

Power Africa Senior Advisors Group Programme

Final Report: Liberia Policy and Business Environment Study for the Off-Grid Solar Lighting Sector

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1. Executive Summary

The objective of this study is to assess the off-grid solar companies¹ currently active in Liberia, including the market and policy barriers they are facing. The report analyses the current and potential market for these products, before exploring key market barriers and—in line with these barriers—making a series of recommendations for promotion of quality and improvement of affordability. Taking forward these recommendations will require continued strong leadership by the RREA, coupled with coordinated and increased support by wider government, development partners, private sector partners—both international and local—and financiers. The report places due and necessary focus on the Lighting Lives in Liberia (LLL) programme, from 2012-2017, and the subsequent Liberia Renewable Energy Access Project (LIRENAP), as nearly all sales of quality-verified products to date have been made through these (RREA-led) projects. Recommendations are considered for how to enhance LIRENAP's approach, to further accelerate development of the off-grid solar market's development in Liberia and in doing so, provide energy access to a greater number of households and small businesses.

Potential Market: While there is limited data available regarding customer willingness to pay for electricity over time, evidence from the World Bank, NRECA International, and the LLL project suggests that around 10 per cent of the population can afford to pay around \$13 per month, 20 per cent can afford to pay around \$10 per month and 50 per cent can pay around \$5.50 per month. Comparing these figures with average PAYG prices suggests that around 30-50 per cent of the population could afford a typical upfront payment of between \$10-30, and a typical monthly payment of \$5-10 for a PAYG system.

Current Market: Quality-verified sales were increasing until 2014-15 when Ebola caused a dip, and since then have flatlined at around 5,000 per year. The market is highly concentrated with over 50 per cent of sales from 2012 to 2017 taking place in Montserrado County. There are around 15 off-grid solar companies in Liberia, most of which are still in a very early stage of development, selling less than 50 systems per month.² International companies have stepped up discussions around establishing partnerships in Liberia. Some of these partnerships are around how international companies can support distributors with business development, through developing PAYG business models, establishing new mobile payment platforms, or using new software platforms. International companies are yet to directly enter the market or enter into exclusive partnerships with Liberian companies.

The use of mobile money is set to grow rapidly, making Liberia a more attractive market for PAYG companies in future. Microfinance is a less attractive potential route to market, given the small size of Liberia's microfinance sector and limited growth prospects. The ability for customers to pay for systems over time through PAYG is regarded by companies, by USAID and the RREA as critical to overcoming the affordability challenge.³ PAYG is clearly viable in Liberia but PAYG business models are complex, and companies will need support to pilot, refine and develop their business models, ideally working in partnership with international PAYG manufacturers with the support of RREA.⁴

Market Barriers: The following market barriers have been analysed.

- Capacity Constraints: Most companies have limited capacity in business management, financial planning, marketing and sales.⁵
- Access to Finance: Although a couple of companies have received grant funding, in general companies have little to no access to finance. Grant funding is needed to build out distribution networks, while concessional financing is needed to help meet working capital needs.
- Starting or Expanding a Business: Business registration requirements are not considered a major barrier to market entry or to business expansion.
- Importation and Taxation: Companies importing products outside of LIRENAP incur taxes of around 30 per cent. Under LIRENAP companies are eligible for a duty reduction, which will reduce over time. The RREA is seeking to replace this subsidy with a permanent duty waiver for all quality-verified solar products.
- Fossil Fuel Subsidies: Subsidies on candles, battery-powered lights, kerosene, diesel or on generators are not considered to be a barrier to market growth.
- Quality Standards and Enforcement: The RREA has only supported the distribution of Lighting Global quality-verified products. However, there are cheaper, poor-quality products in the market, including some counterfeit products. There is no mechanism to identify quality products at import or to prevent poor-quality products from entering the market.
- Awareness, Availability, Affordability and Acceptability: The LIRENAP project has helped to create awareness, and subsidises specific business costs, for example around transportation. There has been discussion of restricting both gross margins and prices, to improve affordability. RREA is exploring options to improve after-sales service, including replacing faulty products under warranty and repairing them where possible.

Policy and Programme Recommendations:

Ultimately, the recommendations in this report steer government intervention towards *encouraging expansion of the commercial off-grid solar market*⁶, in order to increase energy access in Liberia. If implemented, the market enablers outlined in this report will help government to do this by building demand, consumer awareness and willingness to pay and encouraging private investment while minimising market distortion. The approach is ultimately centred on *rewarding outputs* – sales achieved or geographic reach – instead of funding or regulating inputs.

The following recommendations are outlined in more depth in this report:

- Promoting Quality: Develop harmonised national quality standards, based on existing international standards. Set up a Pre-Shipment Conformity Assessment (PSCA) programme to identify quality-verified products on import, and monitoring the prevalence of low-quality, generic products in the market (on an ongoing basis).
- Improving Affordability through a Duty Waiver: Undertake an impact assessment which would seek to understand the fiscal, economic, social and environmental impact of a duty waiver for quality-verified off-grid solar products, ideally in partnership with the Ministry of Finance and Development Planning (MFDP). Thereafter, develop and implement a duty waiver for quality-verified off-grid solar products, using the PSCA programme to identify quality products at import. Use the announcement of a duty waiver to engage international companies and encourage them to consider entering the market.

- Improving Awareness: Limit the geographic scope of awareness-raising activities and jointly plan roadshows in partnership with the private sector through the LEAP network, in order to make these activities as useful to companies as possible.
- Improving Affordability and Availability: Do not place restrictions on margins or prices since this will distort the market, reduce competition, and could prevent PAYG business models from being viable. Work with the African Enterprise Challenge Fund (AECF) and other funders to ensure companies receive grants, concessional loans and technical support to help them build their businesses. Consider transitioning from directly subsidizing specific business costs, to providing companies with results-based financing (RBF) based on sales achieved.
- Improving Acceptability: Consider developing a consumer-facing quality seal, to encourage end-users to 'choose quality'. Establish a small number of centralised repair shops with support from international manufacturers to provide high-quality repair services.
- Coordinating Stakeholders: Use the Renewable Energy Working Group (REWG) and its Steering Committee to improve coordination amongst stakeholders in the off-grid solar sector, with a focus on enhancing communication and collaboration between government and the private sector.

2. Introduction

The objective of this study is to assess the off-grid solar companies currently active in Liberia, including the market and policy barriers they are facing in areas such as product procurement, importation, distribution and retail, as well as access to consumer and business finance.⁷ The study seeks to provide recommendations to Liberia's Rural and Renewable Energy Agency (RREA)—and other relevant Government Ministries and agencies—on how to best overcome these barriers and transition the solar sector in Liberia to a private-sector led approach. These recommendations will help the RREA, and other stakeholders to better support the solar market to reach future commercial viability. In doing so, the RREA will help provide energy access to a greater number of households and small businesses.

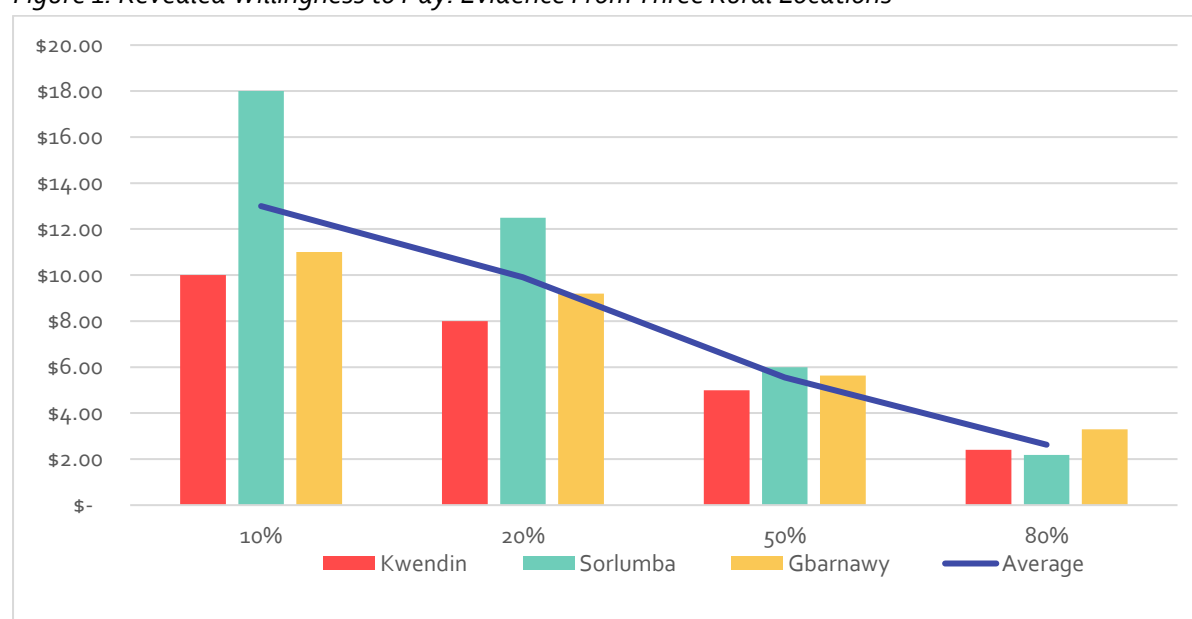
3. The Potential Market

The potential market for off-grid solar solutions in Liberia consists of an off-grid population, made up of households that are not connected to the national grid, and do not currently have access to mini-grid or off-grid technologies. These households lack even basic Tier 1 access to electricity, according to the SEforALL multi-tier framework.⁸ The potential market also consists of an unreliable-grid population, made up of households that have a poor-quality or inconsistent connection to the national grid.⁹ The sale of off-grid solar products to these households contributes to sales volumes and revenues, helping companies fund the cost of building out distribution networks, and putting them in a stronger position to sustainably serve the off-grid population.

Affordability is a major barrier to market growth, but actual sales achieved through the Lighting Lives in Liberia (2012–2017) project suggest that a significant proportion of the population can afford off-grid solar products. Under this project, 26,412 products were sold and 1154 were donated in off-grid areas. The average retail price paid was \$32.33.¹⁰

While there is limited data available regarding customer ability to pay over time, a nationwide ‘revealed willingness to pay’ analysis was carried out by the World Bank in 2012. Willingness to pay is evaluated by collecting data regarding current spending on energy, on the assumption that customers would be willing to spend the same amount in exchange for an improved service.¹¹ This study found that urban and rural respondents outside of Monrovia, over 99 per cent of whom were not connected to the grid, were spending an average of \$17.95 per month, or 10 per cent of overall expenditure, on lighting and cooking. There was a striking discrepancy between rich and poor, with 75 per cent of respondents reporting expenditures below the survey average, and the remainder reporting expenditures twice the amount of the lower quartiles. Average monthly spending on energy dropped to \$11.90 in rural areas and to \$4.34 for the poorest rural households.¹²

Figure 1: Revealed Willingness to Pay: Evidence From Three Rural Locations



A similar, but more recent analysis was undertaken in Kwendin, Sorlumba and Gbarnawy by NRECA International, with the support of the USAID Power Africa Beyond the Grid Program, in 2016, prior to launching three community/cooperative-owned mini-grids.¹³ Findings from this survey shed more light on the likely affordability of solar lights and home systems than actual payment data since customers were asked to pay more for a higher level of service than a typical monthly payment on a PAYG solar home system. All three mini-grid projects struggled as a result of low monthly payments, because of low demand, low ability to pay and other factors.¹⁴ This survey, which excluded cooking, was broadly consistent with the World Bank 2012 findings and suggested that:

- 10 per cent of the population can afford to pay around \$13 per month
- 20 per cent can afford to pay around \$10 per month
- 50 per cent can pay around \$5.50 per month.

In other markets, basic quality-verified solar lights retail for as little as \$7-9, while for entry-level pay-as-you-go (PAYG) products such as the Angaza SoLite3 or the Azuri Indigo, following initial payments of between \$6 to \$30, monthly payments range from \$5 to \$10 per month.¹⁵ Larger bundled systems, which include radios, fans and televisions, cost up to \$45 per month. These low prices have been made possible by such policy interventions as:

- Duty and tax waivers for off-grid solar products.
- Demand creation campaigns to encourage customers and retailers to buy quality-verified off-grid solar products.
- Grants, concessional loans, results-based financing and technical assistance to help companies grow and access commercial investment.
- Promoting quality to protect consumers, through for example only supporting quality-verified products in sector support programmes.
- Fully integrating off-grid solar into National Electrification Plans.¹⁶

Comparing retail prices paid under the LLL project and willingness to pay data with average PAYG retail prices suggests that around 30-50 per cent of the population could afford a typical upfront payment of between \$10-30, and a typical monthly payment of \$5-10, for a PAYG system. This indicative conclusion is broadly in line with findings from the Lighting Lives in Liberia Consumer and Retail survey in 2016, in which 30 per cent of men and 34 per cent of women stated that product prices were affordable.¹⁷ Products are likely to be more affordable than suggested through this survey, given respondents' tendency to over-state the affordability challenge when asked, to encourage lower prices.

A nationwide revealed willingness to pay survey would help to better understand the affordability challenge and could help companies determine where to focus their efforts. Such a survey could also provide a county-level analysis of the potential market for products at different price points or levels of functionality (including demand for DC appliances such as fans, TVs and radios), as well as the geographic, economic and infrastructural factors which could affect the cost of distribution. The Millennium Challenge Account (MCA) is undertaking a national Willingness to Pay analysis, as part of a Cost of Service Study.¹⁸ Preliminary discussions are being held with the Swedish Embassy,

regarding a Willingness to Pay study for solar home systems, as part of technical assistance to inform the design of a Results Based Financing programme.¹⁹

A better understanding of the different costs that cash-sales and PAYG businesses face in Liberia, would help to estimate the gross margins, which is calculated simply as the revenue from sales minus the cost of goods, before considering sales, distribution, after-sales service and other costs. It would also help to estimate the prices that companies would need to charge to achieve commercial viability in an unsubsidised market. These costs include cost of goods, shipping, taxation, distribution, customer credit checks, sales, marketing and after-sales service, including managing mobile payments and warranties.

Pay-as-you-go solar systems can be switched off remotely or reclaimed from customers in case of non-payment. As detailed by the GSMA,²⁰ across sectors, mobile-enabled PAYG meets important needs for both customers and service providers. PAYG allows payments to be made 'affordable and convenient for those with irregular incomes'. PAYG also expands addressable markets significantly and, in some cases, builds consumer trust by offering a low-risk, low commitment trial²¹. This may be true for customers in Liberia who little experience with these products, or perhaps damaged perception given the sizeable grey market of low quality products. For service providers, PAYG provides increased oversight and control of their system's performance, as well as method of efficient and secure payment collection. It also creates an incentive for consumers to pay regularly since the service is suspended in the case of default (although most service providers offer a grace period). Default rates in the industry globally vary widely depending on the quality of companies' credit check processes, the length and flexibility of repayment periods, and on broader economic factors.

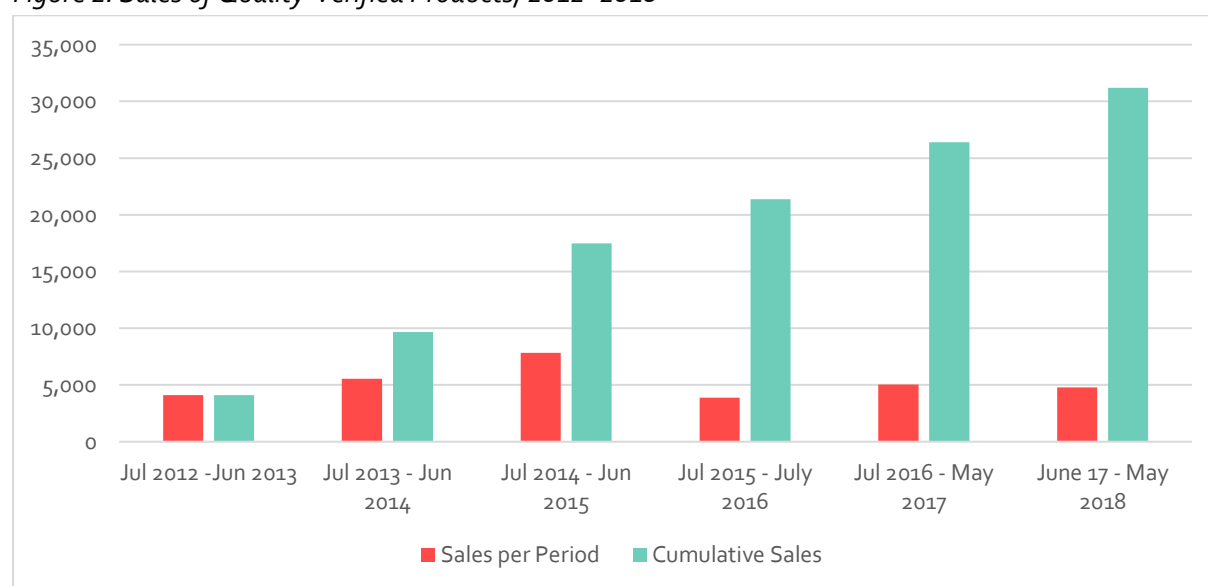
The GSMA, which works globally with PAYG companies through the Mobile for Development Utilities programme, reports rapid growth of the sector globally—annual growth rates of 140 per cent from 2012 to 2016, and proving to be by far the most attractive market segment for investors.²² Indeed, from 2012 to 2017, PAYG companies raised about 85 per cent of the total funding to the off-grid solar sector worldwide (\$773 million).²³ Further, GOGLA reports that globally, the majority of industry players are coalescing around a financing model focusing on lease-to-own payments over a payment period of less than two years. Customers are incentivised to complete payments in order to fully own their asset, and the shorter the payment period, the lower the risk of default.²⁴

As Liberian companies begin to trial pay-as-you-go solutions in Liberia, a better picture will emerge of the risk of customer default, and the payment period that suits the market considering ability to pay and potential default rates, and how this can be priced into business models.

4. The Current Market

Nearly all quality-verified sales achieved to date in Liberia's nascent off-grid solar market have been as a result of the LLL project, which ran from June 2012 to May 2017. The project suffered an understandable dip in sales during the Ebola epidemic in 2015-16, given the challenges in distribution and marketing. Sales picked up again slightly in 2016-2017 and have flatlined in the 2017-2018 period after the LLL project ended, even though companies can still access products at duty-free prices from the RREA, as outlined in more detail below.

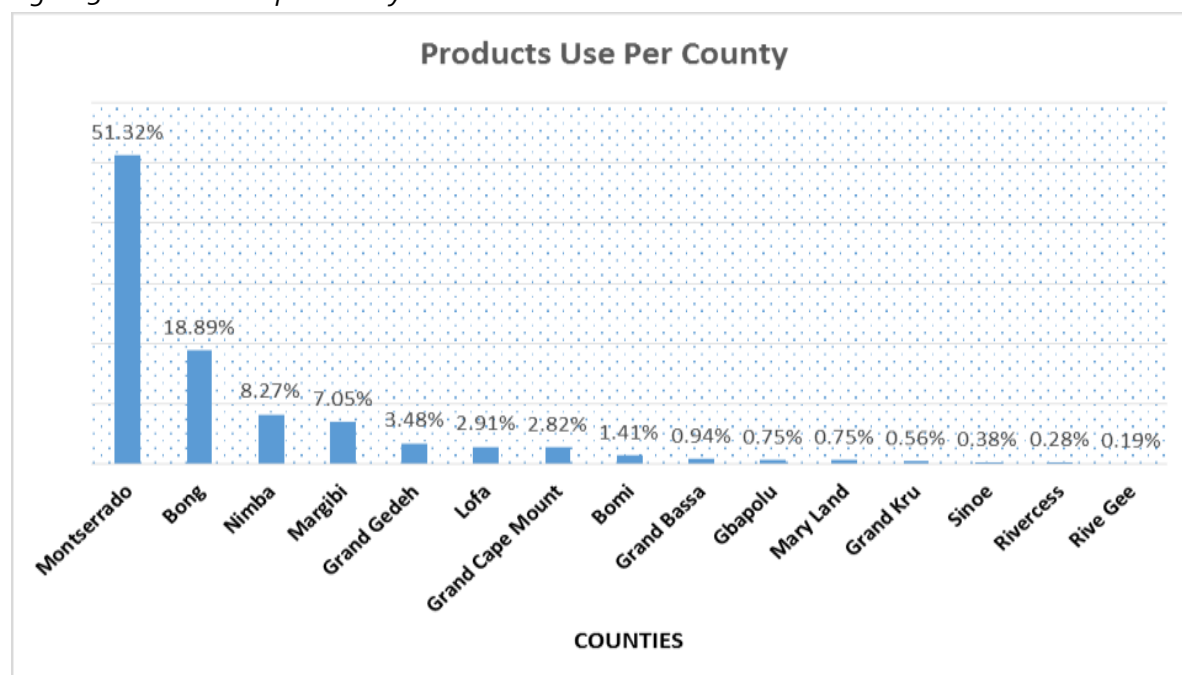
Figure 2: Sales of Quality-Verified Products, 2012–2018



As discussed further below, the flatline in sales is likely to be a result of a range of challenges faced by national and international companies. RREA retail partners benefit from a duty waiver, as well as not having to pay shipment fees, handling or storage costs, saving at least 30 per cent compared to the unsubsidised, landed cost of goods. Despite this support, companies lack the funding needed to build out distribution networks, or to invest in sales and marketing, in order to boost volumes. They are heavily working capital constrained, given that many have sold systems on credit (without using PAYG) and struggled to recover monies owed in a timely fashion.

The market is currently highly concentrated with over 50 per cent of sales from June 2012 to May 2017 taking place in Montserrado County, with significant sales also achieved in Bong, Nimba and Margibi. Half the counties enjoyed less than 1 per cent of sales each. According to the stakeholders we spoke to, these counties are generally wealthier, more densely populated and have better infrastructure than other counties.

Figure 3: Products Use per County



4.1. Companies and Products

According to the forthcoming Africa Enterprise Challenge Fund (AECF) Liberia Market Assessment, and the Liberia Energy Access Practitioner's Network (LEAP),²⁵ there are around 15 off-grid solar companies in Liberia, most of which are still in a very early stage of development, selling less than 50 systems per month.²⁶ Total, VAAFD, Alternative Energy and Liberian Energy Network (LEN) are some of the most active companies in rural areas, selling a range of solar lanterns and small SHS, including from Greenlight Planet, d.light, Barefoot Power, Solarkit, Waka Waka, Biolite, NIWA, Omnivoltaic, and Fosera. Smaller solar lights are most popular due to their low cost. Products are sold for cash or sold to retailers on credit. Recovering revenue from retailers that have bought on credit is a major challenge, with a high risk of default or late repayment. One company has successfully trialled a pay-as-you-go (PAYG) solution.

International companies have stepped up discussions around establishing distribution partnerships in Liberia. Some international companies, including Fosera, Greenlight Planet and D.Light have started talking to companies about importing their systems directly, and establishing mobile payment platforms.²⁷ Greenlight Planet is offering marketing materials, software and training for the development of pay-as-you-go business models and is exploring the possibility of establishing an exclusive distribution partnership. One distributor from Sierra Leone—Easy Solar—recently undertook scoping to explore the possibility of bringing its entry-level PAYG business model to Liberia, which is supported by a software platform developed by Angaza Design. It has since registered in Liberia and is entering the market. Mobisol is in discussions with one Liberian company around using their Paygee software—a hardware-agnostic software suite aimed at boosting the development of PAYG. In addition, according to the forthcoming USAID CEADIR report (2018), In Liberia, PAYG start-up Lodicha is in discussions with UBA regarding debt for

implementation of its business plan alongside the equity investment made by its founder. Lodicha's plan calls for the establishment of a point of sale in Monrovia.²⁸

Despite these positive trends, to date, international off-grid solar companies are yet to *directly* enter the Liberia market, or enter into exclusive partnerships with Liberian companies. They have a limited understanding of Liberia's policies, programmes and future plans regarding the off-grid solar market. Some companies expressed concern that they would be unable to compete with RREA retail partners, particularly if they imported outside of the RREA programme.²⁹ Many are unaware of how they might join the RREA programme to gain access to the tax waiver and other benefits. Amongst those with a more advanced understanding of the Liberia market, there is concern that there will be limited room for commercial competition and profitable business if—as is currently being considered—prices, margins and some costs are either fixed or covered by the RREA—and thus standardised across the sector. Partly as a result of limited understanding of the Liberian market, and partly because of some policies currently being considered, Liberia does not currently represent an attractive market for international companies to enter, compared to alternatives. As noted during private sector consultations, other factors such as limited infrastructure, low consumer purchasing power, and Liberia's relatively small potential market size also mark it hard to attract international companies into the market. As outlined in more detail below, Liberia's commitment to key reforms needs to be clearly communicated, to send a market signal, provide clarity and reduce perceived risk, with a view to attracting international companies and investors into the market and accelerating growth.

4.2. Availability of Mobile Money

Mobile money is a key enabler of PAYG solar business models. 20 per cent of Liberia's population—over 1 million people—is now subscribed to mobile money. The largest mobile money provider, MTN, has 280,000 customers that have completed transactions in the last 90 days and 178,000 that have completed transactions in the last 30 days. 4,000 agents across the country complete 2,400 transactions every month with a total value of over \$5 million. The company plans to expand aggressively in the coming year, increasing subscribers, frequency of transactions and revenue per user. Although limited mobile money usage is not the only barrier new PAYG companies will face upon entering Liberia, the growth of mobile money is likely to make Liberia's PAYG market more attractive for national and international off-grid solar companies in future.

Orange Liberia is also active in mobile money space, with key programmes already in place including a tax payment programme with the Liberian Revenue Authority (LRA) through their Orange Money platform. They currently have approximately 1,700 mobile money agents across the country (800 active). Plans are in place for expansion, and there is interest in partnering with local and international off-grid solar companies to develop a mobile-enabled PAYG service.

4.3. Availability of Microfinance

While microfinance organisations have proven an important distribution channel in other markets, the microfinance sector in Liberia is relatively small and is, in our view, unlikely to grow rapidly in the foreseeable future given low population density, which makes it difficult for MFIs to recruit enough customers to cover their operating costs. According to the Central Bank of Liberia (CBL), there are currently 18 registered microfinance Institutions operating in country, though (according to CBL) the sector is undercapitalised and predominantly operates in the Montserrado County area.³⁰ An IMF report published in 2016³¹ found that although commercial banks account for 90 percent of financial assets, about 70 per cent of individuals who borrowed money in 2013 relied on non-bank FIs instead of commercial banks. However, the report indicated that services offered by non-bank FIs tended to be more costly (they found the average borrowing rate of commercial banks to be ~14 per cent, whereas MFIs were ~25 per cent, while credit unions were ~40 per cent).

There is one international institution, BRAC Microfinance, which has extended its outreach to a several counties in Liberia. Though, with just 40,000 customers (in 6 counties with their 25 branches), their reach is still limited. Considering this, microfinance is unlikely to be a high-potential route to market for off-grid solar companies in Liberia, as has been the case in other markets (particularly in Asia).

Mobile money³² appears to be more promising solution to enable people to pay over time—especially considering that many PAYG companies accept cash payments via agents (who then send them to companies via mobile money), rather than requiring every customer to be a mobile money user.

4.4. Prospects for Pay-As-You-Go (PAYG) Off-Grid Solar

The ability for customers to pay for systems over time through Pay-As-You-Go (PAYG) technology and associated business models is regarded by companies, and by USAID and the RREA as critical to overcoming the affordability challenge and enabling customers to access systems which offer a higher level of electricity service.³³ RREA has been exploring ways to attract PAYG companies into the country, and ways to support local entrepreneurs to set up PAYG businesses. In Liberia, one company has run and completed a successful PAYG trial, recovering over 80 per cent of revenue from 109 sales, with no defaults and just two products being returned by customers who had misunderstood system functionality. The model involved customers visiting agents, who would take cash from them and then process mobile money payments on their behalf, rather than customer paying through mobile money directly. This particular PAYG model for increasing uptake of off-grid solar products is commonplace in areas where a lower proportion of customers are using mobile money—it is the main model used by Easy Solar in Sierra Leone, for example.³⁴ Despite this positive first case, PAYG business models are complex, and companies will need support to pilot, refine and develop their business models—ideally working in partnership with international PAYG manufacturers and with the support of RREA.³⁵

The same Liberian company has also recently benefited from recent training facilitated by the ECOWAS Centre for Renewable Energy, ECREEE (as part of the entrepreneurship curriculum of the ROGEP programme, detailed further in Section 5.2 of this report).³⁶ This training could be made more widely available in Liberia if of interest to local companies.

In addition, regarding the wider prospects for PAYG in Liberia, Mercy Corps is currently developing plans for roll-out of a PAYG trial in 6 counties in Liberia, in partnership with local company Alternative Energy. The trial will assess consumer ability to pay and associated repayment rate for entry-level pico and home solar products. Roll-out, which will commence in early 2019, will involve sale of Biolite systems in several rural counties (strictly outside the grid plan). Payment will be both mobile-enabled (likely using the Angaza platform, in partnership with one of the two key mobile network operators) and also cash-based. This trial will provide important data as to the potential market for PAYG products across Liberia.

In general, further support is needed to encourage Mobile Money Integration with PAYG providers. Even in more established markets, the process can be costly and expensive (the GSMA indicates that in 2016 a single integration between a payment instrument provider—e.g. a mobile money service provider—and a third party—e.g. a utility company—cost anywhere between \$15,000 to \$30,000 and took on average 4-6 months).³⁷ Considerations such as guaranteed non-exclusivity and regulated charges for transactions could support the nascent Liberia sector develop. Technical support in this area would be valuable (which RREA could facilitate).

5. Market Barriers

5.1. Capacity Constraints

All the companies interviewed (and interviewed for other recent, cited reports) are struggling to generate enough solar sales to become profitable and to grow their businesses. Most are surviving hand-to-mouth and through offering other services. Most companies have limited capacity in business management, financial planning, marketing and sales.³⁸

5.2. Access to Finance

Although a couple of companies have received grant funding, most notably from the US African Development Foundation (USADF), companies have little to no access to finance. Grant funding is needed to cover the cost of building out distribution networks, since companies are at a very early stage in their development and lack the track record needed to attract equity investment. Over time, grants can be replaced by concessional financing, once companies have developed a degree of track record and built capacity. Banks would need to be de-risked in order to offer terms that nascent off-grid solar companies could accept. Interest rates would need to be below commercial rates, tenors would need to be flexible depending on the company's business model and ideally banks would accept forms of collateral that companies are able to provide, such as receivables financing.³⁹ As is the case across West Africa, in Liberia, commercial banks consistently stress the importance of securing access to financing that enable them to offer longer tenors and lower interest rates.⁴⁰ Grant funding and concessional lending will help companies to grow and develop track record, putting them in a better position to attract commercial debt and equity in the medium to long term.

With the ROGEP project making concessional financing available in Liberia in the next 12-24 months, the immediate need now is for grants and highly concessional loans to help companies get as investment-ready as possible. Africa Enterprise Challenge Fund (AECF) and the RREA can potentially play an important role here.

The forthcoming CEADIR final report, 2018, indicates that Mercy Corps has €55,000 [approximately \$67,000] to apply to microloans for individuals to purchase pico-solar⁴¹ products. As Mercy Corps is not a financial institution, they were looking to find a partner FI with which they could house the funds and who could make micro loans on their behalf. Mercy Corps is developing a partnership with Access Bank Liberia to identify and screen potential applicants for micro loans in clean energy.

5.3. Starting or Expanding a Business

Deliverable: Identification of all processes involved in starting or expanding a Renewable Energy (RE) off-grid solar business in Liberia, including business registration and import requirements such as import permits/licenses, standards.

According to the companies we spoke to, business registration requirements were not a major barrier to market entry. Business registration in Liberia is less complex as compared to other West African countries. As outlined by guidance provided by Adam Smith International, the process involves:⁴²

- **Choosing and reserving a unique name** for your business at the Liberia Business Registry. This could be done online or at Registry's helpdesk. The reservation of the name costs about LRD 1,400 and lasts for 120 days. This process can take approximately 1 day.
- **Preparing Regulations and Article of Incorporation** of the company. This can be done in house or could be contracted to a capable legal counsel at a negotiable fee.
- **Registering the company at the Liberia Business Registry (LBR).** This can be done concurrently with the first step and could take about a day. It requires obtaining, filling and submitting completed business registration application, including the below documents;
 - Registration Form
 - Articles of Incorporation
 - Copy of ID documents as attachments to forms A or B
 - Additional parts:
 - Empowered person form (A) or Registered agent form (B) in case of a company representative
 - Incorporator(s) form (E)
 - Shares and shareholder(s) form (F)
 - Information for TAX authority form (Q)
- **Paying fees and receiving proof of payment.** This can be done at the LBR Central Bank's window. Upon payment of the fee, the Bank officer issues a flag receipt of the Government of Liberia as proof of payment. This receipt must be returned to the initial officer who accepted the application.
- **Receiving the Business Registration Certificate.** The proof of payment is returned at the LBR. Upon submission, the officer at the LBR then journalises the dossier and provides a receipt slip, thereby approving the dossier for processing. The status of the application can be tracked online; and upon approval, the company receives a Business Registration Certificate.

The whole process used to take around 72 hours but owing to recent changes it is now more likely to be completed in a week or two, according to one company that recently registered (late 2018). All the above processes can be contracted to a legal counsel for a fee ranging from \$1,500 and above. This fee is exclusive of payments required at the Business Registry, which are as follows:

Table 4: Liberia Business Registry

LIBERIA BUSINESS REGISTRY			
FEE SCHEDULE FOR NEW ENTERPRISE REGISTRATIONS			
<i>The following schedule of fees applies to each of the stated type of legal entity when registering a new enterprise.</i>			
<i>These are the only fees applied by the Liberia Business Registry when a new enterprise is being registered.</i>			
No.	Type of Business	Fee for Liberian Applicant (LRD)	Fee for Non-Liberian Applicant (USD)
1.	Sole Proprietors		
	Application Fee	2,000	700
2.	Limited Liability Companies		
	Application Fee	4,000	900
3.	Business Corporation		
	Application Fee	4,000	900
	Articles of Incorporation filing fee		
	100 shares	20	20
	500 shares	100	100
	1,000 shares	200	200
4.	Branches of Business Corporation or LLC		
	Application Fee	2,000	450
5.	Partnership and Limited Partnership		
	Application Fee	3,000	800
6.	Non-For-Profit Corporations, Trusts and Foundations		
	Application Fee	3,500	400
	Articles of Incorporation (Where applicable)	3,500	50
7.	Foreign Companies Applying to do business in Liberia		
	Application Fee		500

5.4. Importation and Taxation

Deliverable: Evaluation of the financial and time cost of importing solar products, including custom and duty tariffs, port clearing fees, and other fee requirements encountered in the process.

Companies importing off-grid solar products outside of LIRENAP incur taxes of around 30 per cent. This makes it difficult to compete with RREA partner retailers on price and reduces sales volumes to the point where revenues are insufficient to cover costs and business is not viable. There is a need to transition from importation by RREA on behalf of the retailers to private sector-driven importation. Little information is available about the time costs or fees incurred importing solar products, since to our knowledge only one company—Total—has imported products outside of the RREA programme.

Under LIRENAP, companies will buy products direct from international manufacturers, and the RREA will verify with Customs authorities that products are eligible for a duty reduction. A full 100 per cent duty waiver will be available in year, equivalent to about 30 per cent of the cost of goods. The subsidy provided through duty reduction will be reduced to 20 per cent of the cost of goods in year 2 and 10 per cent in year three. In the long-term the RREA is seeking to replace this subsidy with a duty waiver for all quality-verified solar products.

5.5. Fossil Fuel Subsidies

Deliverable: Identification of any distorting subsidies from traditional lighting fuels and products.

According to the stakeholders we spoke to, there were no general subsidies on candles, battery-powered lights, kerosene, diesel or on generators. Fossil fuel subsidies may be provided to specific organisations under concession agreements, but these were not considered to present a major barrier to market growth.

5.6. Quality Standards and Enforcement

Deliverable: Assessment of regulatory standards for energy services, including tariffs and consumer protections, in particular for quality standards, and their enforcement, including for batteries, light bulbs, LED torches and lamps, and solar lamps and other components. This will include checking to ensure they are well aligned with regional standards initiatives.

The RREA has only supported the distribution of Lighting Global quality-verified products. However, there are cheaper, poor-quality products in the market, including some counterfeit products. There is no mechanism current in place to identify quality products at import or to prevent poor-quality products from entering the market. Customers and retailers are not always aware of the benefits of buying quality-verified products, and there is a need to promote quality across the market as a whole, both through encouraging customers and retailers to 'choose quality' and working towards keeping poor quality products out of the market.

Liberia is in a similar position to many other ECOWAS countries in this respect. The forthcoming Regional Off-Grid Energy Project (ROGEP), supported by the World Bank, will be working to improve regional policy regarding regulatory standards, before supporting countries with national adoption and implementation of the improved regional regulatory framework. ROGEP will provide technical assistance to support adoption of the existing regional standards, as well as development of a regional quality assurance framework for systems up to 350W. Individual countries will then be supported to adopt and enforce these standards. There will be significant engagement with the technical and political authorities at both regional and national levels. Particular attention will be given to the promotion of exchange of experiences with other economic communities and regions.

For larger institutional or productive use systems, including component-based systems, ROGEP will support the development of technical standards through implementation of pilots. Country based pilots will contribute to the development of standards and a quality assurance framework, which could be agreed upon at the regional level, and then adopted at each country level. For the larger institutional systems, meant for use in schools, health clinics, public administration buildings etc., ROGEP will support the development of a service-oriented quality assurance framework, to move the industry in the direction of providing long-term performance and service contracts than product sales only.⁴³

The recommendations made in this report would see Liberia making significant steps towards putting in place the kind of regulatory framework and implementation mechanism which is likely to be pursued at regional level through ROGEP.

5.7. Awareness, Availability, Affordability and Acceptability

Deliverable: Identification of any other policy barriers for off-grid solar companies

The main sector support programmes have been undertaken by the RREA and Mercy Corps, funded by the World Bank and the European Union respectively.

Awareness: Demand has successfully been created by both above-the-line and below-the-line awareness campaigns. However, companies reported that in some cases radio promotions, trade fairs, and roadshows had been rolled out in areas where products were not available, leading to customers being unable to access products. They would prefer to be able to display company logos and general branding, rather than government or NGO logos prominently displayed—since when government or NGO logos are on display customers expect products to be provided for free or at subsidised prices and are less willing to pay a commercially viable price. Some companies felt that free distribution or discounted pricing of some products made it harder to sell products at commercial prices. Companies would like more involvement in deciding where awareness-raising activities take place, and more advance warning of when roadshows will be taking place.

The financial support offered to companies as part of the roadshows were also discussed; many felt they would prefer the flexibility to choose their own accommodation and transport if possible. Retailers mentioned that they would like the chance to stay with friends or family—if that was an option—or locate all the company representatives at the same lodgings, for example.

Availability and Affordability: Under Lighting Lives in Liberia, prices for solar products were set by retail partners and determined by existing market and distribution variables, such as the cost of transportation, distribution and payment to intermediaries, without distorting subsidies. RREA encouraged retail partners to set a reasonable margin of profit and sell products at affordable prices. A small proportion of products was donated, and some products were offered at discounted prices to accelerate sales following Ebola, but in general while the cost of goods was subsidised, retail partners were encouraged to compete on both margin and price. This component of LIRENAP is currently being refined, and this section is based on current thinking around how the project might work.

A transport subsidy is also being considered, based on the number of products being transported and the region being transported to, which will also be phased out over the three years of the programme. As the cost of goods and transport subsidies are scaled down, the costs, margins and prices companies must achieve to make their businesses viable are likely to rise. It will be important to monitor and manage the phase-out carefully, to ensure it has the desired effect of creating a sustainable market.

The RREA has invested resources in identifying appropriately qualified retailers at district and county level, and will make this list available to importers, with a view to facilitating business partnerships. It is exploring options for improving access to finance, and for providing training. A performance-based grant is being made available to help cover sales and marketing costs. This grant will be awarded to the 10 companies achieving the highest sales in each quarter, with \$40k distributed in year 1, \$25k in year 2 and \$15k in year 3.

Encouragingly the Swedish Embassy is developing a Results-Based Financing (RBF) project, whereby companies will receive financial support either for achieving agreed milestones (e.g. entering a new county) or based on sales achieved. This is based on an approach which has worked well in Zambia and is now being rolled out in several countries. The Nordic development bank NEFCO would act as fund manager, possibly with GIZ or EnDev also supporting implementation, given their deep experience of implementing RBF in other countries.⁴⁴ RREA is seen as a key partner, ensuring coordination with other initiatives and providing oversight of all donor-funded activities in the off-grid sector.

Under the LLL project, gross margins (i.e. total margin on the cost of goods when products are sold, before sales, distribution and other costs are deducted to calculate profit/loss) ranged from 23 to 102 per cent, with an average of 58 per cent⁴⁵. However, under LIRENAP, recognizing the fact that RREA is subsidizing a significant proportion of retail partners' costs and given the need to make products as affordable as possible, current thinking is for gross margins to be capped at 25 per cent of the cost of goods, and for end-user prices to be fixed at below-market rates.

Even with the envisioned subsidies, fixed margins and prices will not enable companies to cover their costs. PAYG business models will not be able to operate since these businesses incur additional costs requiring higher gross margins, in areas such as customer training, carrying out credit checks, setting up mobile payment platforms, and providing after-sales services. There will be little room for companies to compete to find the cheapest ways to transport products, to recruit and retain retailers, to maximise gross margin, or to boost volumes by offering the lowest-possible price. Businesses will not be able to develop the track record of profitability needed to begin to attract private investment into the sector, and international companies and investors are unlikely to consider entering Liberia's off-grid solar market. Alternative approaches to addressing the affordability challenge, based on promoting PAYG and attracting companies and investors into the sector, are outlined in the recommendations below.

Acceptability: All Lighting Global quality-verified products come with a manufacturer warranty. Nearly all companies in the sector prefer to conduct their own repairs and replacements under warranty and use design techniques such as anti-tampering screws to prevent others from opening up their products, in order to ensure that repairs are conducted to an adequate standard. Manufacturer warranties become void if a third-party tamper with a solar product.

Under the RREA programme, a warranty form is given to all customers detailing the nature and length of warranty that is available. Unfortunately, many products which were procured under the LLL project have been in storage for a long time and are no longer covered by manufacturer

warranties. Customers can return products to retailers and the RREA replaces any faulty products that retailers return to them, irrespective of whether they are within the warranty period.

Under LIRENAP, the RREA is seeking to train electronics and repair shops to undertake repairs of products after warranty periods have expired and provide toolkits for them to do so. The importation of spare parts will be subsidised.

6. Policy and Programme Recommendations

6.1. Promoting Quality

Deliverable: Propose methods for establishing a standards programme for all lighting products, including the Government organisations best placed to develop and oversee the enforcement of these regulatory standards.

It is recommended that the RREA work with the Government of Liberia's Division of Standards and other stakeholders to develop and enforce regulatory standards as part of a broader strategy for promoting quality off-grid solar products. Promoting quality in the marketplace helps to build trust in solar technology and creates demand. Low quality products—especially counterfeits or those which falsely claim to provide a level of service which they do not deliver—undermine trust, reducing demand and damaging the market. These products imitate the look and feel of respected brands but use inferior technology, often leading to early failure.⁴⁶ The strategy for promoting quality should include: 1) Sector Support Programmes; 2) Development of Harmonised National Quality Standards; 3) a Pre-Shipment Conformity Assessment Programme to identify quality products at import and to keep poor quality products out; 4) Monitoring, Evaluation and Enforcement.

The Government and RREA have jointly taken the first step, by exclusively promoting products which meet Lighting Global quality standards through the RREA's programmes. In order to review and enhance how quality is promoted through LIRENAP, it may be worthwhile to consult with LEAP network members on how quality is being promoted through awareness campaigns and retailer recruitment efforts. Both customers and retailers need to be targeted to ensure they understand the benefits of 'choosing quality'. This will become increasingly important as demand grows—local retailers and distributors need to ensure their partners are selling quality-verified products and ideally not selling cheaper generic products. This will help build a strong network of reputable and respect international partners selling high-quality products in Liberia. See section on Acceptability below for further recommendations in this area.

6.1.1. Development of Harmonised National Quality Standards

RREA should work with the Division of Standards and wider Government to develop national quality standards, that are harmonised with Lighting Global quality standards. The World Bank / IFC Lighting Global programme maintains a series of quality standards and testing methods for solar lanterns and solar home systems up to 350W. Standards cover five key areas:

- Truth in Advertising: Advertising and marketing materials accurately reflect tested product performance.
- Durability: Product is appropriately protected from water exposure and physical ingress, has durable switches and connectors and, if portable, survives being dropped.
- System Quality: Product passes a visual wiring and assembly inspection.

- Lumen Maintenance: Product maintains consistent light output after 2,000 hours of operation.
- Warranty: A consumer-facing warranty is available; the required warranty duration varies by product type.

The test methods used to assess the Lighting Global Quality Standards have been adopted by the International Electrotechnical Commission as a reference point for quality assurance of off-grid lighting products (IEC Technical Specification 62257-9-5).⁴⁷

There are several advantages to adopting internationally harmonised standards and test methods. The IEC standards are kept up to date as new technology and new products emerge. It is easier and cheaper for companies and investors to engage with a single standards and testing system for all countries of operation, rather than design products to meet diverse requirements set at regional or national level in different markets. Finally, given the high cost and technical expertise required for thorough product testing, it is cheaper and more efficient to conduct testing through IEC-accredited test laboratories around the world, than to establish new testing facilities specifically for solar lanterns and home systems.

It is recommended that the RREA request the support of the World Bank in developing and implementing mandatory national standards that are harmonised with international quality standards. The World Bank works with CLASP, the world's leading experts in quality assurance for off-grid solar systems and related appliances, to provide dedicated, expert support and advice to governments in this area.⁴⁸ This process would begin with an initial assessment to understand the current situation with regards to product quality, understand the capacity of key stakeholders and develop a phased strategy for promoting quality. Capacity building for key stakeholders would be likely to be needed at the outset and periodically throughout the process proposed below.

6.1.2. Pre-Shipment Conformity Assessment Programme

Once standards are adopted, the RREA should work with Division of Standards and Customs Authorities, to design and implement a Pre-Shipment Conformity Assessment (PSCA) Programme. PSCA (sometimes also referred to as Pre-Verification of Conformity or PVoC) is a mechanism that only allows products that comply with standards to enter the market legally, by enabling quality to be assessed at the point of entry. Conformity assessment would be undertaken pre-shipment by a company or range of companies in exporting countries, that are licensed by the Government of Liberia to do so.

Under this approach, the government would require importers to provide a Certificate of Conformity (CoC), as well as a valid Lighting Global Approval document and accompanying Test Report as evidence that products conform to quality requirements.⁴⁹ A certificate of conformity is a mandatory document for customs clearance of exports to many countries around the globe. The CoC, issued prior to a shipment leaving the port of export, shows that the goods comply with the relevant regulations and national, regional or international standards. A CoC is granted to a product that meets a minimum set of regulatory, technical and safety requirements. Prior to issuing a CoC,

PSCA programmes evaluate documents to establish compliance, and shipments are often subjected to physical inspections.⁵⁰

Figure 5: Pre-Shipment Conformity Assessment (PSCA) Process for Off-Grid Solar Products⁵¹



Pre-shipment inspection is already being used in Liberia to confirm that products are being imported under the correct HS code, and to confirm the value of goods, so that appropriate duty and tax can be calculated.⁵² Bureau Veritas is currently the exclusive pre-shipment inspection provider for Liberia.⁵³ We understand that the contract for pre-shipment inspection services is currently being re-tendered, which could present an opportunity to build in a conformity assessment process to verify that off-grid solar products meet quality standards. While a very brief tender document was found, we were unable to find specific information in this area and would encourage RREA to investigate further through formal channels.⁵⁴

If possible, we would encourage more than one company to be approved as pre-shipment tax inspectors, to create competition and keep costs down for companies using the service. We would also encourage the Division of Standards to allocate modest resources to overseeing Bureau Veritas's pre-shipment inspection work, in order to ensure it runs smoothly and to help troubleshoot any implementation challenges.

To minimise the risk of disruption, delays or increased cost to business, such an approach should be piloted before it is implemented at scale. This will help to build capacity and ensure effective implementation when full-scale roll-out takes place.

A PSCA programme would benefit government by keeping sub-standard products out, reducing the risk of dumping of inferior or damaged goods, facilitating international trade through streamlining and transparency, reducing demand on government resources by outsourcing and shifting the cost

of compliance to exporters. Exporters and importers will avoid costly delays at importation and potential losses from importing non-compliant products. Consumers will benefit from lower prices and increased availability of higher-quality products in the market.

The test methods used by Lighting Global are currently IEC certified but the quality standards themselves are not. The quality standards are in the process of becoming IEC certified and it is expected that this process will be completed by mid-2019. This could be an ideal time for countries and regions to harmonise. There could be a great opportunity to peer learning with other ECOWAS countries implementing the same approach at around this time.

6.1.3. Monitoring, Evaluation and Enforcement

In order to monitor the importation of quality-verified products, the RREA may require all companies importing quality-verified products to register with them and report import orders to them. This information would be helpful in maintaining oversight of the sector's development and showcasing the sector's positive contribution to energy access and other national development goals.

While it is more challenging to monitor the importation of non-quality verified products, the RREA may wish to undertake baseline and periodic market assessments whereby the proportion of non-quality verified products available in key markets is estimated. Samples of non-quality verified products can also be sent for laboratory testing, with findings incorporated into awareness campaigns, to highlight the risks of purchasing poor quality products. The World Bank and CLASP are well-placed to advise the Government of Liberia if it wishes to commission market check tests to help monitor quality in the market.⁵⁵

To address issues around counterfeiting, GOGLA encourages governments to provide a legal framework that enables companies or public authorities to prosecute those caught distributing counterfeit or poor-quality products. The Government should ensure that clear and efficient procedures for patent registration and protection, judicial enforcement and criminal persecution are in place. Fines should reflect the severity of the committed crimes. There is a broader need to improve enforcement efforts by police, border guards and custom authorities.⁵⁶

6.2. Improving Affordability Through a Duty Waiver

6.2.1. Duty Waiver Study

Cash-strapped governments around the world are often wary of offering duty waivers for off-grid solar products, because of concerns around product quality, concerns around inappropriate products being brought in under duty waivers (e.g. car batteries, TVs), and concerns around loss of revenue. The development of harmonised national quality standards, and introduction of a PSCA process as outlined above, could effectively address concerns product quality or abuse of a potential duty waiver, since these measures would enable identification of eligible products at import.

However, concerns are likely to remain around loss of revenue. It is recommended that the RREA undertake a detailed impact assessment which would seek to understand the fiscal, economic, social and environmental impact of a duty waiver for quality-verified off-grid solar products.

Such a study could be jointly designed and commissioned by the RREA working in partnership with the Ministry of Finance and Development Planning (MFDP). This would help to ensure that learning from the study informed future policymaking. Specific questions which could be addressed through such a study could include:

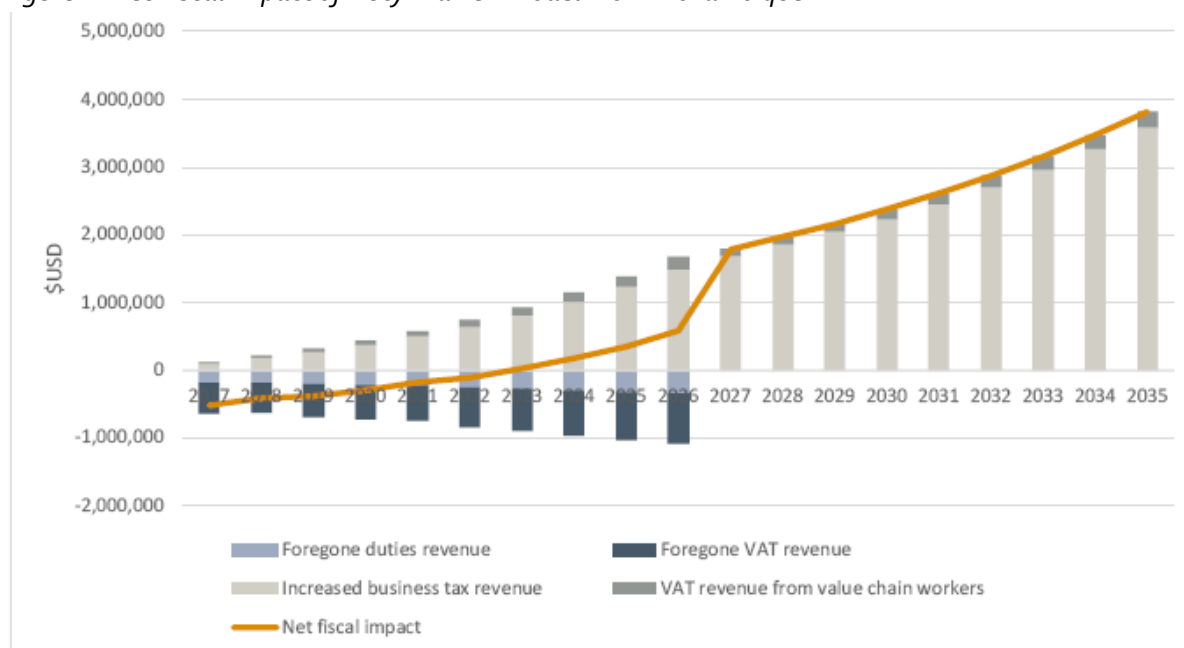
- Impact of Inefficient Lighting:
 - What are the prevalent forms of inefficient lighting being replaced by off-grid solar? How much are households spending on inefficient lighting?
 - Are inefficient lighting products locally manufactured or imported? If they are imported, how much duty are they generating?
 - What is the economic, social and environmental impact of inefficient lighting?
- Impact of Off-Grid Solar:
 - How much are households saving on inefficient lighting as a result of using off-grid lighting products?
 - Beyond household savings, what have been the economic, social and environmental impacts of off-grid solar adoption?
- Impact of Duty on Affordability and Market Growth:
 - What would be the impact of duty on prices for end-users?
 - What would be the impact of any price increases on affordability?
 - What would be the impact of any price increases on market growth rates?
- Potential Impact of Accelerated Market Growth:
 - Energy access
 - Household savings
 - Other economic, social, and environmental benefits
 - Job creation in the off-grid solar sector, and income tax revenue as a result

The study could also include an analysis of how tax exemptions helped to drive the emergence of the market in East Africa. VAT and import tariff exemptions have been a major driver of market growth all over the world. In Africa, Kenya, Tanzania, Uganda and Rwanda have all utilised exemptions to drive growth—these four countries alone account for over 25 per cent of worldwide market share.⁵⁷

One model—as part of such a fiscal impact study—undertaken in 2017 in Mozambique found that standalone solar market growth would increase business taxes through enabling businesses to stay open longer, increasing time spent working through improved health, and job creation in the standalone solar supply chain.⁵⁸ These findings are corroborated by studies showing that solar lights save households an average of \$70 per year over their 3-5-year lifespan, and that savings are invested back into the local economy—spent primarily on food, education and small business development.⁵⁹ It is recommended Liberia conduct a similar fiscal impact analysis. In the

Mozambique example, the study was commissioned following a **combined initiative** between government, universities, the private sector, EnDev Mozambique. A taskforce, chaired by Ministry of Mineral Resources and Energy (MIREME), was established to lobby for tax reductions, and through this, MIREME identified the need for a study to quantify the effects of tariff and VAT reductions. In preparation for its new off-grid energy programme, DFID indicated its willingness to support the study being carried out.⁶⁰

Figure 6: Net Fiscal Impact of Duty Waiver: Model From Mozambique



6.2.2. Duty Waiver for Quality-Verified Off-Grid Solar; High-Level Initiative and Off-Grid Solar Targets

Findings from the duty waiver study should be widely disseminated to stakeholders and used to inform a discussion of tax policy for the off-grid solar sector. If a duty waiver was put in place once a PSCA process for verifying quality at import had already been established, the risk of inappropriate products or poor-quality products being brought in under a duty waiver would be greatly reduced.

In addition to sharing physical and electronic copies of the full duty waiver study, a summary briefing note could be prepared to ensure that time-constrained policymakers were able to quickly absorb key messages. The RREA and Ministry of Finance could jointly organise a series of meetings with key decision-makers, and workshops with key departments and agencies to present and discuss duty waiver study findings. To inform discussion at the highest level, internationally recognised energy expert Dr Kandeh Yumkella, former Chairman of UN Energy and CEO of SEforAll⁶¹, could meet with senior government officials and energy sector to discuss how off-grid solar aligns with wider government priorities and the Pro-Poor Agenda.

Several additional steps might be taken to use the duty waiver to attract the attention of international companies and investors and encourage them to enter or invest in the market. Such steps, which could be announced by the President at the same time as the Duty Waiver as part of a

high-level policy initiative, could include formally integrating existing LIRENAP targets into the Rural Energy Strategy and Masterplan (RESMP), or announcing new targets for the # of people the Government aims to reach with off-grid solar solutions. These targets could be set based on the SEforALL Multi-Tier Framework tiers of energy access. Setting highly visible targets for the country's off-grid solar sector would demonstrate how serious the government was about supporting the market and maintaining an enabling tax environment for the long-term. After the Government of Rwanda set off-grid energy access targets based on the multi-tier framework in 2016, its market grew quickly to become the fifth largest in the world. Similarly, when Sierra Leone announced new targets as part of the 'Energy Revolution' policy initiative, the market grew by more than 10x in just six months.

Liberia's new commitments and policy reforms could also be announced at major sector events such as SEforALL or Unlocking Solar Capital conferences. The RREA could hold a webinar with GOGLA to brief member companies on the steps Liberia is taking to create an enabling environment and accelerate market growth. Beyond this, an Investor Roadshow could be organised to help generate interest in the market, possibly covering the Mano River region, leveraging the recent emergence of an off-grid solar market in Sierra Leone and seeking to attract some companies active in Sierra Leone into Liberia.⁶²

On an ongoing basis, regular 'impact reports' could be used to highlight the work of the RREA and the social impact being achieved through building the off-grid solar market. This would help to build support for the RREA's work and the reforms being put in place to help achieve universal energy access.⁶³ Media events could be held and attended by senior politicians, whenever the LIRENAP programme hit key milestones, again to showcase the RREA's work, raise the profile of the off-grid solar sector, and celebrate success.

6.3. Improving Awareness

Deliverable: Recommendations on how to overcome other barriers through specific support to the companies and other potential partners.

The below-the-line and above-the-line awareness activities being undertaken by the RREA are broadly in line with best practice approaches and should be continued. However, it is vital to ensure that whenever demand is created, companies have the capacity to ensure ongoing supply, in order to avoid situations where customers wish to buy but are unable to do so.

Working closely with the private sector in the design and delivery of awareness-raising activities is the key to delivering maximizing benefit both for customers and for the market as a whole. The RREA could build a partnership with the LEAP network to achieve this goal. In our stakeholder consultations, companies suggested two key ways in which awareness activities could be improved:

- **Limiting Geographic Scope:** Limiting geographical scope, and only delivering awareness activities in areas where companies can guarantee sustained supply. Geographical coverage of awareness activities could start small but steadily expand, becoming nationwide only when the private sector is able to ensure sustained supply across the country.

- **Joint Roadshow Planning:** Companies would like more input into when and where roadshows take place, and more advance warning of upcoming events to help them prepare effectively. They would prefer to have company logos, rather than government or NGO logos, prominently displayed to better manage customer expectations around price.

It is recommended that the RREA work closely with the LEAP Network to co-design and co-deliver awareness activities with the private sector, in order to ensure that demand can be met through sustained supply.

RREA could also consider engaging the leading international NGO SolarAid as an expert partner to provide advice in this area. SolarAid developed a unique approach to demand creation which was widely credited with creating demand and catalysing markets in Kenya, Tanzania, Senegal and elsewhere. Through School Campaigns, Agent Networks and Light Libraries they distributed over 1.4 million lights in just three years. Working in partnership with Ministries of Education, School Campaigns work through headteachers to raise awareness, build trust in solar technology and seed the market by selling basic study lights to the parents of students. Once demand takes off, they recruit, train and supply agent networks, to ensure sustained supply. Light Libraries, which are run by schools and enable students to 'borrow' solar lights in the evenings, can also have a profound effect on demand. Sales uptake in villages with a Light Library in Senegal was 35 per cent compared to other villages where uptake averaged 15 per cent.⁶⁴ The model is specifically designed for more remote, sparsely populated areas where incomes are low, and companies struggle to establish a permanent presence.

6.4. Improving Affordability and Availability

Deliverable: Recommendations on how to overcome other barriers through specific support to the companies and other potential partners.

Margins and Prices: It is recommended that the RREA allows companies to set their own gross margins and prices. This way the programme will encourage competition between companies, which will help to drive prices down and make products more affordable. This will enable PAYG products to enter the market, providing customers with an alternative to buying a product for cash, also helping to overcome the affordability challenge through enabling customers to buy lights in instalments over time. If companies can set their own gross margins and prices, Liberia will be far more attractive to international companies and investors, that should be encouraged to form distribution partnerships with Liberian companies, and to enter and invest in the market directly.

In contrast if gross margins or prices are fixed by the RREA, some products and business models such as PAYG will not be viable. Competition to offer the most attractive product at the lowest possible price, by keeping sales, marketing and distribution costs as low as possible, will be limited. This will render the market unattractive to international companies and investors and is likely to prevent market growth.

Grants, Loans and Technical Support: It is encouraging that AECF and others are considering making small grants and working capital loans available to Liberia's off-grid solar sector, especially when funding is accompanied with technical support to help entrepreneurs refine their business models and build capacity.⁶⁵ This is the kind of support that Liberia's nascent off-grid solar sector requires to help it reach a point where it can begin to attract more commercial forms of financing. Early-stage equity and grants are critical when firms are at seed stage, while at later stages, cash sales companies primarily need working capital financing, while PAYG companies need debt to fund on-lending to customers. Companies at all stages need financing in both international and local currencies, to help mitigate foreign exchange risk.⁶⁶

Considering the state of the market, AECF in Liberia has a comparatively low ticket size, of no less than \$100,000 (more developed markets see grants of \$250,000). Company feedback during the RREA market assessment consultation workshop—in which draft findings and recommendations from this report were shared with the private sector⁶⁷—indicated that lower grant amounts would be helpful. In response, AECF has subsequently indicated that the grant mechanism would not be considered a bullet payment; companies would draw down on the grant over time, determined by the companies' financial projections. In addition, and worth nothing, AECF will likely require Liberian businesses involved in the programme to provide 25 per cent in match-funding⁶⁸ in order to secure grant funding support. As also noted in the consultation workshop, many smaller Liberian businesses may struggle to show this level of match-funding and would like to see the requirement reduced. AECF have made provision for this challenge, however, by building in flexibility with respects to the start of the matching contribution—so that, for example, companies would only be required to meet it after the first year of the grant's tenor. During this inception period, companies would be offered AECF training and capacity building to help them better pursue commercial financing, which would be required to meet the match-funding requirement in subsequent years. Lastly, considering the programme and its implementation, it is recognised that managing a portfolio of smaller grants incurs higher transaction costs for the donor, and that very small companies have a higher risk profile. If match-funding requirements are too low, entrepreneurs may not be sufficiently invested in and committed to the success of their enterprise.

For Liberia, it will be important to ensure that funding is commensurate with the absorptive capacity of the sector, and that grant-dependency is avoided. Technical assistance and capacity building will be essential. Where possible, financial support should be linked to agreed milestones which demonstrate tangible improvements in business performance.

The RREA and the Rural Energy Fund (REFUND) could play a role in coordinating all grant-making and technical assistance being provided to the off-grid solar sector. This will help to ensure coordination amongst donors, avoid duplication, and maximise impact and value for money. Recommendations for how the RREA might coordinate all activity in the off-grid solar sector are made in Section 6.

Performance-Based Support: Companies are likely to need grant funding support into the medium to long term, in order to reach more remote areas and to serve lower-income customers. The current approach involves providing a steadily decreasing importation and transportation subsidy. However, given the current market size and likely growth rate, it is unlikely that the private sector

will be able to sustainably serve remote areas and poorer customers once these subsidies come to an end. Additional support is likely to be needed to move towards universal energy access. The RREA could either continue with its current approach of subsidizing specific business costs, or it could transition to results-based financing.

RBF has proven to be highly effective in incentivizing companies to enter under-served or difficult areas.⁶⁹ An example of how the approach worked in the Lake Zone, Tanzania is provided in the text box below.⁷⁰

Results-Based Financing in Lake Zone, Tanzania

A results-based financing scheme was run in the Lake Zone of Tanzania, financed by Energising Development (EnDev) and implemented by SNV, with the Tanzania Investment Bank hosting the fund. Companies could claim results-based financing for all Lighting Africa quality-verified products sold in the Lake Zone. The value of the RBF incentive was based on the brightness and duration of light provided (lumen-hours per day). A maximum incentive cap was set to ensure the scheme benefited a range of firms. The aim was to improve access to clean energy while creating jobs and making a broader range of products and services available.

After two rounds of RBF financing in 2014, 8 out of 10 participating companies were still active in the zone. Two companies achieved the maximum incentive cap of €550k. All companies secured pre-financing from other sources before starting sales through investment or loans, while some specifically used their participation in the RBF scheme to help secure investment.

38,000-unit sales were incentivised, ranging from basic lights to 200W systems. 70-80 per cent of systems were over 10 Wp (Watt Peak) and delivered at least Tier 1 energy access. 25-30 per cent of the systems were used for productive income-earning activity. Pay-as-you-go companies made up 65 per cent of sales with cash-sales companies making up the other 35 per cent. Further rounds of the successful scheme were subsequently implemented, with the market steadily moving towards larger systems delivering higher tiers of energy access.

Some of the key features of the two approaches are summarised in table 7:

Table 7: Key Features of Two Approaches to Improving Affordability and Availability

	Directly Subsidizing Specific Business Costs	Results-Based Financing
Risk	Lies with the RREA —since distributors could access importation and transportation subsidies, but then fail to sell products, or fail to recover payment if products sold on credit.	Lies with the distributor —since distributor will only receive financial support if sales are achieved, and payment is made.

Administrative burden	High —since RREA needs to manage subsidy application process, and review documentation showing subsidy-eligible activities have occurred as described, before processing many small payments	Low —since RREA only needs to confirm that sales of quality-verified products have taken place. Less documentation needs to be reviewed before a smaller number of larger payments can be approved.
Working capital requirement	Medium —companies need less working capital, since shipping and transport costs incurred prior to sales are covered through subsidy.	High —companies need working capital to cover the time it takes for stock to arrive in-country, as well as the time it takes to sell stock, before receiving RBF. However, this requirement can be reduced by linking a portion of RBF to milestones such as establishing a presence in a new geographical area ⁷¹ . Grants and concessional loans can also be used to meet upfront expansion costs and working capital needs
Competition to drive down costs	Restricted —No competition to keep transportation costs down because these costs are covered by RREA.	Unrestricted —Competition helps to keep transportation costs down.
Flexibility in use of subsidy	None —companies are only able to invest subsidy in transportation, and not in other areas of their business.	High —companies can use RBF to invest in any area of their business, in line with priorities that they have identified.

Based on the above analysis in the medium to long term, it is recommended that the RREA consider phasing out transportation, sales, marketing and retailer recruitment activities—leaving these activities to the private sector. The RREA is encouraged to consider switching from the current approach of providing specific subsidies for specific costs, to providing results-based financing (RBF), in order to help companies, expand into underserved areas, and to serve lower income customers, while lowering administrative costs and allowing companies more flexibility in how they use subsidy support to build their businesses.

As mentioned above, it is encouraging that the Swedish Embassy is exploring the possibility of establishing an RBF facility in Liberia, with expert fund management and implementation support from NEFCO, and possible EnDev or GIZ. We would encourage RREA to consider using this RBF mechanism to provide continued financial support to companies, and to incentivise them to enter underserved areas, once subsidies for specific costs such as sales & marketing, retailer recruitment and logistics are phased out.

6.5. Improving Acceptability

Deliverable: Recommendations on how to overcome other barriers through specific support to the companies and other potential partners.

The RREA is already encouraging customers and retailers to 'choose quality' in its awareness campaigns. The steps outlined under 'Promoting Quality' above would also constitute a major step forward in the effort to keep poor quality products out of the market.

The RREA might also consider developing a consumer-facing quality seal. In addition to developing harmonised product quality standards, as outlined above, the RREA would also need to develop customer service standards, working closely with LEAP.

Companies would then be trained to meet those standards and certified to be able to use the consumer facing quality seal in their marketing materials. Regular quality control and spot checks would be needed to ensure compliance. The Dutch NGO SNV developed product and service standards, as well as a private sector capacity building and certification scheme, under the 'Good Solar Initiative' seal in Cambodia.⁷²

**Good Solar Seal developed
by SNV in Cambodia**



Regarding ensuring robust systems are in place for replacement of faulty lights under warranty, and for the provision of repair services for products outside of warranty, we encourage the RREA to work closely with international manufacturers to design its approach. Retailers need training to identify whether a product has been tampered with, in which case its warranty is void, or whether it has genuinely failed and is eligible for replacement. There needs to be incentive for retailers to return lights to manufacturers under warranty, or to bring lights to a repair centre outside of warranty.

Given the high level of technical skill needed to undertake a repair (especially if a product is fitted with anti-tampering design features), it is unlikely that high-quality repair services can be delivered by a network of electrical shops around the country. However, one or a small number of repair centres could be established in Monrovia. International manufacturers could provide training and ongoing support in how to repair their specific products, and the centre could become an 'authorised repair shop' for leading brands.

7. Recommendations for Coordinating Stakeholders

Deliverable: Recommendations for coordinating all relevant Government institutions, including RREA and other relevant initiatives, to overcome these barriers through a range of policy and regulatory actions, to create a better enabling environment for renewable off-grid solar lighting in Liberia.

In order to better coordinate the sector, it is recommended that the RREA use the Renewable Energy Working Group Steering Committee (REWG-SC) to improve coordination and collaboration amongst Government stakeholders and to facilitate dialogue between government, the private sector, the donor community and other stakeholders. The group could be made up of:

- **Donors and Market Development Agencies:** USAID Power Africa, The European Union, Africa Enterprise Challenge Fund, GIZ, the Tony Blair Institute for Global Change and others.
- **Government Stakeholders:** Ministry of Finance, Division of Standards, State House, Revenue Authority.

To ensure effective implementation of the steps proposed above, strong coordination and collaboration is needed across a range of government agencies. As noted by SEforALL, 'enhanced collaboration between energy ministries and other ministries—such as finance, education, health, rural development and environment [is needed]—to ensure policy coherence across a range of policy areas in the economy'⁷³. The REWG could coordinate activity across all Ministries, Departments and Agencies in support of off-grid energy access.

The REWG would be mandated to work closely with the off-grid private sector to help achieve universal energy access. A robust partnership between government and private sector is needed for stakeholders to work together effectively in pursuit of energy access goals. Government needs to be able to communicate changes in policy to the private sector and get feedback from companies with regards to how policies and programmes are affecting company performance. Companies in turn need a channel through which they can communicate emerging challenges and opportunities in the market. Regular communication should help to build trust and mutual accountability. Improved government-private sector coordination and collaboration could be achieved through the RREA Business Development Officer and other RREA staff meeting regularly with the LEAP Network and reporting back to the REWG-SC through the Secretariat.

Finally, in addition to improving coordination with Government and facilitating dialogue and collaboration between government and the private sector, the REWG could be used to engage other stakeholders with a role to play in delivering energy access. For example, civil society organisations with strong links to communities could be engaged to support public awareness campaigns, provide technical assistance to distributors, or provide policy advisory services to government. Mobile network operators, local financial institutions and cooperatives could be engaged to play a role in last mile distribution, or to help overcome affordability challenges through offering consumer financing.

This would help the RREA to transition from being heavily involved in the day-to-day work of companies through providing subsidies all along the value chain, to playing more of a facilitation, coordination and leadership role for the sector as a whole. This way all donor programmes, NGO activities and interventions would be delivered as part of a more coherent overall plan to create an enabling environment and accelerate market growth. All activities would benefit from regular feedback from companies, provided through REWG and REWG-SC meetings. The RREA would be able to call upon specialist agencies for support in key areas, and to delegate areas of activity to partner organisations, freeing up its time to focus on leadership, coordination and oversight.

8. Next steps

By way of next steps, the RREA (with TBI support) will undertake a validation workshop in early 2019 to discuss the key findings of this Policy and Business Environment Study of Liberia's Off-grid solar market. Key stakeholders interviewed for the report will be invited to participate and share their views, as a follow up to the consultation workshop on the Inception Report shared with a handful of local companies and partners.

The workshop will also feature discussion regarding the policy and program recommendations outlined in this report. Given the importance – for each recommendation – of collaboration and partnership (between government and the private sector, across government and within the donor and development partner community) an intended outcome will be development of a strategy and roadmap for implementation of the agreed recommendations, with clearly designated roles and responsibilities and associated implementation milestones and timelines.

RREA will continue to lead this process, while benefiting from the continued support of wider Government and committed donor partners, including USAID and wider REWG members.

Annexes

Annex 1: Summary of Recommendations, Stakeholders and Their Roles

Recommendation	Stakeholder	Role
Promoting Quality: <ul style="list-style-type: none"> • Development of Harmonised Quality Standards • Pre-Shipment Conformity Assessment (PSCA) Programme • Monitoring, Evaluation and Enforcement 	RREA	Develop and propose standards to Division of Standards Support Customs Authority to design, trial and roll-out PSCA
	Division of Standards, Ministry of Trade	Review, approve & ratify standards
	Customs Authorities	Design, pilot and roll-out PSCA programme
	World Bank / CLASP	Support RREA & other stakeholders with standards development and PSCA programme design & implementation
Improving Affordability through a Duty Waiver: <ul style="list-style-type: none"> • Duty Waiver Study • Duty Waiver for Quality-Verified Off-Grid Solar 	RREA	Jointly commission duty waiver study and disseminate study findings with Ministry of Finance.
	Ministry of Finance	Jointly commission duty waiver and disseminate findings with RREA. Prepare duty waiver for ratification/legislation.
	State House	Approve duty waiver
	Tony Blair Institute for Global Change	Engage Dr Kandeh Yumkella to meet with President George M. Weah and other senior officials to discuss how off-grid solar aligns with Pro-Poor Agenda, and how a duty waiver might support the sector.
Improving Awareness	RREA	Co-design and implement awareness activities with LEAP Network
	LEAP Network	Work closely with RREA on awareness campaign design and implementation
Improving Affordability and Availability	RREA	Do not restrict margins or prices. Work with donors to coordinate grants, loans and technical assistance to the sector.
	Africa Enterprise Challenge Fund, USAID, EU Electrifi	Provide grants, loans and technical assistance to the sector, in line with its absorptive capacity

Coordinating Stakeholders	RREA	Explore ways to improve coordination of all stakeholders in the off-grid solar sector, and to improve government-industry dialogue, through the Renewable Energy Working Group Steering Committee (REWG-SC).
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Annex 2: Indicative Work Plan With Key Actions

	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Promoting Quality												
Develop Harmonised Quality Standards												
Pre-Shipment Conformity Assessment Programme—Pilot												
Pre-Shipment Conformity Assessment Programme—Roll-out												
Monitoring, Evaluation and Enforcement												
Improving Affordability through a Duty Waiver												
Duty Waiver Study												
Dissemination of Duty Waiver Study Findings												
Power Africa Senior Advisor Meeting with President												
Launch of High-Level Policy Initiative												
Duty Waiver Implementation												
Global Industry Engagement to Showcase Liberia's Reforms												
Impact Reports to showcase RREA Impact												
Improving Awareness												
Joint Planning with LEAP												
Improving Affordability												
Flexible Gross Margins and Prices												
Coordinated Grants, Loans and Technical Support												
Transition from subsidies for specific business costs to Results-Based Financing based on sales												
Improving Acceptability												
Development of Service Standards												
Launch of Company Training and Certification Programme												

Launch of Quality Seal													
Ongoing Quality Control													
Coordinating Stakeholders													
Validation workshop													
Implementation of agreed strategy and implementation plan													
Establishment of Off-Grid Solar Working Group													
OGS Working Group Meetings													

- Annex 3: Study Terms of Reference

RURAL AND RENEWABLE ENERGY AGENCY (RREA)

Terms of Reference (ToR)

Policy and Business Environment Study for Off-Grid solar Lighting Business in Liberia

1 Background

Following the adoption of Liberia's National Energy Policy (NEP) in June 2009, the World Bank, in partnership with the Government of Liberia, launched a programme called "Catalyzing New Renewable Energy in Rural Liberia" aimed at supporting the establishment of the Rural and Renewable Energy Agency (RREA) to facilitate off-grid energy development and access in rural areas. The RREA was officially created by Executive Order in January 2010, and a Bill to establish it by statutes was passed into law in July 2015.

In 2012, the RREA, with technical support from the World Bank, developed a project called Lighting Lives in Liberia (LLL) to facilitate, stimulate, develop, and accelerate the local market for high-quality, low-cost solar lighting products. The LLL project was conceived to help facilitate a commercial market for portable solar-PV lighting devices and solar home systems (SHS), by making these products more affordable to the local market. The project specifically targets off-grid populations in the low-income bracket who generally rely on inferior lighting devices such as kerosene lamps, candles, and battery powered lights, by providing, on a commercial basis, high-quality solar lanterns/lamps, and SHD, some with mobile-phone charging capabilities. Until the LLL project closure in May 2017, nearly 41,000 solar lanterns and SHS were imported and disseminated on a commercial basis, thus providing improved lighting for over 100,000 people in Liberia.

The LLL project evolved out of "Lighting Africa", an initiative jointly managed by the World Bank and the International Finance Corporation (IFC), providing support for the rapid scale-up and delivery of modern off-grid lighting in Sub-Saharan Africa. Lighting Africa's goal is to mobilise the private sector in order to provide lighting that will enable 250 million people without electricity to access clean, affordable energy services by 2030, primarily through solar-powered products and systems. In Liberia, the key focus of Lighting Africa has been to develop the renewable energy market by stimulating consumer appetites through lower retail prices alongside building in-country distribution capacity, particularly through the establishment of sustainable retail supply chains and the provision of business support and enabling access to finance to help retailers deliver high-quality solar lighting products.

After completing the pilot and scale-up phases with the RREA importing products on behalf of local retail partners (LRPs), the LLL project is now transitioning to a phase where the private sector is expected to assume the importation and distribution of the products on commercial basis to ensure sustainable market and economic viability. The use of solar PV-based off-grid power and lighting solutions frees up limited household income that is often consumed through the use of traditional light and energy sources, which provide inferior service at a greater daily cost. High-quality, low-

cost solar lanterns and home systems are key to this transition, particularly for those at the base of the pyramid. Owners of these systems typically realise significant cost savings versus alternatives and can leverage their output to boost productivity. In addition, the wider sale, distribution, service, and maintenance of off-grid solar-PV devices is expected to create a slew of job opportunities for a population that still has few avenues for gainful employment.

Therefore, the current aim of the LLL approach under Component 3 of the Liberia Renewable Energy Access Project (LIRENAP) is to cultivate an increasingly private-sector-led supply chain, including product procurement, purchase, importation, customs clearance, storage, distribution, and financing. This is considered a crucial step in transitioning from a small, unsustainable public-sector initiative to a full-fledged dynamic market for solar products. To successfully support a private sector-led market for solar lanterns and SHS in Liberia, a range of preparatory work is required including the identification of the barriers to the proper development of the solar market in Liberia, and providing recommendations on how to address them and to incentivise local and international solar companies to better engage in the Liberian solar market.

2 Objectives of the Assignment

The objective of the assignment is to assess the off-grid solar companies currently active in Liberia, including the market and policy barriers they are facing, and to provide recommendations to RREA on how to best overcome these barriers and transition the solar sector in Liberia to a private-sector-led approach, including product procurement, import, distribution and retail, and access to consumer and business finance.

These recommendations will help the RREA, and stakeholders to better support the solar market to reach commercial viability in the future in order to reach a larger number of households and small businesses.

3 Scope of Work

The specific tasks of this assessment are to include the following areas:

- (i) Identification of all processes involved in starting or expanding a Renewable Energy (RE) off-grid solar business in Liberia, including business registration and import requirements such as import permits/licenses, standards.
- (ii) Evaluation of the financial and time cost of importing solar products, including custom and duty tariffs, port clearing fees, and other fee requirements encountered in the process.
- (iii) Identification of any other barriers that solar companies in Liberia are facing, which are impacting the long-term financial viability of their businesses, and recommendations on how to overcome these barriers through specific support to the companies and other potential partners.
- (iv) Identification of any distorting subsidies from traditional lighting fuels and products.
- (v) Assessment of regulatory standards for energy services, including tariffs and consumer protections, in particular for quality standards, and their enforcement, including for batteries, light bulbs, LED torches and lamps, and solar lamps and other components.

This will include checking to ensure they are well aligned with regional standards initiatives.

- (vi) Propose methods for establishing a standard programme for all lighting products including the Government organisations best placed to develop and oversee the enforcement of these regulatory standards.
- (vii) Identification of any other policy barriers for off-grid solar companies and recommendations for coordinating all relevant Government institutions, including RREA, and other relevant initiatives, to overcome these barriers through a range of policy and regulatory actions, to create a better enabling environment for renewable off-grid solar lighting in Liberia.

4 Qualification and Competencies

If an external consultant or firm is required the following qualification and competencies are required:

- University Degree (preferably Master's degree) in Law, Finance, Economics, Business Administration, or related fields.
- At least 8 years' experience in policy, legal and regulatory assessments and related advisory services, including for fiscal issues.
- Good understanding of the various government policies/initiatives (or lack thereof) towards off-grid lighting.
- Strong business development skills, including skills in economic and financial analyses.
- Technical background and experience in off-grid power and lighting equipment preferred
- Experience in interacting and managing relationships with organisations in the public and private sectors
- Strong report writing skills

5 Deliverables

The following are the main deliverables of the assessment:

1. Inception Report: Within two (2) weeks after contract signing, the consultant will submit an inception report to USAID and RREA, outlining initial findings and proposing work plan and steps to be taken toward information gathering, analysis and final report.
2. Draft report: Within six (6) weeks after contract signing, the consultant will submit a draft report to USAID and RREA for their comments. The draft report will include a summary of each of the main tasks as well as recommendations and an action plan for implementation.
3. Final report: Within eight (8) weeks after contract signing, the consultant will submit the final report to USAID and RREA. The report will incorporate feedback from RREA and USAID on the draft report. This final report will highlight the recommended options and detailed plan of action for scaling-up solar lanterns and home system (SHS), including the following sections:
 - a. An executive summary (no more than two pages) summarizing key findings.
 - b. Sections on each of the main tasks.
 - c. In annex, the Terms of Reference for the assignment.

d. In annex, the contact list of all solar companies and other stakeholders (name, type of actor, email, and phone) identified in the report.

6 Level of Effort (LoE)

The level of effort for this assignment is expected to be approximately 20-25 days of professional staff time, over a period of approximately 2 months, ideally starting 16th July 2018, and being completed by 15th September 2018.

The consultant will be obligated to provide for their own offices, services, facilities, property/equipment, and sufficient staff to complete the assignment.

Annex 4: List of Companies and Other Stakeholders Consulted (non-exclusive)

Name	Organisation	Type
Augustus Goanue	RREA	Government
Stephen Potter	RREA	Government
Sam Nagbe	RREA	Government
Steven Payma	RREA	Government
Anthony Waylea	RREA	Government
Lansana Donzo	Standards Division	Government
Abraham Swaray	Ministry of Commerce and Industry	Government
Zubair Sadeque	World Bank	Aid Agency / DFI
Orlando Kwansen	Mercy Corps	NGO
Emmanuel Aziebor	Mercy Corps	NGO
Tony Chan (and team)	USAID	Aid Agency / DFI
David Kauper	USAID	Aid Agency/DFI, focused on taxation
Ritesh Singh (and team)	Tetra Tech	Consultancy, focused on solar assessment in Liberia
Abubakar Sherif	Liberian Energy Network (LEN)	National Company
Vickson Korlewala	Ecopower	National Company
Royston S. Gbelia	SJEDI Green Energy	National Company
Royston S. Gbelia	LEAP Network	National Renewable Energy Industry Association
Thomas Kpoto	Alternative Energy	National Company
Monique Stewart	Total Liberia Inc	National Company
Manfred Zbrzezny	Lib.Solar	National Company
Chukwudi Ezeoke	Greenlight Planet	International Company
Eric Silverman	Easy Solar	Sierra Leone Company
Alexandre Turre	Easy Solar	Sierra Leone Company
Purinama Kumar	Mobisol	International Company
Arnaud Rouget	D.Light	International Company

Mamado Coulibaly (and team)	Orange Liberia	Mobile Network Operator
Massa Dennis	MTN—in talks with Lumeter on PAYG	Mobile Network Operator
Aisha Nansamba	BRAC Liberia	Microfinance Institution
Bridget Dougherty	BRAC Liberia	Microfinance Institution
Ben Bauchel	Overseas Development Institute	NGO providing TA to Ministry of Commerce & Industry
Hartlieb Eucler (and team)	EnDev	Aid Agency / DFI
Giorgio Kirchmayr	European Union	Aid Agency / DFI
Yannis Tzartzas	European Union	Aid Agency / DFI
Jenkins Flahwor	Swedish Embassy / SIDA	Aid Agency / DFI
Vaanii O. Baker	World Bank	Aid Agency / DFI working on EODB in Liberia
Noel Atino	REACT SSA, AECF	Multi-donor programme focused on access to finance for renewable energy businesses
Kwabena Boafo Adom-Opore	ECREEE—ROGEP	Multi-donor programme focused on standalone/SHS market development in ECOWAS
Mohamed Wurie	CORDAID—Sierra Leone	NGO scoping Liberian market—entrepreneurship/SME training

Notes

¹ For the purposes of this study, off-grid solar companies are defined as those selling portable solar lights, solar home systems and related appliances such as energy efficient radios, TVs, fans

² AECF Liberia Market Assessment, forthcoming

³ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018

⁴ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018

⁵ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018. See also AECF Liberia Market Assessment, forthcoming

⁶ Expansion of the commercial market entails companies beginning to serve new geographic areas and new customers, as demand and willingness to pay increases, along with increased familiarity and trust in standalone solar

⁷ For the purposes of this study, off-grid solar companies are defined as those selling portable solar lights, solar home systems and related appliances such as energy efficient radios, TVs, fans

⁸ Traditionally, access to electricity has been measured on the basis of household connections to the national electric grid of their respective country. A recent shift, driven by SEforALL's Multi-Tier Framework (MTF) for electricity access, seeks to understand electricity access not in binary on or off terms, but as a continuum of service levels that may be satisfied by a range of technologies. Using global baseline surveys that are currently underway, the MTF captures more robust granularity of electricity access including capacity, duration of supply, reliability, quality, affordability, legality and safety

⁹ Unreliable grid households are assumed to receive electricity for less than 12 hours a day. It should be noted that there is no universally accepted definition of unreliable-grid areas. Nor is there reliable data on the size of the population that lives in these areas globally

¹⁰ Based on retailers paying an average FOB price of \$20.52 (shipping costs of \$1.71 were subsidised) and having an average gross margin of 57.56 per cent. See Lighting Lives in Liberia Final Report, May 2017

¹¹ Willingness to Pay Analysis as Guidance for Rural Electrification in Liberia, NRECA International, October 2016

¹² Liberia and Energy Access: A Willingness to Pay Analysis, World Bank, June 2012

¹³ WTP Analysis as a Guidance for Rural Electrification in Liberia, NRECA, October 2016

¹⁴ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018

¹⁵ https://energypedia.info/wiki/Fee-For-Service_or_Pay-As-You-Go_Concepts_for_Photovoltaic_Systems#General_Information

¹⁶ See *Providing Energy Access through Off-Grid Solar: Guidance for Governments*, Global Off-Grid Lighting Association (GOGLA), 2017

¹⁷ Lighting Lives in Liberia Consumer and Retail Survey, African Development Associates (ADEAS), 2016. In total, 1064 respondents

¹⁸ RREA Rural Energy Sector Working Group minutes. RREA, 2018.

¹⁹ 'Support for the Electrification of South East Liberia', Programme Document, May 2018. Discussions are still being held regarding finalization of the approach

²⁰ The GSM Association is the trade body for mobile network operators worldwide. Approximately 800 mobile operators are full GSMA members and a further 300 companies in the broader mobile ecosystem are associate members

²¹ 21 Mobile for Development Utilities: 'Lessons from the use of mobile in utility pay-as-you-go models', GSMA, January 2017

²² Mobile for Development Utilities: 'Lessons from the use of mobile in utility pay-as-you-go models', GSMA, January 2017

²³ GOGLA, 'Off-grid solar market report trends report 2018', January 2018

²⁴ GOGLA, 'Off-grid solar market report trends report 2018', January 2018

²⁵ The current LEAP members list, shared by LEAP President to the Tony Blair Institute for Global Change, is 21 members strong. This includes some partners that do not qualify as off-grid solar companies (for example, electrical shops and sports centres).

²⁶ AECF Liberia Market Assessment, forthcoming

²⁷ AECF Liberia Market Assessment, forthcoming; discussion with Arnaud Rouget (d.light)

²⁸ CEADIR final report, 2018, forthcoming (May 2018)

²⁹ Most notably, leading fuel company Total has imported products outside of the LLL project under its Awango off-grid solar distribution brand, incurring duty of around 30 per cent of the cost of goods. They have been unable to hit sales targets and believe the key factor has been competition from lower-cost RREA retail partners, who are able to import products without incurring duty

³⁰ Central Bank website:
<http://www.cbl.org.lr/2content.php?sub=214&related=32&third=214&pg=sp&pt=microfinance>

³¹ International Monetary Fund, 'Liberia: Selected Issues', July 2016 (most recent report covering microfinance in Liberia identified as part of this assessment)

³² Liberia's mobile money services commenced in 2011, following the Central Bank of Liberia (CBL)'s issuance of Mobile Money Guidelines. The 2014 Mobile Money Regulation thereafter allowed for the establishment of non-bank financial institutions to provide mobile money services. The growth of the mobile money space in Liberia has been promising

³³ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018

³⁴ EasySolar is a PAYG company currently operating in Sierra Leone, which has secured investment from both Acumen and Sunfunder, two of the leading off-grid solar investors worldwide. It focuses on selling the cheapest, most affordable PAYG solutions through customers visiting agents to make mobile payments

³⁵ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018

³⁶ Discussion with Kwabena Boafo Adom-Opare, ROGEP Anglophone Country Coordinator.

³⁷ "Aggregators: the secret sauce to digital finance expansion", CGAP, January 2016

³⁸ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018. See also AECF Liberia Market Assessment, forthcoming

³⁹ Solar Energy Development for Liberia: Concept Notes, USAID Power Africa Transactions and Reforms Program, January 2018. See also AECF Liberia Market Assessment, forthcoming

⁴⁰ CEADIR final report, forthcoming, 2018

⁴¹ Typically defined as portable lights and SHS with an effect below 10 Wp

⁴² Based on Business Registration Requirements and Procedures information provided by Adam Smith International

⁴³ For more information please see

http://www.ecreee.org/sites/default/files/rogep_subcomponent_1_a-the_enabling_environment.pdf

⁴⁴ Results-based Financing for Energy Access: How to Design and Implement Projects, Energising Development, 2018

⁴⁵ Lighting Lives in Liberia Project Implementation Report, RREA, May 2017

⁴⁶ Providing Energy Access through Off-Grid Solar: Guidance for Governments, Global Off-Grid Lighting Association (GOGLA), 2017

⁴⁷ For more information, visit the programme website -<https://www.lightingglobal.org/quality-assurance-program/>

⁴⁸ For more information see <https://clasp.ngo>

⁴⁹ Products that meet the Lighting Global Quality Standards are listed on the Lighting Global website (www.lightingglobal.org/products/). Every quality verified product has a Verification Letter, which is a type approval document that can be used as evidence that the product meets the Quality Standards, and that it has been tested at an ISO 17025 accredited laboratory according to IEC TS 62257-9-5. Verification Letters can be quickly and easily validated via the Lighting Global website

⁵⁰ Pre-Shipment Conformity Assessment for Pico PV Products, Lighting Global, 2017

⁵¹ Pre-Shipment Conformity Assessment for Pico PV Products, Lighting Global, 2017

⁵² The Harmonized Commodity Description and Coding System (HS code) is an international standardised system of names and numbers for the classification of commodities. Nearly 200

countries use these HS codes as basis for: import duties; trade statistics; origin regulations; trade agreements; monitoring of controlled goods (including arms, waste, protected animal species); risk analyses and Customs information systems. For more information see <https://www.logisticsglossary.com/term/hs-code/>

⁵³ For more information, see <https://www.bureauveritas.com/home/worldwide-locations/africa/liberia/>

⁵⁴ Request for Expression of Interest, National Investment Commission

⁵⁵ CLASP recently undertook such a review in Sierra Leone. Further information – and the report when finalised – can be shared

⁵⁶ Providing Energy Access through Off-Grid Solar: Guidance for Governments, Global Off-Grid Lighting Association (GOGLA), 2017

⁵⁷ Providing Energy Access through Off-Grid Solar: Guidance for Governments, Global Off-Grid Lighting Association (GOGLA), 2017

⁵⁸ Energy Africa Mozambique – Technical Assistance to Model and Analyse Effects of VAT and Tariffs on PicoPV, Solar Home Systems and Improved Cookstoves, Economic Consulting Associates, August 2016

⁵⁹ SolarAid Impact Report, 2015

⁶⁰ The study required several weeks of detailed analysis

⁶¹ Dr Yumkella is also part of the Power Africa Senior Advisors Group

⁶² Sierra Leone Opportunities for Business Action (SOBA) Mano River Union conference and analysis: file:///C:/Users/t.lee/Downloads/Renewable-Energy-Investment-Roadmap-Mano-River-Union-2017.pdf

⁶³ Off-grid solar systems save households money, contribute to job creation and economic activity, help people gain access to both mobile communications and financial services, and contribute to health, safety and wellbeing. See *Providing Energy Access through Off-Grid Solar: Guidance for Governments*, Global Off-Grid Lighting Association (GOGLA), 2017

⁶⁴ For more information see link here - <https://solar-aid.org/light-libraries/>

⁶⁵ https://www.aecfafrica.org/portfolio/renewable_energy/react_ssa

⁶⁶ See *Providing Energy Access through Off-Grid Solar: Guidance for Governments*, Global Off-Grid Lighting Association (GOGLA), 2017

⁶⁷ Consultation workshop held on the inception report findings of this assessment, undertaken for RREA in partnership with USAID. Workshop held with a range of relevant, key, stakeholders on Wednesday October 17th, 2018 at RREA Offices in Monrovia

⁶⁸ This requirement has also been adjusted for the Liberian market. In other countries – with more developed off-grid solar markets – the match-funding contribution is 1 to 1. Based on discussion with AECF lead for Liberia and REACT representative from the Swedish Embassy in Liberia

⁶⁹ Results-based Financing for Energy Access: How to Design and Implement Projects, Energising Development, 2018

⁷⁰ Technical Assistance to the Rural Energy Agency of Tanzania Final Report, Mark Hankins, August 2017

⁷¹ A good example of this approach is being implemented in Kenya under the Off-Grid Solar Access Project (KOSAP). See more here: <http://projects.worldbank.org/P160009?lang=en>.

⁷² For more information see <http://www.goodsolarinitiative.org/>

⁷³ Energizing Finance, SEforALL, 2017