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LEARNING, EVALUATION & ANALYSIS PROJECT-II (LEAP-II)

Liberia Energy Sector Support Program (LESSP)
Performance Monitoring and Evaluation – Final Report

CONTRACT NUMBER: AID-OAA-I-12-00042/AID-OAA-TO-14-00046



July 22, 2015

This publication was produced for review by the United States Agency for International Development. It was prepared by International Development Group LLC (IDG).

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ABBREVIATIONS AND ACRONYMS

APL	All Power Labs
BEO	USAID Bureau Environmental Office
BOQ	Bill of Quantities
BWI	Booker Washington Institute
CBOs	Community Based Organizations
CDA	Cooperative Development Agency
CRE	Center for Renewable Energy
CO	Contracting Officer
COP	Chief of Party
COR	Contracting Officer's Representative
CPO	Crude Palm Oil
°C	Degrees Celsius
DBB	Design-Bid-Build
DCA	Development Credit Authority
DO	Development Objective
EHELD	Excellence in Higher Education for Liberian Development
ELWG	Energy Law Working Group
EMMP	Environmental Mitigation and Monitoring Plan
EPA	Environmental Protection Agency (Liberia)
EPC	Engineering, Procurement & Construction
ERB	Energy Regulatory Board
ESG	Energy and Security Group
EU	European Union
GDA	Global Development Alliance
GEK	Gasifier Experimenters Kit
GOL	Government of Liberia
GreenCons	Green Consultancy Inc.
GW	Gigawatts
GW _e	Gigawatt electrical energy
GW _t	Gigawatt thermal energy
IDG	International Development Group LLC
IFC	International Finance Corporation
IEA	International Energy Agency
ISO	International Standards Organization
kg	kilogram
kWh	Kilowatt hours
kWh/m ²	Kilowatt hours per square meter
LEAP	Liberia Energy Assistance Project
LEAP II	Learning, Evaluation and Analysis Project II
LEC	Liberia Electric Corporation
LESSP	Liberia Energy Sector Support Program

MEO	Mission Environmental Officer
MH	Manitoba Hydro
MLME	Ministry of Lands, Mines and Energy
MOU	Memorandum of Understanding
MV	Medium Voltage
MW	Megawatts
MWh	Megawatt hour
NEC	Liberia National Election Commission
NEP	National Energy Policy 2009
NGOs	Nongovernment organizations
NRECA	National Rural Electric Cooperative Association
NVE	Norwegian Water Resources and Energy Directorate
O&M	Operation and Maintenance
OPIC	Overseas Private Investment Corporation
PMP	Performance Monitoring Plan
PV	Photovoltaic
QA/QC	Quality Assurance/Quality Control
RE	Renewable Energy
REC	Renewable Energy Center
REFUND	REFUND Renewable Energy Fund (RREA)
RES	Renewable Energy Systems
RET	Renewable Energy Technologies
RFP	Request for Proposal
RREA	Rural and Renewable Energy Agency
SCECS	Sorlumba Community Electric Cooperative Society
TA	Technical Assistance
TEPS/GDP	Total Energy to produce \$ of gross domestic product
Team	Richard P. Smith, Team Leader, Sam Koduah, Utility Specialist
Tt	Tetrattech ES
T/D	T/D Transmission/Distribution
UL	University of Liberia
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
USAID/Liberia	USAID/Mission to Liberia
VOCTEC	Vocational Training and Education for Clean Energy
WI	Winrock International

1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

In October 2010, USAID awarded an \$18.9 million, four-year contract to Winrock International for the implementation of the Liberia Energy Sector Support Program (LESSP). LESSP was a four-year program intended to increase access to affordable renewable energy services in geographically-focused rural and urban areas to foster economic, political and social development. The LESSP contract was signed for a complete performance period of forty-eight months with an end date of October 2014.

1.2 PURPOSE AND OBJECTIVES AND EVALUATION QUESTIONS

The primary purpose of the evaluation is to determine if the assistance provided met stated development objectives and to understand the lessons learned from implementation of the LESSP. USAID/Liberia seeks a clear picture of program accomplishments and weaknesses, since inception, including management issues that can help inform and recommend changes in implementation approach to assure successful completion of the program objectives and the focus for future energy programming initiatives.

The following three questions were used to frame the performance evaluation:

1. **Effectiveness of infrastructure planning/construction oversight approach.** To what extent was appropriate due diligence done by the contractor in the design phase and how well was the project positioned (in terms of management/staffing structure) to support the construction phase?
2. **Effectiveness of institutional framework and capacity building.** How effective was LESSP's institutional and capacity-building approach in achieving the stated objectives, e.g., ensuring that "improved infrastructure will be handed over to locally-based management technically and financially" to sustain energy supply service improvements in rural Liberia?
3. **Overall project positioning and strategy for phase-out of USAID assistance.** USAID needs to draw lessons learned for future projects. Some uncertainty may remain around local resources, skills, access to capital and other key elements that are crucial for future project design and implementation.

1.3 METHODOLOGY AND CONCEPTUAL APPROACH

The methodology for the performance evaluation of LESSP included a desk review, key informant interviews (KIIs), site visits to pilots located in Gbarneway (solar in Lofa County), Sorlumba (biomass in Lofa County) and Kwendin (biomass in Nimba County),

and two visits to the Booker Washington Institute (BWI) to assess the sustainability of the respective activities. The evaluation team (Team) conducted KIIs with 27 key stakeholder organizations and approximately 60 participants in the US and Liberia.

The Team used a Risk Assessment Framework (RAF) to evaluate potential risks and impacts that may lead to failure of the various program elements. The primary purpose of the risk assessment is to evaluate the consequences if an investment decision or action fails. The Team assessed and assigned a classification to eight focus areas as follows:

1. Selection of contractors for Kwendin and Sorlumba
2. Construction cost overrun
3. Technology selection
4. Capacity building at Gbarnway
5. Capacity building at Sorlumba; lack or preparedness and limited capacity
6. Capacity building at Kwendin; lack or preparedness and limited capacity
7. Capacity building at GOL counterpart organizations RREA and MLME
8. Cost Recovery

1.4 FINDINGS AND CONCLUSIONS

1.4.1 Did LESSP meet its Development Objectives?

Increased sustainable access and affordability of electricity: LESSP was expected to strengthen GOL counterparts through capacity building, by supporting policy reform initiatives and by demonstrating commercially, sustainable energy services delivery mechanisms through implementation of a series of pilot projects in selected urban and rural poor communities. At the time of LESSP's closure these key activities were incomplete.

Improved performance of local governments, civil society and the private sector in monitoring, regulating and managing the use of renewable energy: LESSP was to use a combination of technical assistance, capacity building and the pilot projects to achieve this objective. At program closure a small number of technocrats at RREA (the RREA Executive Director and five director-level staff members) had received capacity building. As the RREA had (and continues to have) very limited staffing it was a challenge to provide training without significantly impacting the day-to-day activities of the organization. RREA has not added to its staffing, and consequently, international donors are funding long term staff in critical positions in the organization at the time of the evaluation. GOL officials participated in an international policy and regulation study tour organized by LESSP. Although the participants were exposed to regulation of the energy sector in other countries, the Energy Regulatory Board (ERB) does not legally exist in Liberia. Capacity building initiatives were adversely impacted by the Ebola crisis, and activities planned for 2014 were canceled.

An increase in the percentage of households and businesses utilizing clean energy, and a corresponding increase in economic activity: There was no increase in the percentage of households and business utilizing clean energy.

Policy changes that improve the investment climate for the energy sector: The Team could not find evidence that LESSP's assistance in the policy reform arena resulted in improvements to the investment climate.

1.4.2 What were the LESSP's Accomplishments, Strengths and Weaknesses?

The Team evaluated LESSP's performance against ten program elements.

Accomplishments: Accomplishments include legally establishing the three rural cooperatives and providing introductory training to their staff in financial and business management, and providing some capacity building to the six senior management staff at RREA, that enhanced the skills of the respective individuals to carry out their duties.

Strengths: The original development objectives were reasonable, sound and valid.

Weaknesses: Key weaknesses include:

- LESSP was not aligned and linked to the targets set in the 2009 National Energy Policy, and there was a lack of communication with the GOL on how LESSP supported the country's goals and objectives. Similarly, performance monitoring plans do not reflect close alignment with national objectives for increasing access to electricity through use of renewable energy.
- The scope of work was highly structured and relatively inflexible – the renewable energy source is identified and county-wide locations were specified in the work statement.
- Key stakeholders felt little "ownership" in LESSP's activities.
- There is limited evidence of stakeholder input into the development of LESSP work plans, associated implementation plans, and deliverables.
- Implementation proved to be challenging. Factors under LESSP's direct control contributing to that include staffing, program direction and priority changes, resource allocations and integration with counterparts to foster local "ownership" and collaboration. There were high rates of staff turnover in key positions. The logistics challenges of providing services to remote in-country locations also contributed to implementation challenges.
- Monitoring and evaluation (M&E) of LESSP was insufficient. The 2011 OIG audit of USAID/Liberia's energy portfolio from 2006-2009 cited concern relating to activity M&E and validation of information. In response, the USAID/Liberia management put in place new Mission Orders in September 2011 specifically to improve these issues.

1.4.3 Implementation and Sustainability

The Team evaluated implementation of LESSP's three objectives and the timeline for reaching sustainability.

Strengthen the GOL's capacity to implement plans for rural electrification as expressed in the National Energy Sector Policy: There is some evidence of LESSP increasing the GOLs' capacity, through short-term training of six senior managers in RREA. However, the increased capacity is limited to a small number of counterparts in RREA.

Establish commercially viable pilot plants that provide renewable energy services to population centers in Bong, Lofa and Nimba counties: LESSP was unable to establish viable pilots. Four rural cooperatives were established with LESSP's assistance, with three of the four cooperatives being selected for pilot projects, Gbarnway, Sorlumba and Kwendin. The fourth, Mein River was dropped as a pilot after due diligence and the environmental approval process.

Collaborate with other international donors for the expansion of Monrovia's power distribution network: LESSP did attempt to collaborate with other donors on expansion of the Monrovia power distribution system but the collaboration did not provide tangible results. This element of LESSP was dropped.

Timeline for reaching sustainability: There is insufficient evidence for the Team to develop an estimate of a timeline for sustainability.

1.4.4 Risk Assessment Framework (RAF) Results

The RAF revealed the need for:

1. Hiring an on-site owner's engineer and construction plans to minimize potential cost overrun during construction;
2. Re-evaluating the financial analysis to develop a more realistic understanding of cost recovery; and
3. Building the capacity of all three cooperatives (with Gbarnway being the first since its pilot is near completion) to enable them to successfully operate their respective pilots.

The following subsections present the findings for each evaluation question.

1.4.5 Effectiveness of Infrastructure Planning/Construction Oversight Approach

Winrock International's construction oversight and implementation monitoring plan included: a detailed Construction Management Guidelines and Quality Assurance/Quality Control Plan for each pilot project; a construction engineer (CE) to oversee the projects; a community organizer, a project engineer (PE), and a QA/QC manager reporting to the CE and were all based in Monrovia. An on-site inspector

reported directly to the PE. Tools employed for monitoring included “paperless” daily inspection/construction reports and photographs sent to LESSP’s Database Specialist (DS). The DS compiled the reports and sent them electronically to the COP and Project Construction Manager for quick action as needed. It should be noted that the staffing structure was adequate.

Winrock undertook feasibility studies to determine loads, evaluate design options, and analyze and select technology options to meet the requirements based on appropriate tradeoffs. It also conducted a willingness to pay for electricity to guide its tariff structure. There was no engineering/value analysis done. The financial analyses did employ some sensitivity analyses in the case of Sorlumba, but it was inadequate as there was no sensitivity analysis done on the revenues. No sensitivity analyses were conducted in the case of both Kwendin and Gbarnway.

Due diligence activities also conducted a rapid assessment to identify the potential of, and opportunities for, select renewable energy (RE) resources and technologies, and potential applications to benefit Liberia’s economic and social development. The RE resources and technologies assessed were: solar photovoltaic (PV) and solar thermal, wind energy, and selected biomass resources and technologies, particularly biogas, charcoal, and wood fuel. The assessment determined that solar energy resource and solar PV technology have the greatest near-term potential of any RE resource and technology to provide electricity for high value applications in non-electrified areas of Liberia. The study did not explore hydropower or other biomass energy activities.

At the time of the evaluation the procurement associated with the completion of construction was only finalized at one pilot project site, Gbarnway. The approach for oversight includes having an expatriate who was directly involved in the due diligence and specifications for the Gbarnway solar project, now serving as the Acting COP for the new USAID/Liberia Beyond the Grid Program (implemented by NRECA), providing oversight on a short-term basis. Given her familiarity with the pilot and the advanced stage of completion, this approach is likely to be acceptable. A similar approach is unlikely to be as effective at the other two pilot project sites as construction is more complex, and the renewable energy technologies to be used to produce electricity are not as technologically advanced as the solar-based system. They are more complicated and difficult to operate and maintain and require more trained staff. Compounding the problem are the site locations that are relatively remote from Monrovia.

1.4.6 Effectiveness of Institutional Framework and Capacity Building

There is a need for substantial capacity building for the staff of the three rural cooperatives if they are to manage, operate and maintain the systems for any length of time. With Gbarnway close to completion it will be important for the cooperative to receive such training very soon with a focus on business and commercial issues as well as operation and maintenance of the system. The cooperative staff at Gbarnway

understands the overarching challenges of revenue collection from its members and sustainability. It is planning to cross subsidize the electricity tariff using revenues from the cooperatives' other revenue generating activities including farming. It is also willing to collect goods in lieu of tariffs (barter) from members who have agriculture products which could be sold. The Kwendin and Sorlumba cooperatives have a greater need for training. Both have, at best, a rudimentary understanding of how to run a modern energy service company. Both are a long way from incorporating that understanding into a functioning entity. The delay in completing construction and the end to the Ebola crisis does afford the opportunity to expedite the training/capacity building. The Center for Renewable Energy could play a role as it has the technologies that will be used by the two cooperatives currently operating at the Center and persons trained on operation and maintenance of the equipment.

1.4.7 Overall Project Positioning and Strategy for Phase-out of USAID Assistance

Analyses of the financial models developed by the implementing partner for two of the three pilots show the net present value (NPV), excluding the time value of money, is marginal for Sorlumba and negative for Kwendin. If a discount rate of three percent is used for Sorlumba then the NPV is also negative. There is little or no evidence of the implementing partner proposing measures to mitigate this situation at a national level or with respect to the individual pilot project. There is no evidence the implementing partner developed sensitivity analyses around differing rates of revenue recovery. Also, there is limited evidence the rural cooperatives have fully considered this factor sufficiently with the exception of Gbarnway. There is a collective perception among the rural cooperative stakeholders that the implementing partner made a positive contribution. However, since the completion of the LESSP and USAID/Liberia's field visits in September/October 2014, the stakeholders all perceive USAID/Liberia to be another implementing partner that will complete what Winrock International did not.

A stakeholder-driven strategic plan needs to be developed to achieve LESSP's objectives and allow for the phase-out of USAID assistance. The strategic plan should be developed in collaboration with key counterparts and should: (1) include a link to national targets and policies, (2) leverage existing organizations, practices and complimentary programs, (3) focus efforts rather than spread efforts too thin, and (4) use regular M&E for prompt issue identification and resolution, and ensure clear understanding of roles/responsibilities between all parties. The strategy should take into account the limited local resources, lack of pertinent quality data, and logistical challenges, and should be aligned with national policy and development goals.

1.5 LESSONS LEARNED

Use a strategic management approach rather than activity-focus to achieve development objectives (Dos): The implementation approach to LESSP emphasized "activity" over "strategy". LESSP may well have benefitted from a strategic situational

review during the inception phase to validate key elements of the program as part of developing the first work plan.

Counterpart “ownership” is critical for success: There is little evidence that GOL policy makers felt “ownership” of LESSP activities. LESSP was to be one of the main donor-sponsored actions in the rural renewable energy sector (the rural areas are a prime focus of the 2009 National Energy Policy) and could have guided counterparts at the nascent RREA and cemented their leadership in this area of the energy sector.

Communication with counterparts is essential: There is no evidence of the program establishing formal communication protocols with key GOL counterparts and stakeholders – in particular civil society non-government advocates such as the Liberia Chamber of Commerce, the National Association of Rural Cooperatives, the financial community or the donor community. Given the leadership role LESSP was anticipated to have with establishing new business models to promote and increase access to electricity to rural and urban poor areas, the lack of any formal communications protocols and ongoing dialogue between the program and those key actors was a major impediment to implementation.

Capacity building should be strategic and focused: LESSP was expected to use capacity building as a tool to develop capability among key counterparts, notably within GOL and the rural cooperatives and to facilitate sustainability post program completion. Capacity building initiatives were initiated on many fronts: RREA staff, GOL policy makers, management and technical staff of rural cooperatives, and at institutes of higher learning: the Center for Renewable Energy at BWI, Stella Maris, and the University of Liberia. However, the sustaining outcomes of these efforts are limited. LESSP would have benefited from strategically selecting capacity building areas and counterparts and focusing on capacity building activities that would have contributed to the achievement of development objectives.

1.6 RECOMMENDATIONS

Recommendation 1: Project design should consider the following: Any future program should consider the following factors:

- Take into account the limited local resources, lack of pertinent quality data and logistical challenges as well as lessons learned from prior engagements.
- Be flexible in the design to allow the implementing partner to achieve the objectives the best way possible by employing tools including value engineering/value analysis in the case of engineering/construction projects.
- Be focused (with attendant performance monitoring and evaluation) instead of trying to accomplish too many initiatives at the same time. Project objectives should be in line with national policy and development goals.
- Engage stakeholders early in the planning and development process and seek local champions to take ownership of the project to facilitate sustainability.

Recommendation 2: Reaffirm the validity of development objectives: LESSP's development objectives are not yet achieved. However, they remain valid. When and if the USAID/Liberia decides to provide assistance to the GOL in the energy sector, it should reaffirm the validity of the DOs and if they are different, the DOs should be linked to national goals and objectives to the extent possible to facilitate ownership.

Recommendation 3: Improve and expand stakeholder partnerships: There are existing mechanisms such as the multi-donor infrastructure committee chaired by the World Bank and National Association of Rural Cooperatives that could have been leveraged more advantageously to improve stakeholder partnerships. Given the capacity constraints in the country, any new initiative should build on and complement successful existing mechanisms.

Recommendation 4: Make capacity building performance-based and strengthen M&E of training activities: Capacity building should be strategic with clearly defined goals. It should be tied to performance objectives for the individuals participating.

Recommendation 5: Align new initiatives with national goals and objectives: The outcomes of any new initiative need to be clearly aligned with national goals and objectives to facilitate local ownership.

Recommendation 6: Select contractors for the completion of construction at Kwendin and Sorlumba pilot projects: At the time of writing of this report procurement actions were in progress, and contracts were not in place for completing the construction.

Recommendation 7: Develop construction oversight and implementation monitoring plans for the Kwendin and Sorlumba pilot projects: Given the challenges with the biomass technology for both pilot sites and how critical the project timing is, USAID should ensure the construction and monitoring plans are adequate and sufficient to ensure a quality installation.

Recommendation 8: Control construction costs: If future programs include a construction element, it is important to ensure the implementing partner explores ways to limit construction cost overruns and options for timely completion. VE/VA is employed prior to and during construction. Another option is to use performance based contracting with provisions for incentives including options to fast track construction.

Recommendation 9: Expedite trials at BWI to find biomass technology solutions: The selected biomass technology for both Kwendin and Sorlumba is relatively unproven in Liberia. The Center for Renewable Energy (CRE) at BWI has been running tests to find solutions to the challenges of using crude palm oil and other biomass which adversely affect the gasifiers. If the current contract between the Center and APL is not renewed, the on-going trials may end at an inopportune time.

Recommendation 10: Re-evaluate the financial analysis including identifying options through sensitivity analysis. The financial analyses used to determine the viability of the pilots should have considered sensitivity analyses.

Recommendation 11: Provide capacity building in all facets of managing the pilots. The capacity needs of the cooperatives are quite tremendous and it will require consistent efforts including hands-on and on the-job-training to bring them to a level where they can manage the pilots.

Recommendation 12: Develop an energy knowledge database and knowledge-sharing platform: Information gaps exist as a consequence of the civil strife, e.g., hydrological, metrological, and solar data. All have an impact on the strategy for expanding the use of renewables. USAID should explore developing a knowledge-sharing platform with an attendant database.

2 INTRODUCTION

2.1 LIBERIA'S ENERGY SECTOR

Liberia's energy sector has one of the lowest rates of access to public electricity in the world (around four percent of the population).¹ National policies have ambitious and lofty goals with respect to increasing access to electricity throughout the country, as articulated in the 2009 National Energy Policy.² However, after the past ten years the sector remains in a state of flux and reform efforts are on-going albeit at a very slow pace. This uncertainty in the energy sector institutional framework increases risk and adversely impacts investment.

Tariffs for publically provided electricity are among some of the highest in the world but the public utility, Liberia Energy Corporation (LEC), is unable to perform in a financially sustainable manner. The LEC has been unable to fully restore access to pre-conflict levels even though the country has been politically stable for several years. Additionally, LEC is a monopoly for generation, transmission, and distribution of power in the country with no third-party access allowed.

Consumers, including private industrialists, commercial business operators and residential customers, have limited options: to go without electricity or to self-generate at prohibitively high costs. This in turn adversely impacts competitiveness and constrains the country's economic growth and provision of social services.

Reforms are long overdue in the sector but the political will to implement meaningful reforms is lacking. The existing governance framework does not stimulate private investment in the electricity sector.

Exacerbating the problems is an enduring lack of human capacity with much needed competencies. This pervades throughout key public sector ministries and agencies as well as in the private sector. There is no critical mass of personnel with appropriate technical skills that can deliver electricity in a sustaining manner to all Liberian citizens in accordance with the targets established by the policy makers. Ultimately, limited capacity remains a major impediment despite many years of donor-supported capacity building initiatives that have included provision of advisors as well as attempts to develop local capabilities.

¹ See the executive summary of "Options for the Development of Liberia's Energy Sector". AFTEG Energy Sector Policy Notes Series, Africa Energy Unit (AFTEG), Sustainable Development Department. Africa Region. The World Bank. October 2011.

² See National Energy Policy 2009 for targets and goals for increasing access. It should be noted this evaluation did not analyze the validity of the stated targets.

2.2 DONOR AND OTHER SUPPORT INITIATIVES

With the cessation of the country's internal conflicts, institutional financing and donor assistance initiatives focused on alleviating the chronic power situation inside Monrovia (2003 – 2009). Following initial successes in helping reestablish power, donors have continued to provide support to the energy sector, notably African Development Bank, Norwegian Agency for Development Cooperation (NORAD), the World Bank, Japan International Cooperation Agency (JICA), and USAID.

Although much of the support targeted energy infrastructure investments³, there have been activities to support market liberalization and to build the capacity of public sector Ministries, agencies and the energy service company. They include the donor funded Management Contract for LEC implemented by Manitoba Hydro, and the direct funding of key staff at the Ministry of Lands, Mines and Energy (MLME) and other government energy agencies, including Liberia's Rural and Renewable Energy Agency (RREA). Private investment efforts have been stymied, most notably a \$111 million loan from Overseas Private Investment Corporation (OPIC) to support Buchanan Renewables (Monrovia) Power, Inc. to develop and construct a 35 MW rubber wood fired biomass electricity generation facility.⁴

USAID was an important development partner to the Government of Liberia (GOL) in the energy sector from 2006 until 2009 providing approximately \$19 million in development assistance through the Emergency Power Program (EPP), and its complementary activity, the Liberia Energy Assistance Program.⁵ The outcomes of the programs were reviewed in 2011 by the Office of Inspector General.⁶

2.3 LIBERIA ENERGY SUPPORT PROGRAM (LESSP)

USAID/Liberia designed the Liberia Energy Sector Support Program (LESSP) to increase access to affordable renewable energy services in geographically focused rural and urban areas in order to foster economic, political and social development. The

³ For example Mount Coffee hydropower plant; Cote D'Ivoire-Liberia-Guinea cross-border transmission line; distribution lines and diesel generation power plants.

⁴ The failure of the project is well documented. See Annex C for listing of online references.

⁵ The EPP was designed to assist in re-commercializing the Liberia Electricity Corporation (LEC) by delivering systems support and human capacity in key business functions. It ran from July 2006 through November 2009, with total funding of \$8.1 million. The Liberia Energy Assistance Program (LEAP) was designed to increase access to affordable energy supplies to foster economic, social, and political development. It ran from October 2006 through February 2009, with total funding of \$10.9 million.

⁶ See Office of Inspector General "Audit of USAID/Liberia's Energy Program Activities" Audit Report no. 7-669-11-007-P June 6, 2011.

solicitation for an implementing partner for LESSP was issued on July 31, 2009. After issue of an amendment in August 2009, responses to the solicitation were required by September 29, 2009. After completing the procurement process, the USAID/Liberia awarded an \$18.9 million, four-year contract to Winrock International for LESSP on October 4, 2010, with an end date set for October 3, 2014.

Through the implementation of LESSP, the energy interventions of USAID/Liberia were designed to achieve the following development objectives:

- (i) Increased, sustainable access and affordability of electricity within selected urban and rural poor communities;
- (ii) Improved performance of local governments, civil society and the private sector in monitoring, regulating and managing the use of renewable energy;
- (iii) An increase in the percentage of households and businesses utilizing clean energy, and a corresponding increase in economic activity; and
- (iv) Policy changes that improve the investment climate for the energy sector.

In September 2013, the Supervisory Contracting Officer and the Agency Competition Advocate approved a modification to the original contract which resulted in a net increase of \$2.9 million, for a new contract amount of \$21.8 million. The modified contract included new pilot projects as deliverables. However, the end date remained unchanged. Two of the original pilot projects were removed from the contract, and replaced with new projects in different locations, and with a completely different scope of work and technical specifications. The amendment also stated that one of the key components of LESSP – the small hydroelectric system on the Mein River – was to be completed no later than four years from the start date of the contract. At the time there were approximately 14 months remaining in the contract.

Between early May and late August 2014, the effects of the Ebola epidemic began to impact project performance. Winrock International requested a no-cost extension through March 31, 2015. However, given the uncertainties with direct relationship on project performance, contract compliance, and expected construction end dates, USAID decided not to grant an extension to the contract, and let the project end October 3, 2014 as originally scheduled. The construction of the pilots at Sorlumba, Kwendin, and Gbarnway were incomplete at project close out. (For additional background information on LESSP see Annex A: USAID/Liberia LESSP Evaluation Scope of Work.)

2.4 LESSP EVALUATION

USAID requested International Development Group LLC (IDG) under the Learning Evaluation and Analysis Project (LEAP-II) contract AID-OAA-I-12-00042/AID-OAA-TO-14-

00046, to conduct a performance evaluation of LESSP.⁷ The evaluation was initiated the week of March 23, 2015 and included U.S.-based work and in-country activities. Work undertaken included a comprehensive desk review of relevant documents and reports, and key informant interviews (KIIs) of key actors and stakeholders both in the U.S. and in Liberia (the field work took place April 17 – May 12, 2015). In-country interviews were supplemented by visits to the three LESSP pilot sites located in Gbarnway (solar in Lofa County), Sorlumba (biomass in Lofa County) and Kwendin (biomass in Nimba County) as well as two visits to the Booker Washington Institute (BWI) to assess the situation on-the-ground with respect to sustainability of activities.

On May 8, 2015, the Team provided USAID-Liberia a presentation outlining the findings to date prior to departing Liberia. This pre-departure debrief afforded USAID/Liberia the opportunity to understand what the Team has learned from the key informant interviews and the field visits to the pilot projects. The Team returned to the U.S. mid-May 2015 for subsequent data synthesis and analyses, as well as a limited number of follow-up conference calls and communications with the implementing partner in the U.S.

This report includes the following sections:

- Executive Summary
- Introduction
- Purpose, Objective and Questions, Background
- Methodology and Conceptual Approach
- Limitations
- Findings and Conclusions
- Recommendations

Supporting information is provided in a series of annexes following the main body of the report⁸.

⁷ The evaluation team included Elly Preotle, Chief of Party of LEAP-II, Richard P. Smith, Team Leader, Sam Koduah, Utility Services Delivery specialist, and Sheku Daboh, Logistics Consultant (the Team).

⁸ This evaluation report is one of a number of deliverables required in the statement of work. Other deliverables included a work plan, a document and information review summary, and presentations to the USAID/Mission to Liberia senior management. For more information see the following: (i) Learning, Evaluation & Analysis Project-II (LEAP-II), contract number: AID-OAA-I-12-00042/AID-OAA-TO-14-00046, Liberia Energy Sector Support Program, Performance Evaluation – Work Plan; (ii) Learning, Evaluation & Analysis Project- II (LEAP-II), contract number: AID-OAA-I-12-00042/AID-OAA-TO-14-00046, Liberia Energy Sector Support Program, Performance Evaluation – Document and Information Review Summary; and (iii) Learning, Evaluation & Analysis Project- II (LEAP-II), contract number: AID-OAA-I-12-00042/AID-OAA-TO-14-00046, Liberia Energy Sector Support Program, Performance Evaluation – Briefings to USAID/Liberia, April 24, 2015 and May 8, 2015.

3 PURPOSE, OBJECTIVES AND EVALUATION QUESTIONS

3.1 PURPOSE AND OBJECTIVES

The primary purpose is to determine if the assistance provided met stated development objectives and to understand the lessons learned from implementation of the LESSP. USAID/Liberia seeks a clear picture of program accomplishments and weaknesses, since inception, including management issues that can help inform and recommend changes in implementation approach to assure successful completion of the program objectives and the focus for future energy programming initiatives.

3.2 EVALUATION QUESTIONS

The following three questions⁹ were used to frame the performance evaluation:

- 1. Effectiveness of infrastructure planning/construction oversight approach.** To what extent was appropriate due diligence done by the contractor in the design phase, and how well was the project positioned (in terms of management/staffing structure) to support the construction phase?
- 2. Effectiveness of institutional framework and capacity building.** How effective was LESSP's institutional and capacity-building approach in achieving the stated objectives, e.g., ensuring that "improved infrastructure will be handed over to locally-based management technically and financially" to sustain energy supply service improvements in rural Liberia?
- 3. Overall project positioning and strategy for phase-out of USAID assistance.** USAID needs to draw lessons learned for future projects. Some uncertainty may remain around local resources, skills, access to capital and other key elements that are crucial for future project design and implementation.

For each of the above, USAID/Liberia requested the Team take certain considerations into account. Table 1 presents the considerations associated with each specific evaluation question.

⁹ The evaluation team was asked to consider a series of underlying considerations for each of the three questions. The specific considerations are shown in Table 1 and addressed in Section 5 of this report.

Table 1: Considerations for Evaluation Questions

Considerations for Evaluation Questions		
Question 1	Question 2	Question 3
How well did LESSP conduct due diligence in analyzing and understanding sustainability issues facing the technical assistance to MLME and RREA related to the National Energy Policy and the Energy Law?	Are there important lessons learned from the past decade of institutional reforms at Liberia Electricity Corporation and other electricity service expansion efforts in Liberia that should inform broader USAID engagement in energy interventions?	Given the findings about local resources and skills, how should USAID planning proceed for similar future projects? What is the recommended approach for a follow-on project?
What was the extent of and appropriateness of the due diligence done by the implementing partner contractor in the design phase; and how well the project positioned (in terms of management/staffing structure) to support the construction phase?	Were LESSP's interventions to build the capacity of government institutions at the central level relevant and strategic to support project objectives?	Is there anything USAID can do differently in the interim to increase the likelihood of the GOL meeting objectives around technical, institutional, and operational capacity and cost recovery, or create better incentives for this to occur, e.g., what could we create in terms of benchmarks/establishing a timeline for gradual phase-out for subsidies, and how/in what venue to negotiate this, etc.?
Were the plans for construction oversight and implementation monitoring sufficient to provide USAID with reasonable assurances of quality, success, and value during implementation?	How effective was the interim capacity-building effort proceeding at the Booker Washington Institute in Kakata as testing grounds for the proposed outstation institutional framework?	Did the project sufficiently integrate coordinate with other donors and key stakeholders in Liberia?
Were project resources well-positioned (staffing, resources, staff positions seconded to government agencies, and so on) to provide the requisite construction oversight, and capacity-building support to government agencies, efficiently and effectively?	How effective were the local staff and contractors of LESSP in assessing and/or performing during the capacity-building work?	
	Is more analytical work needed around Liberia and the energy sector, to help the country on the strategic direction of the energy sector?	

4 METHODOLOGY AND CONCEPTUAL APPROACH

The methodology for the performance evaluation of LESSP included a desk review, KKIs, site visits to pilots located in Gbarnway (solar in Lofa County), Surlumba (biomass in Lofa County) and Kwendin (biomass in Nimba County), and two visits to the Booker Washington Institute (BWI) to assess the sustainability of the respective activities. The following sections present the methodology, data collection methods and conceptual approaches to the overall evaluation and each of the three evaluation questions.

4.1 METHODOLOGY

4.1.1 Desk Review

Annex B includes a list of the documents reviewed. Annex C contains a list of related online information reviewed by the Team in the evaluation process. The primary data sources can be categorized as:

- Program design documents including baseline data,
- Contractor program mandate including terms of reference (TOR)/scope of work (SOW)/request of proposal (RFP)/budgets,
- Pilot project due diligence reports,
- Procurement documents and tender packages,
- Pilot project Implementation plans,
- Capacity building needs assessments and training courses,
- Annual program work plans and budgets,
- Program progress reports and PMPs, and
- Other relevant publications on Liberia's energy sector reform initiatives.

4.1.2 Key Informant Interviews

KIIs covered the majority of the key actors and stakeholders active in the energy sector in-country. The Team conducted KIIs with 27 key stakeholder organizations and approximately 60 participants in the US and Liberia. Annex D includes a list of individuals and contacts for the KIIs conducted. Organizations interviewed included:

- **USG organizations:** USAID Mission to Liberia, U.S. Trade and Development Agency (USTDA), and Millennium Challenge Corporation (MCC)
- **Host Country and Regional Organizations:** MLME, RREA, and LEC.
- **Other International Organizations:** African Development Bank, World Bank, UNIDO, and NORAD's MC Manitoba Hydro International.
- **Implementing Partners:** Winrock International, Tetrattech, NRECA, and EG&S.
- **Other Key Actors:** Gbarnway Woeyah Rural Cooperative (GWRC) in Lofa County, Surlumba Community Electric Cooperative Society in Lofa County, Kwendin (biomass in Nimba County) Liberia Chamber of Commerce, BWI, USAID's IBEX project: Mein River Power Company, USADF, and Stella Maris Polytechnic.

4.2 CONCEPTUAL APPROACH

Prior to conducting KIIs, the Team completed a situational analysis based on an extensive literature review and online research, to ensure a thorough understanding of the context in which LESSP was shaped, designed and implemented as well as the external factors outside of the program's control that impacted implementation in addition to those factors directly under the control of the program. The situational analysis included a review of prior initiatives in the energy sector by the development community as well as those targeted at improving the prevailing institutional environment. The situational analysis was then used to frame the evaluation. This subsection presents the overall conceptual approach to the evaluation followed by the conceptual approach to each evaluation question.

4.2.1 Overall Conceptual Approach

As a first step, the Team used a Logical Framework Analysis Matrix (LFM) to ensure each of the three evaluation questions was appropriately addressed. The LFM was developed based on analyses (Logical Framework Analyses), encompassing stakeholder analysis, problem analysis, objective setting, and strategy selection. The LFM was supplemented with a strengths, weaknesses, opportunities, and threats (SWOT) analysis to assess the program positioning relative to overall development needs in the energy sector. The LFM was then used to shape structured questions for key informant interviews with the various key actors and stakeholders, directly or indirectly associated with LESSP.

As the evaluation progressed the methodology evolved. For example, the Team intended to use a predominantly quantitative-oriented survey. After field-based beta-testing with a limited sample of key actors, the survey for the formal in-country interviews was refined. The Team used a semi-structured interview style and communicated in a consistent manner to source pertinent information on program accomplishments, strengths and weaknesses and to identify lessons learned from LESSP's implementation.

During data synthesis the Team compiled and triangulated information collected to develop findings, draw conclusions, and provide recommendations. Finally, the Team used a Risk Assessment Framework (RAF) to evaluate potential risks and impacts that may lead to failure of the various program elements. The Team selected the RAF to analyze the potential risks and impacts of some recommendations under the three broad evaluation questions, as follows:

1. Effectiveness of infrastructure planning/construction oversight approach
2. Effectiveness of institutional framework and capacity building
3. Overall project positioning and strategy for phase-out of USAID assistance

The primary purpose of the risk assessment is to evaluate the consequences if an investment decision or action fails. Decision makers typically want to avoid new investments or projects when the threats are catastrophic or when they are deemed not cost effective. The goal is to analyze the risks and rewards of a decision using data. Risk assessment reduces the need for intuitions and instincts. The RAF is a strategy for prioritizing and sharing information about the risks to infrastructure investment. A good RAF organizes and presents information in a way that both technical and non-technical personnel can understand. Risk assessment is neither a certification nor a seal of approval. It is a measurement of the risks presented by a particular implementing mechanism deployed to achieve a given development objective relative to the delivery approach to be used. Identifying the risk is only the first step. It is imperative to have concrete actions to mitigate any such identified risk.

The risk level is determined by the impact (severity) and probability of occurrence. There are four impact levels: negligible, marginal, serious and catastrophic. On probability, there are also four levels namely remote, occasional, probable, and frequent. According to the USAID Public Financial Management Risk Assessment Framework (PFMRAF), “a risk classification of Critical requires stringent mitigating measures only if there is a high probability of success.” Otherwise, USAID should terminate exposure by delivering the assistance through other means.

The Team assessed and assigned a classification to eight focus areas as follows:

1. Selection of contractors for Kwendin and Sorlumba
2. Construction cost overrun
3. Technology selection
4. Capacity building at Gbarnway
5. Capacity building at Sorlumba; lack or preparedness and limited capacity
6. Capacity building at Kwendin; lack or preparedness and limited capacity
7. Capacity building at GOL counterpart organizations RREA and MLME
8. Cost Recovery

Please see Section 5 Findings and Conclusions for the results of the RAF.

4.3 CONCEPTUAL APPROACH – EVALUATION QUESTION 1: EFFECTIVENESS OF INFRASTRUCTURE PLANNING / CONSTRUCTION OVERSIGHT APPROACH

Prior to selecting pilot projects it is customary to carry out due diligence to ensure they will result in outcomes consistent with the overall goals and objectives of the program under which they will be implemented. At a minimum, the due diligence should address the following:

- Pilot is consistent with program goals and objectives;
- Pilot is consistent with prevailing institutional framework;
- Associated risks are identified and mitigation options considered;

- Sustainability and replication;
- Key actor and stakeholder commitment;
- Technological factors including technology selection;
- Implementation approach and schedule;
- Procurement plan;
- Resource requirements including: labor/equipment/training; and
- Capacity building.

The Team reviewed the due diligence process for selection of the pilots to determine the extent the above were considered. The analysis included reviewing due diligence reports, determining inputs of key actors involved, including selection, screening criteria, review, commitment and approval, and assessing tender packages to ensure their completeness. The Team sought to determine the level of quality control and extent to which stakeholder and counterpart feedback was incorporated. The Team was guided by industry standard practices to determine the efficacy of the process allowing them to identify lessons that can better inform new and future programs.

The Team used the feedback from the KIIs and data information review and focused on: (1) methodology employed throughout the due diligence, selection, pilot project planning and design process; (2) adequacy and consistency of implementation and construction plans; (3) key planning and design criteria in selecting the pilot projects; (4) synergy with National Energy Policy and Energy Law; (5) assessment of current national and local capacities including private sector and public-private partnership to engineer, procure, construct, operate and sustain the pilots; (6) problems, issues, challenges and opportunities faced; (7) the use of Value Engineering/Value Analysis in facilitating and supporting optimum design vis-à-vis cost and best value for the design options; (8) capacity building needs assessment and capacity building threshold; and (9) resource allocation for construction oversight and capacity building of counterparts.

4.4 CONCEPTUAL APPROACH – EVALUATION QUESTION 2: EFFECTIVENESS OF INSTITUTIONAL FRAMEWORK AND CAPACITY BUILDING

An appropriate institutional framework provides well-defined governance that includes policies, laws, and regulations, that are promulgated and applied in a clear and transparent fashion, and consists of organizational structures and operational plans that are managed and operated by well-trained capable staff with the necessary competency to carry out their duties in a fair and equitable manner. LESSP was meant to deliver the following development objectives with respect to the institutional framework:

- Increased, sustainable access and affordability of electricity within selected urban and rural poor communities;
- Improved performance of local governments, civil society and the private sector in monitoring, regulating and managing the use of renewable energy;
- An increase in the percentage of households and businesses utilizing

- clean energy, and a corresponding increase in economic activity; and
- Policy changes that improve the investment climate for the energy sector.

To achieve the above objectives, LESSP was expected to carry out activities that (1) strengthened the GOL's capacity; (2) used pilot projects to establish rural-based, commercially-viable, renewable energy services; and (3) built managerial, technical and financial capacity in relevant central and local government and rural institutions to facilitate sustainability.

In evaluating the effectiveness of institutional framework activities the Team assessed the original design, RFP, Winrock International prime contract, associated planned activities, work plan/resource allocation, and the performance indicators associated with documenting progress towards meeting the stated development objectives. The Team also assessed risks, capacity of local teams and their ability to sustain and manage activities in the future with limited or no donor support.

4.5 CONCEPTUAL APPROACH – EVALUATION QUESTION 3: OVERALL PROJECT POSITIONING AND STRATEGY FOR PHASE-OUT OF USAID ASSISTANCE

To assess the effectiveness of LESSP's approach to ensuring sustainability post-program completion, it was important to understand the "roadmap" and activities proposed (and modified with USAID's consent) and used/carried out by the contractor during program implementation¹⁰.

A critical element was to check the program success factors and accomplishments to date to: (1) determine whether performance indicators were met, (2) understand the reasons for not meeting the performance indicators if applicable, and (3) identify what is required to fix any problems. These analyses enabled the Team to determine the viability of subsequent actions that may include follow-on project activities, expanded operations, scope changes, etc.

The review process was linked with feedback from the KIIs focused on: (1) determining the impacts from the policy reform agenda of the last decade; (2) adequacy and consistency of application of policies and regulations; (3) assessment of current national and local capacities including private sector and public-private partnership to deliver a sustainable commercially viable functioning sector; (4) problems, issues, challenges and opportunities faced; (5) capacity building needs assessment and capacity building threshold; and (6) extent of integration and collaboration.

¹⁰ The "road-map" is usually defined within the start-up phase of program implementation together with the activities to be undertaken. Both are then linked to a program-specific Performance Monitoring Plan (PMP) and progress monitored and recounted in required program progress reports.

In order to sustain systemic change it is crucial to maintain a close working relationship among all key stakeholders and actors including counterparts, implementing partners, and donors active in the sector¹¹. There needs to be a clear understanding of what programs are expected to accomplish and the respective roles of each individual actor in accomplishing the objectives and goals. As such, it was imperative to assess the level of collaboration and identify what was successful and what did not work for the benefit of future projects.

Finally, after completing data collection, a RAF was developed to assess vulnerabilities associated with the sustainability of LESSP's activities.

¹¹ Key actors for US-funded assistance include the GOL, the LEC, MLME, RREA, USAID, and the implementing partner team.

5 LIMITATIONS

There were several limitations encountered. However, these limitations do not impact the robustness of the performance evaluation provided by the Team. They include the following:

- The time available for a complete situational analysis and field visits was initially limited. Adjustments during the in-country work allowed for visits to the pilot projects sites. These visits enabled a more complete, informed evaluation to be delivered.
- There were a limited number of informants the Team could not interview. However, the interview gaps are not considered to adversely impact the evaluation.
- Throughout LESSP implementation, there was staff turnover including key personnel of the implementing partner and the USAID/Liberia personnel, including COR, and CO. Consequently, it was not possible to interview the staff who helped shape, design and frame the LESSP in its formative years, resulting in the Team having to rely heavily on the program’s documentation records.
- There is little or no documented information from the GOL with respect to their acceptance and/or use of key program deliverables notably, the Energy Law and the ERB Action Plan. As such, the Team relied on KIIs to triangulate perceptions/acceptance. For example, the “current” version of the draft law is understood to be very different from the version developed by the LESSP.

6 FINDINGS AND CONCLUSIONS

This section presents the following: the findings with respect to LESSP’s performance in meeting development objectives along with assessment of the program’s strengths, weaknesses, and accomplishments, and evaluation of the sustainability of the program. These subsections are followed by a summary and discussion of the evidence findings of the Risk Assessment Framework analyses and the lessons learned. The findings with respect to the three evaluation questions are next described. Conclusions and recommendations based on the analyses undertaken as part of the performance evaluation follow.

6.1 FINDINGS

6.1.1 Did LESSP meet its Development Objectives?

LESSP was partially successful in achieving one of its four development objectives. Table 2 summarizes LESSP’s performance. The findings supporting the table are discussed in the following paragraphs.

Table 2: LESSP Performance in Achieving Development Objectives

Development Objective	No	Partially	Yes
Increased, sustainable access and affordability of electricity within selected urban and rural poor communities			
Improved performance of local governments, civil society and the private sector in monitoring, regulating and managing the use of renewable energy			
An increase in the percentage of households and businesses utilizing clean energy, and a corresponding increase in economic activity			
Policy changes that improve the investment climate for the energy sector			

Increased sustainable access and affordability of electricity: LESSP was expected to strengthen GOL counterparts through capacity building, by supporting policy reform initiatives and by demonstrating commercially, sustainable energy services delivery mechanisms through implementation of a series of pilot projects in selected urban and rural poor communities. At the time of LESSP's closure these key activities were incomplete. LESSP strengthened the capabilities of only a small number of counterparts in the RREA. LESSP drafted versions of an Energy Law. However, at the time of writing of this report, none of the LESSP versions of the Law are being endorsed by GOL counterparts charged with supporting promulgation of the Law. LESSP developed an action plan for an Energy Regulatory Board. However, the ERB does not legally exist. The pilot projects at Surlumba, Kwendin and Gbarnway were not finished.

Improved performance of local governments, civil society, and the private sector in monitoring, regulating and managing the use of renewable energy: LESSP was to use a combination of technical assistance, capacity building and the pilot projects to achieve this objective. As noted above, at program closure a very limited number of technocrats at RREA (the RREA Executive Director and five director-level staff members) had received some limited capacity building. In Year One, training courses were conducted for RREA Directors in program and financial management. MLME staff was trained in RETScreen Clean Energy Project Analysis Software. In Year Two, individualized training programs were developed for RREA Directors who attended courses at accredited institutions in Africa and Canada, which select RREA staff also attended. The RREA training was based on a skills assessment of the individuals conducted in the first year of the program. As the RREA had (and continues to have) very limited staffing there was a challenge to provide training without significantly impacting the day-to-day activities of the organization. It should be noted that RREA has not added to its staffing. Consequently international donors are funding long term staff in critical positions in the organization at the time of the evaluation.

GOL officials participated in an international policy and regulation study tour organized by LESSP. Although the participants were exposed to regulation of the energy sector in other countries, the ERB does not legally exist in Liberia. In addition, the Presidential Executive Order used to create RREA in 2010 has lapsed. However, RREA continues to be supported by the major actors in the donor community in Liberia (including the World Bank, NORAD and USAID). The management, financial, and technical training of the rural cooperative personnel has not left them with the capabilities to operate and maintain the proposed technologies or to operate the cooperative in a commercially sustainable manner.

It should be noted that the capacity building initiatives were adversely impacted by the Ebola crisis. Winrock International had planned several capacity building activities in 2014 that were not undertaken due to the prevailing health crisis. However, the Team could not find evidence of the planned evaluations of capacity building undertaken in the early years of the program. In the absence of such evaluations The Team was not

able to determine the effectiveness of capacity building other than the endorsements received from all the direct participants.

An increase in the percentage of households and businesses utilizing clean energy, and a corresponding increase in economic activity: There was no increase in the percentage of households and businesses utilizing clean energy.

Policy changes that improve the investment climate for the energy sector: The Team could not find evidence that LESSP’s assistance in the policy reform arena resulted in improvements to the investment climate. It should be noted that one informant interviewed intimated that the LESSP proposed policy reforms would be expensive to implement. Although this opinion was not substantiated by others, it is indicative that the benefits to the economy from the reforms proposed by the implementing partner were not clearly understood or articulated to the policy makers in a manner that generated the political will to commit to and promulgate necessary reforms in the energy sector.

6.1.2 What were the LESSP’s Accomplishments, Strengths and Weaknesses?

The Team evaluated LESSP’s performance against ten program elements. Table 3 summarizes the findings with respect to accomplishments, strengths and weaknesses. The evidence supporting the findings is discussed in the paragraphs following the Table.

Table 3: LESSP Strengths, Weaknesses and Accomplishments

Program Element	Weakness	Strength
Development Objective(s)		
Program design/Scope of work		
Counterparts		
Stakeholders		
Communications		
Work plans, implementation, deliverables, PMP, M&E		
Linkage to GOL’s targets		
Accomplishments		

Accomplishments: Accomplishments include legally establishing the three rural cooperatives and providing introductory training to their staff in financial and business management, and providing some capacity building to the six senior management staff at RREA, that enhanced the skills of the respective individuals to carry out their duties. It should be noted that the implementing partner spent significantly less than the

planned budget for LESSP activities over the life of the contract (approximately 54 percent of planned budget).¹²

Development Objective(s): The original development objectives were reasonable, sound and valid.

Program Design/Scope of Work: The intent to focus efforts to use renewable energy technologies to increase access to the rural and urban poor are commendable, notably as these unserved populations lack the civil society advocacy channels and ready access to policy makers stakeholders in Monrovia have given the logistics challenges associated with internal travel. However, the scope of work was highly structured and relatively inflexible – the renewable energy source is identified and county-wide locations specified in the work statement. It is recognized other key elements were unknown at the time of contract inception, including the size, and technological characteristics of proposed pilot projects.

The scope of work also details specific requirements with respect to how the pilots are to be constructed. While prior donor activities highlighted the construction challenges, the ultimate intent of the pilots was to demonstrate sustainable modern energy services delivery mechanisms rather than to engineer technical solutions in remote regions of the country. A less-restrictive work scope that emphasized a strategic approach to achieve the development objectives may have provided the implementing partner sufficient flexibility to conduct more appropriate due diligence.

Stakeholders: Key stakeholders felt little “ownership” in LESSP’s activities. This includes key GOL entities, the donor community other than USAID, civil society, businesses, and service organization representatives other than the rural cooperatives where pilots were expected to be implemented. Several GOL stakeholders indicated that LESSP operated in isolation rather than in a collaborative manner. Positive feedback was given by the Center for Renewable Energy at BWI and the rural cooperatives.

Communications: There was a lack of communication with the GOL on how LESSP supported the country’s goals and objectives with respect to national targets for increased energy access and utilization of renewable energy technology as articulated in the 2009 National Energy Policy.

LESSP raised expectations among certain stakeholders, notably the rural cooperatives, the Center for Renewable Energy at BWI, the University of Liberia and Stella Maris Polytechnic with respect to what could be accomplished and LESSP’s legacy by the end of the program. However, it is not clear these expectations were appropriately

¹² It is outside the scope of the performance evaluation to determine the impact on accomplishments from the reduced spending.

articulated and managed by the implementing partner. The collective perception among stakeholders was that the implementing partner made a positive contribution. However, they all perceive USAID/Liberia to be another implementing partner that will complete what Winrock International did not. It was evident from the KIIs that these stakeholders still have high expectations and are frustrated with the lack of communication on future programming.

Work plans, implementation, deliverables, PMP, M&E: There is limited evidence of stakeholder input into the development of LESSP work plans, associated implementation plans, and deliverables. Similarly, performance monitoring plans do not reflect close alignment with national objectives for increasing access to electricity through use of renewable energy.

Work plans are comprehensive, identifying by activity/task the names of proposed staff to carry out an activity/task, the timeline for implementation, milestones, and deliverables. There are associated risk assessments and proposed mitigation strategies. They do not include an associated level of effort or anticipated budget for completion of the activities.

Implementation proved to be challenging. Factors contributing that were under LESSP's direct control include staffing, program direction and priority changes, resource allocations, and integration with counterparts to foster local "ownership" and collaboration. There were high rates of staff turnover in key positions. Winrock International had three COPs and replaced several key personnel. USAID/Liberia had four Activity Managers/CORs and eight Contracting Officers over the life of the program. The logistics challenges of providing services to remote in-country locations also make this a challenge.

The program priorities changed on a number of occasions, with a major change occurring after a mid-term evaluation in late 2012. This resulted in a contract modification executed that increased the original budget to almost \$22 million (over 15 percent increase) and a revised scope of work in September 2013. USAID/Liberia issued a partial termination notice in May 2014.

Additionally, evidence exists for the following **priority changes** that occurred: Objective 1: skills assessment of human resource in MLME limited to staff of RREA; Objective 2: hydro projects dropped; solar project added; no project implemented in Bong County; Objective 3: proposed change: Manage a fund for the purchase of electricity distribution materials to connect low and middle income customers to Monrovia grid to Strengthen the LEC's human capital by funding a capacity building Training and Development Plan for the LEC, to be implemented by the LEC Management Contractor (never approved by USAID); activities on hold for approximately one year then changed to: add two RE subprojects in lieu of procuring materials and providing them to LEC; changed back to managing a fund and then objective 3 was dropped completely.

The 2011 OIG audit of USAID/Liberia's energy portfolio from 2006-2009 cited concern relating to activity **monitoring** and **evaluation** (M&E) and validation of information. In response, the USAID/Liberia management put in place new Mission Orders in September 2011 specifically to improve these issues. There is evidence showing the USAID has improved its monitoring of LESSP activities, most notably since the beginning of 2014. It should be noted that the USAID/Liberia Mission released new enhanced Mission Orders for program M&E in March 2015, superseding those issued in September 2011.

There is evidence to suggest operationalization of the implementing partner's core team was extended (approximately five months after the contract was executed), that the first year work plan and budget were not fully aligned and that the PMP was not approved until some 10 months after program inception.¹³

The quality of the technical assistance **deliverables** were sound and of acceptable quality. However, evidence of the utility of the deliverables as resources to achieving the development objectives and to promote change in Liberia is lacking.

Linkage to GOL's targets: There is little evidence to demonstrate LESSP was aligned and linked to the targets set in the 2009 National Energy Policy. Closer alignment with national objectives may have engendered greater ownership of LESSP outcomes.

6.2 IMPLEMENTATION AND SUSTAINABILITY

The Team was requested to evaluate the implementation of LESSP objectives and the timeline for reaching sustainability. After completing the performance evaluation the Team was unable to accurately determine a timeline for reaching sustainability with the available information. In addition, the performance evaluation found that there were performance issues in two areas: (1) Establishing commercially viable pilot plants that provide renewable energy services to population centers in Bong, Lofa and Nimba counties, and (2) collaboration with other international donors for the expansion of Monrovia's power distribution network. There was also a partial issue in one area: strengthening the GOL's capacity to implement plans for rural electrification as expressed in the National Energy Sector Policy. LESSP did not establish any commercially viable pilot projects, collaborate with donors, or contribute to any expansion of the Monrovia power distribution system.

Table 4 summarizes the evidence findings with respect to implementation and long term sustainability. The rationale for the evidence findings are discussed in the following paragraphs.

¹³ See page 3 "USAID'S Liberia Energy Sector Support Program (LESSP) Quarter 4 Progress Report" Contract no. 669-C-0010-00059-00, July 1 - September 30, 2011

Table 4: Implementation and Sustainability

Objective	No	Partially	Yes
Strengthen the GOL's capacity to implement plans for rural electrification as expressed in the National Energy Sector Policy			
Establish commercially viable pilot plants that provide renewable energy services to population centers in Bong, Lofa and Nimba counties			
Collaborate with other international donors for the expansion of Monrovia's power distribution network.			
Timeline for reaching sustainability			

Strengthen the GOL's capacity to implement plans for rural electrification as expressed in the National Energy Sector Policy: There is some evidence of LESSP increasing the GOLs' capacity, through short-term training of six senior managers in RREA. However, the increased capacity is limited to a small number of counterparts in RREA. It should be noted that key GOL counterpart organizations (RREA and MLME) did not add permanent staffing over the program life. Rather, they continued to use donor funding to fill critical staffing gaps. This situation is expected to continue with donors planning to increase their funding of long term staff inside key government agencies (notably RREA) without necessarily complementing the organization with a strategy for long term permanent staffing. The fact that key GOL agencies were and remain understaffed and seem unable to address critical staffing gaps in the short term is a concern with respect to the timeline for reaching sustainability.

Establish commercially viable pilot plants that provide renewable energy services to population centers in Bong, Lofa and Nimba counties: LESSP was unable to establish viable pilots. Four rural cooperatives were established with LESSP's assistance, with three of the four cooperatives being selected for pilot projects, Gbarnway, Sorlumba and Kwendin. The fourth, Mein River was dropped as a pilot after a lengthy due diligence and environmental approval process.¹⁴

¹⁴ The Mein River experience is discussed in detail in the section of this report that covers the findings with respect to evaluation question 1.

Some staff from each of the three rural cooperatives with LESSP-supported pilot projects received some exposure to modern energy services delivery. However, all three of the rural cooperatives lack personnel with sufficient training and skills in all aspects of managing, operating, and providing modern energy services. Without significant additional training, there remain major risks for operation of the systems in the short run let alone having them operate as commercially viable businesses. Additionally, at the time of the in-country element of the performance evaluation, construction is still incomplete at all three pilot sites.¹⁵

USAID/Liberia has put in place a contract for completion of construction at Gbarway. Most of the renewable energy technology was on-site at the time of the Team's field trip to the pilot project sites. Procurement for completing construction for Sorlumba and Kwendin has not been finalized, and the staff at the cooperatives have yet to see the renewable energy technology that they will use to produce electricity.

Collaborate with other international donors for the expansion of Monrovia's power distribution network: Evidence shows LESSP did attempt to collaborate with other donors on expansion of the Monrovia power distribution system, but the collaboration did not provide any tangible results. Ultimately, this element of LESSP was dropped.

Timeline for reaching sustainability: Based on the information available to the Team collected through data review and KIIs there is insufficient evidence to project a timeline for sustainability. The following information was not available to the Team: the schedule for USAID/Liberia completing its procurement actions with construction contractors and updated construction schedules, and the mechanism for providing essential capacity building and training of the staff of the three cooperatives and their respective abilities to develop meaningful business plans that accurately consider all aspects of providing modern energy services. This would include but is not necessarily limited to start-up capital and financing of day-to-day operations and maintenance, long term supply agreements for the renewable energy resources, maintenance contracts, employee staffing and compensation plans, customer agreements for power purchase and revenue collection systems. It should be noted that the financial models used by Winrock International in assessing the viability of the pilot projects do not include any sensitivity analyses. Evidence from KIIs with the rural cooperatives indicates the cooperatives are not fully familiar with key concepts of business planning and do not have or are not capable of using the models to develop their own independent operating plans.

¹⁵ In May 2014, the USAID/Liberia made a management decision not to extend the Winrock International contract for LESSP to complete construction and additional capacity building.

6.3 RISK ASSESSMENT FRAMEWORK – PILOT PROJECTS

The tables below summarize RAF analyses for the three pilots. Tables 5 and 6 present the definitions of impacts and probabilities. The intersection of the impact and probability of occurrence levels determines the risk level which also has four levels namely low, medium, high, and critical. Table 7 shows the risks (in a pictorial manner) from Table 8. The numbers on the RAF Summary Chart (Table 7) correspond to the ID numbers on the RAF Table (Table 8). It should be noted the RAF focuses on moving forward and completion of LESSP pilots.

Table 5: Probability Rating

Probability	Quantitative	Qualitative
Remote	Less than a 0.25 probability.	An adverse event is rare or would only occur in exceptional circumstances. There is little or no experience of a similar failure.
Occasional	Probability lies between 0.26 and 0.50.	An adverse event might occur because the conditions for it exist, but controls exist and are effective.
Probable	Probability lies between 0.51 and 0.75.	An adverse event will likely occur because the controls are inadequate or are applied inconsistently.
Frequent	Probability lies between 0.76 and 0.99.	An adverse event is expected to occur. There is near certainty of occurrence because the controls do not exist or are ineffective.

Table 6: Risk Classification by RAF Criterion

Classification	USAID Stage 2 Risk Mitigation Guidance
Critical	“Critical requires stringent mitigating measures only if these have a high probability of success. Otherwise, we will terminate our exposure by delivering the assistance through other means. In rare cases where an effective transfer of risk mechanism exists and is deemed effective, we will consider transfer of the risk, albeit with a risk assessment of the ability of the transferor to deliver on its obligation.”
High	“High requires serious mitigating measures to treat the risk to avoid possible catastrophic and other major failures.”
Medium	“Medium requires mitigating measures but these may be periodic.”
Low	“Low requires monitoring and audit, but treatment of specific risks may be required if they can lead to Medium risk conditions.”

Table 7: Summary of Risk Assessment Framework Analyses

Impact	<i>Catatastrophic</i>	High	Critical	Critical	Critical
	<i>Serious</i>	High	<div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1.2</div> High	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1.3</div> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">2.2</div> </div> Critical	Critical
	<i>Marginal</i>	Medium	Medium	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1.1</div> <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">2.1</div> </div> High	High
	<i>Neglegible</i>	Low	Low	Medium	Medium
			<i>Remote</i>	<i>Occasional</i>	<i>Probable</i>
Probability					

Table 8: RAF Matrix

Reference Questions	Overarching Questions	Focus Area	ID	Key Observations	Probability of Occurrence	Impact	Risk	Recommended Mitigation Measures
1	Effectiveness of Infrastructure Planning/Construction Oversight Approach	Selection of Contractors for Kwendin and Sorlumba	1.1	There are no construction oversight and implementation monitoring plan to evaluate as USAID is in the process of selecting contractors for Kwendin and Sorlumba	Probable	Marginal	High	USAID must evaluate construction and staffing plan for adequacy. It must also conclude its procurement quickly to keep the projects moving.
		Construction cost overrun	1.2	Lack of qualified and responsive local contractors; and environmental uncertainty and restarting pilot after project was on hold	Occasional	Serious	High	Conduct Value Engineering & Value Analysis (VE/VA) prior to and during construction; Institute Performance based contracting with provisions for incentives; and evaluate and examine project fast tracking.
		Technology Selection	1.3	Biomass technology for Kwendin & Sorlumba not as robust as solar technology for Gbarnway. Technical challenges must be sorted out.	Probable	Serious	Critical	Expedite trials at BWI to find biomass technology solutions; USAID must have an owner's engineer on site to ensure robust construction
2	Effectiveness of institutional framework and capacity building	Capacity building at Gbarnway is limited. Gbarnway is fairly prepared to manage pilot.	2.1	The most prepared of the three cooperatives but it still needs some training for its team. Plans to use cross subsidization to manage tariffs	Occasional	Serious	High	Provide capacity building in all facets of managing the pilot in the interim while the pilot construction is now at a standstill.
		Capacity building at Sorlumba. Lack of preparedness and limited capacity	2.2	Capacity building very limited. Sorlumba is not prepared to run facility. The coop needs a tremendous amount of capacity building to enable it to manage the pilot. It is the worst of three in preparedness.	Probable	Serious	Critical	Provide capacity building in all facets of managing the pilot in the interim while the pilot construction is now at a standstill. Emphasis on financial management and basics of revenue and expenses.
		Capacity building at Kwendin. Lack or preparedness and limited capacity	2.3	Capacity building very limited. Kwendin is not prepared to run facility. The coop needs a tremendous amount of capacity building to enable it to manage the pilot.	Probable	Serious	Critical	Provide capacity building in all facets of managing the pilot in the interim while the pilot construction is now at a standstill. Emphasis on financial management and basics of revenue and expenses.
		Capacity building at GOL counterpart organizations RREA and MLME	2.4	RREA and MLME did not add permanent staffing over the program life. Their (especially RREA) continued reliance on donor funding to fill critical staffing gaps isn't sustainable. Poses a threat to sustainability.	Probable	Marginal	High	GOL must make resources available for permanent staff to complement what the donors are providing.
3	Overall project positioning and strategy for phase-out of USAID assistance.	Cost Recovery	3.1	Financial analyses conducted with some sensitivity analyses. 100% revenue collection assumption not realistic. Sensitivity must be done on revenues as well.	Probable	Marginal	High	Re-evaluate and simulate the financial analyses under various options and assumptions to identify the range of cost and financial tradeoffs and implications and to determine the cost recovery period.

6.3.1 Risk Assessment Framework Results

The summary of the RAF analyses is based on the evidence gained during the performance evaluation. The Team noted several key observations which can adversely impact the pilots, principally the need for:

1. Hiring an on-site owner's engineer and construction plans to minimize potential cost overrun during construction;¹⁶
2. Re-evaluating the financial analysis to develop a more realistic understanding of cost recovery; and
3. Building the capacity of all three cooperatives (with Gbarnway being the first since its pilot is near completion) to enable them to successfully operate their respective pilots.

Selection of Contractors for Kwendin and Sorlumba: USAID took over the pilots once it terminated the contract with Winrock International. At the time of writing of this report there was no construction oversight and implementation monitoring plan for the Team to analyze.

Construction cost overrun: Construction cost overruns can be attributed to several factors, including but not limited to: (1) Errors in budgeting/estimating a project; (2) mathematical errors-transcribing, pressing wrong keys, omissions and miscalculations; (3) plans and specifications - errors, omissions, vague drawings and scope in the plans and specifications; (4) estimators inexperienced in the field of expertise, estimating programs and unique bid requests by the client; (5) lack of knowledge by the contractor in new locations, and (6) working in a new environment, in this case Liberia with all its socioeconomic and environmental challenges post recovery from the civil war. Consideration to resources (personnel, material and equipment), site conditions, weather, accommodations, and safety requirements are indispensable. Costs required beyond the scope of work are most often attributed to: conditions unknown to the contractor including requests by the client clearly not within the scope of work, and client failure to fulfill commitments according to specifications. Lack of qualified and responsive local contractors and environmental uncertainty vis-à-vis health, transportation infrastructure, etc., have already exacerbated the uncertainty around the cost of construction activities in Liberia.

The application of Value Engineering/Value Analysis (VE/VA) prior to and during construction; a two-stage procurement process; performance based contracting (PBC), with provisions for incentives; and evaluating and examining project fast tracking are

¹⁶ An "Owners Engineer" represents the owner of a project. The work of an "Owners Engineer" is to assure the project owner that engineering, construction aspects of the project are completed to appropriate quality standards.

among the options that, when employed, can minimize the risk of construction cost overruns. The VE/VA in the construction phase is conducted with the goal of eliminating unnecessary costs while maintaining the project's function, quality and owner's vision by providing creative construction solutions such as: employing efficient construction technology, using alternative construction materials, eliminating/substituting more commonly available construction material for hard to find items, etc., all to provide opportunities to eliminate unnecessary costs.

Technology Selection: The selection of biomass technology for both Kwendin and Surlumba is proving to be challenging in that unlike solar technology, which is quite robust, biomass technology has not proven itself quite yet. The Center for Renewable Energy (CRE) at BWI has been running tests to find solutions to the challenges of using crude palm oil and other biomass which adversely affect gasifiers. There must be a way to expedite the trials with the appropriate support. Even if a solution is found, USAID must have an owner's engineer on site to ensure robust construction given the remote pilot locations. The CRE is being supported by a donor and once that support goes away, there is no certainty the center can support itself.

Capacity building at Gbarnway: Of the three pilots, the cooperative at Gbarnway seemed to be the most prepared in terms of understanding the basic economics of a simple utility and how to think of sustainability. The cooperative had thought about cross subsidizing the tariff for energy from its other ventures including farming. It is also willing to accept in-kind payments (e.g., agricultural goods via a barter system) for energy tariff payments. In spite of all that, there is the need for capacity building to ensure that the cooperative can sustainably manage the utility. With Gbarnway pilot close to completion, it is quite critical for the cooperative to receive such training very soon.

Capacity building at Surlumba and Kwendin: Evidence shows both Kwendin and Surlumba need major training in all aspects of operating a utility. They both have very limited understanding of how to run an energy service company. Both cooperatives need tremendous capacity building if there is any chance of operating the pilots successfully once they are installed. Surlumba, for example, didn't understand basic revenue and expense implications. The cost for fuel aside, the cooperative wanted to spend \$2,800 a month for its operating team but with 208 households each paying \$10 per month, even at 100% collection, it will only collect \$2,080 in revenues. Kwendin is nowhere ready to run the plant once it is installed. The cooperative was very emphatic on the need for more training, as one member stated that the LESSP training he had received amounted to having a four-year college course crammed into two weeks.

Capacity building at GOL counterpart organizations RREA and MLME: Both MLME and RREA need capacity building. Donors are funding key permanent staff positions which may not be sustainable once the donor support ends. RREA and MLME did not add permanent staffing over the LESSP program life. Their continued reliance on donor

funding (especially for RREA) to fill critical staffing gaps is not sustainable, posing a threat to sustainability of RREA and its programs. While the GOL is providing staffing resources, it needs to do more for RREA especially.

Cost Recovery: Ensuring that the pilots reach cost recovery is critical for sustainability. In its financial and economic analysis, the implementer employed assumptions to develop costs and revenues. While some sensitivity analysis was completed to test the assumptions, none was done for the revenues. A review of the analysis shows that the net present value (NPV) for Kwendin is negative; summing the cash flows, excluding the time value of money gives a sum of \$249,720 against an investment cost of \$487,300. For Sorlumba, at a discount rate of three percent, the NPV is -\$23,265 and at five percent it is -\$45,519. In all cases though, including Gbarnway, there was an implicit assumption that 100 percent of revenues will be collected, which is not a realistic rate. A sensitivity analysis on revenues should be done to see when cost recovery occurs.

In the following subsections we present the findings the for each evaluation question.

6.4 EFFECTIVENESS OF INFRASTRUCTURE PLANNING/CONSTRUCTION OVERSIGHT APPROACH

At the time of the evaluation USAID/Liberia had not finalized all procurements associated with the completion of the construction at the three pilot project sites.¹⁷ An expatriate member of the LESSP implementing partner who was directly involved in the due diligence and specifications for the Gbarnway solar project is serving as the Acting COP for the new USAID/Liberia “Beyond the Grid” Program, implemented by NRECA. With construction nearing completion and system commissioning expected in June 2015, the intent was to have her provide oversight on a part-time basis to ensure construction is appropriately completed. Given her familiarity with the pilot and the advanced stage of completion, this approach is likely to be acceptable.

A similar approach is unlikely to be as effective at the other two pilot project sites. Construction at the other pilots is more complex. The renewable energy technologies to be used to produce electricity are not as technologically advanced as the solar-based system. They are more complicated and difficult to operate and maintain and require more trained staff. Compounding the problem are the site locations that are relatively remote from Monrovia. The most practical solution would be to have full-time onsite construction oversight by appropriately qualified staff. The staff should be independent of the construction contractor serving as “owner engineers/representatives”.

¹⁷ Section C 2.2 Requirements for all Construction Activities of the original LESSP contract provides a comprehensive approach to ensuring appropriate construction oversight.

The associated technologies were installed and are currently being used by the Center for Renewable Energy at BWI. Staff there have received training from the equipment supplier on operations and maintenance. Potentially, staff at the Center could be contracted to provide the needed oversight. However, it would be imperative to confirm if the staff at the Center has appropriate skills and background in construction oversight in remote locations. Having assumed the responsibility for completing the pilot projects at all three locations, it is incumbent on USAID/Liberia to finalize an appropriate practical and pragmatic approach to this crucial issue. USAID/Liberia may wish to be guided by Section C.2.2 Requirements for All Construction Activities of the USAID/Liberia – Winrock International contract in determining the approach to be undertaken.

The implementing partner did not use industry practice value engineering and value analysis (VA/VE) when estimating the costs for the pilot projects. There is also limited evidence the implementing partner leveraged its team’s collective prior in-country experiences during the due diligence phase.

Consideration: How well did LESSP conduct due diligence in analyzing and understanding sustainability issues facing the technical assistance to MLME and RREA related to the National Energy Policy and the Energy Law?: Due diligence relating to sustainability of technical assistance (TA) to the GOL was limited. The technical assistance delivered included the drafting of an Energy Law, the development of an Action Plan for an Energy Regulatory Board, the operating guidelines for the REFUND, and an RREA skills assessment and Training Plan. There is limited evidence that the version of the law drafted by the implementing partner was supported by strong analytics to enable GOL policy makers to make an informed decision to adopt the draft law as proposed. There was an international study tour to complement the work, but no evidence that the visit facilitated understanding by GOL counterparts of the benefits to the economy of LESSP’s draft law. There is also no evidence that the implementing partner considered what laws/regulations existed within the current legal framework that promoted economic activity and whether they could be applied to facilitate increased investment. In addition, there is no evidence the implementing partner fully understood local options for legal alternatives rather than relying on the passage of an omnibus law.¹⁸ There is also no evidence of a local champion for policy reform consistent with the approach encompassed in the draft Law, as developed by LESSP.

Consideration: What was the extent of and appropriateness of the due diligence done by the implementing partner contractor in the design phase; and how well was the

¹⁸ For example, RREA was established through a Presidential Executive Order. It is not known why this mechanism could not have been used to establish an Energy Regulatory Board or whether the mechanism could have been adopted to allow for third party access. Appropriate due diligence/legal review should be able to determine if alternative approaches could have been used.

project positioned (in terms of management/staffing structure) to support the construction phase?: Winrock undertook feasibility studies to determine loads, evaluate design options, and analyze and select technology options to meet the requirements based on appropriate tradeoffs. It also conducted a willingness to pay for electricity to guide its tariff structure. There was no value engineering/value analysis done. The financial analyses did employ some sensitivity analyses in the case of Sorlumba, but it was inadequate as there was no sensitivity analysis done on the revenues. No sensitivity analyses were done in the case of both Kwendin and Gbarnway. In all three pilots, there was an assumption that collections will be at 100 percent which is unrealistic even with the tariff within the affordability range.

LESSP also conducted a rapid assessment for the USAID Liberia Energy Sector to identify the potential of, and opportunities for, select renewable energy (RE) resources and technologies, and potential applications to benefit Liberia's economic and social development. The RE resources and technologies assessed were: solar photovoltaic (PV) and solar thermal, wind energy and selected biomass resources and technologies, particularly biogas, charcoal, and wood fuel. The assessment determined that solar energy resource and solar PV technology has the greatest near-term potential of any RE resource and technology to provide electricity for high value applications in non-electrified areas of Liberia. The study did not explore hydropower or other biomass energy activities because LESSP was already working in those areas through its pilot projects.

Consideration: Were the plans for construction oversight and implementation monitoring sufficient to provide USAID with reasonable assurances of quality, success, and value during implementation? There is limited evidence to prove the veracity of the proposed Winrock International approach as the construction at all sites did not lead to commissioning and operationalization before the end of the program. As such, the approach is unproven. Winrock International's plan included: a detailed Construction Management Guidelines and Quality Assurance/Quality Control Plan for each pilot project; a construction engineer (CE) to oversee the projects; a community organizer, project engineer (PE) and QA/QC manager reporting to the CE, all based in Monrovia. An on-site inspector reported directly to the PE. Tools employed for monitoring included "paperless" daily inspection/construction reports and photographs sent to LESSP's Database Specialist (DS). The DS compiled the reports and sent them electronically to the Chief of Party and Project Construction Manager for quick action as needed. It should be noted that the staffing structure was adequate.

Having a project engineer on site or visit frequently would have been better given the lack of adequate communication infrastructure which made it difficult to transmit the "paperless" construction reports. USAID/Liberia has not yet selected the contractors for the Sorlumba and Kwendin pilots. Therefore, no construction oversight plans are available to evaluate.

Consideration: Were project resources well-positioned (staffing, resources, staff positions seconded to government agencies, and so on) to provide the requisite construction oversight, and capacity-building support to government agencies, efficiently and effectively? Evidence shows that over the life of the program the implementing partner delivered over 85 percent of their level of effort in-country. The implementing partner allocated 18 percent of its level of effort to policy reform (objective 1); two percent to expanding the Monrovia distribution network (objective 3 of the contract), and the remainder to objective 2. The breakdown shows about 21 percent was allocated to due diligence and capacity building associated with increasing renewable energy access in rural areas, and over 57 percent to the construction of pilot projects. Approximately two percent was used to facilitate grants associated with objective 2.

A relatively high in-country LOE is usually a positive sign. There is no reason to believe this is not the case with LESSP. However, LOE alone is not necessarily an indicator of positive outcomes. Nor is the delivery of quality assistance. Sufficient resources and quality assistance have to be channeled and delivered strategically to appropriate counterparts, to complement and leverage other related activities to achieve positive outcomes. LESSP was not able to deliver the resources and quality assistance it produced through a strategically important delivery channel.

It should also be noted that at USAID/Liberia's request Winrock International's spending on the LESSP amounted to approximately 54 percent of the overall budget for the program. This is a major resource disparity between what was expected to be needed versus what was actually delivered. Such a budget shortfall surely impacted what the LESSP accomplished.

6.5 EFFECTIVENESS OF INSTITUTIONAL FRAMEWORK AND CAPACITY BUILDING

The evaluation provided sufficient evidence of the need for major capacity building efforts for the staff of the three rural cooperatives if they are to manage, operate and maintain the systems for any length of time. With Gbarnway close to completion it will be important for the cooperative to receive such training very soon with a focus on business and commercial issues as well as operation and maintenance of the system.

The cooperative staff at Gbarnway understands the overarching challenges of revenue collection from its members and sustainability. It is planning to cross subsidize the electricity tariff using revenues from the cooperative's other revenue generating activities including farming. It is also willing to collect goods in lieu of tariffs (barter) from members who have agriculture products which could be sold.

The Kwendin and Sorlumba cooperatives need training on all aspects. Both have, at best, a rudimentary understanding of how to run a modern energy service company. Both are a long way from applying that understanding to a functioning entity. The

Kwendin cooperative was very emphatic on the need for more training as one member stated that the LESSP training he had received amounted to having a four-year college course crammed into two weeks. The cooperative at Sorlumba did not understand basic revenue and expense implications. The cost for fuel aside, the cooperative wanted to spend \$2,800 a month for its operating team but with 208 households each paying \$10 per month, even at 100 percent collection, it will only collect \$2,080 in revenues.

The delay in completing construction and the end to the Ebola crisis does afford the opportunity to expedite the training/capacity building. The Center for Renewable Energy could play a role as it has the technologies that will be used by the two cooperatives currently operating at the Center, and persons trained on operation and maintenance of the equipment. However, it does not have formal training curricula available. Also, the Center is not necessarily the appropriate vehicle to conduct the business and commercial training. It was evident that each cooperative recognized the approach used by LESSP to impart knowledge was high quality but was compressed, which negatively impacted participant knowledge retention.

Consideration: Are there important lessons learned from the past decade of institutional reforms at Liberia Electricity Corporation (LEC) and other electricity service expansion efforts in Liberia that should inform broader USAID engagement in energy interventions? The reform efforts over the last ten years at LEC have not yielded substantial results. LEC has not delivered any major increase in access to electricity. LEC also is still not commercially viable or attractive to outside investors. The reform that centered round bringing in outside private sector expertise to manage operations has resulted in some limited improved financial viability, but the organizational development of LEC has been limited. The Manitoba Hydro International (MHI) five-year management contract is set to expire in June 2015. They have increased customer connections; the number of LEC customer connections went from 2,500 in 2010 to 29,000 in 2014. One of the performance incentives for MHI was tied to the number of connections rather than increased revenues from new connections. The majority of these new customers are those who are least able to afford the tariff. Hence the new customers do not necessarily bring any significant financial relief to LEC. Simply increasing the number of connections does not necessarily optimize revenues if the customers connected do not have the resources to pay.

In addition, the cost of hiring the Management Contractor was provided exclusively through donor assistance, and there was only a limited exploration of issues of an exit strategy and sustainability.

Fundamentally, the prime lessons to be learned are:

- LEC will not be able to spearhead a major increase in access to modern energy services throughout the country and without substantive technical support would struggle to sustain and expand service in the Monrovia area.

- LEC will not be financially viable for several years without continued support from institutional financiers and donors.
- LEC's monopoly situation will continue to serve as a barrier to increasing access outside of Monrovia.

A similar situation is developing with RREA. Donors are increasing the funding of key organizational personnel, in spite of the fact that the Executive Order that established RREA has expired making the entity's legality questionable.

Consideration: Were LESSP's interventions to build the capacity of government institutions at the central level relevant and strategic to support project objectives? LESSP's interventions to build capacity at the central government level were relevant and somewhat strategic. The RREA interventions are relevant and strategic because it is the agency in charge of leading the country's rural electrification initiatives. Capacity building within MLME was extremely limited (participation in a study tour and some limited participation in LESSP training events). It is difficult to determine the efficacy of capacity building activities and whether they proved to be relevant or strategic. Once again there is no evidence of any post training/study tour evaluation to determine whether there was utility from the efforts.

Consideration: How effective was the interim capacity-building effort proceeding at the Booker Washington Institute in Kakata as testing grounds for the proposed outstation institutional framework? The interim capacity building effort at BWI is different to the outstation model of the cooperatives. Although the model is different, the situation at BWI is similar to that of the cooperatives with respect to sustainability. Although at the time of the evaluation the Center was operating, the long term sustainability is "fragile" at best. The Center has no financial support from BWI and currently relies on the funds received from outside to operate the facility. The contract with API of California is expiring in June 2015. There is no power purchase agreement between the Center and BWI. They have not proposed or secured any contracts with the rural cooperatives for training or maintenance of equipment. Their renewable energy curriculum is not fully developed.

Consideration: How effective were the local staff and contractors of LESSP in assessing and/or performing during the capacity-building work? There is some evidence of the effectiveness of the local staff and contractors in the capacity building initiatives. However, as no long-term post training evaluations were scheduled (or planned) by LESSP, it is difficult to gage the efficacy of the capacity building activities. Without exception, training participants provided positive feedback. However, they also all stated that they need additional training to succeed. It should be noted the implementer was unable to fully execute its training plan due to funding availability and/or Ebola.

In addition to having a subcontractor conduct a capacity building assessment of RREA and MLME, the implementer developed a capacity building module, identified the type

of training, and selected participants from the rural cooperatives for specific training including business management and electrical/electronic basics.

Consideration: Is more analytical work needed around Liberia and the energy sector, to help the country on the strategic direction of the energy sector? Evidence shows there has been little attempt to build an energy sector knowledge base within key counterpart organizations. This lack of a database is exacerbated by the fact that there is no formal mechanism between organizations active in the sector to share/exchange information among stakeholders.

Information gaps exist as a consequence of the civil strife – for example hydrological, metrological and solar data – which impact the strategy for expansion of the use of renewables.

There is no evidence to suggest that access to such data would have necessarily altered the outcomes from LESSP as it was originally tasked with delivering two hydropower pilot projects. However, the lack of access to current hydrological data resulted in the need for a relatively major data collection effort by the cooperative that in turn delayed and impacted the timing of the feasibility study. Certainly, the data availability would have accelerated the decision (yes/no) on the feasibility and provide a basis for determining the commercial viability of the hydropower projects.

6.6 OVERALL PROJECT POSITIONING AND STRATEGY FOR PHASE-OUT OF USAID ASSISTANCE

Analyses of the financial models developed by the implementing partner for two of the three pilots show the NPV, excluding the time value of money, is marginal for Sorlumba and negative for Kwendin. If a discount rate of three percent is used for Sorlumba then the NPV is also negative. There is little or no evidence of the implementing partner proposing measures to mitigate this situation at a national level or with respect to the individual pilot project.

LESSP used an unrealistically high rate of revenue collection for each pilot project. There is no evidence the implementing partner developed a sensitivity analysis around differing rates of revenue recovery. Also, there is limited evidence the rural cooperatives have fully considered this factor sufficiently with the exception of Gbarnway. They intend to allow for the use of a barter system by consumers who are unable to pay for the electricity on a cash basis. There is no evidence to suggest the approach will be an efficient way of addressing the situation.

Consideration: Given the findings about local resources and skills, how should USAID planning proceed for similar future projects? What is the recommended approach for a follow-on project? While ultimately it is incumbent on the people of Liberia to determine their national priorities and to accept the responsibility for development of modern energy services within the country, evidence shows there are very limited

capacity and resources within the country to implement a major expansion of access to electricity in the short term without the assistance from the international donor community.¹⁹ Prior capacity building initiatives have not created a critical mass of trained personnel. The prevailing institutional framework has not increased access to electricity. Cost of service for those who have access remain among the highest in the world constraining economic growth and making goods and services more expensive. Despite stymied efforts to liberalize the electricity market over the past several years, this should remain a priority for the international donor community.

One challenge is that the energy issue in Liberia is perceived as fundamentally a technical issue, whereas little resources have been allocated to creating awareness of the benefits of market liberalization and advocacy for reform among society. In addition, there has been little effort made to leverage existing rural trading and commercial models. Outside of Monrovia, communities are obliged to be relatively self-reliant as the central government appears unable to facilitate the resources to deliver infrastructure and quality basic services to the rural poor. Leveraging these existing rural models and building their capabilities at the national level by engaging with the National Association of Rural Cooperatives, can accelerate delivery of modern energy services country-wide. The Association may be as effective a vehicle for communicating and advocating as the RREA and should be a natural ally for expansion of modern energy services.

Simultaneously, it is important to work with those in central government charged with the responsibility for expanding access – RREA and the MLME. Collectively, they should take ownership and responsibility for success. To facilitate information exchange implementing partner staff should be co-located with counterparts. To facilitate ownership, the counterparts should lead the development of a stakeholder-driven strategic plan that: (1) links to national targets and policies; (2) leverages existing organizations, practices and complimentary programs; (3) focuses efforts rather than spreads efforts too thin; and (4) uses regular M&E for prompt issue identification and resolution, and ensures clear understanding of roles/responsibilities between all parties. The plan development can be used to build capacity in counterparts and stakeholders as well as a team-building exercise. While the plan is being developed each stakeholder should nominate and second staff to participate.

The strategy should take into account the limited local resources, lack of pertinent quality data, and logistical challenges, and should be aligned with national policy and development goals. It should also take into account lessons learned from both prior

¹⁹ For a follow-on project, it is important to assess if the GOL has the capacity to meet its obligations. It is also just as important to properly estimate the required resources to achieve success, identify if funding is available, and ensure the commitment of all stakeholders to see the project through to completion. Such an exercise is beyond the scope of this evaluation.

successful and unsuccessful projects. The strategy should be flexible with capacity building and sustainability as major components. The capacity building component should use a train-the-trainer approach and on-the-job training as well. There should also be incentives for accomplishing major tasks and deliverables ahead of time and below budget.

The strategy should only consider using pilot projects on a cost-sharing basis, based on robust business plans and appropriate due diligence. Cost-sharing could also include access to a loan facility.

The supporting program should be flexible to allow the implementing partner to adapt to changing circumstances but be focused enough to accomplish objectives (with attendant performance monitoring and evaluation). It should avoid trying to accomplish too many initiatives at the same time taking into consideration identified constraints.

Consideration: Is there anything USAID can do differently in the interim to increase the likelihood of the GOL meeting objectives around technical, institutional, and operational capacity and cost recovery, or create better incentives for this to occur, e.g. what could we create in terms of benchmarks/ establishing a timeline for gradual phase-out for subsidies, and how/in what venue to negotiate this, etc.? It should be noted Benchmarks/Targets/Timelines are included in the National Energy Policy 2009, and these are assumed to be valid.

In the past USAID has used different options to try to promote systemic change. Those options have included benchmarking aid to specific conditions, linking cash transfer mechanisms to negotiated policy reforms, and supplementing technical assistance with G2G mechanisms for funding of critical energy infrastructure.

It may be worth considering benchmarking funding for energy infrastructure (and supporting assistance) to policy reform. However, USAID/Liberia funding for infrastructure is relatively limited as compared to that of the World Bank and others. Conditionality-linked aid is unlikely to be effective once again given the relatively small amount of funding that is available.

In the interim, USAID can build the capacity of the cooperatives while plans are in process for selecting contractors for the Kwendin and Sorlumba pilots. It can also add incentives to the contract given the delays which have led to some dismay of the citizenry, especially the coop leaders. The incentives could be for early completion. USAID can also explore crashing the schedule (fast tracking) to see the cost-benefit tradeoffs.

There is a collective perception among the rural cooperative stakeholders that the implementing partner made a positive contribution. However, since the completion of the LESSP and USAID/Liberia's field visits in September/October 2014, the stakeholders

all perceive USAID/Liberia to be another implementing partner that will complete what Winrock International did not.

Consideration: Did the project sufficiently integrate/coordinate with other donors and key stakeholders in Liberia? Integration/coordination efforts were mixed. The Team received positive feedback from the BWI/Stella Maris and the cooperatives and negative from MLME and other GOL entities counterparts and some donors.

7 CONCLUSIONS AND LESSONS LEARNED

The section presents conclusions followed by lessons learned.

7.1 CONCLUSIONS

Program Scope: The program scope was too broad with too many initiatives each of which required time and resources. The lack of focus created implementation challenges. Ultimately by overreaching, the program was unable to accomplish anything successfully.

Implementation Approach: The program design was not strategic and stakeholder driven making it difficult for stakeholders to claim ownership to facilitate sustainability. Too many activities that lacked a strategic focus were also hamstrung by staff turnover that impacted continuity.

Relationship Building: The findings suggest relationship building was flawed. At the time of the evaluation there was little evidence that LESSP built any meaningful relationship within the GOL. Most parties outside of GOL had positive interactions with LESSP but had high expectations of what would still be delivered based on their interactions with LESSP. There is limited evidence that LESSP was able to leverage other stakeholder resources, complimentary programs, and other mechanisms.

Capacity Building: Capacity building did not emphasize organizational performance improvement sufficiently and did not have a rigorous evaluation mechanism to determine long term impacts.

Pilots: The pilots initiated by LESSP did not achieve their original purpose – the demonstration of sustainable mechanisms to provide modern energy service in rural poor communities. Rather than being viable demonstrations the goal became to complete installation of the pilots prior to program end. Ultimately this proved too much for the program. Putting pilots in remote areas (in a post-conflict country) where there are technological and logistical challenges requires more resources to facilitate effective implementation which should have been identified during the due diligence.

7.2 LESSONS LEARNED

There are four major lessons from LESSP that can help inform future USAID programming. They are summarized in Table 9 and discussed in the paragraphs following the Table.

Table 9: Lessons Learned

Lesson Learned	Actions Areas
Use a strategic management approach rather than activity-focus to achieve DOs	Develop a stakeholder-driven strategic plan for implementation of programs. Leverage existing organizations, practices, and complimentary programs.
Counterpart “ownership” is critical for success	Use strategic plan development to build capacity in counterparts and teambuilding between counterparts, implementing partners and stakeholders. Ensure clear understanding of roles/responsibilities of all parties. Co-locate staff with counterparts.
Communication with counterparts is essential	Use existing stakeholder mechanism(s).
Capacity building should be strategic and focused	Focus efforts rather than spreading too thin.

Use a strategic management approach rather than activity-focus to achieve DOs: The implementation approach to LESSP used emphasized “activity” over “strategy”. There are several factors that contributed to this. They include the timing of the design of LESSP, subsequent RFP, original USAID/Liberia-Winrock International contract SOW,²⁰ and the first year LESSP work plan²¹. LESSP was designed as the country was beginning to emerge from conflict during the nascent days of political stability and was intended to build on the emergency power program activities.²² It is not unusual for programs that evolve during periods of post-conflict or the immediate aftermath of natural disasters to be very activity focused. These programs tend to target and address needs through quick impact actions. However, the country had experienced almost two additional years of political and social stability at the LESSP’s inception. LESSP may well

²⁰ See Contract 669-C-00-10-00059-00, LIBERIA ENERGY SECTOR SUPPORT PROGRAM, pages 15 – 17 for the LESSP scope of work.

²¹ The first year work plan is a reasonably comprehensive implementation plan but does not reflect the extent to which the implementing partner: (1) evaluated the prevailing “on-the-ground” realities in late 2010 through the conduct of a situational analysis after contract award and as input into the work plan, (2) interacted with counterparts and other key stakeholder partners (LEC MHI) to solicit their inputs, (3) established communication protocols with key counterparts and players that would directly interact on a sustaining basis, and (4) conducted due diligence to ascertain whether the proposed locations and technologies identified in the SOW for the pilots were realistic and valid.

²² It is understood LESSP was designed while the USAID/Liberia LEAP was still operating.

have benefitted from a strategic situational review during the inception phase to validate key elements of the program as part of developing the first work plan.²³

Counterpart “ownership” is critical for success: There is evidence that some key counterparts had ownership of their respective elements of LESSP (notably the rural cooperatives). There is scant evidence that GOL policy makers felt “ownership” of LESSP activities. Evidence from key informant interviews indicates that some felt LESSP operated “in isolation” from its natural counterparts. LESSP progress reports (quarterly and annual reports) indicate a counter position citing LESSP having numerous meetings with key counterparts. However, these meetings do not appear to have engendered any local counterpart “ownership” for LESSP outcomes and deliverables.

There is limited evidence that key counterparts and stakeholders were actively involved in LESSP’s work planning process. The implementing partner’s first annual work plan references the creation of a private sector coordinating council. This has merit, but there is no evidence of what actions were taken to establish such an entity and to use it as a vehicle to advocate for liberalization of the energy market. Similarly, an opportunity was missed to leverage the work planning process to help build counterpart capacity and foster team building among the key counterparts, implementing partners and key stakeholders. LESSP was to be one of the main donor-sponsored actions in the rural renewable energy sector (the rural areas are a prime focus of the 2009 National Energy Policy) and could have guided counterparts at the nascent RREA and cement their leadership in this area of the energy sector.

Communication with counterparts is essential: There was poor communication between the LESSP and other key actors.²⁴ There is no evidence of the program establishing formal communication protocols with key GOL counterparts and stakeholders – in particular civil society non-government advocates such as the Liberia Chamber of Commerce, the National Association of Rural Cooperatives, the financial community or the donor community. Given the leadership role LESSP was anticipated to have with respect to establishing new business models to promote and increase access to electricity to rural and urban poor areas, the lack of any formal

²³ See section C.2 Core principles. The following language is taken from page 14 of the original USAID/Liberia – Winrock International contract: *“Each activity must be preceded by a comprehensive analysis. A better understanding of training, financing, maintenance and other similar needs before implementation of an activity reduces time and costs”.*

²⁴ See section C.2 Core principles. The following language is taken from page 13 of the original USAID/Liberia – Winrock International contract: *“Energy systems must be developed in a manner which is compatible with a sector master plan. Quick-fix, short-term projects waste time and money; therefore, it is imperative the Liberian stakeholders (e.g. GOL, civil society, private sector) take the lead to prioritize projects, and coordinate donor assistance if long-term, systemic change is to be achieved. Donors can facilitate the formulation of a sector master plan, but Liberian stakeholders should be at the core of the process.”*

communications protocols and ongoing dialogue between the program and those key actors was a major impediment to implementation.

Capacity building should be strategic and focused: LESSP was expected to use capacity building as a tool to develop capability among key counterparts, notably within GOL and the rural cooperatives and to facilitate sustainability post program completion.²⁵ Capacity building initiatives were initiated on many fronts: RREA staff, GOL policy makers, management and technical staff of rural cooperatives, and at institutes of higher learning: the Center for Renewable Energy at BWI, Stella Maris, and the University of Liberia. The sustaining outcomes of these efforts are limited.

²⁵ The contract required Winrock International to conduct a skills assessment of the human resources inside MLME (see section C 2.1 Objectives, Tasks and Results, page 15). This corresponding activity in the first year work plan limits the assessment to RREA only.

8 RECOMMENDATIONS

The following table summarizes the recommendations for future program considerations. These are discussed in more detail in the paragraphs that follow the table.

Table 10: Recommendations for Future Energy Programs

Element	Recommendations
Objectives	Reaffirm validity of DOs.
Stakeholder partnerships	Leverage existing mechanisms to build partnerships/alliances with stakeholders. Clearly define roles/responsibilities of key actors. Communicate frequently with key stakeholders.
Use strategic approach that considers: GOL policies, stakeholders, procurement, capacity, available resources & integrate with related initiatives	Encourage GOL “ownership” and participation in developing strategy to complete activities. Leverage existing organizations, practices and complimentary programs. Link to GOL NEP targets.
Leverage other ongoing capacity building initiatives and focus capacity building initiatives on organizational performance improvement	Leverage existing complementary capacity building initiatives For all training and capacity building efforts: <ul style="list-style-type: none"> • Integrate M & E into capacity building activities • Conduct performance needs assessment prior to developing training plan for each capacity building activity • Develop capacity building results indicators for each activity • Require recommendations for individual participants from organization/entity • Screen potential participants pre-training • Sign participation agreement with individual participants and supervisors/organization to ensure seriousness: <ul style="list-style-type: none"> ○ Require participants to train peers and colleagues ○ Require participants to self-evaluate pre-training, post training and monthly for a minimum of 12 months after training ○ Require supervisors to submit a monthly evaluation report of participant performance • Conduct Impact evaluations immediately post training and every 6 months after training for a minimum of one year
Report Progress: impacts and progress toward sustainability	Define performance indicators to national targets and sustainability. Carry out frequent, monitoring and impact evaluations throughout implementation at all levels: program, activity, sub-activity levels. Report progress internally and externally.

Recommendation 1: Project design should consider the following: Any future program should consider the following factors:

- Take into account the limited local resources, lack of pertinent quality data and logistical challenges as well as lessons learned.
- Be flexible in the design to allow the implementing partner to achieve the objectives the best way possible by employing tools including value engineering/value analysis in the case of engineering/construction projects.
- Be focused (with attendant performance monitoring and evaluation) instead of trying to accomplish too many initiatives at the same time. Project objectives should be in line with national policy and development goals.
- Engage stakeholders early in the planning and development process and seek local champions to take ownership of the project to facilitate sustainability.

Recommendation 2: Reaffirm the validity of development objectives. LESSP's development objectives are not yet achieved and remain valid. When and if USAID Liberia decides to provide assistance to the GOL in the energy sector, it should reaffirm the validity of the development objectives. If they are different, the DOs should be linked to national goals and objectives, to the extent possible, to facilitate ownership.

Recommendation 3: Improve stakeholder partnerships: There are existing mechanisms that could have been leveraged more advantageously to improve stakeholder partnerships. Given the capacity constraints in the country any new initiative should build on and complement successful existing mechanisms. For example, there is a multi-donor infrastructure committee, chaired by the World Bank, that USAID/Liberia is not part of. The committee meets frequently to coordinate and report on progress of donor-supported activities. The focus of the committee has been roads, but energy infrastructure can be part of the donor dialogue. Another example is the National Association of Rural Cooperatives that would have made a logical partner to the LESSP program and could have helped with the due diligence phase as well as capacity building.

Recommendation 4: Make capacity building performance-based and strengthen M&E of training activities: Capacity building should be strategic with clearly defined goals tied to performance objectives for the individuals participating. There are on-going capacity building initiatives that could be leveraged to develop local capability in a sustaining manner. There is a need to strengthen the M&E of capacity and training activities to ensure the activities are effective. The intent should be to develop an individual's skills, but this skill enhancement should provide for a corresponding improvement in the performance of in-country organizations.

Recommendation 5: Align new initiatives with national goals and objectives: The outcomes of any new initiative need to be clearly aligned with national goals and objectives to facilitate local ownership. In addition, progress towards achieving those

goals needs to be widely disseminated to all concerned stakeholders to promote awareness and inform the community at large.

Recommendation 6: Select contractors for the completion of construction at Kwendin and Sorlumba pilot projects: In September/October 2014, USAID/Liberia indicated to the three rural cooperatives that they intended to ensure the pilot projects were completed. At the time of writing this report procurement actions were in progress. However, contracts were not yet in place to complete the construction.

Recommendation 7: Develop construction oversight and implementation monitoring plans for the Kwendin and Sorlumba pilot projects: The new construction contracts should include construction oversight and implementation monitoring plans. Given the challenges with the biomass technology for both pilot sites and how critical the project timing is, USAID should ensure the construction and monitoring plans are adequate and sufficient to ensure a quality installation. In addition, the implementation needs to be monitored independently by an “owner’s engineer” as neither cooperative has appropriately qualified staff to monitor the construction.

Recommendation 8: Control construction costs: If future programs include a construction element, it is important to ensure the implementing partner explores ways to limit construction cost overruns and options for timely completion. One proven best practice is VE/VA. VE/VA is employed prior to and during construction. Another option is to use performance based contracting with provisions for incentives to fast track construction. Recommendations include:

- a. **Conduct and apply the principles of VE/VA to the design and construction of proposed improvements prior to and during construction.** For any given project, a typical VE/VA study reveals the optimum blend of scheduling, performance, constructability, maintainability, environmental awareness, safety, and cost effectiveness. Applying VE/VA during construction will potentially maximize the value for the budget as the costs for design and construction materials are a large portion of a construction budget.
- b. **Institute performance-based contracting (PBC) with provisions for incentives.** The concept of PBC is centered on a contract instrument that defines performance expectations in terms of outcomes or results as opposed to methods, processes, systems, or broad categories of work activity. The PBC concept describes the work in terms of what the required output is supposed to be rather than how the work is to be accomplished. Under a PBC, the contractor bears responsibility for assuring quality performance. Based on the incentive structure, a PBC allows the contractor to employ innovative techniques to yield cost/time savings. Given the delays in the projects, the time savings will be very apropos and a positive step.

- c. **Evaluate and examine project fast tracking and crashing the construction schedule.** Fast tracking and crashing are two project compression techniques used to shorten project schedules. In light of timing challenges, the cooperatives' and citizens' concerns about getting access to energy services, LESSP should check these project compression techniques to see if the project could be completed faster at minimal or no additional cost. The time is quite critical given the very high public expectations set by LESSP.

Recommendation 9: Expedite trials at BWI to find biomass technology solutions: The selected biomass technology for both Kwendin and Sorlumba is relatively unproven in Liberia. The Center for Renewable Energy (CRE) at BWI has been running tests to find solutions to the challenges of using crude palm oil and other biomass which adversely affect the gasifiers. If the current contract between the Center and APL is not renewed the on-going trials may come to an abrupt end. USAID/Liberia may wish to consider supporting continuation and/or contracting with the Center to provide maintenance to the pilots at Kwendin and Sorlumba for a minimum of one year.

Recommendation 10: Re-evaluate the financial analysis including identifying options through sensitivity analysis: The financial analyses used to determine the viability of the pilots should include a sensitivity analysis. In the initial planning, there was no apparent discount rate used to take into account the time value of money. The Team recommends that LESSP re-evaluate and simulate the financial analyses under various options and assumptions to identify the range of cost and financial tradeoffs and implications to determine the cost recovery period.

Recommendation 11: Provide capacity building in all facets of managing the pilots: The capacity needs of the cooperatives are quite tremendous. It will require consistent efforts including hands-on and on-the-job-training to bring them to a level where they can manage the pilots. While the pilot construction is now at a standstill, this may be the best time to resume the capacity building efforts. Gbarnway should be the first since its pilot is almost completed. Kwendin and Sorlumba need the most capacity building. The training should entail all facets of running a plant including but not limited to:

1. Plant Operation
2. Plant Management
3. Meter Reading and Tariff Collection
4. Accounting and Bookkeeping
5. Electro-mechanical Works Maintenance
6. Transmission & Distribution Lines Maintenance

Recommendation 12: Develop an energy knowledge database and knowledge-sharing platform: Evidence shows there has been little attempt to build an energy sector knowledge base either within key counterpart organizations or within the donor community. This lack of a database is exacerbated by the fact that there is no formal

mechanism between organizations active in the sector to share/exchange information among stakeholders. Information gaps exist as a consequence of the civil strife, e.g., hydrological, metrological, and solar data, which have an impact on the strategy for expanding the use of renewables. Certainly, the data availability would have accelerated the decision (yes/no) on the feasibility and helped determine the commercial viability of the hydropower projects. USAID should explore developing a knowledge-sharing platform with an attendant database.

ANNEX A: USAID/LIBERIA PERFORMANCE EVALUATION SCOPE OF WORK

PERFORMANCE MONITORING AND EVALUATION Scope of Work USAID Liberia Energy Sector Support Program

I. Description

Project Title: Liberia Energy Sector Support Program (LESSP)
Project Number: Contract No. 669-C-00-00-00059-00 (LESSP)
Project Dates: October 4, 2010-October 3, 2014
Project Funding: \$ 21,861,948
Implementing Partner: Winrock International
COR: Luis Velazquez

II. Performance Period

The period of performance will run approximately 6 weeks, starting on or about January 10, 2015 depending on the availability of consultants and available funding.

III. Funding Source

The funding source will be through the budget of the USAID/Liberia Economic Growth Office.

IV. Purpose and Objectives

The primary purpose of the evaluation is to determine whether the assistance provided by USAID/Liberia through LESSP met the stated development objectives, and understand the lessons learned from this particular intervention in Liberia. The evaluation should provide a detailed picture of the major accomplishments and weaknesses of the project since inception, including management issues, and indicating the recommended changes in implementation approach to future energy programs, and/or USAID's project design/programming approach to assure successful completion of the project objectives.

The evaluation should include specific recommendations to USAID regarding the exercising of the cost modification and amendments to the scope of the contract, including any key issues or changes recommended to the implementation approach and programmatic priorities that were available to USAID. Finally, the evaluation will identify priority areas that should be the focus of possible future programming in the Liberian energy sector, including the renewable energy market, and the rural development strategies in Liberia.

The timing of this evaluation is propitious for making plans for future construction projects as USAID is planning new investments on infrastructure projects to support the construction of new facilities over the coming few months designed to address the immediate needs of the Ebola emergency, while maintaining a long term view for the national expansion of the energy sector and institutional development.

V. Background

On October 4, 2010, USAID awarded an \$18.9 million, four-year contract to Winrock International for the implementation of the Liberia Energy Sector Support Program (LESSP). The LESSP contract was signed for a complete performance period of forty-eight months, and the end date was set for October 3, 2014. The Liberia Energy Sector Support Program (LESSP) was designed by USAID/Liberia to increase access to affordable renewable energy services in geographically focused rural and urban areas in order to foster economic, political and social development. Through the implementation of the LESSP contract, the energy interventions of the Mission were designed to achieve the following development objectives:

- (v) Increased, sustainable access and affordability of electricity within selected urban and rural poor communities;
- (vi) Improved performance of local governments, civil society and the private sector in monitoring, regulating and managing the use of renewable energy;
- (vii) An increase in the percentage of households and businesses utilizing clean energy, and a corresponding increase in economic activity; and
- (viii) Policy changes that improve the investment climate for the energy sector.

As originally designed, the LESSP was intended to implement – at a minimum – key activities leading to the achievement of three primary intermediate results:

1. Strengthen the GOL's capacity to implement plans for rural electrification as expressed in the National Energy Sector Policy;
2. Establish commercially viable pilot plants that provide renewable energy services to population centers in Bong, Lofa and Nimba counties; and
3. Collaborate with other international donors for the expansion of Monrovia's power distribution network.

As critical components of the LESSP contract in support of the development objectives of the Mission, the contractor was to develop a number of small pilot power generation and distribution systems, based on indigenous hydroelectric and biomass energy resources, but as a result of changes in the scope of work and an underestimation of

investment costs, these pilot projects went through an extensive review process that eventually led to the first modification of the contract. In September 2013, the Supervisory Contracting Officer and the Agency Competition Advocate approved a modification to the original contract which resulted in a net increase of \$2.9 million, for a new contract amount of \$21.8 million.

The modified contract included new pilot projects as deliverables but the end date remained unchanged. Two of the original pilot projects were removed from the contract, and replaced with new projects in different locations, and with a completely different scope of work and technical specifications. The amendment also stated that one of the key components of the LESSP – the small hydroelectric system on the Mein River – was to be completed no later than 4 years from the start date of the contract. At the time, and without a time extension to the contract, there were about 14 months remaining in the contract.

Under the terms of the amended contract, Winrock was then to design the engineering, legal, and operational components of the pilot project, produce tender documents, and proceed with a competitive bid tender process for the Mein River project and three other pilot projects fueled with indigenous renewable energy technologies located in Sorlumba, Kwendin, and Gbarway. The technical tasks associated with these projects proved to be extremely challenging for the contractor and the timeline for completion was very limited. There were significant delays on the award of a construction contract, and in late February 2014, Winrock submitted the request for consent to award a construction contract for the first three projects in Sorlumba, Kwendin and Gbarway.

As reported by Winrock, these three projects would have been completed by mid-September 2014, as there were no anticipated restrictions to successfully perform the construction activities on time before the contract end date. At this time, Winrock informed USAID that the construction start date of the Mein River project would be delayed, and it would require about 20 months for construction with an estimated completion date of February 2016. USAID approved the request for consent for the award of the remaining pilot projects at Sorlumba, Kwendin and Gbarway, under these conditions with an estimated timeline for construction of about 5 months for each of the projects. At that time, the effects of the Ebola outbreak in Liberia were limited to a handful of cases in remote areas of the country without an impact on project performance, and construction of these projects began.

In late April 2014, Winrock submitted the request for the Mein River hydroelectric project. As informed by Winrock, the implementation of the Mein River project would require a new time extension and the reallocation of funds from the components removed in the first modification of the contract to support the additional administrative expenses to be incurred beyond the original end date of October 2014. Following a due diligence process, USAID decided not to approve the request for consent for Mein River, and partially terminate the original LESSP contract. On May 30,

2014, the USAID/Liberia Contracting Officer issued a notice of partial termination of the LESSP Contract. Winrock was instructed to cease work specified in the contract related to the Mein River construction work, and two of the components added to the contract when it was amended.²⁶

Given the conditions of the partial termination notice, the operations and remaining deliverables of the LESSP were limited to the close-out process, and the construction of the projects in Sorlumba, Kwendin, and Gbarnway, but between early May and late August, the effects of the Ebola epidemic began to impact project performance. The expat staff of Winrock International left the country in early August as a result of the epidemic. Other international contractors informed Winrock that they would be unable to travel to Liberia to perform their key services on these projects, such as the commissioning of new power generation equipment and technical training to the future operators of the power plants.

Winrock submitted a formal budget realignment, contract modification, and request for no cost extension, with respect to the contract ceiling, through March 31, 2015, based on FAR 52.249-14 (Excusable Delays) as the basis for the approximate 6-month extension. The new requested contract end date was based on the assumption that “... *it will be safe for LESSP expat staff to return to Liberia on January 1, 2015 ...*” but it also informed that “... *Should Ebola not be contained in Liberia by the beginning of January 2015, it will likely result in [a] period of performance extended beyond March 31, 2015, and cost implications to LESSP.*” At the time of the WI submission, the estimated date for the return of the expat staff to Liberia was “... *WI’s very best and potentially optimistic estimate.*”²⁷

The logistical issues related to the Ebola epidemic affecting project performance and contract compliance – as informed by Winrock – were as follows:

- LESSP was forced to suspend the Electricity Cooperative Training Program for the three remaining projects. Seven electricity cooperative training activities remained outstanding for completion.
- There were severe restrictions on cargo shipments/lack of cargo space, due the majority of airlines and shipping companies suspending or restricting cargo shipments to Liberia. This was directly impacting LESSP equipment shipments to Liberia, originating in India and the United States.

²⁶ These projects included the Paynesville to University of Liberia Fendell Campus medium voltage power distribution line, and a 0.5 MW solar on-grid generation project at Bushrod Island.

²⁷ Other performance and compliance issues in the LESSP contract included the frequent replacement of key personnel assigned to the project. Over the life of the contract, there were 3 COPs, and two DCOPs. These issues are not discussed in this document.

- Critical construction materials, such as poles and associated hardware had been purchased in Ghana. Due to border closings, LESSP could not get the poles or hardware into Liberia.
- All Power Labs, based in California and a key subcontractor on the remaining projects, informed LESSP that staff would not travel to Liberia in order to commission the gasifiers until Ebola was brought under control.
- Other construction contractors – performing under contract with Winrock on all three aforementioned project sites – stated that they required additional time, due to quarantines and roadblocks, to transport requisite equipment, material, and personnel to and from project sites.
- According to Winrock “... *it is becoming increasingly difficult for LESSP to get [project] staff to and from the project sites in Lofa and Nimba counties, due to the quarantine in place.*”

Given these uncertainties with direct relationship on project performance, contract compliance, and expected construction end dates, USAID decided not to grant a new extension to the contract, and let the project end – as originally scheduled – on October 3, 2014. The construction of the new projects at Sorlumba, Kwendin, and Gbarnway is still incomplete as of the date of this document. Winrock and USAID/Liberia are coordinating efforts to complete the close-out process, ensure the transfer of remaining assets and project documents, dispose of the usable project inventory, and manage the handover process of the projects.

Against this background, the LESSP project can be considered a challenging development project, and the conditions in Liberia proved to be difficult for the country, in particular, those related to human and institutional capabilities, quality of local services, infrastructure, and vulnerability to national emergencies. Important lessons can be learned from the LESSP for the successful design and implementation of future projects in Liberia.

VI. Proposed Evaluation Questions

- 1. Effectiveness of infrastructure planning / construction oversight approach.** *To what extent was appropriate due diligence done by the contractor in the design phase and how well was the project positioned (in terms of management/staffing structure) to support the construction phase?* In answering this overarching question, the Evaluation Team should consider:
 1. How well did LESSP conduct due diligence in analyzing and understanding sustainability issues facing the technical assistance to MLME and RREA related to the National Energy Policy and the Energy Law?
 2. Were the plans for construction oversight and implementation monitoring sufficient to provide USAID with reasonable assurances of quality, success, and value during implementation?

3. Were project resources well-positioned (staffing, resources, staff positions seconded to government agencies, and so on) to provide the requisite construction oversight, and capacity-building support to government agencies, efficiently and effectively?

2. Effectiveness of institutional framework and capacity building. *How effective was LESSP's institutional and capacity-building approach in achieving the stated objectives, e.g. ensuring that "improved infrastructure will be handed over to locally-based management technically and financially" to sustain energy supply service improvements in rural Liberia? In answering this overarching question, the Evaluation Team should consider:*

1. Are there important lessons learned from the past decade of institutional reforms at Liberia Electricity Corporation and other electricity service expansion efforts in Liberia that should inform broader USAID engagement in energy interventions?
2. Were LESSP's interventions to build the capacity of government institutions at the central level relevant and strategic to support project objectives?
3. How effective was the interim capacity-building effort proceeding at the Booker Washington Institute in Kakata as testing grounds for the proposed outstation institutional framework?
4. How effective were the local staff and contractors of LESSP in assessing and/or performing during the capacity-building work?
5. Is more analytical work needed around Liberia and the energy sector, to help the country on the strategic direction of the energy sector?

3. Overall project positioning and strategy for phase-out of USAID assistance. USAID needs to draw lessons learned for future projects. Some uncertainty may remain around local resources, skills, access to capital and other key elements that are crucial for future project design and implementation. In light of this situation, key questions include:

1. Given the findings about local resources and skills, how should USAID planning proceed for similar future projects? What is the recommended approach for a follow-on project?
2. Is there anything USAID can do differently in the interim to increase the likelihood of the GOL meeting objectives around technical, institutional, and operational capacity and cost recovery, or create better incentives for this to occur, e.g. what could we create in terms of benchmarks/ establishing a timeline for gradual phase-out for subsidies, and how / in what venue to negotiate this, etc.?
3. Did the project sufficiently integrate / coordinate with other donors and key stakeholders in Liberia?

The contractor should allocate a proportional level of effort to the 3 overarching themes described on the questions above, and should present a report describing the findings and conclusions to these questions thoroughly. The number of pages to each section is not necessarily an indicator of the quality of the response.

VII. Evaluation Methodology

The Evaluation Team should consider a range of possible methods and approaches for collecting and analyzing the information required to answer the evaluation objectives. The methodology should include, but not be limited to, the following techniques to conduct the evaluation. Prior to arriving in country and conducting field work, the team should submit to USAID/Liberia three key deliverables: 1) Document Review Summary; 2) Evaluation Report Outline; & 3) Methodology / Detailed Work Plan. USAID/Liberia will review these three deliverables, turning them around within one work-week to the evaluation team.

- **Document Review/Data Analysis.** Prior to arriving in country and conducting field work, team members will review various documents and reports, including but not limited to the LESSPP original contract and amendments; USAID/Liberia strategy document; quarterly and annual reports, and other relevant documents such as the specification of the project deliverables and construction projects. USAID/Liberia will provide the relevant documents to the team.
- **Key Informant Interviews.** The team will conduct interviews and focus groups with a variety of stakeholders including USAID staff, government staff in various departments, implementing partner staff, and other key donor partners. A full list of stakeholders and contacts will be provided by USAID/Liberia, and additional individuals may be identified by the evaluation team at any point during the evaluation prior to the drafting of the final report.
- **Site Visits.** In addition to the many key informant interviews that will take place in Monrovia, the evaluation team will visit the project sites and the BWI facility in Kakata to interview local GoL staff and local Steering Committee members. If this is not feasible due to in-country travel limitations related to Ebola response, consultations with relevant staff may be done by phone or in-person in Monrovia. However, the Mission anticipates that travel should be possible to Kakata. There are also to-country travel restrictions. Currently, there are no flights available between Washington and Monrovia on Wednesdays and Saturdays, and the evaluator should plan accordingly. It should also be noted that since the project has ended, the implementer has returned to the United States. So, some interviews should take place in the U.S.

USAID staff from the EG Office and the Infrastructure Team will accompany the Evaluation Team as needed.

VIII. Composition of Evaluation Team

The Evaluation Team shall consist of at least two individuals, one team leader with 10+ years of experience in energy projects in low-income countries with USAID and/or other donors and a second individual with Liberia-specific experience in electric utility service delivery in rural Liberia (and ideally someone familiar with recent power sector reforms). Demonstrated experience and skills in project evaluation are required for at least one of the two team members proposed.

Team members will be required to travel to Monrovia to obtain an understanding of the projects' activities. A six-day work week is authorized for this activity. This activity is proposed to be conducted in Liberia and the U.S. for a total of five work weeks, beginning on or about February 2015. The Team will provide 7.5 working days to USAID/Liberia for review and comments on the draft evaluation report and PowerPoint presentation, after which time the Team will be expected to spend another 2.5 days finalizing the report and presentation and then submitting the requested deliverables to USAID/Liberia as outlined in this SOW.

The required areas of technical (subject matter) expertise that should be represented on the team correspond to the technical focus areas of the program being evaluated. The contractor may propose a different configuration of these skills between team members than outlined below, but all skill areas outlined must be represented:

- Power sector service delivery/utility management
- Renewable energy with emphasis on biomass and hydroelectric resources
- Business/organizational performance improvement and capacity-building
- Infrastructure system operations and maintenance in developing countries

Team:

1. Overall Team Leader – The team leader will serve as the primary point of contact between the USAID/Liberia Mission and Evaluation Team. The incumbent must:

- Have knowledge and professional experience in energy supply system design and operations.
- Be able to communicate effectively with senior U.S. and host country officials and other leaders;
- Have a proven track record in terms of leadership, coordination, and program/process evaluation for development projects and programs;
- Have excellent writing/organizational skills and proven ability to deliver a quality written product (Evaluation Report and PowerPoint).

- 2. Utility Service Delivery Specialist** –This member should have substantial experience in efforts to reform power service delivery including rural and renewable energy systems, corporate reform, regulatory/policy reform and sector restructuring. Experience in power utility reform in Liberia or West Africa region preferred.

USAID Liberia will designate a technical representative to work in coordination with the evaluation team; however, the Team Leader will have the primary responsibility for ensuring the final deliverables are completed in a timely manner and are responsive to the scope of work and Mission comments.

IX. Deliverables

The Evaluation team will be responsible for producing the following deliverables:

- Draft and final approved work plan detailing evaluation methodological approach and draft schedule of field activities and draft and final questionnaire(s) to be used during interviews/stakeholder (prior to travel to the field)
- Summary of document review and proposed outline of draft Evaluation Report (either prior to the field or at the end of first week of interviewing)
- Summary of initial findings PowerPoint Briefing (at the end of follow-up and synthesis effort and prior to Team’s departure from Liberia)
- Draft Evaluation Report – Remote
- Final Evaluation Report and Stakeholder Presentation, following standard reporting format and branding guidelines (within 2 weeks of receiving Mission comments on draft report). – Remote

All reports are to be submitted in English in both electronic and hard copies. The Team will provide five printed copies of the Final Evaluation Reports. The consultants will be responsible for report production.

The Final Evaluation Report should not exceed 30 pages in length in its body, not including title page; Table of Contents; List of Acronyms; usage of space for tables, graphs, charts, or pictures; and/ or any material deemed important and included as Annexes.

The Final Evaluation Report and PowerPoint addressing the Mission's comments should be submitted in both Word and PDF formats. Once the PDF format has been approved by the Mission, the Team will submit the Final Evaluation Report to the Development Experience Clearinghouse for archiving. Reports should be submitted consistent with the Automated Directives System (ADS) 579.

X. Relationships and Responsibilities

USAID/Liberia will designate a point of contact for the evaluation. An Evaluation Committee comprised of other Mission staff will be formed to guide the Evaluation Team in their work by reviewing reports, responding to questions from the team and resolving administrative or logistical obstacles.

The evaluation implementer will provide:

- International travel to and from the consultant's point of origin and Liberia.
- Consultant per diem and lodging expenses
- Hotel/ guest house reservations in country
- Necessary communications and computer equipment
- Vehicles for meetings/site visits
- Arrangements/scheduling for meetings/site visits

USAID/Liberia will provide:

- Background documents will be identified and prioritized by USAID/Liberia and provided to evaluation team as early as possible prior to team work
- A list of key informants, institutions, organizations, and other stakeholders, as well as a suggested location and length of site visits
- If needed, will provide information as early as possible on suggested lodging
- Ensure constant availability of Mission Point of Contact to provide technical leadership and direction for the evaluation team's work
- Assistance with arrangements/letters of introduction for formal and official meetings, and where necessary for high-level meetings, will accompany teams on introductory interviews
- If necessary and deemed appropriate, assist in identifying and helping set up meetings with local development partners relevant to the assignment.

ANNEX B: INFORMATION SOURCES

The following references are for materials received from USAID/Liberia and Winrock International. The materials were reviewed to better inform the Team with respect to the Liberia Energy Sector Support Program and assist in responding to the evaluation questions.

LESSP Overall Program:

1. Contract 669-C-00-10-00059-00 LESSP -SK092310
2. Contract 669-C-00-10-00059-00 LESSP Signed Winrock Mod 001
3. Contract 669-C-00-10-00059-00 LESSP Signed Winrock Mod 002
4. Contract 669-C-00-10-00059-0000 LESSP Signed Winrock Mod 003
5. Contract 669-C-00-10-00059-0000 LESSP Signed Winrock Mod 004
6. LESSP Partial Termination – Signed May 2013
7. USAID_WI Closeout Memo for Gbarway final submitted to USAID Dec. 15 2014
8. Annual Report Y1_DEC_2011
9. Annual Report Y2_NOV_2012
10. Annual Report_Y3_NOV_2013
11. QPR Y1 Q1_MAR_2011
12. QPR Y1 Q2_APR_2011
13. QPR Y1 Q3_JULY_2011
14. QPR Y1 Q4_OCT_2011
15. QPR Y2 Q1_JAN_2012
16. QPR Y2 Q2_APR_2012
17. QPR Y2 Q3_JULY_2012
18. QPR Y3 Q1_JAN_2013
19. QPR Y3 Q2_MAY_2013
20. QPR Y3 Q3_AUG_2013
21. QPR Y4 Q1_JAN_2014
22. QPR Y4 Q2_APR_2014
23. QPR Y4 Q3_JULY_2014
24. LESSP PMP Year 1_AUG_2011
25. LESSP PMP Year 1_AUG_2011
26. LESSP Annual WorkPlan_Year 1_DEC_2010
27. LESSP Annual WorkPlan_Year 2_SEPT_2011
28. LESSP Annual WorkPlan_Year 3_NOV_2013
29. LESSP Annual WorkPlan_Year 4_JAN_2014
30. LESSP Branding & Marking Plan_FEB_2011
31. LESSP Branding & Marking Plan Revised_JULY_2014
32. Cross Cutting Issues Plan Final_SEPT_2011

Special Reports

1. Lib Nat'l Elect Gen Desk Study

- a. Liberia National Electrical Generation Desk Study_AUG_2014
- b. Ref Materials
 - i. Statistics Netherlands_An Introduction to Data Cleaning_2013
 - ii. Options for Development of Energy Sector_2011
 - iii. Enterprise Surveys_Liberia Survey_2009
 - iv. MWH_Evaluation of EU energy funding_2012
 - v. Fichtner GOL Least Cost Power Development Plan_2013
 - vi. LIGIS_Population and Household Census_2008
 - vii. RREA_Investment Plan for Renewable Energy_2013
 - viii. Norad_Norwegian support to the Liberian energy sector_2011
 - ix. LEC_Monthly Status Report_June 2014
 - x. Modi ResearchPower Sector Cap Bldg & Energy Master Plan_2013
 - xi. World Bank_Liberias Infrastructure_2011
 - xii. Norad_Simplified Power System Master Plan_2009
 - xiii. Load Demand Assessment & Socioeconomic survey_2011
 - xiv. Load Demand Assessment & Socioeconomic survey_2011
 - xv. 15_GSDPM_Liberia Major Demand Centers_2013
- 2. Preliminary Gbarnga City Electricity Generation Study_JULY_2014
- 3. Concept Study Eagle Power_NOV_2013
- 4. Concept Study UL Fendell Campus T&D_APR_2013
- 5. Concept Study Utility Interconnected 1 MW solar PV System_APR_2013
- 6. Health and Safety Plan_JUNE_2013
- 7. Report Biomass Workshop_APR_2014
- 8. Report_Electric Coop. & Power Comp. Legal & Environ. Training_AUG_2013
- 9. Success Story Biomass Workshop_APR_2014
- 10. Success Story CPO Lister Engine_JUNE_2013
- 11. Success Story LCBE Open House_APR_2014
- 12. Success Story LESSP Training of RREA and MLME_MAR_2013
- 13. Success Story OPIC President at BWI_FEB_2014
- 14. Success Story UNIDO_MAR_2013

Objective 1: Deliverables:

- 1. Energy Law Review_MAR_2011
- 2. RREA Skills Assessment_APR_2011
- 3. RREA Training Plan_APR_2011 4.
- 4. Energy Regulatory Board Action Plan_SEPT_2011
- 5. REFUND Operating Guidelines_APR_2014

B. Objective 2 Deliverables

General Deliverables

- 1. Database of Community Based Orgs_Aug_2011
- 2. Draft Training Plan for CBOs SEPT_2012
- 3. Curricula Strengthening for Vocational Inst_MAR_2012

4. Updated RE Curricula for UL_MAY_2012
5. RE Curricula Development for BWI_MAY_2013
6. Feasibility Study_Cocopa Biomass_OCT_2011
7. Feasibility Study_Wayavah Falls_DEC_2011
8. Wayavah Falls_Environmental Review and Assessment Checklist_FEB 2012
9. QAQC Plan_Wayavah Falls_DEC_2012
10. Construction Mgmt Guidelines and Quality Assurance Control_APR_2013
11. RFC Approval_Gbarnway, Kwendin, Sorlumba_APR 2014
12. Grant and PPP Proposal for Establishment of the LCBE at BWI_JUNE_2013
13. Rapid Assessment of RE Options for Liberia June_2012

Environmental Deliverables

1. IEE Submission_DEC_2010
2. IEE Approved_MAY_2011

Objective 2. Booker Washington Institute (BWI)

1. BWI (LCBE) Technical Drawings_MAR_2014
2. BWI LCBE Environmental Review and Assessment Checklist_APR_2014
3. BWI LCBE Environmental EPA Permit_JAN_2014
4. Lister Engine Manual
5. Gasifier Manual

Objective 2. Bi-Weekly Construction Reports

1. Biweekly report_June 10 2014
2. Biweekly Report_June 13 2014
3. Biweekly Report_June 27 2014
4. Biweekly Report_July 11 2014
5. Biweekly Report_July 25 2014
6. Biweekly Report_Aug 08 2014
7. Biweekly Report_Aug 22 2014
8. Biweekly Report_Sept 05 2014
9. Biweekly Report_Sept 19 2014

Objective 2: Deliverables: Gbarnway:

1. Gbarnway Feasibility Study_AUG_2013
2. Gbarnway RFP Newspaper Ad_JAN_2014
3. Gbarnway RFP Addendum 01_DEC_2013
4. RFP Addendum 01 Web-Based Posting Gbarnway, Kwendin, Mein, Sorlumba_DEC_2013
5. RFP Addendum 02 Web-Based Posting Gbarnway, Kwendin, Sorlumba_JAN_2014
6. Gbarnway Technical Specifications_DEC_2013
7. Gbarnway Technical Contract Modifications_AUG_2014

8. Gbarnway Price Bill of Quantity_DEC_2013
9. Gbarnway Price Bill of Quantity Additional Specs_DEC_2013
10. Gbarnway Environmental Review and Assessment Checklist_DEC_2013
11. Gbarnway Environmental EPA Permit_JAN_2012
12. Gbarnway Environmental EPA Letter Regarding Permit Renewal_JAN_2013
13. Gbarnway Environmental EPA Permit_JAN_2014
14. Gbarnway Cooperative (GWEC) CDA Permit_FEB_2012
15. Gbarnway Cooperative (GWEC) Articles of Incorporation_FEB_2012
16. Gbarnway Final Site Inspection Punch List_OCT_2014
17. AdMeasurement_Gbarnway_Final_Submitted to USAID_Nov 26_2014

Objective 2: Kwendin:

1. USAID_WICloseout Memo for Kwendin_final_Submitted to USAID_Dec 15 2014 – Copy
2. Kwendin Feasibility Study_OCT_2012 – Copy
3. Kwendin RFP Newspaper Ad_DEC_2013
4. Kwendin RFP Addendum 01_DEC_2013 – Copy
5. RFP Addendum 01 Web-Based Posting_Gbarnway, Kwendin, Mein, Sorlumba_DEC_2013 – Copy
6. RFP Addendum 02 Web-Based Posting_Gbarnway, Kwendin, Sorlumba_JAN_2014 – Copy
7. RFP Addendum 02 Web-Based Posting_Gbarnway, Kwendin, Sorlumba_JAN_2014
8. Kwendin Civil Technical Specifications_DEC_2013
9. Kwendin Technical Specifications Electro-Mechanical_DEC_2013 – Copy
10. Kwendin Detailed Engineering Drawings_JUNE_2013 – Copy
11. Kwendin Detailed Engineering Drawings_JUNE_2013
12. Kwendin Price Bill of Quantity_DEC_2013
13. Kwendin Technical Contract Modifications_JULY_2014 – Copy
14. Kwendin Environmental Review and Assessment Checklist_NOV_2013
15. Kwendin Environmental EPA Permit_MAY_2013 – Copy
16. Kwendin Cooperative (KLEC) Articles of Incorporation_APR_2013 – Copy
17. Kwendin Cooperative (CLEC) Land Docs_JAN_2013 – Copy
18. Kwendin Cooperative (KLEC) Land Deed_MAR_2013 – Copy
19. Kwendin Final Site Inspection Punch List_OCT_2014 – Copy
20. AdMeasurement_Kwendin_Final_Submitted to USAID_Dec 15 2014
21. Final Site Inspection Pictures and Videos
22. Gasifier Manual

Objective 2: Sorlumba:

1. USAID_WICloseout Memo for Sorlumba_final_Submitted to USAID_Dec 15 2014
2. Sorlumba Inception Report_JAN_2010
3. Sorlumba Feasibility Study_JULY_2011
4. Sorlumba RFP Newspaper Ad_DEC_2013

5. Sorlumba RFP Addendum 01_DEC_2013
6. Addendum 01 Web-Based Posting Gbarndway, Kwendin, Mein, Sorlumba_DEC_2013
7. Addendum 02 Web-Based Posting Gbarndway, Kwendin, Sorlumba_JAN_2014
8. Sorlumba Civil Technical Specifications_DEC_2013
9. Sorlumba Electro-Mechanical Technical Specifications_DEC_2013
10. Sorlumba Detailed Engineering Drawings_DEC_2013
11. Sorlumba Price Bill of Quantity_JAN_2014
12. Sorlumba Technical Contract Modifications_JULY_2014
13. Sorlumba Environmental Review and Assessment Checklist_FEB_2012
14. Sorlumba Environmental EPA Permit_JAN_2012
15. Sorlumba Cooperative (SCECS) CDA Permit_FEB_2012
16. Sorlumba Cooperative Articles of Incorporation_FEB_2012
17. Sorlumba Cooperative Land Contribution_AUG_2011
18. Lister Engine Manual
19. Sorlumba Final Site Inspection Punch List_OCT_2014
20. AdMeasurement_Sorlumba_Dec_17_2014_submitted to USAID on Dec 17 2014

Objective 2: Mein River:

1. Mein River Inception Report DEC_2010
2. Mein River_Feasibility Study_OCT_2011
3. Mein River RFP Newspaper Ad_DEC_2013
4. Mein River RFP_Addendums 1 - 4_DEC_2013
5. RFP Addendum 01 Web-Based Posting_Gbarndway, Kwendin, Mein, Sorlumba_DEC_2013
6. Mein River Environmental Assessment_Aproved DEC_2012
7. Mein River Environmental EPA Permit_MAR_2012
8. Mein River Environmental EPA Permit_MAY_2012
9. Mein River Envrionmental EPA Letter Regarding Renewal of Permit_MAY_2014
10. Technical Specs & Drawings
11. Mein River Power Company (MRPC)
12. Mein River Legal Due Diligence Report _NOV_2012
13. Mein River_LEC Communication_ 11kV voltage Issue_FEB_2012
14. UNIDO

ANNEX C: DATA INFORMATION RESOURCES – ONLINE RESEARCH

The following references are for materials reviewed as a result of online research. The primary intent of the research was to enhance contextual understanding of Liberia, with particular emphasis on the country's energy sector. This serves to better inform the Team with respect to the background against which the Liberia Energy Sector Support Program was designed, developed, and implemented. The references are a combination of publication title and hyperlinks to the respective materials.

1. Sustainable Municipal Energy Services (SMES) program, 2004-2013, Final Report, July 2013, Nexant, Inc. under USAID Contract No. EPP-I-02-03-00007-00 Order No. 02.
2. National Energy Policy: An Agenda for Action and Economic and Social Development Ministry of Lands, Mines and Energy Monrovia, Liberia May 2009
3. CIA Fact book: <https://www.cia.gov/library/publications/the-world-factbook/geos/li.html>
4. West African Solar Opportunities: Summary 2014
<http://westafrica.solarenergyevents.com>
5. A Fast Track Comparative Analysis of the Various Power Generation Options Available to Liberia or Simplified Power System Master Plan - A Primer for Decision-making, Norconsult December 2008, funded by NORAD on behalf of the Ministry of Lands, Mines, and Energy, Liberia.
6. Assessment of Biomass Resources in Liberia, Anelia Milbrandt, National Renewable Energy Laboratory, report prepared for the U.S. Agency for International Development (USAID) and managed by the International Resources Group (IRG), December 2008.
7. Impact Assessment Report, Liberia Energy Assistance Program (LEAP), Urban Community Development Pilot Project, Wroto Town Community, Sinkor, Center for Sustainable Energy Technology (CSET) for International Resources Group (IRG), February 2009.
8. Liberia Energy Assistance Program (LEAP), Final report, IRG February 28, 2009
9. Millennium Challenge Corporation, Liberia Compact, Quarterly Status Report, September 2014.
10. Millennium Challenge Corporation, Liberia FY 15 Scorecard
11. Technical and Financial Feasibility Study for the Reconstruction and Expansion of the Mount Coffee Hydropower Facility in Liberia, Liberia Electricity Corporation, Monrovia, Liberia, West Africa, Final Report – Public Version, Update Stanley Consultants, for USTDA, December 29, 2008
12. http://en.wikipedia.org/wiki/Mount_Coffee_Hydropower_Project
13. <http://www.mhius.ca/projects/display/project/136/five-year-management-contract-of-liberia-electricity-corporation>
14. <http://www.pennenergy.com/articles/pennenergy/2015/01/a-us-renewable-energy-blueprint-meant-to-help-liberia-fails.html>

15. http://news.yahoo.com/us-loans-fueled-insider-deal-failed-power-plan-082443133.html;_ylt=AwrBT8p1cjVVdMEaA1JXNyoA;_ylu=X3oDMTEzbzZtY3VmBGNvbG8DYmYxBHBvcwM2BHZ0aWQDVklQNjEyXzEEc2VjA3Ny
16. https://www.opic.gov/sites/default/files/docs/buchanan_renewables_monrovia_power_inc_nc.pdf
17. <http://www.africa-energy.com/liberia?type=articles>
 - a. <http://archive.crossborderinformation.com/Article/Liberia+LEC+seeks+operator+for+Mount+Coffee+hydro+plant.aspx?date=20140616#full> Issue 279, 16 June, 2014
 - b. <http://archive.crossborderinformation.com/#>
 - c. <http://archive.crossborderinformation.com/Article/Liberians+file+complaint+over+failed+biomass+scheme.aspx?date=20140213#> Issue 271, 13 February, 2014
 - d. <http://archive.crossborderinformation.com/Article/Liberia+Dawnus+to+prepare+Mount+Coffee+rehab.aspx?date=20140130#full> Issue 270, January, 2014

ANNEX D: KEY INFORMANT CONTACT INFORMATION

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