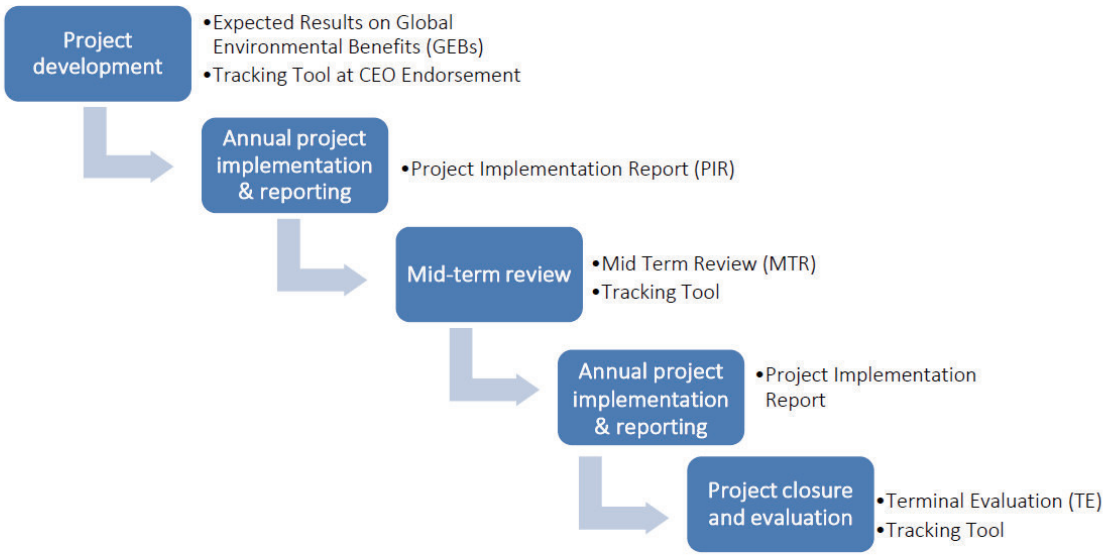


Figure 8 RBM Reporting within the GEF Project Cycle[70]

There is regular flow of annual project information (reporting) at both projects. Project Implementation Reports are available for both projects, Liberia[71] and Sierra Leone[72].

Progress reports, back to office reports, inspection reports, steering committee meetings are available, with some inconsistent frequency. Excel tracking tools are also available, as there was a finding in the Mid-Term reviews on the necessity of these tools. A track record of site visit reports and technical reports are also available.

Criterion: Monitoring & evaluation and Results-Based Management	
Finding	
Sierra Leone	Liberia
Monitoring and Evaluation procedures followed. Oversight of the main activities performed well. Reports available, inconsistent frequency.	Monitoring and Evaluation procedures followed. Oversight of the main activities performed well. Reports available, inconsistent frequency.
Rating	
Sierra Leone	Liberia

[70] GUIDELINES ON THE PROJECT AND PROGRAM CYCLE POLICY, GEF, 2017
[71] Annual project implementation report (PIR) Fiscal Year (FY) 2013, 2014, 2015, 2016, 2017, 2018, 2019
[72] Annual project implementation report (PIR) Fiscal Year (FY) 2013, 2014, 2015, 2016, 2017, 2018

Satisfactory	Satisfactory

5.2 Overarching assessment and rating table

The evaluation is made separately for both projects, in accordance to five different evaluation criteria given in the TORs: Impact, Project design, Project performance, Cross-cutting performance criteria and Performance of partners. Ratings are mandatory for all five criteria. The rating uses a six-point rating system, where 6 is the highest score (highly satisfactory) and 1 is the lowest, suggested by UNIDO Independent Evaluation Division.

Table 28 Project evaluation, Sierra Leone

#	Evaluation criteria	Rating
A	**Impact**	Satisfactory
B	**Project design**	**Moderately satisfactory**
1	Overall design	Moderately satisfactory
2	Logframe	Satisfactory
C	**Project performance**	**Moderately satisfactory**
1	Relevance	Very satisfactory
2	Effectiveness	Moderately satisfactory
3	Efficiency	Moderately satisfactory
4	Sustainability of benefits	Satisfactory
D	**Cross-cutting performance criteria**	**Satisfactory**
1	Gender mainstreaming	Very satisfactory
2	M&E • M&E design • M&E implementation	Satisfactory
3	Results-based Management (RBM)	Satisfactory
E	**Performance of partners**	**Satisfactory**
1	UNIDO	Highly satisfactory
2	National counterparts	Satisfactory
3	Donor	Highly satisfactory
F	**Overall assessment**	

Table 29 Project evaluation, Liberia

#	Evaluation criteria	Rating
A	**Impact**	Satisfactory
B	**Project design**	**Moderately satisfactory**
1	Overall design	Satisfactory
2	Logframe	Moderately satisfactory
C	**Project performance**	**Moderately satisfactory**
1	Relevance	Very satisfactory
2	Effectiveness	Moderately satisfactory
3	Efficiency	Moderately satisfactory
4	Sustainability of benefits	Satisfactory
D	**Cross-cutting performance criteria**	**Satisfactory**
1	Gender mainstreaming	Satisfactory
2	M&E • M&E design • M&E implementation	Satisfactory
3	Results-based Management (RBM)	Satisfactory
E	**Performance of partners**	**Satisfactory**
1	UNIDO	Satisfactory
2	National counterparts	Satisfactory
3	Donor	Highly satisfactory
F	**Overall assessment**	

6. Conclusions, recommendations and lessons learned

6.1 Conclusions

“Promoting mini grids based on small hydropower for productive uses in Sierra Leone” and “Installation of multi-purpose mini-hydro infrastructure in Liberia” proved to be very relevant projects for both countries and implemented in the right time, with a design in terms of scope consistent with the national energy development and environmental priorities and strategies, but most of all, consistent with the needs of the countries.

Moyamba Mini Hydro Project is one of the most important projects in electrifying rural areas of Sierra Leone, in particular for the Southern Province of Sierra Leone. The project was well coordinated, with eminent visibility, with capacity development and community involvement as its best sides.

Liberia project seems to stand a sustainable gain considering that the project integrated all necessary national stakeholders within government and the targeted beneficiary stakeholders during all fronts of the project. The project is being highly embraced by the beneficiaries, inhabitants and institutions within the project are very excited about the level of effort exhausted by the donors in implementing the project.

The Projects succeed to initiate an intensive processes of cooperation among different stakeholders in working on a same RE agenda, evident awareness and behavioral changes resulting with significant effects on the policy and capacity side enabling sustainability grounds in the countries, which having in mind the identified HE potential will inevitably lead to replication in the future.

Both projects contributed significantly in bringing small/mini hydro energy in the mainstream of sustainable energy supply systems in the countries looking at the national policy status in Sierra Leone and Liberia eight years after. They also contributed in removing the institutional, technical, policy and economic barriers to the promotion of SHP/MHP.

From a developmental perspective, Sierra Leone project has reached its objective of attracting investment in RE technologies for mini-grids based on small hydropower sources.

Liberia project has been highly embraced by the beneficiaries, inhabitants and institutions within the project are very excited about the level of effort exhausted by the donors in implementing the project.

The project design in terms of time and global benefits seems too ambitious for this type of projects that take significant implementation time, as two years for implementation is too little for such objectives, even more to expect global benefits. As DPR concludes, optimal time is 6 years for implementation only (from tendering to the start of commercial operation), having the preparation done before (site identified, feasibility study done, project details determined).

For projects like Sierra Leone that are based on high capital, financial commitments from execution partners might not be always sufficient enough as they may affect the outputs and outcomes.

Joint cooperation model with strong partner proves to be effective and efficient, but sometimes comes with a domination of the partner together with a shadow effect and risks of unilateral decision that might significantly change the project and affect the objectives.

Bigger changes during the implementation of the project may affect the project objectives and reaching the targets, as this was the case in Liberia.

Strong presence in the country and dedicated team work bring better project management grip.

6.2 Recommendations

Based on the assessment and findings of this report, the evaluation team prepared several recommendations that can contribute to the achievement and sustainability of the outcomes and outputs of both projects and the overall Project objective.

The recommendations are separated according to the designees into: recommendations to UNIDO and recommendations to Stakeholders.

UNIDO:

- Stronger mechanisms should be considered to be put in place to ensure the partner funding is available and delivered on time, so project outputs and outcomes are achieved by the end of the project.
- In joint cooperation models, agreements should consider arrangements for mutual decision making during the implementation to avoid partner dominance and shadowing effect.
- In event of significant changes happening during project implementation, one should consider amending the project results framework.
- In case of a joint implementation, indicators to be given separately for all expected results in order to ensure appropriate evaluation for each of the agencies.
- Support should be considered to providing technical assistance for connecting small hydropower centres on a regional or global in order to provide sharing of experience, peer to peer help or any other assistance for sustainability and replication of success stories.
- Consider providing technical and other assistance in development of growth centers in Moyamba district as follow up to Moyamba SHP once it commences its work.

Government of Sierra Leone / Stakeholders

- Resettlement and compensation plan should be in place together with sufficient funding to provide adequate relocation and compensation to affected communities.

Government of Liberia / Stakeholders

- Awareness campaign should be conducted among local communities in Bong County to educate the people on safe use of electricity, possible risks ana avoiding incidents.

6.3 Lessons learned

- Country presence and country management office provides better project implementation and stronger management grip.
- Partnership and joint implementation with a strong partner leverage and certainty in project implementation, but it also it might come shadow effect and reduced visibility.
- Developing and implementing a hydro project takes a long time, as Sierra Leone DPR showed. Allocating sufficient time in project implementation framework is of great importance.

Annex 1 ToRs

Annex 2 Engagement Plan for stakeholders

DATE	INSTITUTION	LOCATION
11TH November, 2019	Sensea hub	Arberdeen, F/town
12TH November, 2019	EDSA, USL and Ministry of Trade	Free town
13th November, 2019	Ministry of Energy, EGTC and FBC	Freetwon
14th November, 2019	Njala University, Njala Campus	Kori Chiefdom, Moyamba District
15th November, 2019	Moyamba District Council	Moyamba
15th November, 2019	Palema Community	Upper Banta Chiefdom
15th November, 2019	Sigimi Community	Bangruwa Chiefdom

Annex 3 List of stakeholders consulted, Sierra Leone

#	Name	Designation	Instiution
1.	Mr Anthony Davies	Environmental Expert and Facilitator	Sensea hub at Arberdeen, F/town
2.	Joe Lahai Sormane	CDG	EDSA
3	Edward D Parkinson	Ag. Network Planning Manager	EDSA
4	James Rogers	Cooperate Planning and Project	EDSA
5	Francis Nyama	Deputy Director General	EDSA
6	Prof. Jonas A. S. Redwood-Sawyer	Professor Electrical Engineering	USL
7	Prof. Oganlade Davidson	Professor Electrical Engineering	USL
8	Ing. Ishmael Kanu	Local hydrological expert	USL
9	Dr. Jinnah S. Momoh	Lecturer, and GIS local expert	USL
10	Dr. Solomon P. Gbanie	Lecturer, and GIS local expert	USL
11	Mickail N. Turay	Director, Domestic Commerce and Industry	Ministry of Trade and Industry
12	Dr. Patrick Tarawally	Technical Adviser	Ministry of Energy
13	Dr. Arnold Okom-Williams	Consultant, Ecology	FBC

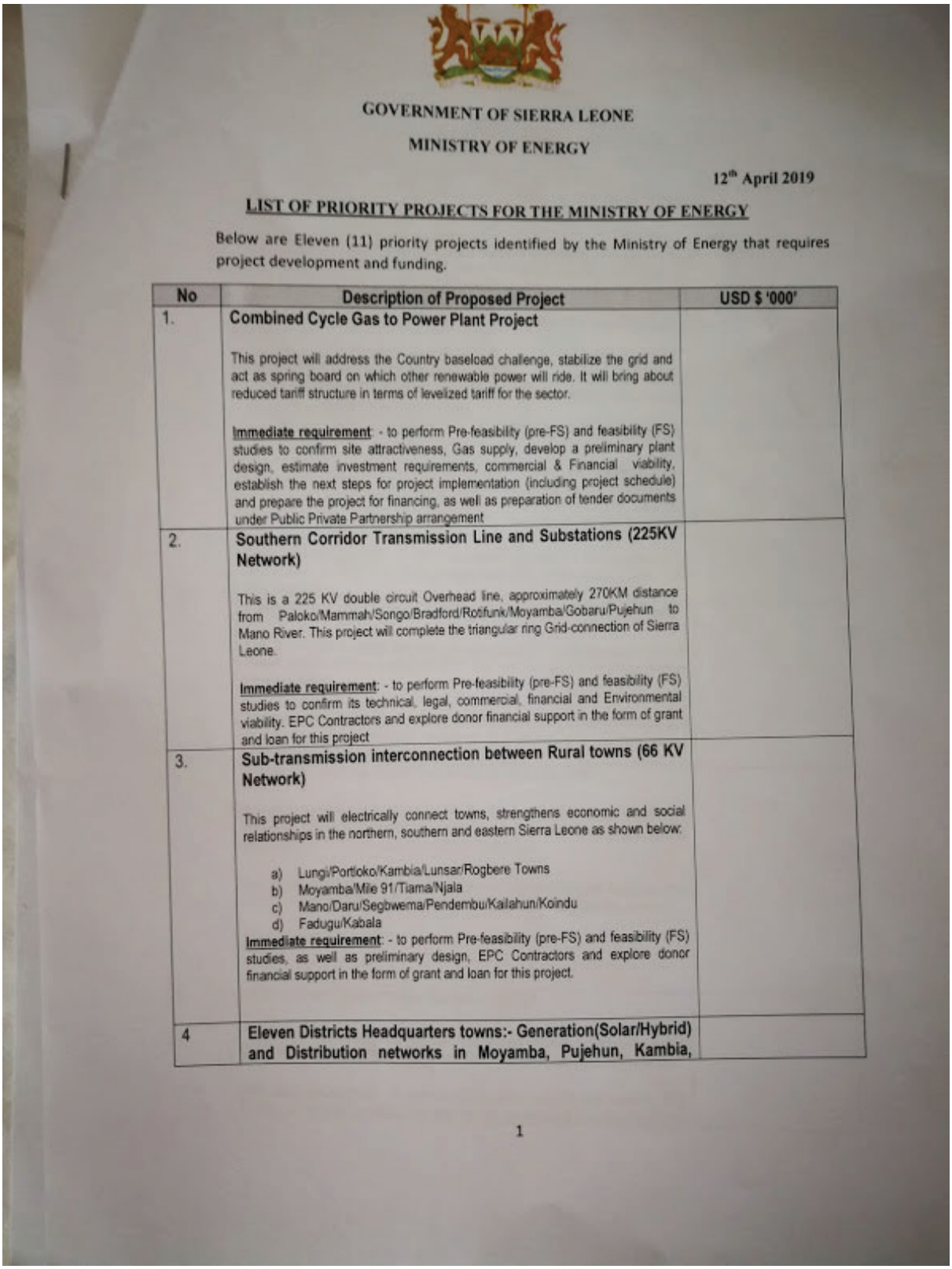
14	Sinneh A. S. Kamara	Ag, Head of Generation	EGTC
15	Benjamin B. Kamara	P&P Coordinator	EGTC
16	Ing. John A Kabie	Ag. Director General	EGTC
17	Ing. Benjamin Kamara	Director of Energy,	MOE
18	Dr. Kanja Sesay	Hon. Minister	MOE
19	Dr. Eldred Taylor	Deputy Minister	MOE
20	Dr. Sherman Kamara	DVC	NU, Njala Campus
21	Mr. Mohamed Saidu Kamara	Ag. SAFO	NU
22	Mr. Saffa MAssaquoi	Lecturer, Agric Business Dept.	NU
23	Dr. Rashid Noah	Associate Lecturer, Agric. Engineering Dept.	NU
24	Georgiana Allie	Lecturer, Agric. Engineering Dept.	NU
25	Emmanuel Kangoma	Lecturer, Agric Engineering Dept.	NU
26	Sheik Dyphan Massaquoi	HOD, Agric. Economics	NU
27	Henry L. Nyademoh	Deputy Registrar	NU
28	Peter A. Belmoh	Electrical Engineer	NU
29	Dr. Abdul Rahman Sesay	Dean, School of Agriculture	NU
30	Alfred J. Lewis	Deputy Chief Adminstrator	MDC
31	Solomon Lebbie	Manager Fawaz Contsruction Company	FC&GS
32	Syvester Boima	PO-MDC	MDC
33	Alberta M. Barrie	Finance Offficer	MDC
34	Patrick Boima	IEC	MDC
35	Ahmed A. Kamara	DAO-MAI	MAF
36	Albert Ndenje	Pdf. Manager	Radio Modcar
37	George Gbenga	M&E	CSO
38	Abdul Joe Kamanda	Chairman CSO	CSO
39	Mohamed M. Falia	Civil Works Engineer	MDC
40	Joseph B. Mbogba	Chairman	MDC
41	PC Foday M. Gulama	PC/ CPC	CPC

Annex 4 List of stakeholders consulted, Sierra Leone

No.	Full Name	Institution	Position
1.	Levi Z. Piah	Environmental Protection Agency (EPA)	Chief Technical Advisor/Ramsar Focal Point
2.	Jerry T. Toe	Environmental Protection Agency (EPA)	National Focal Point Stockholm Convention
3.	Jay Exodus Flanjay	Stella Maria Polytechnic University (SMP)	Dean, Monsigar Stephen Kyne Technical College
4.	Guah Kenedy	Hydrologic Survey: Ministry of Mines and Energy	Hydrometric Supervisor
5.	Emmanuel O. Sherman	Ministry of Mines and Energy	Deputy Minister for Operation
6.	Prince Nanlee Johnson	Ministry of Mines and Energy	Senior Energy Analysit
7.	Paschal Buckley	Liberia Electricity Corporation (LEC)	Chief Executive Officer
8.	N. Hun-Bu Tulay	Engineering Society of Liberia (ESOL)	Former President - ESOL, Now Engineer
9.	Eugene H. Shannon, PhD	Natural Resources Development Corporation (NRDC)	Former Minister – MME & President - NRDC
10.	Stephen V. Potter, Sr.	Rural and Renewable Energy Agency of Liberia (RREA)	Deputy Executive Director
11.	Hon. Daniel Dudu	Suakoko District	District Commissioner
12.	Mr. Najuwah F. Toniee	Suakoko District	Youth President
13.	Quaqua S. Mulbah, PhD	Central Agricultural Research Institute (CARI)	Director of Programs/ Senior Research Officer, Crops Program
14.	Samuel Sando Johnson	Central Agricultural Research Institute (CARI)	Agro-MET & Irrigation Unit, Research Officer I
15.	Jefferson Sibley, MD	Phebe Hospital and School of Nursing	Medical Director
16.	B. Willie Voupawoe	Phebe Hospital and School of Nursing	Head of Maintenance
17.	Chidi Omeze	Cuttington University	Vice President for Insttitutional Advancement
18.	J. Allison Flomo	Cuttington University	Physical Plant Director
19.	Orea Wright	Cuttington University	Vice President, Administration
20.	Morris Gbasie	Cuttington University	Director of Procurement
21.	Charles Ford	Cuttington University	Vice President, Academic Affairs
22.	Siafa Chowoe	Cuttington University	Associate Vice President for Administration
23.	Lvis Arismendi	NRECA International	666ECO Project Manager
24.	Muhammed Asif	United Infrastructure Project (UIP)	Project Manager - MRHP
25.	Rhonton F. Bill Wisseh	United Infrastructure Project (UIP)	Project Engineer
26.	Aaron Mineen	NRECA International	Electrical Engineer
27.	Anita Nzeribe	USAID	Senior Engineering Advisor, USAID
28.	William S.Y. Tamba	APSCO Engineering Services	Camp Site Manager
29.	Danny Carter	APSCO Engineering Services	Environmental Compliance Officer

30.	David D. Wounuah	APSCO Engineering Services	Infrastructure Engineer/Manager Partner
31.	Aaron Mineen	NRECA International	Electrical Engineer
32.	Anita Nzeribe	USAID	Senior Engineering Advisor, USAID
33.	Sherock Mah	APSCO Engineering Services	SVP - APSCO
34.	Anthony B. Sheriff	Bong County Administrative Office	Developing Superintendent
35.	Nat M. Queelyme, Sr.	Bong County Administrative Office	Project Planner

Annex 5 List of priority projects for the Ministry of Energy



GOVERNMENT OF SIERRA LEONE

MINISTRY OF ENERGY

12th April 2019

LIST OF PRIORITY PROJECTS FOR THE MINISTRY OF ENERGY

Below are Eleven (11) priority projects identified by the Ministry of Energy that requires project development and funding.

No	Description of Proposed Project	USD $ '000'
1.	**Combined Cycle Gas to Power Plant Project** This project will address the Country baseload challenge, stabilize the grid and act as spring board on which other renewable power will ride. It will bring about reduced tariff structure in terms of levelized tariff for the sector. **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies to confirm site attractiveness, Gas supply, develop a preliminary plant design, estimate investment requirements, commercial & Financial viability, establish the next steps for project implementation (including project schedule) and prepare the project for financing, as well as preparation of tender documents under Public Private Partnership arrangement	
2.	**Southern Corridor Transmission Line and Substations (225KV Network)** This is a 225 KV double circuit Overhead line, approximately 270KM distance from Paloko/Mammah/Songo/Bradford/Rotifunk/Moyamba/Gobaru/Pujehun to Mano River. This project will complete the triangular ring Grid-connection of Sierra Leone. **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies to confirm its technical, legal, commercial, financial and Environmental viability. EPC Contractors and explore donor financial support in the form of grant and loan for this project	
3.	**Sub-transmission interconnection between Rural towns (66 KV Network)** This project will electrically connect towns, strengthens economic and social relationships in the northern, southern and eastern Sierra Leone as shown below: a) Lungi/Portloko/Kambia/Lunsar/Rogbere Towns b) Moyamba/Mile 91/Tiama/Njala c) Mano/Daru/Segbwema/Pendembu/Kailahun/Koindu d) Fadugu/Kabala **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies, as well as preliminary design, EPC Contractors and explore donor financial support in the form of grant and loan for this project.	
4	**Eleven Districts Headquarters towns:- Generation(Solar/Hybrid) and Distribution networks in Moyamba, Pujehun, Kambia,**	

1

	Kailahun and Kabala This project will address the urgent electricity supply needs for the over 4 million people living in these rural townships, as they have been deprived of electricity supply for over 30 years. **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies, as well as preliminary design, EPC Contractors and explore donor financial support in the form of grant and loan for this project.	
5	**Rehabilitation and Expansion of GOMA hydro Dam Power Station** This is a hydro-power project with 6 MW installed capacity and was constructed by the Chinese Government in 1986. The hydraulics and alternators system need to be replaced and increased output capacity between 10-12 MW. The proposed project will enhance electricity supply to Bo/Kenema grid connection in terms of output capacity. At the moment, the hydro power station is de-rated between 2-3MW. **Immediate requirement**: - Technical Assistance support is required from the Chinese Government to perform technical and financial feasibility as well as the project design for the rehabilitation works.	
6	**Moyamba Singimi 16MW Hydro Power Dam with T & D Network** This project is to install 16 MW hydro power station with transmission and distribution to connect the Rutile and Sembehun Mining sites, Njala University, Tiama Town, Moyamba Township (hybrid) and communities within Moyamba District. Note that with the support from UNIDO Feasibility studies has been done. **Immediate requirement**: - financial support required for the preparation of tender documents to launch the procurement of a private partner under PPP arrangements	
7	**Kailahun Luaawa Foiya 12 MW hydro on the Meni/Yingidy falls** This is a hydro potential site that has the capacity to generate about 25 MW based UNIDO scoping studies in 2013. The site is about 3 KM distance from Kailahun Town. **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies, as well as packaging the deal for the procurement of a private partner under PPP arrangements.	
8	**Wanje Run-off the River hydro Power 100-200 MW** This is a run-of the river with huge hydro power potential of about 100-200MW capacity. This project is linked to the Southern Corridor 225KV line project as well as leveraging the newly constructed CLSG 225KV line. **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies, as well as packaging the deal for the procurement of a private partner under PPP arrangements	
9	**Mange River Hydro Power Station -100MW** This river has the potential to produce 100MW and capable of connecting to the CLSG 225KV line and the proposed new 225KV Indian Exim Bank funded project. **Immediate requirement**: - to perform Pre-feasibility (pre-FS) and feasibility (FS) studies, as well as packaging the deal for the procurement of a private partner	

Annex 6 Activities/results implemented per year, Sierra Leone

Project Component	Project activities							
	2012	2013	2014	2015	2016	2017	2018	2019
Institutional capacity building	Steering committee set-up and first meeting held on August 14. Validation Workshop held on 15 August. Co-financing Meeting held on 14 August 2012 to reinforce the commitment from the Government of Sierra Leone and resulted in the pledging of co-financing from OFID and EBID.	The Ministry of Finance and Economic Development made the required budgetary provision in the 2013 budget.	Ebola outbreak	Ebola outbreak Steering committee held on February 17. Steering committee held on July 30.	International Workshop on Renewable Energy, with specific focus given to Small Hydropower Technology.	Steering committee held on September 11 in Moyamba. One year Financial Resource Mobilization Strategic Plan was drafted and finalized on 1 March.	Steering committee meeting held on 18 December. Reinforced the implementation of the one year Financial Resource Mobilization Strategic Plan developed in 2017. Several stakeholder consultations held with the relevant Government MDAs, private sector players, civil society organizations, and members of the local community. Updated the newly appointed Ministry of Energy officials, including the Minister and his deputy on the project activities since its inception.	A study visit of 14 Sierra Leonean delegation to Kenya organized. Representatives of Government Ministries, Departments and Agencies in the Energy, Water, Agriculture Tourism and local government sectors, as well as representatives from universities were invited to participate in the study tour between 24 and 28 September.
Demonstration of SHP based mini grid			Ebola outbreak	Ebola outbreak Sierra Leone	Independent Mid-Term Review	Detailed Project Report completed.	Held meetings with potential investors to	Detailed Geological, Geophysical and Geotechnical

Project Component	Project activities							
	2012	2013	2014	2015	2016	2017	2018	2019
				Regional Hydrological Network Geodatabase and comprehensive report on the database structure developed in June.	undertaken.	Copy of the DPR submitted to the Minister of Energy. The quantum of land (8.05 km^2) required for the implementation of the Project acquired, surveyed and demarcated.	discuss their interest in financing and developing the Project.	assessment of the SHP dam site carried out in April to address the lack of such data for this site. Held meetings with potential investors to discuss their interest in financing and developing the Project. Mini Grid Facility constructed in Palima village.
Capacity building of stakeholders	National Stakeholders' Workshop held on 16 August.	EIA training organized from 23 September to 2 October. Environmental, Social and Health Impact Assessment (ESHIA) completed. Training on SHP Development in Sierra Leone organized between 3 and 12 July.	SHP Technology Training Centre established at Fourah Bay College, University of Sierra Leone, on 24 March. Ebola outbreak	Ebola outbreak	Awareness building and perception changing undertaken	Awareness building and perception changing undertaken	Stakeholders sensitivized on the progress of the project activities.	A training programme on "Renewable Energy for Enabling Innovative Entrepreneurs in Sierra Leone" organized from 8 to 12 July. Training programme on "Development and Implementation of Renewable Energy Policy in Sierra Leone" organized on 23 and 24 July. Training programme on "Enterprise Development in the Renewable Energy Sector in Sierra Leone" organized from 19 to 23 August. Training programme on "Women's Empowerment through Access to Energy,

Project Component	Project activities							
	2012	2013	2014	2015	2016	2017	2018	2019
								Energy Use and Benefit" organized from 26 to 30 August.
Policy and regulatory framework for SHP development			Ebola outbreak	Ebola outbreak		Contributed to the development of the Renewable Energy and Energy Efficiency Policies.	Contributed to the development of the Electricity and Water Regulatory Commission.	Training on RE Policy Development and Implementation provided

Annex 7 Activities/results implemented per year, Liberia

Project Component	Project activities							
	2012	2013	2014	2015	2016	2017	2018	2019
Institutional capacity building	Project Inception workshop 2012	42 Persons trained in 'Small Hydropower Project Development In Liberia' from 13 major government ministries and agencies including private sector institutions in December 2013	Established the 'Small Hydro Technology Center' on the campus of the Stella Maris University on April 2014 through a partnership agreement between the two institutions, with handover of state-of-the-arts hydroelectric equipment		Sponsored the training of one staff of the Rural and Renewable Energy Agency (RREA) to attend the 'Sustainable Energy Leadership Program' at Teri University in New Delhi, India in 2016 February	Sponsored the training of one staff of the Ministry of Mines and Energy (MME) to attend the 'Renewable Energy as a Catalyst for Regional Development' at the Arava Institute, Israel in 2017 May		
Demonstration of SHP based mini grid		42 persons trained in SHP demonstration at Kakata, Margibi County in December 2013			Detailed drawings for the Transmission and Distribution (T&D) component of the project has been completed and approved and is used in the implementation of the ongoing works		Erection of poles, establishing distribution grid	

Project Component	Project activities							
	2012	2013	2014	2015	2016	2017	2018	2019
					-Detailed Periodic Project Report is prepared and submitted by the Contractor			
Capacity building of stakeholders		Establishing MRHPC and training						
Policy and regulatory framework for SHP development		To be developed by national government when project is completed in 2020 and handover, as project is in line with national energy policy.						