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CLEAN ENERGY MARKET DIAGNOSTIC, BANK READINESS ASSESSMENT AND LENDING TOOLKIT PILOT TESTING LIBERIA

Final Report

Findings and Recommendations

September 2014



Submitted to: **US Agency for International Development**

Prepared by: **USAID Economic Growth Training Project
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dTS with Abt Associates and Enclude Ltd.
Dr. Marcia Trump, Abt Associates
Daniel Gies, Enclude Ltd.**

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Clean Energy Market Diagnostic, Bank Readiness Assessment And Lending Toolkit Pilot Testing LIBERIA

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By: USAID Economic Growth Training Project
Marcia Trump, Abt Associates Inc.
Daniel Gies, Enclude Ltd.

With: **Development and Training Services Inc.**

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ACRONYM LIST

AILEG	Analysis and Investment for Low-Emission Growth
CDA	Cooperative Development Agency
CE	Clean Energy
CIF	Climate Investment Fund
CTF	Climate Technology Fund
DCA	Development Credit Authority
dTS	Development Technology Services, Inc.
E3	Bureau of Economic Growth, Education, and Environment
EBRD	European Bank for Reconstruction and Development
EC-LEDS	Enhancing Capacity in Low-Emission Development Strategies
EE	Energy efficiency
EP	Office of Economic Policy
ERB	Energy Review Board
ESCO	Energy Service Company
FI	Financial Intermediary
GCC	Global Climate Change
GHG	Greenhouse Gas
GoL	Government of Liberia
IBEX	Investing for Business Expansion
IBLL	International Bank of Liberia Ltd.
IFC	International Finance Corporation
IPP	Independent power producer
KW	Kilowatt
kWh	Kilowatt hour
LCD	Local capacity development
LEC	Liberia Electricity Company
LEDS	Low emission development strategies
L-EPA	Liberia Environment Protection Agency
LESSP	Liberia Energy Sector Support Program
MLME	Ministry of Lands, Mines and Energy
MPEP	Microenterprise and Private Enterprise Promotion
MW	Megawatt
NEP	National Energy Policy
OPIC	Overseas Private Investment Corporation
PA	Power Africa
PV	Photovoltaics
RE	Renewable energy
REFund	Renewable Energy Fund
RREA	Rural and Renewable Energy Agency
ROSEFF	EBRD - Romania SME Sustainable Energy Finance Facility
SREP	Scaling-Up Renewable Energy Program
SHPP	Small Hydropower Plant
SME	Small and Medium Enterprises
SOW	Scope of Work
SREP	Sustainable Renewable Assistance Program
TA	Technical Assistance
ToR	Terms of Reference
USAID	United States Agency for International Development
USG	United States Government

I. EXECUTIVE SUMMARY

The Clean Energy Lending Toolkit is a reference guide prepared by USAID under the Analysis and Investment for Low-Emission Growth (AILEG) Project¹. Clean energy (CE) refers to renewable energy (RE) and energy efficiency (EE) systems that represent sustainable, more efficient use of indigenous resources that can supplant or diversify reliance on traditional fossil or other higher-carbon fuel sources. Typically, CE financing faces significant investment, institutional, policy, and capacity development barriers in developing countries that depress or eliminate incentives for the commercial lending sector to commit to this rapidly evolving market opportunity. Financial intermediaries (FIs) first need the ability to understand CE market opportunities and, second, develop the credit systems and products to effectively lend to consumers, Small and Medium Enterprises (SMEs), Energy Service Companies (ESCOs), and other clean energy providers. In 2013, USAID created the Clean Energy Lending Toolkit to offer FIs a practical guide to launching a clean energy lending line of business.

This report, provided by Development and Training Services Inc. (dTS), Abt Associates and Enclude Ltd., under the USAID Economic Growth Training (EGT) Project (Contract AID-OAA-C-12-00081), includes the findings and recommendations from pilot-testing of the USAID Clean Energy Lending Toolkit (Toolkit) in Liberia. It is based upon the information gathered by the team, Dr. Marcia Trump (Abt Associates) and Daniel Gies (Enclude Solutions Ltd.), during an in-country diagnostic and assessment engagement from March 24 to April 5, 2014. Two pilot-testing phases for the Toolkit have been envisioned, with Phase I (covered in this report) being the initial CE market and institutional bank readiness scans and also including recommendations for improving the effectiveness of the Toolkit (Box 1). The results of Phase I are to solicit go/no go decisions regarding DCA-approved banks' interest in CE lending in Liberia. If sufficient interest and capabilities exist by these banks and possibly other lending institutions in Liberia, Phase II of the pilot testing will move forward. During Phase II, clean energy finance experts will provide assistance to support the interested bank(s) in the development of appropriate CE loan products.

Phase I was launched in early 2014, when USAID/Liberia reached out to its Development Credit Authority (DCA) approved Liberian banks with loan guarantees for the CE market to determine their interest in pilot testing the Toolkit. With the International Bank of Liberia (IBLL) and Ecobank responding positively, USAID/Liberia and the USAID/E3 offices proceeded with sending the team, contracted through Development and Training Services Inc. (dTS) under the USAID Economic Growth Training Project (Contract AID-OAA-C-12-00081), to support the pilot testing of the Toolkit in Liberia.

The consulting team (CT) arrived in Monrovia, Liberia in late March 2014 to undertake a CE-focused quantitative and qualitative analysis of the banks with

Box 1. Objectives of Phase I

- 1. CE Market Scan:** Develop a summary market scan or diagnostic of the Liberian Clean Energy Market, with a focus on market size, needs, and recommendations.
- 2. Bank Readiness Assessment:** Conduct an internal diagnostic assessment of Ecobank and International Bank of Liberia in order to assess their willingness and capacity to engage in CE lending. This included working with the banks to quantify their engagement in the CE sector in the context of a "go/no-go" decision, and to make recommendations for potential new CE loan product development.
- 3. Pilot Testing the Toolkit:** Complete the pilot testing of the USAID Clean Energy Lending Toolkit (Modules 1-3) after conducting a formal workshop to assess the banks' current capacity to engage in CE lending. Provide recommendations to update the Toolkit based on feedback from the pilot test and the banks.

¹ Funded and managed by the USAID Offices of Economic Policy (EP), Micro-Enterprise and Private Enterprise Promotion Program (MPEP), and Global Climate Change (GCC) in the Bureau of Economic Growth, Education and Environment (E3).

the participation of senior management and staff. During the assignment, the team collaborated closely with USAID/Liberia and its key energy and private enterprise development programs – Investing for Business Expansion (IBEX), Liberia Energy Sector Support Program (LESSP), and Power Africa – to conduct the CE market scan and institutional readiness assessment to ascertain the financial viability of the local CE market and to solicit the level of interest of the banks to initiate CE lending.

Upon arrival, the CT met with the USAID/Liberia Private Enterprise Officer Mr. Stephen Berlinguette, USAID/IBEX Chief of Party Ms. Watchen Bruce, USAID/LESSP Chief of Party Mike McGovern as well as the USAID Power Africa and Energy Sector team (Mr. Edward Thornton, Mr. Luis Velazquez, Dr. Jeffrey Haeni) for a detailed briefing on the background and expectations of the engagement. This was followed by extensive meetings with IBLL, Ecobank and other stakeholders in order to assess the CE market in Liberia, to evaluate the banks' ability and willingness to target this market, and also to conduct the first pilot-test of the USAID Clean Energy Lending Toolkit. Annex I presents the schedule of meetings, contacts, and a list of activities undertaken by the team.

The CT met with a large number of USAID/Liberia counterparts, financial institutions, Liberian institutions, the Liberian Central Bank as well as USAID project implementers active in the renewable energy and business development areas. However, the most important meetings took place with the banks themselves. A Clean Energy Lending Workshop was convened by USAID/Liberia on Monday March 31, 2014 in Monrovia to introduce IBLL and Ecobank mid- to senior-level staff to the Toolkit, discuss Liberia's CE market, and solicit their recommendations regarding key risks and bank risk mitigation strategies if lending to the clean energy market (Annex 2: Workshop Agenda; Annex 3: Workshop Participants). After these meetings, the CE market lending opportunities, constraints and mitigating factors were discussed with USAID/Liberia on April 3, 2014 and both banks' senior management at out-brief meetings on April, 4 2014. These meetings covered the results of the CE workshop, the analysis of the trainers, and also the bank's participants of the constraints to CE lending, and finally the recommendations about next steps.

Based on the meetings held during the field visit, the bank assessment and the CE market scan, the CT developed the following findings, recommendations and next steps. These include:

- 1. CE Market Diagnostic: Potential Demand, Supply and Costs** - In Liberia, grid electricity reaches only 8% of potential customers, mostly in and around the capital, Monrovia. Demand far exceeds current energy supplies, and there are no national plans for universal access to electricity or energy production to meet rural and secondary cities' needs well into 2030. In contrast, there currently exist abundant supplies of renewables -- biomass, solar and hydro – and other CE resources (municipal solid wastes) that if used sustainably could more than meet the current and projected future off-grid rural energy demand. The costs of CE biomass and solar projects (USD 0.34-0.43/kWh) are on average 50% to 61% less than the off-grid diesel electricity costs (USD 0.68 - 0.78/kWh), and less than the current 2014 Liberia Electricity Company (LEC) tariff (USD 0.57/kWh). When hydro power from Mt. Coffee comes into LEC sometime between 2015-2020 grid prices may fall (USD 0.40/kWh). If only 50% of the unserved rural electricity demand was met by CE sources using an average off-grid diesel cost (USD 0.75/kWh), the annual revenues paid by off-grid rural consumers for electricity could exceed USD 100 Million per year; if using LEC 2014 tariff prices then potential revenues from unserved urban and rural residential users could be upwards of USD 400 Million per year. Studies by USAID LESSP indicate that the ability to pay by the average rural unserved residential consumer, however, is less than the average CE costs.² To address all the data points and to consolidate the CE market diagnostic for the partner banks, a table outlining the estimated potential total loan demand for CE technologies at a low range of USD 221 million and a high range of USD 376 million. The estimation methodology and data inputs are shown in Table 6 in Section 2.6.

² Alia Luz. February 2014. *Economic Analyses and Cost Feasibility for Private Sector Investments in Small Rural Off-Grid Electrification Systems in Bong, Lofa and Nimba Countries Today*. USAID Liberia Energy Sector Support Program. Winrock International. Monrovia, Liberia.

2. **CE Project Pipeline: Priority and Potential** - The CT's scan of the CE market indicates that although there are relatively few actors in this sector, there exists a sufficient "CE project pipeline" of five to ten priority projects for 2014 and total potential of fifty CE projects over the coming five years from corporate, SME and cooperative clients to enable the banks to successfully begin their engagement with this sector, if appropriately targeted. In addition to stand-alone CE projects, banks should look to their existing loan portfolios to see where current loans have "embedded energy lending", in which the loan includes financing for energy generation (capital and operating expenses) for a business. In such cases, a bank might be interested in financing CE over traditional fuels;
3. **Bank Readiness Assessment: Bank's CE Lending Risks, Ability, Decisions** - The banks have both indicated that they are willing to increase their engagement in CE lending activities through the development of a new product focused on the CE sector. Discussion with USAID/Liberia in late April/early May will confirm in writing the "go" decisions from IBLL and Ecobank as indicated to the team during the country visit;
4. **Bank Needs and Interest: Next Steps** -The assessment supports this commitment by the banks and concludes that although they lack substantial human capacity to conduct CE lending, this can be remedied by a technical assistance program building on the next phase of pilot-testing of the toolkit, as well as other measures highlighted below;
5. **Recommendations for Toolkit Customization** - The pilot-testing of the USAID Clean Energy Lending Toolkit at the Workshop and workshop evaluations indicate that it can be a tool of substantial utility for the CE banking sector in Liberia. There were a number of recommendations made by both the banks and the team to further increase the effectiveness of the toolkit as a resource to bank planning to increase their level of engagement in the CE sector. The focus by the bank's management was the need for more CE market information, minimization of perceived lending risks, securing long-term sources of financing for CE lending, and others. The team recommends that these suggestions and other updates be incorporated into a next draft, as further outlined below.
6. **Recommendation for Phase II** - Finally, considering the results of the market scan, bank assessment and the pilot test of the toolkit, in coordination with USAID/Liberia and USAID/E3, the CT recommends that the engagement be extended into a "Phase II" that will work with both banks on CE loan product development and capacity-building measures as well as leverage existing IBEX, LESSP, and Power Africa programs at the Mission to increase FI and CE project developers' capacity to engage in CE lending in Liberia after the conclusion of a product-development focused "Phase II."

Following the initial review of the report by USAID, additional information was requested on the "Estimated CE Loan Market Potential" for Liberia in order to share it with the banks. The requested information has been added into this report, with an explanation about the relevant assumptions presented in Annex VII. This pertains to the potential market size (number of users and expected uptake) and total loan demand and is based on values obtained from CE and USAID experts augmented as possible with country-based interviews and information based on desktop research. The estimation methodology and data inputs are shown in table 7 in section 2.6 and show that the potential total loan demand for CE technologies is estimated at a low range of USD 221 million and a high range of USD 376 million.

The total CE market size, uptake, and loan size data should now be discussed with the lending institutions – the DCA-approved banks -- who are the primary beneficiaries of the capacity-building exercise undertaken in Phase I of this project and who would be the primary beneficiaries and partners in Phase II of this project. Accordingly, the following sections present in greater details the findings and recommendations based on the CE market and bank diagnostic assessments as well as the CE toolkit pilot testing activity and provide the banks with sufficient information to make a go/no-go decision on continuing the activities of the pilot test. Recommendations about further activities and next steps are outlined in the remainder of the document.

2. CLEAN ENERGY MARKET DIAGNOSTIC

2.1 Overview

Financial Intermediaries first need to understand the CE market demand and supply as well as the investment opportunities and costs prior to developing CE lending lines of businesses. This Clean Energy Market Diagnostic helps FIs to gauge the technical viability and profitability of investing in renewable energy and energy efficiency projects following the process outlined by the Clean Energy Lending Toolkit, as applied in Liberia. It maps the key elements necessary for IBLL and EcoBank to assess:

- **Energy and CE Sector Market Scans** - the current and future energy and CE sector market demand (e.g., consumers' needs and ability to pay for the product);
- **Enabling Environment** – the institutional or enabling environment in terms of key regulatory, legal, and policy frameworks to support or constrain CE investments by FIs;
- **CE Technology Scan** – the potential supply and types of CE technologies in Liberia; and,
- **CE Project Pipeline Potential** - the existence and number of CE lending opportunities over the coming decade and beyond.

2.2 Energy Sector Market Scan: The Demand for Clean Energy

Liberia has one of the lowest rates of access to public electricity in Sub-Saharan Africa. Currently, about 10% of urban residents and less than 2% of rural residents have electricity access largely from self-generation using expensive imported fuel.³ This public electricity grid (Liberia Electric Company/LEC) serves only Monrovia and the surrounding corridor in the south. The civil war devastated Liberia's energy infrastructure, which is being rebuilt mostly with donor and public funding. The National Energy Policy (NEP)⁴ calls for a transition towards a mix of hydropower and oil (heavy fuel oil and diesel). Thus, Liberia's current reliance on diesel will taper off in the future when the refurbished Mt. Coffee hydropower plant(s) coming on line over the next five years.

Liberia's electricity demand projections for off-grid residential, commercial, industrial, public sector, and institutional users that were compiled in 2011 by the World Bank, assuming a conservative slow growth scenario, range from 109.8 to 1,154.5 GWh/year for 2010 to 2030, respectively, as shown in Table I. Total off-grid electricity demand may increase over twenty-fold in two decades, while on-grid demand may increase by half this amount. The country's financial resources are insufficient to expand the grid to meet half (53%) of rural demand even with LEC linking up to the West Africa Power Pool (WAPP) Côte d'Ivoire connection, which will help LEC to serve electricity to cities located near the WAPP transmission lines sometime after 2015 assuming investments from the donor and public sector and construction plans proceed as envisioned.⁵

³ National Energy Stakeholders Forum. <http://www.nefi.org.lr/content.php?details=National%20Policies>

⁴ Ministry of Lands, Mines and Energy. May 2009. *National Energy Policy: An Agenda for Action and Economic and Social Development*. Monrovia, Liberia.

⁵ Berlingiero, Bill Matthews, and Ju-Sung Park. October 2011. *Options for the Development of Liberia's Energy Sector*. World Bank. Report No. 63735-LR. Africa Energy Unit. Washington, D.C, http://siteresources.worldbank.org/EXTAFRREGTOPENERGY/Resources/717305-1266613906108/Liberia_Energy_ESW_11-4-11web.pdf

Table 1. Projected Total Electricity Demand in Liberia, 2010-2030 Slow Growth Scenario

USERS	2010	2015	2020	2030
On-grid (GWh/yr)				
Monrovia Electrical Grid	117.46	216.89	268.70	553.18
Other On-grid (WAPP Côte d'Ivoire interconnection)	2.98	14.46	21.51	43.29
Non-Monrovia Industrial	0	0	361.79	558.01
Total On-grid	120.44	2341.35	652.00	1,154.48
Off-grid (GWh/yr)				
Urban and rural residential, commercial, public, cell towers and other	8.62	42.41	63.62	128.02
Non-Monrovia Industrial	101.18	435.37	1,171.21	1,966.77
Total Off-grid (GWh/yr)	109.80	477.79	1,234.83	2,114.79
TOTAL DEMAND (GWh/yr)	230.24	709.13	1,886.83	3,269.27

Source: Berlingiero, Bill Matthews, and Ju-Sung Park. October 2011. *Options for the Development of Liberia's Energy Sector*. World Bank. Report No. 63735-LR. Africa Energy Unit. Washington, D.C. http://siteresources.worldbank.org/EXTAFRREGTOPENERGY/Resources/717305-1266613906108/Liberia_Energy_ESW_11-4-11web.pdf

Urban and Rural Off-Grid Demand in Liberia: The Clean Energy Market

The GoL, thus, states in its 2009 NEP that universal access to power in rural areas is “not a national mid-term goal of the Rural Energy Master Plan”. Therefore, Liberia’s Rural Renewable Energy Agency (RREA) is looking to meet off-grid and rural users’ energy needs with “affordable, sustainable and environmentally friendly modern energy sources”.⁶

The World Bank’s 2011 least-cost modelling analysis of Liberia’s energy supply over the coming decades shows an increasing reliance on hydropower with the addition of the Saint Paul River hydropower plants in 2020 and the Mano hydropower plan in 2025 bringing Liberia’s total projected hydropower capacity from 66 MW in 2015 from Mt. Coffee refurbishing up to 314 MW by 2025.⁷ In addition, it forecasts the necessity to use biomass for on-grid purposes pending some higher economic growth scenarios, and reinforces the RREA position that off-grid rural demand cannot be met by the grid but will need to rely on renewable energy resources for the foreseeable future into 2030 and beyond because the demand for electricity will far outstrip the potential grid supply.

Cost Comparison and Advantages of Clean Energy to Conventional Systems

Given the large unmet off-grid demand for electricity and power, especially by the commercial and industrial users which are the country’s engine of growth, reliance on CE appears essential if the supply and costs are favorable. Hence, the prices paid for grid vs. off-grid electricity (tariffs) established by MLME’s Energy Review Board (ERB), costs of clean energy, willingness to pay (WTP) and ability to pay (ATP) for electricity by different consumer classes (low income residential, commercial, vs. industrial), plus the

⁶ Ministry of Lands, Mines and Energy. May 2009. *National Energy Policy: An Agenda for Action and Economic and Social Development*. Monrovia, Liberia.

⁷ Berlingiero, Bill Matthews, and Ju-Sung Park. October 2011. *Options for the Development of Liberia's Energy Sector*. World Bank. Report No. 63735-LR. Africa Energy Unit. Washington, D.C. http://siteresources.worldbank.org/EXTAFRREGTOPENERGY/Resources/717305-1266613906108/Liberia_Energy_ESW_11-4-11web.pdf

potential electricity revenues paid by all consumers all impact the profitability of the clean energy market, and hence loan repayments from FIs to CE project developers.

The ERB follows an electricity pricing policy of “cost-reflective but affordable pricing” for energy. Under NEP, independent power generators and distributors according to GoL regulations can establish their own prices, which are subject to “costs allowed by the ERB and pricing principles designed to facilitate access by the poor. Appropriate financing mechanisms will need to be established to support all economically and socially acceptable rural energy projects regardless of financial viability. Targeted subsidies in the form of grants, low interest loans or guarantees shall be utilized to allow access by the poor”.⁸

No in-depth electricity pricing analysis currently exists of actual market prices paid for grid and off-grid electricity. USAID has and is supporting efforts to conduct such analyses through LESSP and Power Africa initiatives, with results of an Independent Power Producer analysis due in late June 2014. A quick survey of energy prices and CE costs by the team, which reportedly are being paid by electricity customers and approved by MLME⁹, shows a wide variability from the current average USD 0.57/kWh for LEC grid electricity in Monrovia to USD 0.68 - 0.78/kWh average for off-grid diesel systems or over 80% increase in grid versus off-grid electricity prices from diesel fuels compared to LEC Monrovia prices. MLME expects the projected LEC tariff will fall once Mt. Coffee begins supply hydropower to the grid, and LEC estimates that its tariffs may drop on average to USD 0.40/kWh or be 30% less than current 2014 LEC tariff price. In contrast, USAID’s LESSP estimated that the costs of electricity from various RE projects may average from USD 0.34/kWh to USD 0.43/kWh (Table 2).

Thus, according to the costs realized through on-going off-grid CE demonstration projects supported by USAID LESSP, the unit costs of CE projects range from 50% to 61% less than off-grid costs and monthly connection charges from 21 to 54% less than diesel off-grid prices currently being paid by off-grid power producers. It appears that CE projects might be an attractive investment option for FIs now and in the future given the large unmet rural off-grid electricity demand from residential and most importantly industrial/commercial consumers. But banks are also worried about the subscription rates and repayment revenue potential from CE users.

To answer this question, the CT assessed the potential annual electricity revenues coming from rural off-grid users depending on a range of user class and subscription rate assumptions (Table 3). If one uses the current tariff structures or market retail prices that grid and off-grid consumers currently pay to obtain electricity either through LEC or by stand-alone off-grid generation, using prices obtained from the USAID Liberia Energy Sector Support Program (LESSP), then Table 4 shows the amount of potential revenues that commercial bankers could expect CE producers to receive assuming 100% repayment from urban and rural off-grid residential customers depending on location and average monthly bills. For total urban and rural off-grid customers, the total revenue potential could be as high as \$450M, assuming diesel must meet these needs. For rural off-grid customers, the revenue potential is almost \$92M if paying the current LEC bill per month. Potential revenues double to slightly over \$200M if rural residential users pay the average stand-alone electricity price in rural unserved areas, and drops down to under \$100M if the off-grid average monthly bill is based on the costs of CE, as projected by LESSP. If only 50% of the off-grid market urban and/or rural could be met with CE sources, the revenue source for repayment of commercial loans to banks would be in the range of \$50-100M/year, which is a substantial annual cash flow potential due to clean energy developers just from rural household electricity users.

⁸ Ministry of Lands, Mines and Energy. May 2009. *National Energy Policy: An Agenda for Action and Economic and Social Development*. Monrovia, Liberia.

⁹ These prices were provided to the team by the USAID LESSP, IBEX and Clean Energy Lending workshop participants,

Table 2. Comparison of Grid/Off-Grid Electricity Costs by Fuel Type, Technology and Location

Location	Off-Grid Renewable Energy (RE) System	Electricity Costs			Connection Costs		
		Off-Grid Diesel (USD/kWh)	Off-grid Renewable (USD/kWh)	RE as % Diesel Costs (%)	Off-Grid Diesel (USD/mo)	Off-Grid Renewable (USD/mo)	RE as % Diesel Costs (%)
Grid electricity LEC (2014)	X	0.57	X	X	X	X	X
Grid electricity LEC (2020)	X	0.40	X	X	X	X	X
Off-grid Sorlumba Community, Lofa County	Crude Palm Oil in Lister Engine	0.78	0.42	54%	20.57	10.65	52%
Off-grid Kwendin Community, Nimba County	Rubber Tree Chips in Gasifier	0.68	0.34	50%	22.19	11.99	54%
Off-grid Gbarnway Community, Lofa County	Solar Photovoltaics	0.71	0.43	61%	23.84	4.96	21%

Source: Luz, Alia. February 2014. *Economic Analyses and Cost Feasibility for Private Sector Investments in Small Rural Off-Grid Electrification Systems in Bobg, Lofa, and Nimba Counties Today*. USAID Liberia Energy Sector Support Program. Winrock International. Monrovia, Liberia.

Table 3. Potential Revenues Paid for Grid and Off-Grid Households in Liberia

Customer	LEC 2014 Tariff (\$57/amp)	LEC 2025 Tariff (\$40/amp)	2014 Off-Grid (\$75/amp)	2025 Off-Grid (\$50/amp)	CE Price (\$30/amp)
Total	\$ 50,501,357	\$ 259,299,473	\$ 447,068,057		\$ 28,501,451
Total Urban	\$ 208,408,133	\$ 154,179,486	NA		\$ 135,866,980
Total Rural	\$ 92,634,471	NA	\$ 201,379,286	\$116,799,986	\$ 92,634,471

2.3 Enabling Clean Energy Environment Scan: Legal and Policy Incentives

Many policy directives are in place to support clean energy expansion in off-grid and rural areas in Liberia but the financial and institutional resources need strengthening and capacity development. The GoL stated that “in keeping with the United Nations’ Millennium Development Goals, as adopted by the Economic Community of West African States, it has these goals:

- 40% of Liberian citizens living in rural and peri-urban areas and using traditional biomass for cooking shall have access to improved stoves and kerosene or efficient-gas cookers in order to reduce indoor pollution;
- 30% of the urban and peri-urban population shall have access to reliable modern energy services enabling them to meet basic needs (lighting, cooking, communication, and production activities);
- 15% of the rural population and 25% of the schools, clinics, and community centers in rural areas shall have access to modern energy services to meet the same basic needs.

The GOL will promote renewable energy use in power plants and all large commercial facilities such as supermarkets, hotels, restaurants, entertainment centers, hospitals, and large retail shops and stores to supply commercial, industrial, and residential energy users.¹⁰

Liberia has set up some of the institutional framework tasked with the development of clean energy in the country but there is a lack of serious human and capital resources to fully meet the demands for assistance in the CE market. The Off-Grid Power and RE Unit in the MLME (within the Division of Electricity and Renewable Energy) and Rural Renewable Energy Agency (RREA) are the primary GoL institutions dedicated to provide assistance to remote and low income communities in the country. RREA also has an associated Rural Energy Fund (REFund) that can provide technical and financial support, which again is not sufficient to meet RREA needs. A recently approved World Bank Climate Investment Fund (CIF) loan for Scaling-up Renewable Energy Program (SREP) of USD 50 Million will go far to help financing local capacity and CE development in Liberia.¹¹

According to the NEP, “GoL established and enforces technical standards for renewable energy technologies used for off-grid electrification. The Government shall also establish a licensing system for installation contractors. Notwithstanding the Government’s explicitly stated desire to provide access to the whole country, the law is silent on the special needs for rural energy investments and hence, minimal attention has been devoted to rural areas in practice.”¹² Low income, remote rural areas simply cannot attract the level of CE investments as can rural areas with productive (agribusiness, mining, palm plantations, forestry, and processing) assets where CE is financially viable to provide energy services.

In practice, thus, delivery of off-grid rural energy services in Liberia are regulated and delivered by public and private sector organizations (especially by the productive and extractive industries), community energy developers, small fledgling electricity coops, and informally approved IPPs. Regulatory oversight by the ERB in MLME was established in the 2009 NEP. While businesses are permitted to build their plants with electricity generation and have rates approved by ERB, in reality those delivering stand-alone or mini-grid electricity or other energy production (thermal-electric) capacity are being informally approved by GoL through such business/construction permits or concessions, but may not be legally recognized forever for energy generation, distribution and transmission. Even so despite the lack of a legal structure guaranteeing these off-grid energy generation rights, there exists many informal understandings and concessions being given by MLME to business owners and small cooperatives, in essence independent power producers (IPPs), to generate, distribute and sell off-grid thermal and/or electric power in Liberia.

The institutional enabling environment for CE lending in Liberia would change quite positively once, and if, the new energy policy act being considered by the GoL is enacted and if LEC is strengthened to better coordinate with off-grid IPPs and stand-alone or mini-grids. The specific enabling requirements for scaling up commercial clean energy systems in the country include¹³:

- **Obtaining an L-EPA Permit:** A clean energy provider needs to have several permits to operate, which include environmental and construction permits from the Liberia Environment and Protection Agency (L-EPA) and EMMP (Construction and Operation);
- **Cooperative Charter:** If the electricity generator and distributor is an electric cooperative, as with several LESSP projects, this energy provider must obtain a cooperative charter from the government;

¹⁰ National Energy Stakeholders Forum. <http://www.nefl.org.lr/content.php?details=National%20Policies>

¹¹ Climate Investment Fund/World Bank. 2013, *SREP Investment Plan for Liberia*. Presented to SREP Sub-Committee. Washington, D.C. Agenda Item 4. October 31. 2013.

https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/SREP_SC.10_4_Investment_plan_for_Liberia_.pdf

¹² Ministry of Lands, Mines and Energy. May 2009. *National Energy Policy: An Agenda for Action and Economic and Social Development*. Monrovia, Liberia.

¹³ McGovern, Michael. February 2014. *Planning, Designing, Cost, Operational and Institutional Issues of Rural Off-Grid Renewable Energy Systems in Bong, Lofa, and Noimba Counties*. USAID Liberia Energy Sector Support Program. Winrock International. Monrovia, Liberia

- **LEC Concession and Agreement:** All clean energy providers need agreements with LEC to legally generate and distribute energy either on or off-grid. While most IPPs and CE systems active in the country currently possess “informal” agreements, the lack of legally binding power purchase agreements (PPA) or off-take agreements from LEC is a serious weakness for banks, which need to collateralize these loans. If LEC were to change management or oversight arrangements with the government, the ability to obtain PPAs during any such transition or reorganization would need to be addressed by the MLME;
- **Tribal Agreements:** Possibly tribal agreements may be needed to legalize land or other rights for CE projects;
- **Land Deeding and Easements:** Different types of CE owners/operators will need to show banks that they possess the necessary land deeds and easement rights to build and operate the systems;
- **Fuel Supply Agreements:** A clean energy project owner/developer will need to have legally binding supply agreements for biomass (e.g., palm oil, rubber tree chips, palm kernels, bagasse) or other RE energy sources to be bankable by financial institutions;
- **Business, Management, O&M, Safety, Legal and Environmental Training;** For commercial sustainability, the CE developers/operators must be able to demonstrate to commercial lenders their ability to profitably run the operation over time. At this point, few institutional (training) support programs and equipment suppliers/repairers exist to provide such O&M support.

2.4 Clean Energy Supply: Sources, Technologies, and Energy Potential

Liberia’s energy sector assessment prepared by MLME’s 2009 National Energy Policy (NEP)¹⁴ discusses the importance of clean energy to supply off-grid and rural energy given the expectation that LEC cannot be sufficiently expanded in the coming decades to meet this unserved demand. Liberia’s Rural and Renewable Energy Agency (RREA) states that CE would be used primarily for expanding energy access of rural off-grid customers not served by the LEC or the West Africa Power Pool (WAPP) grid. RREA is not looking for universal access to power in rural areas in the coming two decades rather looking to increase rural users’ access to “affordable, sustainable and environmentally friendly modern energy sources”.¹⁵ The energy production, environmental, economic growth and diversification benefits of CE are that it can supplant or supplement current and future conventional high-carbon fuel sources, often at lower costs to society.

RREA’s CE supply expansion goals are to increase renewable energy use to 30% of electricity production and 10% of overall energy consumption, while increasing biofuels in transport to 5% of national consumption by 2015. The primary sources of renewable energy in Liberia in order of abundance are:

- I. **Biomass systems**
 - a. **Biodiesel:** crude palm oil (CPO) and coconut oil used in Lister engines currently
 - b. **Biogas:** palm oil effluence/residues/kernels, coconut residues (husks), rubber tree woodchips, municipal solid wastes, and other crop residues used in gasifiers
 - c. **Biofuels:** palm kernels, husks, bagasse residues, and wood chips used in boilers.
2. **Solar power systems**
 - a. solar photovoltaic (PV) panels
 - b. solar lanterns for lighting and charging batteries
 - c. solar thermal for residential and industrial hot water
 - d. Solar PV refrigeration

¹⁴ Ministry of Lands, Mines, and Energy. May 2009. *National Energy Policy: An Agenda for Action and Economic and Social Development*. Republic of Liberia. Monrovia, Liberia.

¹⁵ Ministry of Lands, Mines and Energy. May 2009. *National Energy Policy for Liberia*. Monrovia, Liberia.

3. Hydropower systems

- a. Mini-hydro
- b. Micro-hydro

The USAID LESSP project has been successfully documenting and demonstrating the feasibility of RE systems in Liberia.¹⁶ Table 4 below summarizes the largest potential for CE to produce liquid and power generation from biomass resources, with coming from the National Renewable Energy Laboratory (NREL)¹⁷ and Liberia's RREA. The table suggests that there are substantial biomass supplies in Liberia to meet off-grid electricity demand in 2015 for Liberia if one only draws on palm oil and sugarcane bagasse residues. Indeed, a major nexus that is and should continue to be seriously explored is leveraging CE market lending assistance with loan application by agribusinesses and other productive sectors, which are often creditworthy and current customers of the DCA banks and other FIs.

The USAID LESSP project has demonstrated the technical viability of several biomass and biofuel technologies, notably the use of crude palm oil (CPO) in Lister engines and use of biomass residues in gasifiers.¹⁸ Solar PV panels and lanterns are currently being sold with import incentives from RREA by retailers in Liberia, and have the potential for significant expansion under World Bank and other donor concessionary loan programs.

Having sufficient supplies of biomass and biofuels or even hydro power, does not necessarily equate to environmentally sustainable or desired societal use of clean energy. Shifting crude palm oil (CPO) to supplying the energy rather than the food market may cause food security problems. NREL, LESSP and others agree that there are sufficient biomass supplies at present not to adversely using up to 25% cropland. Increasing demand for CPO could spur higher conversion of fragile forest lands to palm plantations, which if not sustainably managed would create negative environmental effects such as land degradation, and biodiversity and carbon sequestration losses. Careful enforcement of sustainable, environmental management standards and monitoring are needed with biomass and hydro use.



Solar Lantern. World Bank.

¹⁶ Winrock International. June 2012. *Rapid Appraisal of Renewable Energy Options for Liberia: Solar, Wind and Biomass Energy Resources Report*. USAID Liberia Energy sector Support Program. Monrovia, Liberia.

¹⁷ Milbrandt, Anelia. 2009. *Assessment of Biomass Resources in Liberia*. National Renewable Energy Laboratory (NREL). Technical Report. NREL/TP-6A2-44808 April 2009. The study assessed supply from oil palm and coconut along with sugarcane biomass as diverse applications as energy sources for the production of transportation fuels and power generation.

¹⁸ Michael McGovern. Feb 2014. *Electricity in Bong, Lofa, and Nimba Countries today and Tomorrow*. USAID Liberia Energy Sector Support Program (LESSP). Winrock International. Monrovia, Liberia.

A recently approved USD 50 Million loan from the World Bank's fund -- Scaling-Up Renewable Energy Program in Low-Income Countries Investment Plan (SREP IP) -- shall flow into and be managed by RREA during the coming year, with important implications for rapid capacity development and access to concessional financing for CE development. The Liberia Investment Plan for Renewable Energy prepared by RREA for MLME (2013) sent to SREP stress the importance to accelerate rural access to electricity with more rapid reconstruction and revitalization.¹⁹ The major SREP projects to be funded by the Bank loan are hydro, with a focus on the several sites identified as potential for creating regional mini-grids to local businesses and adjacent communities that will not have access to LEC or WAPP in the coming decade. Thus, major donor or concessional loan funds for CE market development from the Climate Investment Funds are dedicated primarily to capital-intensive hydropower options in the country.

Table 4. Potential Biomass Energy Supply for Liberia by Region (2009)

County	Liquid Fuels (dam ³ /yr)			Electricity Generation (GWh/yr)			
	Biodiesel from Crude Palm Oil	Biodiesel from Coconut Oil	Ethanol from Sugarcane	Urban Municipal Solid Waste	Palm Oil Residues	Coconut Residues	Sugarcane Residues
Bomi	282	99	235	NA	2,713	70	1,367
Bong	942	324	770	NA	8,883	228	4,475
Grand Bassa	589	206	491	NA	5,664	145	2,853
Grand Cape Mount	273	95	227	NA	2,621	67	1,320
Grand Gedeh	39	14	33	NA	378	10	191
Grand Kru	172	60	143	NA	1,654	42	833
Lofa	531	186	442	NA	5,101	131	2,570
Margibi	275	96	229	NA	2,639	68	1,329
Maryland	135	47	112	NA	1,296	33	653
Montserrado	0	0	0	NA	0	0	0
Nimba	859	301	716	NA	8,259	212	4,161
River Cress	105	37	88	NA	1,013	26	510
Sinoe	50	17	41	NA	477	12	240
River Gee	44	16	37	NA	476	11	215
Gbarpolu	300	105	250	NA	2,883	74	1,453
TOTAL Supply	4,580	1,603	3,817	51.6	44,070	1,330	22,170
CE as % of Total Off-grid Demand (2015)				1%	9,224%	278%	4,640%

Source: ¹ Milbrandt, Anelia.. 2009. *Assessment of Biomass Resources in Liberia*. National Renewable Energy Laboratory (NREL). Technical Report. NREL/TP-6A2-44808 April 2009. The study assessed supply from oil palm and coconut along with sugarcane biomass as diverse applications as energy sources for the production of transportation fuels and power generation.

Assumptions: Using 25% available cropland for all biomass supply estimates. Units: dam³ – cubic decameter or 1,000 m³ or 10⁶ L, described in some sources as a ML (Megaliter).

¹⁹ Climate Investment Fund/World Bank. 2013, *SREP Investment Plan for Liberia*. Presented to SREP Sub-Committee. Washington, D.C. Agenda Item 4. October 31, 2013. https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/SREP_SC.10_4_Investment_plan_for_Liberia_.pdf

2.5 Clean Energy Project Lending Pipeline in Liberia

Current Clean Energy Projects

Liberia has clean energy projects operating and demonstrating the technical viability of using biomass, solar, and hydro resources in the country. USAID LESSP Project has documented between 10 to 15 active off-grid RE projects, which include small hydro, solar, and small-scale biomass including their demonstration projects, which received grant funding.²⁰ These LESSP CE projects are vital to local capacity development by training national experts in designing, operating, maintaining, and monitoring these investments.



USAID LESSP Project in Liberia.
Photo credit: Winrock International.

Potential Pipeline of Clean Energy Projects for Commercial Banks

Two sources of CE projects exist for the lending sector: (1) new “stand-alone” CE projects where CE fuels are substituted for the use of traditional fuels (diesel, fuel oil) or (2) “embedded energy financing loans where banks find energy systems being financed within their existing loan portfolio and can finance at lower capital and operating costs CE systems to replace traditional fuels being used by the client (e.g., business, clinic, school, commercial or residential builder, and retail distributor).

If the commercial lending sector decides to invest in CE, it needs a pipeline of bankable stand-alone and embedded CE energy projects. Given on-going USAID/Liberia activities to identify national IPP suppliers and lenders’ stated preferences for looking at a pipeline of potential projects, the following set of almost 50 potential CE investments were identified that require a broad range of technical project development and loan investment support (Table 5). Assuming that each project would request a loan for working or investment capital of USD 50K (small solar distributors) to the DCA max of USD 500K (larger I+MW operations), then the loan portfolio market for the banks might go from USD 2.5Million to USD 25Million over the next five years. The advancement in terms of project origination definition and loan requirements of potential CE developers also varies substantially, with most listed projects being far from ready for preparing credit-worthy applications at this point. A preferable process is to develop a “Fast-Forward” list of the most well-defined projects with sufficient engineering and business plans to meet the banks’ credit hurdles. The initial draft of such a list is included in Table 5, below.

In addition to new stand-alone CE loans, banks should look “inward” to their existing loan portfolios to identify “embedded energy financing” that could profit from the substitution of CE for traditional fuels (i.e., diesel). IBL staff during the Toolkit training workshop, for example, identified several corporate loan clients currently using diesel generation who might be interested in switching to crude palm oil.



USAID LESSP Lister Engine Project.
Photo credit: Winrock International



USAID LESSP Project.
Photo credit: Winrock International

²⁰ McGovern, Michael, February 2014. *Electricity in Bong, Lofa, and Nimba Countries Today and Tomorrow*. Liberia Energy Sector Support Program (LESSP) for USAID by Winrock International.

Table 5. Potential Clean Energy Lending Project Pipeline in Liberia

No.	Recipient Organization	CE Fuel & Technology	Location	Contact Person
1	A. T. Akakpoe Construction company	Biomass	Montserrado County	Charles Togba
2	ADI Contractor	Hydropower	Montserrado County	Momo Kamara (0886571571)
3	Africa Green Energy System	Solar	Montserrado County	James S. Korha
4	Afrique Construction & Maintenance Co.	Biomass	Montserrado County	Soko Sackor
5	Akins Building Inc.	Biomass	Montserrado County	Leva A. Taylor
6	Alternative Energy	Biomass	Montserrado County	Thomas Kpoto
7	Beacon of Hope for the Least Developed	Not available	Montserrado County	Rebecca Miller
8	Boimah Engineering	Biomass	Montserrado County	Sigmund Wright
9	C. J Construction Inc.	Hydropower	Montserrado County	Bernard Aghom
10	C. M. Company	Hydropower	Montserrado County	Bernard Aghom
11	Community Power House	Solar	Montserrado County	David Tarley
12	Dig's Light	Solar	Montserrado County	Irene George
13	EADECON LIB INC.	Not available	Montserrado County	John K. Kapakolo
14	Eagle Power Electric Company	Solar	Margibi County	Emmanuel Giddings (0886-550-988)
15	EcoPower	Biomass	Not available	Not available
16	Engineering Society of Liberia	Biomass	Montserrado County	Thomas Gonkerwor
17	Fabrar Rice	Biomass	Kakata, Margibi	
18	Gbanway Electric Cooperative	Biomass	Montserrado County	Moses K. Willion (0886-751-491)
19	Geontia Liberia LTD	Hydropower	Montserrado County	H. Kwaku Addy (0888-640-972)
20	Green Consulting Environment company	Biomass	Montserrado County	Godwin Senegah
21	Gregory Altman		z Unknown	Gregory Altman
22	Hadris Construction & Engineering Inc.	Hydropower	Montserrado County	James Miller (0886-775975/0776574685)
23	International Energy Services ltd		Montserrado County	Ayemi Sandy
24	Interwood Construction & Engineering		Montserrado County	Wabel Harb
25	Itergrated Technology & Engineering Network		Montserrado County	Danletta Scere
26	J.R. Money Grow	Biomass - palm kernels; gasifier	Monrovia-HQ, Cape Mount, Rural Montserrado and Margibi	Henry Junior (0886 414 554)
27	Liberia Energy Network	Solar	Montserrado County	Abubakar K. Sherif (0886-412-792)

28	Liberia Equipment Ltd		Montserrado County	Abednego Gargard
29	Liberian Oil Palm Farmer's Union (LOPFU)	CPO/Lister Engine	Totota	Chars Brown (0880 599 399)
31	Liberia Reconstruction & Development Co.		Montserrado County	Albert Sangs
30	Liberty Works Inc.	Biomass- palm kernels; gasifier	Montserrado County	Fabio Lavelanet (0886-109-817)
31	Mahud Johnson	Biomass - palm kernels; gasifier	Montserrado County, Kakata Country	Mahmud Johnson (0777-550-008)
32	Mein River Company	Hydropower	Bong County	George King
33	Newlook Construction & Development		Montserrado County	Alex Wesley
34	P. A. C. (Liberia)		Montserrado County	Simon Chabel
35	Pealat Construction Company		Montserrado County	Praise O. T. Lawal
36	Possible Construction Company	Hydropower	Montserrado County	Matthew H. Nyarko
37	Renewable Energy Corp		Montserrado County	Burgess H. Houston
38	S. Jedi Green Energy		Montserrado County	Roy Stin Geeplia
39	S. S. F. Inc.		Montserrado County	Shawki Fadas (0886-483-688/0888-406-238)
	Swaray Oil Depot (Bong Oil Buyers Association)		Bong County	Ayouba Swaray (886958119)
40	Sawyer & Associates		Montserrado County	Nathaniel Hina
41	Seek Engineering & Construction		Montserrado County	J. Nyuma
42	Sikor Power		Montserrado County	Sensee A. Bawer
43	Silokon Group Inc.		Montserrado County	Barteh Freeman
44	Sjedi Green Energy	Clean Cook stove	Montserrado County	Peter Gbejilia
45	Solar Solution Liberia INC	Solar	Montserrado County	Rachard A. Nimmo (0886-618-321)
46	Sorlumba Community Electric Cooperative	Hydropower	Lofa County	Jefferson Fallah Tengbeh (0886-226-516)
47	Suakoko Community	Hydropower	Bong County	George King
48	Sustainable Development Project	Not available	Montserrado County	Momo G. Stevens
49	Total Quality Engineering Technology	Hydropower	Montserrado County	James Baxter
50	Wendell Engineering & Consultancy	Not available	Montserrado County	Amos H. Perkins
51	West Africa Energy	Not available	Montserrado County	Amos H. Perkins

2.6 Clean Energy Loan Market Potential, Conclusions and Recommendations

In addition to the possible CE market pipeline, the CT compiled indicative information regarding an estimated CE Loan Market potential for Liberia to share with the banks. The requested information has been compiled in Table 6 below, with an explanation about the relevant assumptions presented in Table 7 and Annex VII. The Tables and Annex pertain to the potential market size (number of users and expected uptake) and estimated total loan demand based on values obtained from CE and USAID experts, secondary sources and supplemented where ever possible with country-based information from a desktop research. The values for potential loan clients, which are the basis of hypothetical CE loan demand, will require confirmation by the banks and substantiation with primary country data. Table 6 shows a potential total loan demand for CE technologies at a low range of USD 221 million and a high range of USD 376 million. The total CE market size, uptake, and loan size data should now be discussed with the lending institutions – the DCA-approved banks -- who are the primary beneficiaries of the capacity-building exercise undertaken in Phase I of this project and who would be the primary beneficiary and partner in Phase II of this project.

In summary, the Liberian CE market scan finds:

1. **Energy and CE Sector Market Scans** – significant unserved energy demand exists from rural off-grid energy users that could be met with the abundant supply of CE in the country at prices favorable to commercial banks to recover their loans and profit from CE lending. Banks can make CE loans to existing clients ;
2. **Enabling Environment** – the institutional or enabling environment is quite weak and will need support from the private and public sector to ensure the GoL passage of the new energy act that provides clear legal and regulatory rights for off-grid energy production to non-public suppliers
3. **CE Technology Scan** – biomass, solar, and hydro are the primary CE sources in Liberia with demonstration of the technical and financial viability by USAID LESSP of using biofuels from CPO in Lister engines and biomass residues in gasifiers; and,
4. **CE Project Pipeline Potential** – there exist at least 5-10 potential CE projects that with technical assistance in business plan and loan application development combined with assistance in the creation of CE credit products by the banks could be explored over the coming 2-5 years, with a larger set of 50 potential CE developers expressing interest in entering the market.

These abundant renewable biofuels and bio-power options that could meet a significant unserved off-grid rural electricity demand are sustainably produced and managed to not cause food security or environmental degradation.

Recommendations from the analysis are that 1) USAID proceed to Phase II of the Toolkit and CE lending market pilot testing in Liberia and 2) integrate support for the CE lending market across the existing donor and USAID projects (e.g., SREP, Power Africa, IBEX, LESSP).

Table 6. Potential Clean Energy Market Size in Liberia – To Be Shared with DCA Banks

Bundle of Energy Services Delivered by System Size (Tiers)	Consumer	Clean Energy Fuel/Technology System	Average CE Technology System Values												Estimated CE Loan Market Potential*						
			Energy Demand			Low LCOE Scenario			High LCOE Scenario			Capital Costs Only			Potential Market Demand			CE Financing Potential			
			Required kWh per yr ^a	Required kWh per yr ^a	Average System Size (kW)	LCOE per kWh (USD/kWh)	Average CE System Costs (USD)	Average CE System Loan Needs- 50% Financing (USD)	LCOE per kWh (USD/kWh)	Average CE System Costs (USD)	Average CE System Loan Needs- 50% Financing (USD)	Initial capital cost per kw, does not include O&M (USD)	Average CE System Costs (USD)	Average CE System Loan Needs- 50% Financing (USD)	Potential Number of Clients	% Annual Uptake	Total Projected Demand	Low LCOE Loan Opportunity (USD)	High LCOE Loan Opportunity (USD)	Capital Cost Only Loan Opportunity (USD)	
Unelectrified Households																					
Lights, cell phone charging, radio, fan	Rural Households w/o Electricity	Solar PV	781.20	0.20	0.45	\$ 0.24	\$ 937	\$ 469	\$ 0.43	\$ 1,680	\$ 840	\$ 3,000.00	1,337.67	\$ 669	276,292	5%	13,815	\$ 6,475,188	\$ 11,601,379	\$ 9,239,709	
		Solar Lanterns	3.35	0.15	0.003	\$ 0.24	\$ 20	\$ 10	\$ 0.24	\$ 20	\$ 10	\$ 500.00	20.00	\$ 10				15%	41,443.86	\$ 414,439	\$ 414,439
Lights, cell phone charging, radio, fan	Urban Households w/o Electricity	Solar PV	781.20	0.20	0.45	\$ 0.24	\$ 937	\$ 469	\$ 0.43	\$ 1,680	\$ 840	\$ 3,000.00	1,337.67	\$ 669	392,833	15%	58,925	\$ 27,619,288	\$ 49,484,557	\$ 39,411,084	
		Solar Lanterns	3.35	0.15	0.003	\$ 0.24	\$ 20	\$ 10	\$ 0.24	\$ 20	\$ 10	\$ 500.00	20.00	\$ 10				25%	98,208.20	\$ 982,082	\$ 982,082
Commercial, Industrial and Community Users (off-grid conversion from diesel or other traditional fuel to renewable fuel sources)																					
Lights, sewing machine, music system, television, fans, small refrigerator, or blender	Micro-Enterprise	Solar PV	5,500	0.16	3.92	\$ 0.24	\$ 8,250	\$ 4,125	\$ 0.43	\$ 14,781	\$ 7,391	\$ 3,000.00	11,772.26	\$ 5,886	173,000	5%	8,650	\$ 35,681,250	\$ 63,928,906	\$ 50,915,026	
		Biogas	-	0.20	0.00	\$ 0.34	\$ -	\$ -	\$ 0.34	\$ -	\$ -	\$ 4,000.00	0.00	\$ -	173,000	5%	8,650	\$ -	\$ -	\$ -	
		Biofuels (Oils)	5,500	0.40	1.57	\$ 0.12	\$ 1,650	\$ 825	\$ 0.42	\$ 5,775	\$ 2,888	\$ 2,500.00	3,924.09	\$ 1,962	173,000	5%	8,650	\$ 7,136,250	\$ 24,976,875	\$ 16,971,675	
		Biomass (Agricultural waste)	5,500	0.35	1.79	\$ 0.18	\$ 2,829	\$ 1,414	\$ 0.34	\$ 5,343	\$ 2,671	\$ 2,500.00	4,484.67	\$ 2,242	173,000	5%	8,650	\$ 12,233,571	\$ 23,107,857	\$ 19,396,200	
30 lights, 14 computers, 1 printer	Small-Business and Institutions	Solar PV	10,000	0.25	4.57	\$ 0.24	\$ 9,600	\$ 4,800	\$ 0.43	\$ 17,200	\$ 8,600	\$ 3,000.00	13,698.63	\$ 6,849	4,800	5%	240	\$ 1,152,000	\$ 2,064,000	\$ 1,643,836	
		Biogas	10,000	0.20	5.71	\$ 0.34	\$ 17,000	\$ 8,500	\$ 0.34	\$ 17,000	\$ 8,500	\$ 4,000.00	22,831.05	\$ 11,416	4,800	5%	240	\$ 2,040,000	\$ 2,040,000	\$ 2,739,726	
		Biofuels (Oils)	10,000	0.40	2.85	\$ 0.12	\$ 3,000	\$ 1,500	\$ 0.42	\$ 10,500	\$ 5,250	\$ 2,500.00	7,134.70	\$ 3,567	4,800	5%	240	\$ 360,000	\$ 1,260,000	\$ 856,164	
		Biomass (Agricultural waste)	10,000	0.35	3.26	\$ 0.18	\$ 5,143	\$ 2,571	\$ 0.34	\$ 9,714	\$ 4,857	\$ 2,500.00	8,153.95	\$ 4,077	4,800	5%	240	\$ 617,143	\$ 1,165,714	\$ 978,474	
Serving 300 households (HH), with a health clinic, school and/or other 3 small businesses.	Energy Cooperative for a Community (mini-grids)	Solar PV	290,000	0.25	132.42	\$ 0.24	\$ 278,400	\$ 139,200	\$ 0.43	\$ 498,800	\$ 249,400	\$ 3,000.00	397,260.27	\$ 198,630	116	100%	116	\$ 16,147,200	\$ 28,930,400	\$ 23,041,096	
		Biogas	290,000	0.20	165.53	\$ 0.34	\$ 493,000	\$ 246,500	\$ 0.34	\$ 493,000	\$ 246,500	\$ 4,000.00	662,100.46	\$ 331,050	116	100%	116	\$ 28,594,000	\$ 28,594,000	\$ 38,401,826	
		Biofuels (Oils)	290,000	0.40	82.76	\$ 0.12	\$ 87,000	\$ 43,500	\$ 0.42	\$ 304,500	\$ 152,250	\$ 2,500.00	206,906.39	\$ 103,453	116	100%	116	\$ 5,046,000	\$ 17,661,000	\$ 12,000,571	
		Biomass (Agricultural waste)	290,000	0.35	94.59	\$ 0.18	\$ 149,143	\$ 74,571	\$ 0.34	\$ 281,714	\$ 140,857	\$ 2,500.00	236,464.45	\$ 118,232	116	100%	116	\$ 8,650,286	\$ 16,339,429	\$ 13,714,938	
		Hydro	290,000	0.22	150.48	\$ 0.22	\$ 290,000	\$ 145,000	\$ 0.34	\$ 448,182	\$ 224,091	\$ 4,000.00	601,909.51	\$ 300,955	116	100%	116	\$ 16,820,000	\$ 25,994,545	\$ 34,910,751	
Agricultural (palm) or rubber plantation processing center	Large Commercial	Biogas	300,000	0.20	171.23	\$ 0.34	\$ 510,000	\$ 255,000	\$ 0.34	\$ 510,000	\$ 255,000	\$ 4,000.00	684,931.51	\$ 342,466	2,174	5%	109	\$ 27,718,500	\$ 27,718,500	\$ 37,226,027	
		Biofuels (Oils)	300,000	0.40	85.62	\$ 0.12	\$ 90,000	\$ 45,000	\$ 0.42	\$ 315,000	\$ 157,500	\$ 2,500.00	214,041.10	\$ 107,021	2,174	5%	109	\$ 4,891,500	\$ 17,120,250	\$ 11,633,134	
		Biomass (Agricultural waste)	300,000	0.35	97.85	\$ 0.18	\$ 154,286	\$ 77,143	\$ 0.34	\$ 291,429	\$ 145,714	\$ 2,500.00	244,618.40	\$ 122,309	2,174	5%	109	\$ 8,385,429	\$ 15,839,143	\$ 13,295,010	
		Hydro	300,000	0.33	103.78	\$ 0.22	\$ 200,000	\$ 100,000	\$ 0.34	\$ 309,091	\$ 154,545	\$ 4,000.00	415,110.00	\$ 207,555	2,174	5%	109	\$ 10,870,000	\$ 16,799,091	\$ 22,561,229	
Total Demand																			\$ 221,834,125	\$ 376,022,167	\$ 350,332,997

Table 7. Potential Clean Energy Market Size in Liberia – Notes and Supplementary Information to Table 6

Notes:
* CE client demand is based on USAID expert opinions, not country surveys. The data presented in the table is from a variety of sources as noted in the comments. Most of the cost and energy use data were collected on-site or from Liberian secondary data sources, the data of potential demand however is based on inputs from CE experts in the country and USAID as part of desk-top research requested by USAID. Ranges are provided given for cost information given the diversity from various sources and there is a need to reconfirm potential demand by clients through in-country analysis. The data needs to be discussed with the banks, who are the primary beneficiary of the capacity-building exercise undertaken in Phase I of this project and who would be the primary beneficiary and partner in Phase II of this project.
Capacity factors from Luis Velaguez, Senior Engineer, USAID/Liberia Mission.
The estimated investment is calculated for the installation of a power generation unit sufficiently large to provide for the annual electricity consumed. Annual O&M costs are not included.
Solar home system kWh cost assumes 25 year lifespan and minimal O&M. As indicated in the LESSP report, PV manufacturers routinely provide 25 year warranties on PV panels.
Household size is 5 persons as per Liberia 2008 census.
The mini-grid CE lending scenario is assumed to serve 300 HH (using approx. 800 kWh/yr/HH), one health clinic (using 20,000 kWh/yr) and 3 small businesses (using 10,000 kWh/yr). Potential demand assumes there are 700,000 Liberian HH, of which 5% would be eager for this sort of arrangement, this would be 35,000 HH. Assuming the mini-grid serves 300 HH, that equates to 116 mini-grid systems with an average cost. Assuming banks would lend 50% loan to value.
Sources:
1. Milbrandt, Anelia. 2009. <i>Assessment of Biomass Resources in Liberia</i> . National Renewable Energy Laboratory. Technical Report NREL/TP-6A2-44808. Boulder, Colorado. April 2009.
2. Rural and Renewable Energy Agency (RREA) Sept. 3, 2013. <i>Draft Investment Plan for Renewable Energy</i> . Liberia Ministry of Mines, Lands, and Energy, Monrovia, Liberia.
3. Luz, Alia. 2014. <i>Economic Analyses and Cost Feasibility for Private Sector Investment in Small Rural Off-Grid Electrification Systems in Bong, Lofa and Nimba Counties Today</i> . Liberia Energy Sector Support Program. 5 February 2014.
4. Thailand Ministry of Energy, Department of Alternative Energy Development and Efficiency. November 2007. <i>Project on Studying of Energy Efficiency Index in Rubber Industry</i> . Bangkok, Thailand.

Population in Liberia (2014)

Population	Total	Percentage
Urban pop	2,067,541.00	59%
Rural	1,409,655.00	41%
Total	3,477,196.00	

Source: World Bank Liberia Country Profile website (2014)

Off-Grid Rural Population

% Rural Off-grid Population	98%
# Rural Off-grid population	1,381,462
# Rural HH w/o Electricity	276,292.38

Off-Grid Urban Population

% Urban Off-grid Population	95%
# Urban Off-grid population	1,964,164
# Urban HH w/o Electricity	392,833

Clean Energy and Grid/Off-Grid Pricing Analysis

Location	Off-Grid Renewable Energy (RE) System	Electricity Costs
Grid electricity LEC (2014)		\$ 0.57
Grid electricity LEC (2020)		\$ 0.40
Off-grid Diesel		\$ 0.73
Off-grid Sorlumba Community, Lofa County	Crude Palm Oil in Lister Engine	\$ 0.32
Off-grid Kwendin Community, Nimba County	Rubber Tree Chips in Gasifier	\$ 0.34
Off-grid Gbarway Community, Lofa County	Solar Photovoltaics	\$ 0.43

Source: Luz, Alia. February 2014. *Economic Analyses and Cost Feasibility for Private Sector Investments in Small Rural Off-Grid Electrification Systems in Bong, Lofa, and Nimba Counties Today*. USAID Liberia Energy Sector Support Program. Winrock International. Monrovia, Liberia.

3. BANK READINESS ASSESSMENT

In accordance with the USAID Scope of Work, the CT was tasked to conduct a diagnostic assessment of each of the two banks, in order to determine each bank’s willingness and ability to launch clean energy lending services in Liberia. The Enclude Clean Energy Bank Diagnostic Assessment was therefore conducted on both banks (IBLL and Ecobank) during the 15-day on-the-ground assessment mission in Monrovia.

The Enclude Clean Energy Banking Diagnostic Assessment methodology focuses on three key areas of commercial bank operations in terms of their actual and potential ability to serve the CE segment in accordance with their current capacity. These areas are assessed based on “paper” criteria, i.e. does the policy documentation exist, and also on “practice” criteria, i.e. is the policy actually implemented by the staff of the bank. In detail, these three key areas include:²¹

1. **Strategy, Management and Execution Capabilities:** Assesses the Bank’s ability to design a business-driven CE strategy and to consistently execute this strategy. This involves the evaluation of the overall framework for strategy design, HR management, performance management, and the evaluation of the specific CE focus implemented in the bank’s strategy and organizational structure.
2. **Market and Products:** Assesses the extent of the market currently targeted by the bank, the comprehensiveness of the Bank’s product offer, and the ability of the bank to address the CE customer segments, with a view to creating value for the clients and additional profitability for the bank.
3. **Sales and Delivery Channels:** Assesses the bank’s ability to shift from a traditional corporate-lending culture, mainly based on individual relationship banking, to a culture focused on CE expertise, as well as CE client acquisition, service, and retention. To efficiently manage the trade-off between volume and risks, in CE lending, sector knowledge, loan analysis, and market understanding are key elements in making the credit decision.

A more detailed breakdown of the bank CE diagnostic categories are outlined below:

Figure 1. Enclude Bank Diagnostic Categories

1	A	Strategy and Management	Strategy and Management - Strategy
	B		Strategy and Management - Business Model
	C		Strategy and Management - Employee Selection and Capacity
	D		Strategy and Management - Employee Training
2	A	Market and Products	Market and Products - Research
	B		Market and Products - Segmentation
3	A	Sales and Delivery Channels	Sales and Delivery Channels - Marketing & Client Selection
	B		Sales and Delivery Channels - Delivery Channels

Each question in the above categories are answered “positively” or “negatively” and a corresponding numerical score is given. This score is then weighted based on its importance to the task at hand, in this case related to clean energy lending. The score is used to create a heat map and other graphic indicators that indicate areas where the bank will need improvement to meet best practices, and also serve to identify potential weaknesses. In each table, a percentage score is given for paper and practice areas that are used to generate graphics and to prepare a report, if appropriate, for the evaluated bank.

²¹ The Full Enclude Bank Diagnostic methodology consists of five key elements, including the three in the figure above and also Credit Methodology and Information Systems. Due to the abbreviated nature of the assignment, the Credit Methodology and Information Systems sections of the Diagnostic were not completed in this Phase.

The final result of this assessment is primarily qualitative, not subjective, since it analyzes on a relative scale taking into account Enclude's experience through its financial and technical involvement in dozens of financial institutions in emerging countries, on four continents and at different stages of development. The assessment was complemented by the CE Lending Toolkit Workshop in the second week of the assignment, which expanded on some of the results and was found to be particularly useful to the participating bankers.

Following this methodology, each bank was assessed in accordance with the same diagnostic framework, and each bank had the opportunity to provide feedback on its ratings and also on the constraints to CE lending during the training workshop on March 31, 2014. In some cases, results may seem repetitive across both banks, but are in all cases listed out in full for detail and ease of presentation. The assessment results are presented below for each of the DCA-supported banks. The assessment identifies strengths that each bank can potentially leverage as well as funding and capacity gaps to be addressed to enable the bank to make its CE lending "go / no-go" decision.

3.1. International Bank of Liberia Limited (IBLL)

Background

IBLL is primarily a corporate bank, not a retail bank. It has focused on mid-level corporate borrowers since most of the supported businesses are either corporates or SMEs. The bank is active in trade, construction, and light manufacturing. For over 60 years the bank was a struggling institution, serving mainly the Liberian shipping industry, before finally being virtually bankrupt a decade ago. In 2006 PACG took a majority stake the failing bank, which was then subsisting primarily on money transfers. Over the last years the group has returned to profitability and grown in assets. Today the balance sheet is over USD 100 million and the ROA of the banks is 1.5% compared to -0.5% for the sector in Liberia (2012 data).

In terms of the interest rates charged by the banks, these are essentially capped by the Central Bank at 14% and IBLL's range from 10-14%. Primary funding comes from demand deposits at 1-2% cost. The bank's management has recently tried to raise deposits from international corporates up to a term of 12 months with at 5% rate, which the bank hopes will be "stickier." Raising international funding from OPIC and others has been difficult given their interest rates tend to be in the 8% range, leaving little room for a spread considering the central bank effective caps.

As outlined later in this document, IBLL is currently operating with a maturity mismatch for any longer term loans, which is relevant for clean energy projects. It is hoped that USAID, OPIC or Power Africa could be helpful in facilitating longer-term facilities or other incentive packages for IBLL to mitigate this important issue.

Clean Energy Awareness

IBLL has a strong interest in this sector but no prior knowledge or exposure. The bank understands the criticality of energy access and reducing costs of energy from their own energy bills, and appreciates the struggles of SMEs with costs of USD 55 cents per KWH. IBLL pays for energy from the LEC grid, but for them it is cheaper to run a generator.

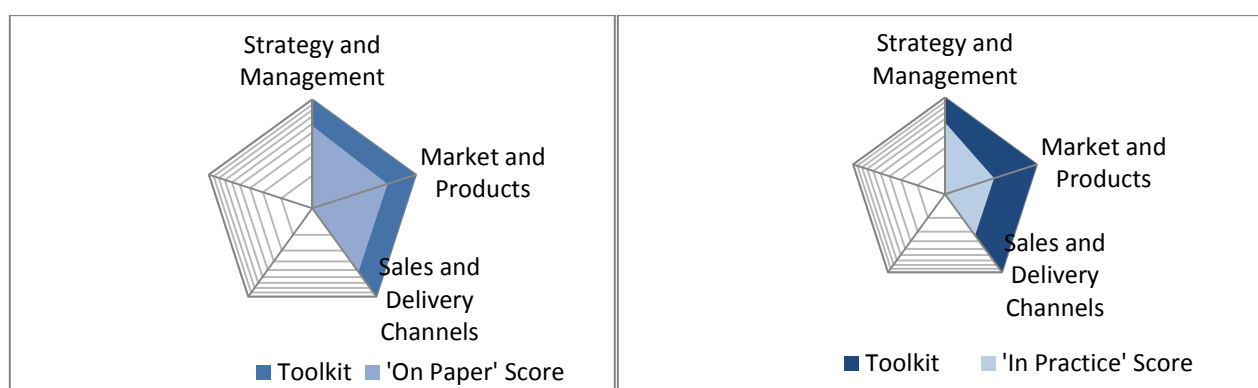
USAID has provided a USD 6.868 million DCA guarantee to IBLL to scale up financing to SMEs throughout Liberia across various sectors, including clean energy. The development objective of the DCA guarantee was to increase lending to SMEs in order to bolster economic growth, job creation, and food security. The guarantee has been underutilized and as a result it has recently been expanded to additional sectors including transportation, trade, hospitality and others. Currently, the USAID/IBEX project is providing significant technical support to the bank to alleviate these issues.

IBLL Diagnostic Findings

The Enclude Clean Energy Banking Diagnostic Assessment covers the areas of Strategy/Management, Market/Products and Sales/Delivery Channels. The overall assessment evaluated the bank's current policies and practices across a range of factors including a total of 221 questions in the three areas, subdivided by "paper" and "practice" categories.

The graphical results of the overall assessment indicate that the bank is within an acceptable range of an acceptable score, and with only a slight differential between paper and practice. In the graph, "toolkit" means a perfect score, and the colored areas the banks' fraction of perfect, as below:

Figure 2. Overall Diagnostic Results of the Three Assessment Categories



Broken out by category, the assessment reviews the ability and willingness of IBLL to conduct CE lending in Liberia, as outlined below:

a. Strategy and Management

Management and Strategy

- The analysis of this area indicates that IBLL's management, strategy and implementation capabilities are sufficiently strong and can support a CE lending business line or specialized product. IBLL has procedures in place that make it capable to increase outreach to the CE sector, if there is sufficient management willingness.
- IBLL does not have a CE lending strategy at this stage. The bank is strongly considering moving into this business as a result of perceived market demand, particularly for those urban and rural residents who will not be able to access the LEC grid for many years, if ever.
- The bank however does not plan to lend to CE or any other kind of start-up, which will reduce its outreach into this market as there are very few established players.

Organizational Structure

- There is no specialized CE department. The Head of Credit reports to the Managing Director for the entire country, supported by a few external consultants.
- Specialized lending units are not reflected in the bank's organizational structure.
- Discussions at the bank are to develop a "Clean Energy Desk" in Monrovia, which will manage any potential CE deals with 1-2 key loan officers, reporting to the Corporate Department and working on other corporate deals as appropriate.

Employee Selection, Capacity and Training

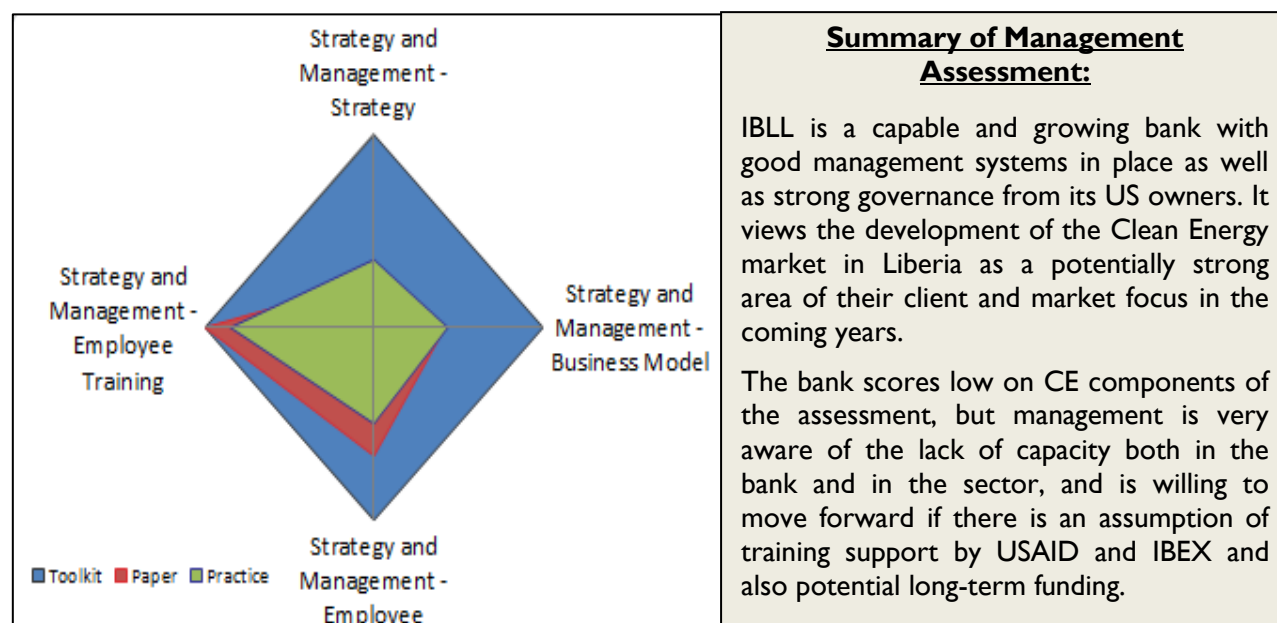
- Branch Managers, Relationship Managers, Credit Analysts and Managers currently lack CE lending skills. There is no CE sectoral knowledge in the bank.
- IBLL occasionally struggles with dishonest employees, but continues to push for training and other incentives to motivate staff. IBLL has participated in a number of trainings in the past in credit analysis and more recently the USAID workshop on the CE Toolkit.

The score of the assessment (weighted) for assessment category I is specified in the table and figure below:

Table 8. Overall Diagnostic Results of the Strategy/Management Assessment Categories

	Score		Percentage	
	Paper	Practice	Paper	Practice
Strategy and Management - Strategy	12	17	6.6%	5.2%
Strategy and Management - Business Model	19	16	10.5%	4.9%
Strategy and Management - Employee Selection and Capacity	9	14	5.0%	4.3%
Strategy and Management - Employee Training	14	20	7.7%	6.1%

Figure 3. Graphical Diagnostic Results of the Strategy/Management Assessment Categories



b. Market and Products

Products

- The bank does not have any CE finance products at this stage. Each case is processed on merit (using its internal credit application and assessment forms, which are accessible in its IT system), in terms of loan appraisal and motivation for approval.

Pricing and Term

- Currently charging interest rates of between 12-14% per annum.
- Sourced funds are overwhelmingly customer demand deposits, paid out at between 1% and 2% interest per annum. A plan exists to introduce longer-term deposit structures but these have not yet been launched by the bank.
- Financing term is important, and there is a lack of long-term funding.

Processes

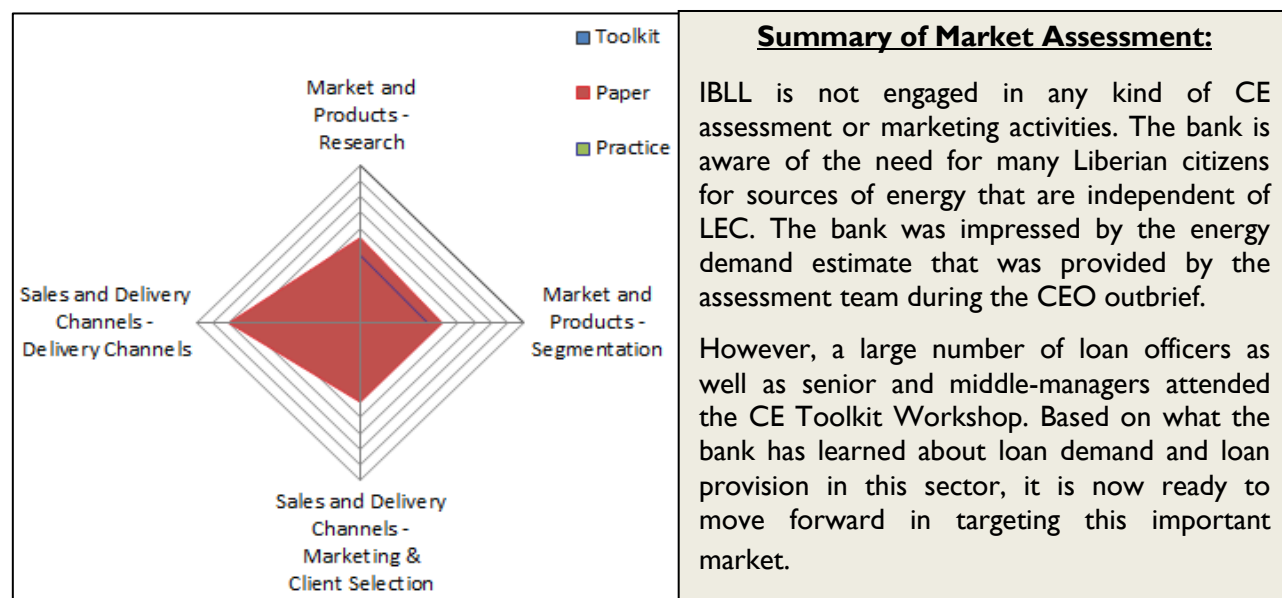
- Loan officers work well with management (Corporate, SME, etc.) to prepare, appraise and present loan applications for approval. Site visits are undertaken where necessary.
- No in-depth market research has been undertaken for the CE segment, and thus the business model in operation is not adapted to development of the CE market.
- There are no processes at the bank yet to analyze CE loans as compared to normal loans.

The score of the assessment (weighted) for assessment category II is in the table and figure below:

Table 9. Overall Diagnostic Results of the Market/Management Assessment Categories

	Score		Percentage	
	Paper	Practice	Paper	Practice
Market and Products - Research	13	21	7.2%	6.4%
Market and Products - Segmentation	2	17	1.1%	5.2%

Figure 4. Graphical Diagnostic Results of the Market/Product Components (note: viewed right and up)



c. Sales and Marketing

Marketing

- The bank has yet to use any kind of marketing or delivery channel to serve potential CE clients.
- Up and cross-selling opportunities presented by either an agricultural lending approach or an energy-savings approach are currently unexploited, such as the possibility to make agricultural loans to CE biofuel producers around the larger rubber plantations.
- The bank leverages some of the linkages with its US-based owners to engage in some trade financing and also to speak to international funders, although this has not happened recently.

Sales Channels

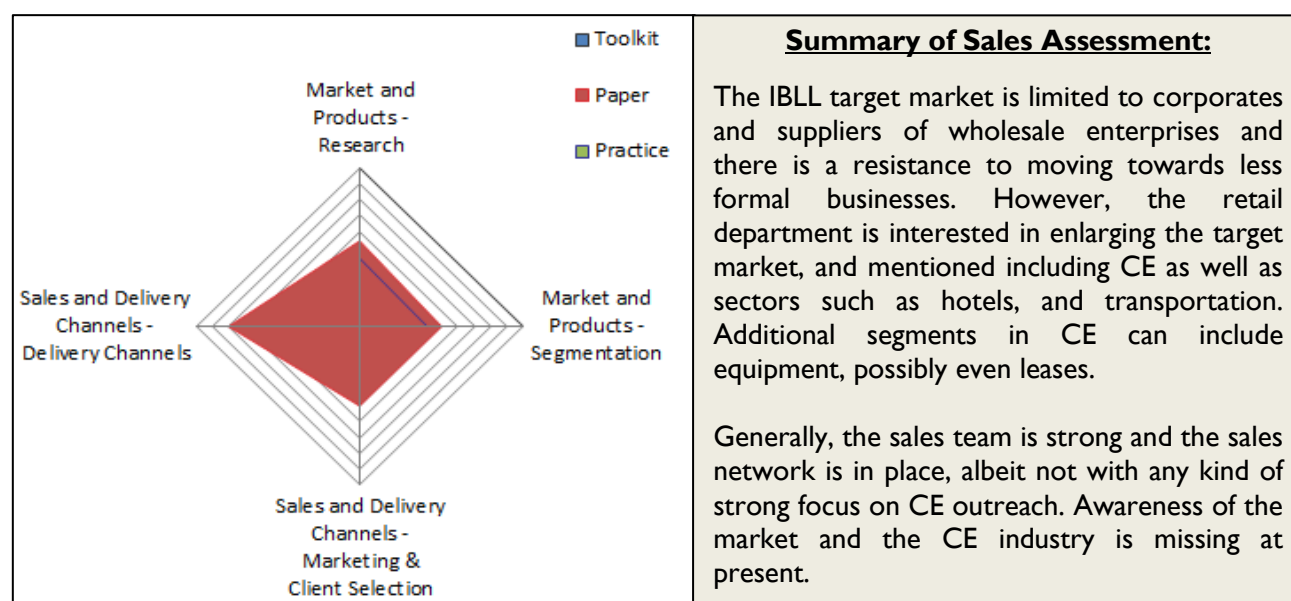
- There is low market coverage and client acquisition channels– the bank is not present in most of the rural areas of Liberia.
- IBLL has a strong sales culture. However, there is insufficient focus on products: no “Product Champions / Ambassadors”, and no clear sales objective per product

The score of the assessment (weighted) for assessment category III is in Table 8 and Figure 4 below:

Table 10. Overall Diagnostic Results of the Sales/Channels Assessment Categories

	Score		Percentage	
	Paper	Practice	Paper	Practice
Sales and Delivery Channels - Marketing & Client Selection	10	21	5.5%	6.4%
Sales and Delivery Channels - Delivery Channels	1	15	0.6%	4.6%

Figure 5. Graphical Diagnostic Results of the Market/Product Components (note: viewed right and up)



Summary SWOT Analysis for CE Lending at IBLL

There is potential for IBLL to profitably target the CE sector in Liberia. However, it is important that the bank identifies and defines, through a strategy exercise, stages and segments of the CE value chain that it finds most appealing. The bank will also need to develop appropriate products, sharpen CE lending skills, and above all, leverage its branch network to drive volume. However, the long-term success will depend on how quickly and aggressively it adopts a holistic approach to CE lending.

That proposed CE approach makes it imperative for IBLL to start work on developing its internal capacity. To begin this process, the assessment outlines a SWOT analysis as per Table 9 below:

Table 11. SWOT Analysis for CE Lending at IBLL

Strengths	Weaknesses
Market position and geographic outreach	No CE strategy or business plan
Strong organizational partnerships (USAID, IBEX, DCA) and access to technical assistance	No long-term financing sources which are needed for usual CE loan sizes of 3-7 years
Strong staff commitment and morale	No CE sector experience or awareness
Solid lending policies and procedures, US-backed ownership and management involvement strengthens governance	Lack of understanding of the CE market
Awareness of technical assistance needs	Unclear collateral requirements for CE loans
Opportunities	Threats
High market demand of the population for more power and clean energy sources	That CE is not the panacea expected by the international community for energy needs
Government policy and CE support initiatives coming online to finance the sector	Low access to long-term financing which is generally required for CE projects
Long-term financing sources are potentially available via Power Africa, OPIC, AfDB, others	Poor payment ability/willingness by CE borrowers and consumers
Strong need for equipment which can be collateralized, and leveraged with donor finance	Poor CE loan product design

IBLL Constraint Identification and Mitigation for CE Lending by the Bank

During the assignment, the bank was assessed in accordance with the Enclude CE Diagnostic framework. Interim narrative results were shared with the bank, which had the opportunity to provide feedback on its ratings. Following this, a wide session with 12 bank employees on the perceived and actual constraints to CE lending was conducted during the CE Toolkit workshop on March 31, 2014. At this session, the bankers identified the top-10 constraints and outlined mitigation strategies with the trainers in an open and participative discussion.

The results of the top-10 constraint assessment by the participating bankers are below in the table:

Table 12. IBLL Constraint Identification and Mitigation for CE Lending

Constraints Identified by Bank	Recommended Mitigation Strategies
1. No Market Knowledge	Engage with USAID partners and others for detailed information about the CE market and developments
2. Lack of LT Financing Sources	Develop a strategy and CE specialized product(s) and then reach out to the multilaterals, OPIC, WB and others for potential long-term financing
3. Unknown Cost of Financing	This will be determined during the product development process which will include appropriate pricing decisions
4. Uncertain Recovery	Risk mitigation strategies apply here as per normal banking practices

5. Equipment Warranty and Service	Important issue: Banks must only support clients who acquire good-quality equipment from a reputable dealer that provides warranty coverage and maintenance
6. Unknown CE Product Terms	Determined during the product development process
7. Collateral Conditions	This will be determined during the product development process, but the DCA guarantee can be taken into account in making the collateral-coverage decision
8. Risk and Return Uncertain	This will be determined during the product development process, risks to be assessed and mitigated
9. Low Cash of Rural Clients	A key point – borrower analysis will be particularly important during the credit assessment process
10. No Experience with CE Product	Engage with USAID partners and others for detailed information about the CE market and developments

At the workshop, the bankers were then organized into groups and asked to identify the top-three constraints to expanding their banks' CE loan portfolio. They were then asked to prepare a formal presentation to their CEO about what these constraints were and what they would do to alleviate the constraints. The results of this exercise are below in Table 11:

Table 13. Top Constraints and Recommended Mitigation Strategies by IBLL

Top Three Constraints	Recommended Banker Mitigation Strategies
1. Lack of LT Financing Source	As above, but with more details on finalizing the product development and then reaching out to OPIC and others
2. Product Pricing and Terms	Suggestions were made but will be finalized during loan product development (including market research)
3. Loan Security / Collateral	"Know your borrower" practices, a focus on cash flow

These constraints and the recommended mitigating factors were discussed with the IBLL General Director at an outbrief meeting on April 4, 2014. This meeting covered the results of the workshop, the analysis of the trainers and also the bank's participants of the constraints to CE lending, as well as the recommendations about next steps presented later in this document.

Recommendations for IBLL

In order for IBLL to deepen and broaden its CE portfolio in a sustainable manner, which takes advantage of its capabilities and branch network; the dormant synergy between potential CE lending segments; and also the opportunities presented by growth in the CE sector, the recommendations outlined in the below table were made by the CT directly to the bank's senior management:

Table 14. IBLL Recommendations for CE Lending

Recommendations	
CE Financing Market	Liberia faces significant challenges in assuring energy supply for much of its population. Based on trends related to increasing sources of clean energy production as well as project donor activities, we project that the size of the market for clean energy lending approaches USD 100 million / year.
CE Financing Strategy	Based on this every-increasing market size, we recommend that the bank develop a summary strategy which spells out its vision for supporting CE lending; lays the plan for achieving that vision; and incorporates staff training and an appropriate organizational structure, among other considerations, to target this market.

CE lending skills and knowledge	In order to facilitate this, we recommend that the bank develop lending capacity in CE lending at both operational as well as at head office levels, through training and market linkages facilitated by various USAID programs in Liberia.
Organizational Partnerships	In this context, the bank should take advantage of the opportunities presented by its partnership with USAID/DCA and USAID/IBEX to access CE training, develop its internal staff capacity, as well as to strengthen the pipeline of its CE clients.
New CE finance product(s)	During this process, it is recommended that the bank develops one or more CE loan products aligned to the needs of CE players and with a view to approach OPIC, AfDB and other international lenders for long-term financing and other support.
Approach for holistic CE lending	Finally, we recommend that the bank work with USAID/IBEX and others to adopt a holistic approach to CE lending, taking into account the challenges of the market in Liberia. Support from USAID may be available to assist your bank in this effort.

Specifically, these constraints and recommended mitigating factors were discussed with the bank General Manager at an out-brief meeting on April 4, 2014. This meeting covered the results of the workshop, the analysis of the trainers and also the bank’s participants of the constraints to CE lending, and finally the recommendations about next steps. The response of the General Manager was one of acceptance; his one-sentence response was “yes, we need to do this, and we want to move forward on the next steps as soon as possible.” Based on the results of the meeting, the team finalized its recommendations for the achievement of these goals, which are made at the end of the report. The next step is to brief USAID on these results and the proposed work plan, and then finalize with the bank if the approval from USAID to move forward is secured.

3.2. Ecobank Liberia

Ecobank Liberia is the biggest bank by branch network and total assets in Liberia. The bank was started in 1999 and recently moved from an institutional bank to a focus on retail banking with a total of 30 outlets. Ecobank is interested in rice and cassava investments as well as rubber and farm rehabilitation. Its group presence, large branch network, interest in agricultural finance and strong financial standing makes it a logical partner bank for clean energy lending in Liberia.

Background

Ecobank is the leading pan-African banking group, with a presence in 33 African countries and international offices in Paris, London, Dubai and Beijing. At year-end 2012, the Group had US\$20 billion in assets and US\$2.2 billion in total equity. With more than 650,000 institutional and individual shareholders, ETI is one of the largest listings on the Lagos, Accra and Abidjan (BRVM) stock exchanges.

In Liberia, Ecobank obtained a license to operate as a commercial bank in August 1999. Until recently, Ecobank Liberia Limited was a wholly owned subsidiary of Ecobank Transnational Incorporated (ETI), a bank holding company incorporated in 1985 under the laws of Togo. Ecobank Liberia has an asset base of USD 289.27 million (as of December 2012). Since there are only 9 licensed banks in Liberia, Ecobank is maintaining a leading role as the largest commercial bank in the country. The bank currently has 28 branches and a range of internet and other channels meeting the needs of both urban and rural customers. Ecobank is regulated by the Liberian Central Bank, has met all regulatory requirements as of today and remains committed to operating within local prudential guidelines.

As explained earlier in the background section about IBLL, interest rates are essentially capped by the Liberian Central Bank at 14% and Ecobank’s range from 10-14%. Primary funding comes from demand deposits at 1-2% cost. Similar to IBLL and other banks in Liberia, Ecobank is currently operating with a maturity mismatch for any longer term loans, due to lack of LT funding, although it has a small trade finance loan product with a term of 3-5 years. During the workshop, hope was expressed that USAID or Power Africa could be helpful in structuring discretionary liquidity facilities or other incentive packages for Ecobank to ease the funding issue.

Clean Energy Awareness

As with IBLL, Ecobank has expressed some interest in CE lending, but the bank has no prior knowledge or exposure. Like most businesses in Monrovia, Ecobank pays for energy from the LEC grid, but it would be cheaper to run its own (diesel) generator. Indirectly the bank is already moving into some form of retail financing for solar lamps, as it has made a loan to a small MFI in the rural areas which is moving into this business.

USAID/DCA has provided a USD 3.42 million guarantee to Ecobank to scale up financing to Liberian SMEs across various sectors, including clean energy. The development objective of the DCA guarantee was to increase lending to SMEs in order to bolster economic growth, job creation, and food security. The guarantee has been underutilized and as a result it has recently been expanded to additional sectors including transportation, trade, hospitality and others. Currently, the USAID/IBEX project is providing significant technical support to the bank to reach out to these new sectors in order to increase utilization of the guarantee.

Ecobank Diagnostic Findings

The Enclude Clean Energy Banking Diagnostic Assessment covers the areas of Strategy/Management, Market/Products and Sales/Delivery Channels. The overall assessment evaluated the banks current policies and practices across a range of factors including a total of 221 questions in the three areas, subdivided by “paper” and “practice” categories.

The graphical results of the overall assessment indicate that the bank is within an acceptable range of an acceptable score, and with only a slight differential between paper and practice, as below in Figure 5:

Figure 6: Overall Diagnostic Results of the Three Assessment Categories



Broken out by category, the assessment reviews the ability and willingness of Ecobank to conduct CE lending in Liberia, as outlined below:

a. Strategy and Management

Management and Strategy

- The assessment of this area indicates that Ecobank’s management, strategy and implementation capabilities are sufficiently strong and can support a CE lending business line or specialized product. Ecobank has procedures in place that make it capable to increase outreach to the CE sector if there is management willingness.
- As with IBLL, Ecobank does not have a CE lending strategy at this stage. The bank is considering moving into this business, but wants to learn more and to plan to move into potential product development efforts more slowly than IBLL.
- The bank however does not plan to lend to CE or any other kind of start-up, which will reduce its outreach into this market as there are currently very few established players. However, it is aware of upcoming changes in the Liberian Energy Law and admits that this may change its view in the near future.

Organizational Structure

- There is no specialized CE department. The Director of Corporate would likely be in charge of any new CE loan product development, but this has not been decided officially by the bank although recommendations have been provided.
- Specialized lending units are not reflected in the bank’s organizational structure with the exception of Corporate, Retail and SME lending.
- A mid-level manager in the SME department has expressed strong interest in managing CE lending efforts by the bank as they are developed. His role is strongly supported by the CE team, and is currently under discussion but no quick decisions are expected by Ecobank.

Employee Selection, Capacity and Training

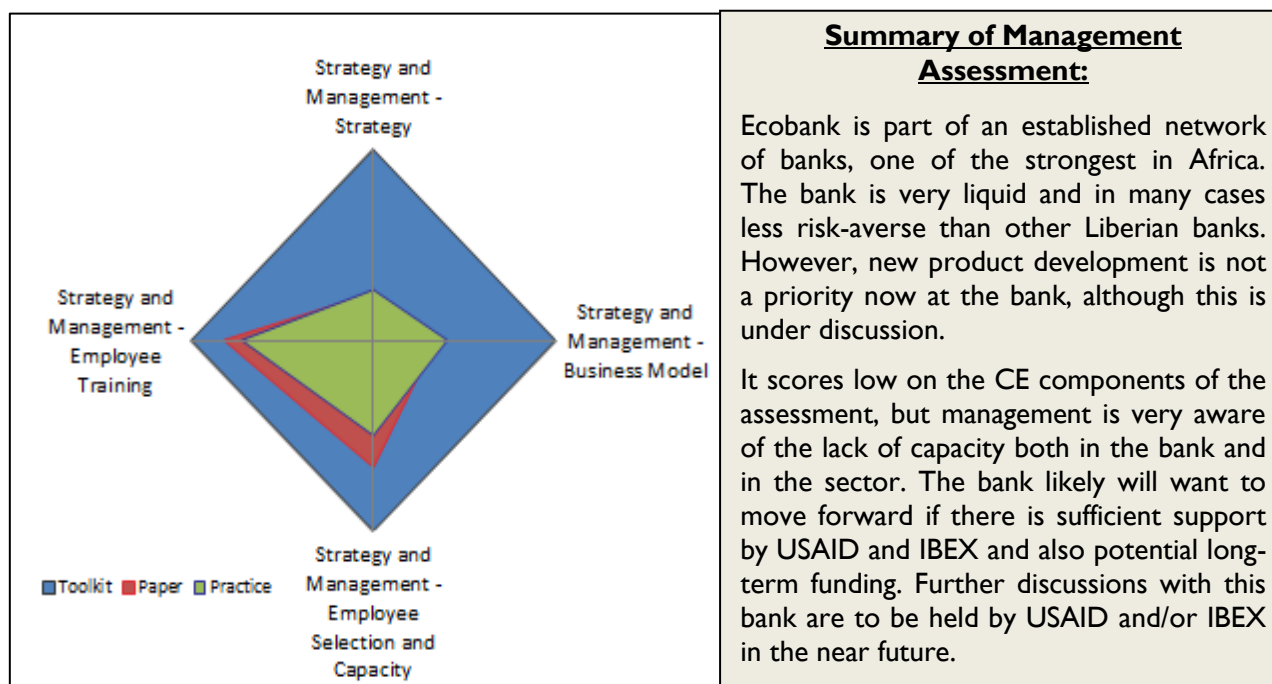
- All Branch Managers, Relationship Managers, Credit Analysts and Managers currently lack CE lending skills. There is no CE sectoral knowledge in the bank.
- Ecobank has a well-developed in-house training program. It has participated in a number of trainings in the past in credit analysis and more recently the Workshop on the CE Toolkit.

The score of the assessment (weighted) for assessment category I are listed in the table and figure below:

Table 15. Overall Diagnostic Results of the Strategy/Management Assessment Categories

	Score		Percentage	
	Paper	Practice	Paper	Practice
Strategy and Management - Strategy	12	17	6.6%	5.2%
Strategy and Management - Business Model	19	16	10.5%	4.9%
Strategy and Management - Employee Selection and Capacity	9	14	5.0%	4.3%
Strategy and Management - Employee Training	14	20	7.7%	6.1%

Figure 7. Graphical Diagnostic Results of the Strategy/Management Assessment Categories



b. Market and Products

Products

- The bank does not have any CE finance products at this stage. As with IBLL, each loan application is processed on merit (using its internal credit application and assessment forms, which are accessible in its IT system), in terms of loan appraisal and motivation for approval.
- Products include a recently-developed agricultural loan product, which was developed by IBEX and is part of the USAID/DCA guarantee.

Pricing and Term

- Currently charging interest rates of between 12-14% per annum.
- Sourced funds are overwhelmingly customer demand deposits, paid out at between 1% and 2% interest per annum. The bank has high liquid assets well in excess of its loan portfolio based on 2012 audit documentation.
- As mentioned earlier, the bank is interested in a CE product but most likely needs long-term financing to launch (interest in talking to OPIC and AfDB was strongly expressed). The pricing of any potential CE loan product will also be tied to risk level, in accordance with its policies.

Processes

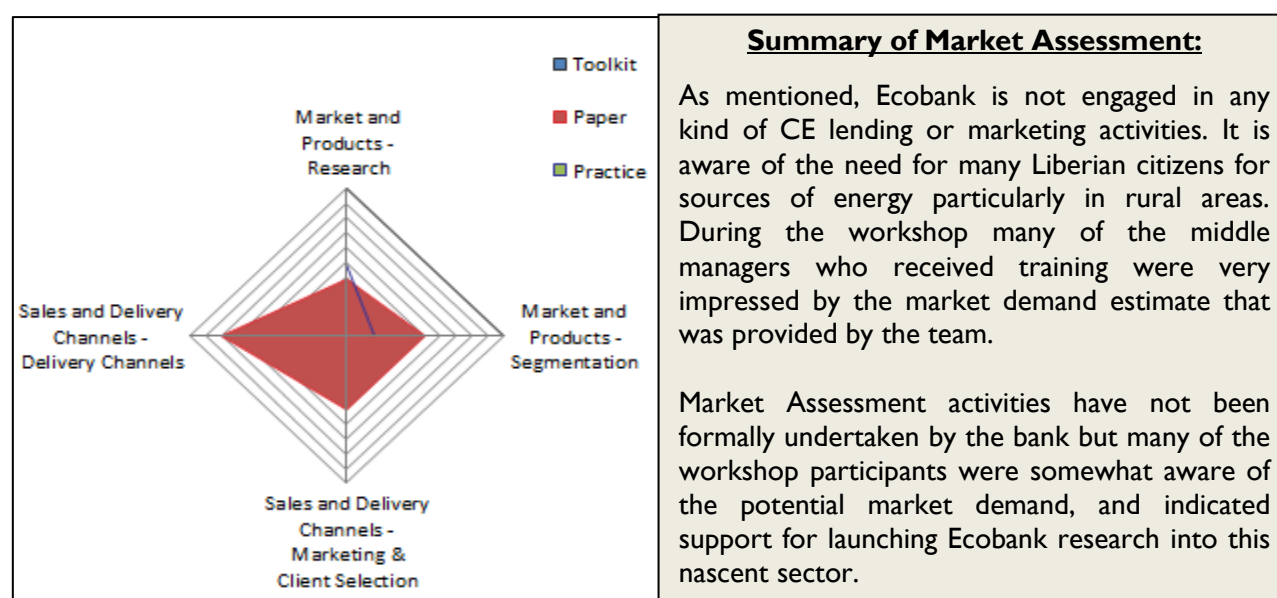
- Loan officers work well with management (Corporate, SME, etc.) to prepare, appraise and present loan applications for approval. Site visits are undertaken where necessary.
- As with IBLL, no in-depth market research has been undertaken for the CE segment, and thus the business model in operation is not adapted to development of the CE market.
- There are no processes at the bank yet to support CE loans as compared to normal loans.
- The bank identified a number of constraints to CE lending during the workshop that were tied directly to its loan assessment process (time in business, previous history), indicating a rigid focus on established policies and procedures.

The score of the assessment (weighted) for assessment category II is in Table 14 and Figure 7 below:

Table 16. Overall Diagnostic Results of the Market/Management Assessment Categories

	Score		Percentage	
	Paper	Practice	Paper	Practice
Market and Products - Research	13	21	7.2%	6.4%
Market and Products - Segmentation	2	17	1.1%	5.2%

Figure 8. Graphical Diagnostic Results of the Market/Product Assessment Categories
(Note: viewed right and up)



c. Sales and Marketing

Marketing

- Ecobank is the leading pan-African banking group, with a presence in 33 African countries and international offices in Paris, London, Dubai and Beijing. The bank leverages these sales channels with a trade finance product and also with a centralized internet presentation.
- Up and cross-selling opportunities presented by its recently-developed agricultural value chain approach and an energy-savings or CE approach are currently unexploited.

Sales Channels

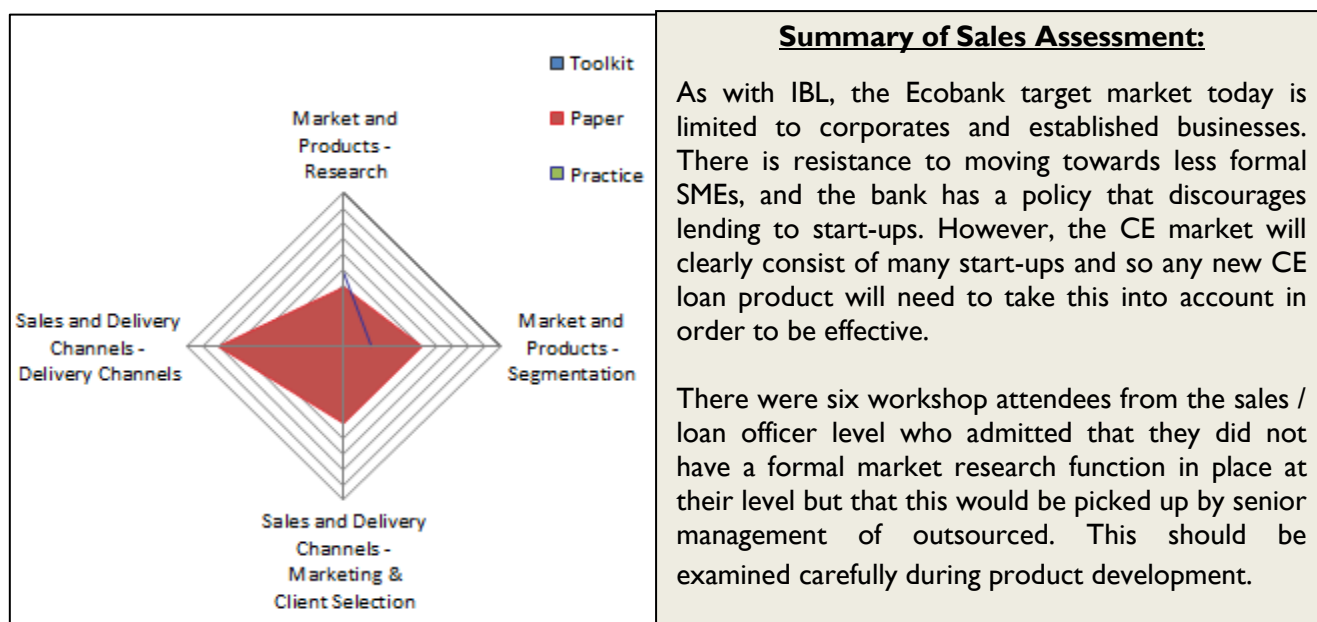
- Highly centralized with poor market coverage and client acquisition – the bank is not present in most rural areas of Liberia and where it is present it is not looking at potential CE deals.

The score of the assessment (weighted) for assessment category II is in Table 15 and Figure 8 below:

Table 17. Overall Diagnostic Results of the Sales/Channels Assessment Categories

	Score		Percentage	
	Paper	Practice	Paper	Practice
Sales and Delivery Channels - Marketing & Client Selection	10	21	5.5%	6.4%
Sales and Delivery Channels - Delivery Channels	1	15	0.6%	4.6%

Figure 9. Graphical Diagnostic Results of the Sales/Channels Assessment Categories
(note: viewed left and down)



Ecobank Summary SWOT Analysis for CE Lending

There are many similarities between the SWOT analysis for Ecobank as compared to IBL or indeed to many other banks in Liberia. Generally all the banks face the same constraints in terms of increasing outreach to this sector. Certainly there is potential for Ecobank to profitably target the CE sector in Liberia. However, it is important that the bank identifies and defines, through a strategic process, stages and segments of the CE supply chain it finds most appealing.

Before launching any CE product, Ecobank will need to develop its internal capacity to engage in such lending. To begin this process, the assessment outlined a SWOT analysis for the bank, based on the diagnostic assessment, as per the below table:

Table 18. SWOT Analysis of Ecobank for CE Lending

Strengths	Weaknesses
Market position and geographic outreach	No CE strategy or business plan
Strong organizational partnerships (USAID, IBEX, DCA) and access to technical assistance	No long-term financing sources which are needed for usual CE loan sizes of 3-7 years
Strong staff commitment and morale	No CE sector experience or awareness
Strong Lending Policies and Procedures	Lack of understanding of the CE market
Awareness of technical assistance needs	Unclear collateral requirements for CE loans
Opportunities	Threats
High market demand of the population for more power and clean energy sources	That CE is not the panacea expected by the international community

Government policy and CE support initiatives coming online to finance the sector	Low liquidity
Long-term financing sources under Power Africa, OPIC, AfDB, others	Poor payment ability/willingness by CE borrowers and consumers
Need for equipment which can be collateralized by bank and leveraged with w/c finance	Ecobank is highly centralized back to the Group level and new product process may be onerous requiring approval at group level

Ecobank Constraint Identification and Mitigation for CE Lending by the Bank

The bank will need to develop appropriate products, sharper CE lending skills, and, above all, leverage its branch network to reach out to nascent actors in the sector. After the assignment, interim narrative results were shared with the bank, which had the opportunity to provide feedback on its ratings. Following this, a wide session with seven bank employees on the perceived and actual constraints to CE lending was conducted during the Toolkit workshop on March 31, 2014. At this session, the bankers identified the top-10 constraints were identified and mitigation strategies were outlined in a participative discussion.

The results of the top-10 constraint assessment by the participating Ecobank staff are in Table 17 below:

Table 19. Ecobank Constraint Identification and Mitigation for CE Lending

Constraints Identified by Bank	Recommended Mitigation Strategies
1. Lack of Clients' Knowledge of Clean Energy	Engage with USAID partners and others for detailed information about the CE market and developments
2. Market Coverage/Accessibility	Utilize market research and interviews to learn more about the ability of Ecobank to provide market coverage
3. Repayment Source	This will be determined during the product development process which will include appropriate pricing decisions
4. Client Contribution	Risk mitigation strategies as well as the expected client contribution apply here as per best banking practices
5. Collateral/Value/Location/Security	This will be determined during the product development process, but the DCA guarantee and borrower CE assets can be included in making the collateral-coverage decision
6. Government Enabling Environment	May be lacking; mitigation strategies to be further discussed
7. Peer Review / Industry Analysis	This will be determined during the product development process, but the DCA guarantee can be taken into account in making the collateral-coverage decision
8. Product Pricing and Terms	This will be determined during the product development process, risks to be assessed and mitigated
9. Lack of LT Financing Source	Develop a strategy and CE specialized product(s) and then reach out to the multilaterals, OPIC, WB and others for potential long-term financing
10. Unknown Monitoring Policies	A key point – borrower analysis will be particularly important during the credit assessment process

The bankers were then organized into groups as part of the workshop and asked to identify the top-three constraints to expanding their bank's CE loan portfolio. They were then asked to prepare a formal presentation to their CEO about what these constraints were and what they would do to alleviate the constraints.

The results of this exercise are listed in the table below:

Table 20. Top Constraints and Recommended CE Lending Mitigation Strategies for Ecobank

Top Three Constraints	Recommended Banker Mitigation Strategies
1. Lack of Clients' Knowledge of CE	Engage with USAID partners, RREA and other potential supporters of the sector for detailed information about the CE market and developments
2. Collateral/Value/Location/Security	This will be determined during the product development process, but the DCA guarantee and borrower CE assets can be included in making the collateral-coverage decision
3. Unknown Monitoring Policies	A key point – borrower analysis will be particularly important during the credit assessment process

These constraints and recommended mitigating factors were discussed with the bank's Corporate Manager at an outbrief meeting on April 4, 2014. This meeting covered the results of the workshop, the analysis of the trainers and also the bank's participants of the constraints to CE lending, and finally the recommendations about next steps. Further detail about the proposed next steps is provided below.

Recommendations for Ecobank

In order for Ecobank to deepen and broaden its CE portfolio in a sustainable manner which takes advantage of its capabilities, its branch network; and also the opportunities presented by growth in the CE sector, the recommendations outlined in the below table were made by the CT directly to the bank's senior management:

Table 21. Recommendations for Ecobank for CE Lending

Recommendations	
CE Financing Market	Liberia faces significant challenges in assuring energy supply for much of its population. Based on trends related to increasing sources of clean energy production as well as project donor activities, we project that the size of the potential market for clean energy lending approaches USD 100 million / year.
CE Financing Strategy	Based on this every-increasing market size, we recommend that the bank develop a summary strategy which spells out its vision for supporting CE lending; lays the plan for achieving that vision; and incorporates staff training and an appropriate organizational structure, among other considerations, to target this market.
CE lending skills and knowledge	In order to facilitate this, we recommend that the bank develop lending capacity in CE lending at both operational as well as at head office levels, through training and market linkages facilitated by various USAID programs in Liberia.
Organizational Partnerships	In this context, the bank should take advantage of the opportunities presented by its partnership with USAID/DCA and USAID/IBEX to access CE training, develop its internal staff capacity, as well as to strengthen the pipeline of its CE clients.
New CE finance product(s)	During this process, it is recommended that the bank develops one or more CE loan products aligned to the needs of CE players and with a view to approach OPIC, AfDB and other international lenders for long-term financing and other support.
Approach for holistic CE lending	Finally, we recommend that the bank work with USAID/IBEX and others to adopt a holistic approach to CE lending, taking into account the challenges of the market in Liberia. Support from USAID is available to assist your bank in this effort.

Specifically, these constraints and recommended mitigating factors were discussed with the bank General Manager (GM) at an outbrief meeting on April 4, 2014. This meeting covered the results of the workshop, the analysis of the trainers and also the bank’s participants of the constraints to CE lending, and finally the recommendations about next steps. The response of the GM was one of acceptance; his one-sentence response was “yes, we need to do this, and we want to move forward on next steps as soon as possible.”

Based on the results of the meeting, the team finalized its recommendations for the achievement of these goals, which are made at the end of the report. The next step is to brief USAID on these results and the proposed work plan, and then finalize with the bank if the USAID approval to move forward is secured.

3.3. Recommendations for Next Steps

Identified Issues/Gaps: (to be addressed by both banks):

The primary areas of focus and the identified key activities for both banks are listed in the table below. In the diagnostic team’s opinion, the bank will certainly require external assistance to assist it address the gaps noted in each focus area. When these gaps are successfully addressed, as noted above, then each bank will have a much higher probability of becoming a leader in the CE banking segment in Liberia. Table 20 presents the summary of gaps to be addressed.

Table 22. Recommendations for Next Steps to Assist IBLL and Ecobank with CE Lending

Focus Area and Key Activities
Strategy and Structure
Each bank should develop a CE Strategy and Mission Statement for CE lending
Developing an appropriate organizational structure incorporating all regions for CE lending
Identifying a CE “Champion” and developing related job descriptions and performance criteria
Selecting and training suitable personnel country-wide, based on the strategy, to drive CE financing
Sales/Marketing
Positioning the CE champion to take advantage of each bank’s branch network to build the pipeline
Develop an appropriate sales strategy and marketing channels for CE lending, based on the CE product
Products
Developing one or more CE products integrated into its low-cost delivery channels
Loan Underwriting
Developing appropriate loan application and appraisal forms for CE financing
Developing CE loan appraisal techniques including financial analysis techniques and tools (ex.: cash flow analysis, IRR/NPV analysis, sensitivity analysis, payback period and ratio analysis)
Developing repayment schedules to match the income cycle of renewable energy sources
Selecting and training suitable personnel in the risk department of the bank to assess these deals

Based on the identification of the above gaps and the discussion with each bank, the following training areas are recommended in Phase II (Tables 21 and 22).

Table 23. Proposed CE Lending Training and Product Development for IBLL

Formal Training (15 days) based on the USAID CE Lending Toolkit	When?
Review of CE needs in selected sectors of Liberia	To be determined
Understanding CE Lending – concepts and strategy development	
Complete Pilot testing of the USAID CE Lending Toolkit (Modules 4-6)	
Review of specific CE case studies	
Understanding financing needs of CE value chain players, including site visits	
Developing and analyzing CE cash flow projections/ statements	
Complete design of a CE lending product building on the approved CE strategy	

Table 24. Proposed Training Plan for Ecobank

Formal Training (15 days) based on the USAID CE Lending Toolkit	When?
Review of CE needs in selected sectors of Liberia	To be determined
Understanding CE Lending – concepts and strategy development	
Complete Pilot testing of the USAID CE Lending Toolkit (Modules 4-6)	
Review of specific CE case studies	
Understanding financing needs of CE value chain players, including site visits	
Complete design of a CE lending product building on the approved CE strategy	

The banks have both indicated that they are willing to increase their engagement in CE lending activities through the development of a new product focused on the CE sector. The team’s assessment supports this commitment by the banks and concludes that although they lack human capacity to conduct CE lending, this needs to be remedied by a technical assistance program building on the pilot-testing of the toolkit, as well as other measures to develop a new CE loan product, strategy and related staff capacity.

Accordingly, the diagnostic assessment and CE toolkit pilot testing were completed as the overall objectives and deliverables of the assignment. As these have been achieved, the CT recommends that the recommendations and below next steps be considered by USAID and a “go/no go” decision be made at the earliest opportunity in the context of building on the momentum generated in Liberia and launching Phase II of the engagement.

4. PILOT TESTING THE CE LENDING TOOLKIT

4.1. Preparatory Work

In 2013, USAID created the Clean Energy Lending Toolkit to offer FIs a practical guide to launching a clean energy lending line of business. Market mapping tools and country case studies in the Toolkit help lenders adapt to and invest in this growth industry. In early 2014, USAID/Liberia reached out to its Development Credit Authority (DCA) approved Liberian banks with loan guarantees for the CE market to determine their interest in pilot testing the Toolkit. With the International Bank of Liberia (IBLL) and Ecobank responding positively, USAID/Liberia and the USAID/E3 offices proceeded with sending the CT, contracted through Development and Training Services Inc. (dTS) under the Economic Growth Training Project, to support the pilot testing of the Toolkit in Liberia.

Two pilot testing phases for the Toolkit in Liberia are envisioned, with Phase I being the initial CE market and institutional bank readiness scans plus recommendations for improving the effectiveness of the Toolkit (Box 1). The results of Phase I are to solicit go/no go decisions regarding DCA-approved banks' interest in CE lending in Liberia. If sufficient interest and capabilities exist by these banks and possibly other lending institutions in Liberia, Phase II of the pilot testing will move forward.

4.2. Workshop and Bank Feedback

USAID/Liberia and USAID/IBEX coordinated the workshop invitations and announced the USAID Clean Energy Lending Workshop, which was held on March 31, 2014 from 9:00AM to 4:00PM at the Mamba Point Hotel. The workshop collaborated with managerial and operational leaders from the two banks with the purpose of creating or strengthening lines of credit to renewable energy and energy efficiency projects in Liberia. USAID introduced the training team on the Clean Energy Lending Toolkit to the participants (agenda in the appendix), which was presented as a reference guide to help banks decide if, and if so, how to lend to clean energy (CE) project sponsors and developers.

The goals of the workshop were to have the banks help prepare a CE market diagnostic and conduct an internal bank capability diagnostic for clean energy lending. The workshop covered the material in Modules 1, 2 and 3 of the Toolkit. In addition, the trainers met prior to and after the workshop with the senior management of each bank to discuss relevant information and solicit feedback particular to each institution's perception of the Toolkit, as well as its capabilities and interests in the CE market.

4.3. Recommendations for Improvement of Toolkit Modules

Based on the CT analysis of the toolkit, questions and suggestions from the pilot test participants at Ecobank and IBLL, a number of minor edits, tweaks and updates are proposed to be made to the toolkit. Below, each Module of the toolkit has a short list of bullet-point observations, suggestions, and recommendations broken out by section. *It is important to stress that these edits are relevant to Liberian context, and may not be relevant across the entire spectrum of CE lending operations in other countries that have a more developed financial sector or more active CE players.*

Module 1

- The introduction and overview section to be left as is.

Module 2: Clean Energy Market Diagnostic

The relevant feedback for this module from the pilot test in the Liberian context, where the Clean Energy market is relatively undeveloped, is:

- Toolkit questionnaires are relevant but there are numerous cases in Module 2 where an insufficiently quantitative score is given to assist bank management in determining whether to proceed with CE lending. This is particularly relevant for the assessment of the enabling environment and the sector scan. It is recommended that toolkit questionnaire sections be adjusted to provide a quantitative score which is then assessed against a provided scale to contribute to the “go / no-go decision” on CE lending.
- For example, questions from the “Enabling Environment Scan” on page two are vague. The questions should not be “what are fuel prices?” or “what CE policies are in place?” but rather specific yes/no questions, or with a 1-5 grading scale, the answers to which provide quantitative input into the market assessment. Other examples can be given but the point made here is clear.
- The section “Sector Scan” has an unclear title. This should be renamed “Economic Sector Scan” to differentiate from other scan sections.
- Section 2.3.4 - the Financial Product Scan presents good questions but many financial institutions may be incapable of answering the questions presented.
- Focus of Enabling Environment scan should shift towards describing what kind of enabling environment and regulation exists to adding an option for clarification and assessment in cases when these do not exist (such as in Liberia).
- Section 2.5.3 should be shortened or eliminated due to their irrelevance to the scan. Sections 2.5.4 to 2.5.7 should be moved into Module 4 and tied into the Product Development section.

Module 3: Institutional Readiness Assessment

Relevant feedback from the pilot test for this module, in the Liberian context where the financial sector is undeveloped and lending to the CE sector does not already exist, is:

- The Toolkit should flow from least-complicated banking capabilities to more complicated, for example for banks already engaged in CE lending, there should be questionnaire on this. At the same time if there is absolutely no CE lending by the bank (a likely case for many banks using the Toolkit) then there should be an option to “stop and go to page X” when questions are not relevant and/or cannot be answered.
- As per the above, this quantitative score should give a response of 1-5 for each relevant question and then be totaled for sections of Module 2 and 3 in order to provide a rating guide for bank management on potential next steps.
- In conducting the internal (or external) assessment of the financial institution for CE lending, the toolkit should focus on five key areas related to its internal capacity:
 - Its ability and willingness to develop management focus and a strategy around CE lending
 - Its ability and willingness to conduct relevant market research for CE lending
 - Its ability and willingness to expand and/or open new sales channels for CE lending
 - Its capacity in terms of credit processes and if these are sufficient for CE lending
 - Its capacity related to its MIS, IT systems and compliance with regulation
- Various minor edits are required to simplify the flow, increase the quantitative rating assessment, and eliminate references to non-core assessment criteria, especially for Module 3.

In terms of comparative structure, the current organization of Module 3 is below:

- Tools (Section 3.3)
 - CE Financing Market
 - Current CE Portfolio
 - Current CE Clients
 - Structure, Policies, Processes

The focus of the current Tools Section (3.3) is that two of the four sections are focused on the bank's current CE lending activities. However, this is not well-structured because most of the banks using the toolkit (almost by definition, if they are using the toolkit) will probably not be very involved in CE lending while undergoing the Toolkit exercises.

Based on the above, the suggested organization (and following the structure of the graph in Figure 3.1) of Module 3 is as follows:

- Tools (Section 3.3 revised order)
 - Analysis of FI Internal Resources
 - Current CE Financing Environment
 - Current FI CE Portfolio and Clients (if any)
 - Evaluating the FI's Structure, Policies, Processes
 - Formulate Comprehensive Business/Strategic Plan for CE Lending

Another suggestion is that Section 3.3.3. "Market Research" should be moved to Module 4, as this section is more appropriate in the "Product Development" area.

Developing a Strategic Plan for CE Lending is important and the process is well-outlined in the Toolkit at the end of Module 3. However, references to "new Mission/Vision" statements for the bank to be approved at Board of Director level should be reduced. Senior management of the bank should facilitate the development of a CE strategic plan, but this plan should be accepted and implemented at a management level most appropriate for the bank (not necessarily changing the Mission/Vision of the bank, which is an exercise that is likely required to be approved by shareholders and potentially regulators as well).

Toolkit Module 3 focus should be on identifying the following: 1) current CE capacity and willingness to engage in CE lending; 2) Capacity needed for engagement in CE lending; and 3) Measuring the difference between 1 and 2 and then outlining the needed capacity for the bank to acquire as it develops its CE lending strategy and product.

Based on these comments, the CT recommends that the points be incorporated into the next draft of the toolkit, preferable following Phase II of the pilot test to be conducted in the next period. Once the pilot test is complete, a few weeks should be enough to update the toolkit in advance of further use and/or pilot testing being scheduled with other financial institutions. *It is important to stress here once again that these edits are relevant to Liberian context, and may not be relevant across the entire spectrum of CE lending operations in other countries that have a more developed financial sector or more active CE players.*

5. RECOMMENDATIONS AND NEXT STEPS

5.1. Recommendations

As described above, the CT met with a large number of USAID/Liberia counterparts, financial institutions, Liberian institutions, the Liberian Central Bank as well as USAID project implementers active in the renewable energy and business development areas. However, the most important meetings took place with the banks themselves. During these meetings, the constraints and recommended mitigating factors were discussed with both bank's senior management at outbrief meetings on April 4, 2014.

These meetings covered the results of the CE workshop, the analysis of the trainers, and also the bank's participants of the constraints to CE lending, and finally the recommendations about next steps. Based on the meetings held during the field visit, the bank assessment and the CE market scan, the CT proposes the following on recommendations and next steps.

These recommendations include:

1. The banks have both firmly indicated that they are willing to increase their engagement in CE lending activities through the development of a new product focused on the CE sector;
2. The assessment supports this commitment by the banks and concludes that although they lack substantial human capacity to conduct CE lending, this can be remedied by a technical assistance program building on the pilot-testing of the toolkit, as well as other measures highlighted below;
3. The CT scan of the Clean Energy market indicates that although there are relatively few actors in this sector, a sufficient "pipeline" of potential corporate, SME and cooperative clients exists that can enable the banks to successfully begin their engagement with this sector, if appropriately targeted.
4. The pilot-testing of the USAID Clean Energy Lending Toolkit indicated that it can be a tool of substantial utility for the CE banking sector in Liberia. There were a number of recommendations made by both the banks and the CT to further increase the effectiveness of the toolkit as a resource to banks planning to increase their level of engagement in the CE sector. The CT recommends that these suggestions and other updates be incorporated into a next draft, as further outlined below.
5. Finally, considering the results of the market scan, bank assessment and the pilot test of the toolkit, in coordination with USAID Liberia and USAID/EG, the CT recommends that the engagement be extended into a "Phase II" that will work with both banks on CE loan product development and capacity-building measure to increase their capacity to engage in CE lending in Liberia after the conclusion of a product-development focused "Phase II."

Accordingly, the diagnostic assessment and CE toolkit pilot testing were the overall objectives and deliverables of the assignment. As these have been achieved, the CT recommends that the below next steps be considered by USAID and a "go/no go" decision be made in the context of Phase II.

5.2. Next Steps

As mentioned, the banks have both indicated that they are willing to increase their engagement in CE lending activities through the development of a new product focused on the CE sector. Discussions with USAID/Liberia will confirm in writing the “go” decisions from IBLL and Ecobank as indicated to the CT during the country visit.

Considering the results of the market scan, bank assessment and the pilot test of the toolkit, in coordination with USAID/Liberia and USAID/E3, the CT recommends that the engagement be extended into a “Phase II” that will work with both banks on CE loan product development and capacity-building measures. The next phase should also leverage existing IBEX, LESSP, and Power Africa programs at the Mission to increase FI and CE project developers’ capacity to engage in CE borrowing in Liberia and to help the banks create a coherent initial pipeline of potential CE deals. Based on the above, the below table highlights the proposed next steps for the CE market assessment and bank capacity-building as well as for the CE toolkit pilot testing activity:

Table 25. Next Steps for CE Lending Facilitation in Phase II

Next Steps for Phase II		LOE Required
CE Market Analysis and Pipeline Development	Analyze and leverage existing USAID/IBEX, USAID/LESSP, and USAID Power Africa programs as well as those of the Liberian government and other donors to support each bank by developing an illustrative pipeline of potential CE borrowers in Liberia.	Clean Energy Expert: 30 days
		Banking Expert: 5 days
CE Loan Product Development, Lending Skills and Capacity-Building	Work with senior management of each of the banks to develop a new loan product specifically designed for CE lending. The parameters of the CE loan product(s) would be worked out with each bank in accordance with its needs, goals and capabilities. Each bank would then be trained on CE lending at both the management and loan officer level, based on the new product parameters, and a summary marketing strategy for clean energy lending will be developed.	Clean Energy Expert: 5 days
		Banking Expert: 30 days
Complete Pilot Test of Toolkit, Conduct Training Workshop	Provide feedback and lessons learned about the implementation of the pilot test which would inform USAID about further refinement of the USAID Clean Energy Lending Toolkit.	Clean Energy Expert: 10 days
		Banking Expert: 10 days

The basis of the recommendations entails consultancy and training of two Liberian banks. Phase I has already been implemented. Phase II consists of three components:

1. First, prior to travel to Liberia, a Banking Expert and a Clean Energy Expert would collect additional data about the two banks, the banking sector in Liberia and the CE sector in Liberia.
2. In Liberia, a Banking Expert and a Clean Energy Expert would work primarily with senior management of the two banks to develop each bank’s internal capacity for CE lending, as well as to design a CE-focused credit product and then to work with each bank to develop a concrete pipeline of lending opportunities. This would take place on the premises of each of the two banks and would take a total of 45 days per bank.
3. Upon return to the United States after the trip to Liberia, the Banking Expert and a Clean Energy Expert would finalize the deliverables for Phase II.

A detailed TOR for the proposed Phase II assignment, with corresponding administrative arrangements recommended through dTS, will be discussed with USAID and other stakeholders at the earliest opportunity.

ANNEX I: MEETING SCHEDULE

Date	Time	Institution	Location	Contact Name
March 25, 2014	09:00	USAID/Power Africa	US Embassy	Steven Berlinguette
	11:00	USAID/IBEX	IBEX Office-Lynch & Broad Streets	Watchen Bruce
	14:00	IBLL	IBLL	Henry Sammoi
	15:00	Ecobank	Ecobank	Doreen McIntosh
	16:00	USAID/LESSP	LESSP office	Michael McGovern
Date	Time	Institution	Location	Contact Name
March 26, 2014	09:00	IBLL Bank Diagnostic	IBLL	IBLL staff
	12:00	Ecobank Diagnostic	Ecobank	Ecobank staff
	15:00	USAID/LESSP	LESSP office	Michael McGovern
Date	Time	Institution	Location	Contact Name
March 27, 2014	09:00	Liberia Energy Network	IBEX Office-Lynch & Broad Streets	Abubakar Sherif
	12:00	Eagle Power	IBEX Office-Lynch & Broad Streets	Emmanuel Giddings
	15:00	Ecobank Diagnostic	Ecobank	Ecobank staff
	17:00	USAID/FED Program	Mamba Point Hotel	Agnes Luz

Date	Time	Institution	Location	Contact Name
March 28, 2014	09:00	USAID/Power Africa	US Embassy	Steven Berlinguette
	12:00	W. Africa Venture Capital	Their office	Fred Balogun
	14:00	Liberian Chamber of Commerce	Their office	Francis Dennis
	15:00	Central Bank of Liberia	IBEX Office-Lynch & Broad Streets	Michael Ogun
	16:00	USAID/LESSP	LESSP office	Michael McGovern
Date	Time	Institution	Location	Contact Name
March 31, 2014	09:00	CE Workshop for DCA Banks	Mamba Point Hotel	Marcia Gowan Daniel Gies
	15:00	Overseas Private Investment Corporation	Mamba Point Hotel	Samuel Kwame Okpattah
Date	Time	Institution	Location	Contact Name
April 1, 2014	09:00	IBLL Bank Diagnostic	IBLL	IBLL staff
	12:00	Ecobank Diagnostic	Ecobank	Ecobank staff
	16:00	USAID/FED Program	Mamba Point Hotel	Agnes Luz
Date	Time	Institution	Location	Contact Name
April 2, 2014	09:00	IBLL Bank Diagnostic	IBLL	IBLL staff
	12:00	Ecobank Diagnostic	Ecobank	Ecobank staff
	14:00	USAID/IBEX	IBEX Office-Lynch & Broad Streets	Watchen Bruce
	16:00	USAID/LESSP	LESSP office	Michael McGovern

Date	Time	Institution	Location	Contact Name
April 3, 2014	09:00	USAID/Power Africa	US Embassy	John Mark Winfield
	12:00	Barry and Gaye Global	Their office	Rufus Berry
	15:00	USAID/LESSP	LESSP office	Alma Cota
	16:00	USAID/LESSP	LESSP office	Michael McGovern
Date	Time	Institution	Location	Contact Name
April 4, 2014	09:00	Final Debrief for DCA Bank CEO - IBLL	IBLL	Henry Sammoi
	10:00	Final Debrief for DCA Bank CEO - Ecobank	Ecobank	Doreen McIntosh
	11:00	Rural and Renewable Energy Agency (RREA)	RREA	Augustus Goanue

ANNEX II: CLEAN ENERGY WORKSHOP AGENDA

Mamba Point Hotel Monrovia, Liberia
March 31, 2014

The United States Agency for International Development (USAID) is providing training to support DCA-approved banks' capabilities and interests in the clean energy (CE) lending market. This is part of a broader initiative to introduce the USAID Clean Energy Lending Toolkit.

Time of Workshop: 09:00 – 16:00, Monday, March 31st

09:00 – 09:15: “Introduction and Opening of Workshop”

Subject	Introduction, Overview
Content	<ul style="list-style-type: none"> • Introduction of Participants • Overview of USAID support to Liberian banks • Issues of CE financing and USAID response • Introduction to the USAID/IBEX Project
Presenter	Mr. Stephen Berlinguette, Office of Economic Growth, USAID/Liberia Ms. Watchen Harris Brice, Chief of Party, USAID/IBEX Project

09:15 – 09:30: “Introduction of USAID/LESSP Project”

Subject	Introduction of USAID/LESSP Project
Content	<ul style="list-style-type: none"> • Overview of USAID/LESSP support to Liberian CE sector • Issues of CE investment growth in Liberia and LESSP response
Presenter	Michael McGovern, Chief of Party, USAID/LESSP (or designee)

09:30 – 10:00: “Introduction to the USAID Clean Energy Lending Toolkit”

Subject	Module 1: Introduction to the USAID CE Lending Toolkit
Content	<ul style="list-style-type: none"> • Review Course Agenda and Objectives • Toolkit Introduction • Implementers Guide • Basic types of RE
Materials	Exercises Power Point
Presenter	Dr. Marcia Trump, Principal Associate, Abt Associates Daniel Gies, Clean Energy Banking Expert, Enclude Solutions

10:00 – 11:30: “CE Market Diagnostic”

Subject	Module 2: How to Conduct a CE Market Diagnostic
Content	<ul style="list-style-type: none">• Module Introduction• Guidelines for Market Mapping• Approach to the CE Market Diagnostic• Breakout Session – Tool assessment by bank, reporting back
Materials	Exercises Power Point
Presenter	Dr. Marcia Trump, Principal Associate, Abt Associates

11:30 – 12:30: Meal Break at Mamba Point Restaurant

12:30 – 13:30: “Institutional Readiness Assessment”

Subject	Module 3: Institutional Readiness Assessment
Content	<ul style="list-style-type: none">• Module Introduction• About Institutional Readiness• Guide to Development of CE lending Strategic Plan• Tools and Strategies
Materials	Exercises Power Point
Presenter	Daniel Gies, Clean Energy Banking Expert, Enclude Solutions

13:30 – 15:30: “Strategy Development Exercise”

Subject	Capstone Exercise: Strategy Development Exercises for your Bank
Content	<ul style="list-style-type: none">• Introduction• Developing your institutional strategy for CE lending• Tools• Complete exercise, present results
Materials	Strategy Development Exercises
Presenter	Dr. Marcia Trump, Principal Associate, Abt Associates Daniel Gies, Clean Energy Banking Expert, Enclude Solutions

15:30 – 16:00: Review of Results and Recommendations – Overview of Workshop

16:00: Closure of Workshop

ANNEX III. CLEAN ENERGY LENDING WORKSHOP AND MEETING PARTICIPANT LIST

Organization Name	No:	Participant Name	Cell #s	Email Address	Sex
International Bank Liberia Limited	1	Boima Baoh	0886-591-026	btbone_2009@yahoo.com	M
	2	Ballah Davies	0886-549-200	bkaydavis2@yahoo.com	M
	3	Francis Baiden	08888-401-23	fbaiden@ibliberia.com	M
	4	Cromwell Bedell			M
	5	Marcellus Mulbah	0886-561-889	mmulbah@ibliberia.com	M
	6	Jen E. Ngwayah	0886-461-829	jngwayah@ibliberia	M
	7	Patrick Kittoe			M
	8	Ahmed Dempster	0886-715-580	dempsterahmed@yahoo.com	M
	9	Sully Turay	0886-579-724	sturay@ibliberia.com	M
	10	Franklin Cole	0886-511-823	fcole@ibliberia.com	M
	11	James Kiadii	0886-550-081	jkiadii@ibliberia.com	M
	12	Miatta Jones	0886-451-989		F

Organization Name	No:	Participant Name	Cell #	Email Address	Sex
Ecobank Liberia Limited	13	Marly Ellis	0886-515-105	mellis@ecobank.com	F
	14	Yeady Kollie	0886-510-405	ykollie@ecobank.com	F
	15	Diana A. Gbalah	0880-714-452	dgbalah@ecobank.com	F
	16	Vivan Howard	0886-524-416	vhoward@ecobank.com	F
	17	Korto Simpson	0886-526-553	ksimpson@ecobank.com	F
	18	Adboul K. Sankoh	0886-471-823	asankoh_@ecobank.com	M
	19	Zaza Mulbah	0886-107-992	zmulbah@ecobank.com	M
	20	Charles A. Kpoh	0880-656-108	ckpoh@ecobank.com	M
USAID and other participants	21	Stephen Berlinguette	+231 (0) 776-777-000 Ext 7151	sberlinguette@usaid.gov	F
	22	Luis Velaquez	+231(0) 776 77 0000 ext. 7133	lvelaquez@usaid.gov	F
	23	Marcia Gowen Trump	301-347-5705	Marcia_Trump@abtassoc.com	F
	24	Daniel Gies	+381 62 550 926	dgies@encluderolutions.com	F
	25	Watchen H. Bruce	231-888-101-828 or 231-777-101-828	wbruce@iesc.org	F
	26	Moses Forkpah	231-886570-278	mforkpah@iesc.org	M
	27	Michael McGovern	231 (0) 880 295 795	mmcgovern@winrocklessp.org	M
	28	Alia Luz	231 (0) 888 952859	aluz@winrocklessp.org	M
	29	Alma Cota	231 (0) 888 653523	acota@winrocklessp.org	F
	30	Samual Kwame Okpattah	202- 336-8506	Samuel.Okpattah@opic.gov	M

ANNEX IV. RECOMMENDATION LETTER TO INTERNATIONAL BANK OF LIBERIA

June 30, 2016

Mr. Saamoi:

Many thanks for the support and participation of International Bank of Liberia in the Clean Energy Lending Toolkit workshop and pilot-test over the past two weeks. Your energetic welcome of our efforts has been very much appreciated by USAID, USAID/IBEX, USAID/LESSP and the clean energy team here in Monrovia.

As you know, we spent a great deal of time with your management and loan staff to review the clean energy market (CE) and the possibilities of such lending by your bank. During this time, we were very impressed with the skills, motivation and energy of your team.

Based on the market opportunities in this sector, we believe that an opportunity exists for your bank to take a harder look at the clean energy financing, in a measured and deliberate way, in the coming period. To build on this momentum, we make the following recommendations:

USAID Clean Energy Finance Team - Recommendations	
1. CE Financing Market	As you know, Liberia faces significant challenges in assuring energy supply for much of its population. Based on trends related to increasing sources of clean energy production as well as project donor activities, we project that the size of the potential market for clean energy lending approaches USD 100 million / year.
2. CE Financing Strategy	Based on this every-increasing market size, we recommend that the bank develop a summary strategy which spells out its vision for supporting CE lending; lays the plan for achieving that vision; and incorporates staff training and an appropriate organizational structure, among other considerations, to target this market.
3. CE lending skills and knowledge	In order to facilitate this, we recommend that the bank develop lending capacity in CE lending at both operational as well as at head office levels, through training and market linkages facilitated by various USAID programs in Liberia.
4. Organizational Partnerships	In this context, the bank should take advantage of the opportunities presented by its partnership with USAID/DCA and USAID/IBEX to access CE training, develop its internal staff capacity, as well as to strengthen the pipeline of its CE clients.
5. New CE finance product(s)	During this process, it is recommended that the bank develops one or more CE loan products aligned to the needs of CE players and with a view to approach OPIC, AfDB and other international lenders for long-term financing and other support.
6. Approach for holistic CE lending	Finally, we recommend that the bank work with USAID/IBEX and others to adopt a holistic approach to CE lending, taking into account the challenges of the market in Liberia. Support from USAID is available to assist your bank in this effort.

Thank you again for your welcoming and support of our team. We are excited about the potential of collaborating with you on developing, diversifying and expanding Liberia's clean energy supplies to create new sources of energy, business and livelihoods in Liberia.

Best regards,

Daniel Gies
Clean Energy Banking Expert
Enclude Solutions Ltd.

ANNEX V. RECOMMENDATION LETTER TO ECOBANK OF LIBERIA

June 30, 2016

Mr. Adeleke:

Many thanks for the support and participation of Ecobank in the Clean Energy Lending Toolkit workshop and pilot-test over the past two weeks. Your energetic welcome of our efforts has been very much appreciated by USAID, USAID/IBEX, USAID/LESSP and the clean energy team here in Monrovia.

As you know, we spent a great deal of time with your management and loan staff to review the clean energy market (CE) and the possibilities of such lending by your bank. During this time, we were very impressed with the skills, motivation and energy of your team.

Based on the market opportunities in this sector, we believe that an opportunity exists for your bank to take a harder look at the clean energy financing, in a measured and deliberate way, in the coming period. To build on this momentum, we make the following recommendations:

USAID Clean Energy Finance Team - Recommendations	
7. CE Financing Market	As you know, Liberia faces significant challenges in assuring energy supply for much of its population. Based on trends related to increasing sources of clean energy production as well as project donor activities, we project that the size of the potential market for clean energy lending approaches USD 100 million / year.
8. CE Financing Strategy	Based on this every-increasing market size, we recommend that the bank develop a summary strategy which spells out its vision for supporting CE lending; lays the plan for achieving that vision; and incorporates staff training and an appropriate organizational structure, among other considerations, to target this market.
9. CE lending skills and knowledge	In order to facilitate this, we recommend that the bank develop lending capacity in CE lending at both operational as well as at head office levels, through training and market linkages facilitated by various USAID programs in Liberia.
10. Organizational Partnerships	In this context, the bank should take advantage of the opportunities presented by its partnership with USAID/DCA and USAID/IBEX to access CE training, develop its internal staff capacity, as well as to strengthen the pipeline of its CE clients.
11. New CE finance product(s)	During this process, it is recommended that the bank develops one or more CE loan products aligned to the needs of CE players and with a view to approach OPIC, AfDB and other international lenders for long-term financing and other support.
12. Approach for holistic CE lending	Finally, we recommend that the bank work with USAID/IBEX and others to adopt a holistic approach to CE lending, taking into account the challenges of the market in Liberia. Support from USAID is available to assist your bank in this effort.

Thank you again for your welcoming and support of our team. We are excited about the potential of collaborating with you on developing, diversifying and expanding Liberia's clean energy supplies to create new sources of energy, business and livelihoods in Liberia.

Best regards,

Daniel Gies
Clean Energy Banking Expert
Enclude Solutions Ltd.

ANNEX VI: LIST OF POTENTIAL CE PIPELINE COMPANIES FROM USAID/IBEX

No.	Recipient / Organization	Sector	SubSector	Location	Contact Person
1	A. T. Akakpoe Construction company	Renewable Energy	Other	Montserrado County	Charles Togba
2	ADI Contractor	Renewable Energy	Hydropower	Montserrado County	Momo Kamara
3	Africa Green Energy System	Renewable Energy	Solar	Montserrado County	James S. Korha
4	Afrigue Construction & Maintenance Co.	Renewable Energy	Other	Montserrado County	Soko sackor
5	Akins Building Inc.	Renewable Energy	Other	Montserrado County	Leva A. Taylor
6	Alternative Energy	Renewable Energy	Other	Montserrado County	Thomas Kpoto
7	Beacon of Hope for the Least Developed	Renewable Energy	Other	Montserrado County	Rebecca Miller
8	Boimah Engineering	Renewable Energy	Other	Montserrado County	Sigmund Wright
9	C. J Construction Inc.	Renewable Energy	Hydropower	Montserrado County	Bernard Aghom
10	C. M. Company	Renewable Energy	Hydropower	Montserrado County	Bernard Aghom
11	Community Power House	Renewable Energy	Other	Montserrado County	David Tarley
12	Dig's Light	Renewable Energy	Solar	Montserrado County	Irene George
13	EADECON LIB INC.	Renewable Energy	Other	Montserrado County	John K. Kapakolo
14	Eagle Power Electric Company	Renewable Energy	Other	Margibi County	Emmanuel Giddings
15	Engineering Society of Liberia	Renewable Energy	Other	Montserrado County	Thomas Gonkerwor
16	Gbanway Electric Cooperative	Renewable Energy	Other	Montserrado County	Moses K. Willion
17	Geontia Liberia LTD	Renewable Energy	Hydropower	Montserrado County	H. Kwaku Addy
18	Green Consulting Environment company	Renewable Energy	Other	Montserrado County	Godwin Senegah
19	Gregory Altman	Renewable Energy	Other	Unknown	Gregory Altman
20	Hadris Construction & Engineering Inc.	Renewable Energy	Hydropower	Montserrado County	James Miller
21	International Energy Services ltd	Renewable Energy	Other	Montserrado County	Ayemi Sandy
22	Interwood Construction & Engineering	Renewable Energy	Other	Montserrado County	Wabel Harb
23	Itergrated Technology & Engineering Netw	Renewable Energy	Other	Montserrado County	Danletta Scere
24	Liberia Energy Network	Renewable Energy	Solar	Montserrado County	Abubakar K. Sherif
25	Liberia Equipment Ltd	Renewable Energy	Other	Montserrado County	Abednego Gargard
26	Liberty Works Inc.	Renewable Energy	Other	Montserrado County	Fabio Lavelanet
27	Liberia Reconstruction & Development Co.	Renewable Energy	Other	Montserrado County	Albert Sangs
28	Mein River Company	Renewable Energy	Hydropower	Bong County	George King
29	Newlook Construction & Development	Renewable Energy	Other	Montserrado County	Alex Wesley
30	P. A. C. (Liberia)	Renewable Energy	Other	Montserrado County	Simon Chabel
31	Pealat Construction Company	Renewable Energy	Other	Montserrado County	Praise O. T. Lawal
32	Possible Construction Company	Renewable Energy	Hydropower	Montserrado County	Matthew H. Nyarko
33	Renewable Energy Corp	Renewable Energy	Other	Montserrado County	Burgess H. Houston
34	S. Jedi Green Energy	Renewable Energy	Other	Montserrado County	Roy Stin Geeplia
35	S. S. F. Inc.	Renewable Energy	Other	Montserrado County	Shawki Fadas
36	Sawyer & Associates	Renewable Energy	Other	Montserrado County	Nathaniel hina
37	Seek Engineering & Construiction	Renewable Energy	Other	Montserrado County	J. Nyuma
38	Sikor Power	Renewable Energy	Other	Montserrado County	Sensee A. Bawer
39	Silokon Group Inc.	Renewable Energy	Other	Montserrado County	Barteh Freeman
40	Sjedi Green Energy	Renewable Energy	Other	Montserrado County	Peter Gbejilia
41	Solar Solution Liberia INC	Renewable Energy	Solar	Montserrado County	Rachard A. Nimmo
42	Soflumba Community Electric Cooperative	Renewable Energy	Hydropower	Lofa County	Jefferson Tengbeh
43	Suakoko Community	Renewable Energy	Hydropower	Bong County	George King
44	Sustainable Development Project	Renewable Energy	Other	Montserrado County	Momo G. Stevens
45	Total Quality Engineering Technology	Renewable Energy	Hydropower	Montserrado County	James Baxter
46	TBD	Renewable Energy	Other	Montserrado County	Norman Robinson
47	Wendell Engineering & Consultancy	Renewable Energy	Other	Montserrado County	Amos H. Perkins
48	West Africa Energy	Renewable Energy	Other	Montserrado County	Amos H. Perkins

ANNEX VII: CLEAN ENERGY LENDING TABLE ASSUMPTIONS ON LIBERIA MARKET SIZE

A. General Data Assumptions

The data presented in the Table is from a variety of sources as noted in the comments. Most of the clean energy (CE) system costs and energy user information was collected from Liberian secondary data sources. The electricity demand market is segmented by the types of users and their expected total annual average energy use values based on delivering a basket of electricity services. The energy use data was determined through consultations and cross-referencing various energy use studies for Liberia. Similarly, the energy cost data per CE technology come from a variety of sources, which show a range of levelized cost of energy (LCOE) by sources as well as capital cost estimates from USAID/Liberia, national, international, and project-based studies confirmed with Liberian energy experts' opinions. Thus, the "Average CE Technology System Values" calculations in the Table reflect substantiated costs per CE system from country-based information.

The "Estimated CE Loan Market Potential" information in the relevant tables of the potential market size (number of users and expected uptake) and total loan demand, however, is based on values obtained from CE and USAID experts supplemented as possible with country-based information based on desk-top research. Thus, while the CE client loan demand is based on a variety of secondary sources supplemented by USAID expert opinions, such information requires more detailed in-country confirmation. The total CE market size, uptake, and loan size data needs to be discussed with the lending institutions – DCA-approved banks -- who are the primary beneficiary of the capacity-building exercise undertaken in Phase I of this project and who would be the primary beneficiary and partner in Phase II of this project.

B. Household Energy Consumption

Household energy consumption ranges from over 310 kWh/year/ household for basic services (lights only) based on Liberia Energy Sector Support Program (LESSP) studies by USAID to higher annual average demand for a typical household of 7 people in Liberia up to 781 kWh/year/household when small appliance(s) and charging of cell phones are added. The household energy consumption or demand data come from two sources, the LESSP) data on services for households and USAID/Liberia energy experts.²² The number of urban and rural off-grid households data is derived from national statistics and World Bank country profile information.

²² McGovern, Michael. 5 February 2014. *Electricity in Bong, Lofa, and Nimba Counties Today and Tomorrow*. Liberia Energy Sector Support Program. Winrock International, Monrovia, Liberia; Luz, Alia. 5 February 2014. *Economic Analyses and Cost Feasibility for Private Sector Investment in Small Rural Off-Grid Electrification Systems in Bong, Lofa and Nimba Counties Today*. Liberia Energy Sector Support Program. Winrock International, Monrovia, Liberia.; and, expert Opinion from Luis Velazquez, USAID/Liberia, Senior Energy Engineer.

C. Commercial Sector Information

According to a 2011 analysis of the commercial sector, the Government of Liberia (GoL) followed the established international norms when defining micro-enterprises, small, and medium enterprises (MSMEs) in terms of full time, non-family employment (Table E.1). This analysis of potential demand and energy use by different commercial producers from MSMEs to larger enterprises uses the GoL definitions for best understanding of “enterprise sizes and accompanying characteristics.”²³

TABLE I: COMMERCIAL ENTERPRISE DEFINITIONS OF GOL

Type of Enterprise	Number of Full Time, Non-Family Employees
Micro-Enterprises	1 – 3
Small Enterprises	4 – 20
Medium Enterprises	21 – 50
Large Enterprises	>50

Source: Ministry of Commerce and Industry. July 2011. *Poverty Alleviation and Wealth Creation through Small Enterprise Development: Rationale, Policy and Implementation Frameworks for MSME Development 2011-2016*. Government of Liberia. Monrovia, Liberia. <http://www.moci.gov.lr/doc/Final%20MSME%20Policy%20Liberia.pdf>

The 2011 GoL MSME study found that the MCI registry lists 7,062 enterprises (including NGOs) that registered for the first time or undertook annual “re-registration” in 2009, the last full year for which data are available. Of these, 2,174 were corporations, 237 were partnerships and 4,594 were sole proprietorships, many of which are women-owned and operated according to the MCI. Liberia has improved in its Doing Business rankings from 2008 to 2009 (from 170 to 157), but the country ranks the lowest among 183 countries in overall ease of doing business.

D. Micro-Enterprises: Market Size and Average Energy Use

According to the GoL, microenterprises are very small, usually family businesses with only family labor or perhaps one to three full or part time employees. In contrast the USAID definition of micro-enterprise is: “A very small enterprise owned and operated by poor people, usually in the informal sector. For USAID program purposes, the term is restricted to enterprises with 10 or fewer workers, including the micro-entrepreneur and any unpaid family workers.”²⁴ This USAID classification allows for broader range of activities and energy consumption than the GoL micro-enterprise definition. For consistency with GoL’s labor force census data and its Ministry of Commerce and Industry (MCI) reports, this analysis uses “1-3 employees” definition put forth by MCI.

Some micro-enterprises produce simple products like soaps and metal and wooden products, but many are engaged in petty trade and provision of basic services. Some are registered as petty traders, but many are informal and not registered with any government agency. They are businesses in that they are profit-oriented, but they are not companies in any corporate sense. Few keep business accounts separate from their personal or household accounts according to MCI.

²³ Ministry of Commerce and Industry. July 2011. *Poverty Alleviation and Wealth Creation through Small Enterprise Development: Rationale, Policy and Implementation Frameworks for MSME Development 2011-2016*. Government of Liberia. Monrovia, Liberia. <http://www.moci.gov.lr/doc/Final%20MSME%20Policy%20Liberia.pdf>

²⁴ USAID Automated Directives System - ADS - Chapter 219.

TABLE 2: POTENTIAL MICROENTERPRISES IN LIBERIA

Status in Employment			
Males	Employer	Own account worker	Total
next to/in front of home	2,000	16,000	18,000
market or bazaar stall		13,000	13,000
street stall		10,000	10,000
other place		15,000	15,000
Females			
next to/in front of home	1,000	30,000	31,000
market or bazaar stall	1,000	59,000	60,000
street stall	1,000	12,000	13,000
other place		13,000	13,000
Total			173,000

Source: Ministry of Labour. 2012. *Labour Force Survey*. Government of Liberia. Monrovia, Liberia. Page 39. http://lisgis.net/pg_img/2010%20Labour%20Force%20Report.pdf

The energy required by a micro-enterprise will run the gamut of everything in the middle and the spreadsheet can be modified for any level requested. This analysis draws from a National Renewable Energy Laboratory study that looked at average energy consumption by micro-enterprises and clean energy technologies in 2000²⁵. Examples of services for micro-enterprises enabled or enhanced with electricity include television, lighting, blending for drinks, refrigeration, sewing, and cell phones. Lights and television alone draw customers in rural areas. Table E.3 below provides some of the findings regarding typical energy use for various energy services. The 5,000 kWh average use from the Table is a middle ground between micro-enterprises that need a refrigerator and micro-enterprises that need other small machine services (e.g., sewing, small processing).

A smaller system would power lights, a television, and a cell phone. Extensive use of an electric sewing machine would require more electricity, but less than a refrigerator, in large part because a refrigerator has to be powered non-stop. A television, fan, and two lights would use 205 watts. Assuming 10 hours a day, we are using 2,050 watt hours a day, or 2 kWh. Assuming a six day work week this is 625 kWh a year. A sewing machine for 10 hours a day, 6 days a week, would require 312 kWh by itself. An *inefficient* or old refrigerator would require approximately 1000 watts. 1000 w x 24 hours = 2,400 wh per day or 24 kWh per day. 24kWh x 365 days a year = 8,760 kWh a year. So for microenterprises we could have a range of 400 kWh to 9000 kWh.

²⁵ National Renewable Energy Laboratory. November 2000. *Renewable Energy for Microenterprises*. Boulder, Colorado. And Milbrandt, Anelia. 2009. *Assessment of Biomass Resources in Liberia*. National Renewable Energy Laboratory. Technical Report NREL/TP-6A2-44808. Boulder, Colorado. April 2009.

TABLE 3: AVERAGE ENERGY USE FOR COMMERCIAL ENTERPRISE SERVICES

Energy Services	Average Energy Use (watts)*	Annual Electricity Use (kWh/yr)
<i>Individual Services</i>		
LED Light bulb	10	
TV- 19" color	85	
VCR	20	
Fan	55-250	
Sewing machine or small machinery**	100	1,000
Refrigerator		9,000
<i>Enterprise Bundled Energy Services</i>		
Small store: 2 lights, fan, and TV	205	625
Sewing or small machinery enterprise		1,000
Store with refrigeration		9,000

*Source: www.energy.gov

** Source: www.absak.com

The total micro-enterprise market segment size could range upwards of 173,000 or most likely more since many such firms are never formally registered with MCI or show up on the GoL labor force census survey. For this analysis, an average market demand for this category of commercial clients potentially requesting CE loans is therefore around 175,000 as shown in the Table.

Small Businesses

Small and medium enterprises (SMEs) are companies with paid employees. They typically are far more organized than microenterprises, with fixed premises and business lines, more complex operating systems, company accounts, and a greater need for investment capital. SMEs are, or should be, registered as partnerships, sole proprietorships or corporations.

According to the GoL study for MSMEs, there were 2,174 were corporations, and there were 237 partnerships and 4,594 sole proprietorships registered in 2009 with MCI. Only a few corporations, most partnerships and many sole proprietorships being formally registered with MCI were most likely small businesses. So a total size for this market segment, which might request CE loans from commercial banks, is assumed to be 4,800 as used in the Table.

Large Companies

Per the 2009 MCI register, Liberia had 2,174 corporations listed. Thus, this number will be used as the total potential market size for this commercial sector. The average energy use by such companies varies widely, and the analysis assumes larger companies use an average of 300,000 kWh/year in electricity consumption.

ANNEX VIII: LIST OF CURRENT DCA LOAN GUARANTEE BENEFICIARIES FROM USAID/IBEX

Transaction Report Summary

Report Date: 2014/04/04

Partner	Guarantee Number	Country	Beneficiary Name	Start Date	End Date	Credit Type	Business/Sector	City/Town	State/Province/Region	Purpose of Loan	US Dollar Amount	Total Disbursement	Total Disbursement (USD)
Ecobank Liberia Limited	669-DCA-09-001	Liberia	Moonlight Metal Work	05/12/2010	05/12/2011	Term Loan	Agriculture	Bong	Bong	Farming	\$10,000	10,000	\$10,000.00
Ecobank Liberia Limited	669-DCA-09-001	Liberia	Suzela Agro-Business	20/05/2011	30/06/2012	Term Loan	Agriculture	Paynesville	Montserrado	Farming	\$20,000	20,000	\$20,000.00
Ecobank Liberia Limited	669-DCA-09-001	Liberia	Moonlight Metal work	07/12/2011	30/11/2012	Term Loan	Agriculture	Gbangasiakole	Bong	Farming	\$25,000	25,000	\$25,000.00
Ecobank Liberia Limited	669-DCA-09-001	Liberia	Samjac Agro Industry	10/05/2012	30/05/2013	Term Loan	Agriculture	Kakata	Montserrado	Farming	\$10,000	10,000	\$10,000.00
International Bank Liberia Limited	669-DCA-10-002	Liberia	LIBCO, Cocopa Rubber Plantation	18/12/2009	03/09/2011	Term Loan	Agriculture	Ganta	Nimba	Working Capital	\$150,000	150,000	\$150,000.00
International Bank Liberia Limited	669-DCA-10-002	Liberia	Anarco trading Center	26/05/2010	26/05/2011	Term Loan	Agriculture	Monrovia	Bong	Working Capital	\$50,000	50,000	\$50,000.00
International Bank Liberia Limited	669-DCA-10-002	Liberia	ARROW ALLIANCE GROUP	24/02/2013	24/07/2014	Term Loan	Agriculture	TODEE DISTRICT		Asset Financing / Working Capital	\$150,000	150,000	\$150,000.00
International Bank Liberia Limited	669-DCA-10-002	Liberia	Jacqueline's Production	10/09/2013	11/06/2016	Term Loan	Agriculture	Paynesville	Montserrado	Capital Investment (purchase of	\$73,211	3,600,000	\$47,758.03
											\$488,211		\$462,758.03
											US Dollar Amount		Total Disbursement (USD)