MAPPING THE OFF-GRID SOLAR MARKET IN SIERRA LEONE

2019

Source: https://preprod.one.org/international/blog/for-two-kenyan-farmers-solar-lamps-benefit-every-part-of-life/

signify foundation

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AAVISHKAAR GROUP

Contents

Abbreviations

ACE	Africa Clean Energy Programme
AfDB	African Development Bank
BWSEASL	Barefoot Women Solar Engineer Association of Sierra Leone
BD	Business Development
DFID	Department for International Development
EnDeV	Energising Development
ECREEE	ECOWAS Renewable Energy and Energy Efficiency Centre
EDSA	Electricity Distribution and Supply Authority
EGTC	Electricity Generation and Transmission Company
EPA	Environmental Protection Agency
EREP	ECOWAS Renewable Energy Policy
EWRC	Electricity and Water Regulatory Commission
GoSL/Govt.	Government of Sierra Leone
GSM	Global System for Mobile Communications
GST	Government Service Tax
HH	Household
MNO	Mobile Network Operator
Mn	Million
MoE	Ministry of Energy
MoF	Ministry of Finance
MFI	Microfinance Institution
NCTVA	National Council for Technical, Vocational & Other Academic Awards
NGO	Non-Governmental Organisation
NREAP	National Renewable Energy Action Plan
NREP	National Renewable Energy Policy

Abbreviations

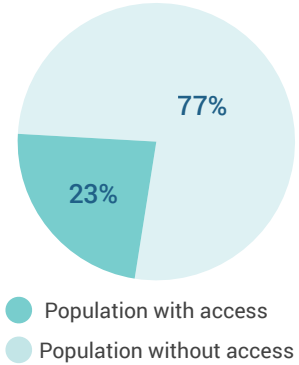
NTC	National Technical Certificate
OGS	Off-Grid Solar
PAYGO	Pay-as-you-go
PRESSD	Promoting Renewable Energy Services for Social Development
REASL	Renewable Energy Association of Sierra Leone
RE	Renewable Energy
REC	Renewable Energy Centre
ROGEP	Regional Off-Grid Electrification Project
RREP	Rural Renewable Energy Project
SE4ALL	Sustainable Energy for All
SHS	Solar Home Systems
SPL	Solar Portable Light
SLAMFI	Sierra Leone Association of Microfinance Institutions
SLS	Solar Lighting System
SOBA	Sierra Leone Opportunity for Business Action
WTP	Willingness to Pay

MARKET **OVERVIEW**

Source: https://acumenideas.com/investment-as-a-means-announcing-acumens-first-for-profit-fund-kawisafi-cee9d46cab81

Market Potential: ~77% of Sierra Leone's citizens lack electricity access. Ministry of Energy (MoE) aims to serve 37% of the population through off-grid RE based minigrids and stand-alone systems by 2030

ACCESS TO ELECTRICITY



- Sierra Leone's **national electrification rate is ~23%**, 48.7% in urban and 5.4% in rural areas (2017)
- By 2030, **55%, 27% and 10% of electrification** is expected from **grid, RE-based minigrids and RE-based stand-alone systems,** respectively
- Electricity tariffs at **$0.28/kWh are twice** as much as the average in Africa. High tariffs create a favorable market for low cost and good quality off-grid solutions
- According to a recent paper by Clean energy solution centre* (supported by USAID), the investment for achieving 2030 targets is estimated at **~ $24 Bn for off-grid stand-alone systems and ~ $3 Bn for minigrids**

KEY GOVERNMENT TARGETS THAT CONTRIBUTE TO THE OVERALL MARKET OPPORTUNITY

National Renewable Energy Action Plan (NREAP)

- **14%** of the rural population to be served by **off-grid RE (minigrid and stand-alone systems) solutions** by **2020 and 37% by 2030**
- **65 RE/hybrid minigrids** to be constructed by 2030
- **Renewable energy share** in the electricity mix to rise to **52%** and **65%** by 2020 and 2030 respectively with **95 MW of grid connected solar energy by 2030**

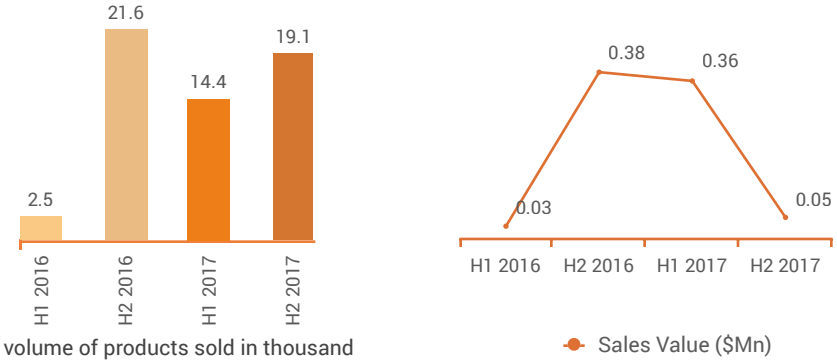
National Renewable Energy Policy (NREP)

- **60% of the population** living in remote areas to be served by **off-grid solutions** to achieve electricity access target of **82% by 2030**

Sources: National Renewable Energy Action Plans (2015-2030), Sierra Leone, July 2015 (Link);Sierra Leone Call to Action, Power for All, March 2017 (Link); Sierra Leone SE4ALL Action Agenda, MoE, July 2015 (Link); Accelerating Access to Electricity in Africa with Off-grid Solar, ODI, Jan 2016 (Link); Lighting Africa Sierra Leone (Link) *Rural Electrification in Sierra Leone: The Role of Minigrids vis-à-vis Stand-alone Home Systems and Grid Extension, SD Strategies, Nov 2017 (Link), Source: Access to Electricity in Sierra Leone, World Bank, 2017 (Link)

Market Penetration (Stand-Alone Solar Systems): OGS sales volume grew by 38% between Jan'16-'17 due to favorable policy changes, with the total value at $0.41 Mn (Jan-Dec'17)

SALES VOLUME AND VALUE OF STAND-ALONE SOLAR SYSTEMS INCREASED IN 2017 COMPARED TO 2016



- As of 2015, the **market penetration** of off-grid solutions stood at **less than 1%** of the households. Majority of the rural population that has off-grid access uses low quality electric lanterns with disposable batteries
- Improved government legislations such as **duty-free import of PV systems and favorable policies for quality products** have boosted sales
- The market is still at a nascent stage, confined to **small local distributors** of three international suppliers (Azuri, BBOX and D.Light)

OFF-GRID TECHNOLOGIES AVAILABLE FOR HHS

Two categories of stand-alone solar systems are more widely available in Sierra Leone. These include the following:

- **Pico Systems:** Capacity <20 W ,plug and play
- **Solar Home Systems (SHS):** Capacity 20 – 1000 W

- From 2014-17, Barefoot Women Solar Engineer Association of Sierra Leone (BWSEASL) **installed solar PV systems in 3,500 HHs.** It also constructed and equipped **18 Rural Electronics Workshops with Solar PV materials**
- Under "**Promoting Renewable Energy Services for Social Development Project (PRESSD)" programme,** more than **15,000 HHs** were provided electricity access through **off-grid lighting** in 2018

Sources: Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, GOGLA - H1 2016 (Link), H2 2016 (Link), H1 2017 (Link), H2 2017 (Link); Rural Electrification in Sierra Leone: The Role of Minigrids vis-à-vis Stand-alone Home Systems and Grid Extension, SD Strategies, Nov 2017 (Link); Ministry of Energy Progress Report 2014-2017 (Link)

Market Penetration (Minigrids): There were 53 solar minigrids in Sierra Leone with a total installed capacity of 1,596 kW supported by GoSL and development partners, in 2018

GOSL IN COLLABORATION WITH DEVELOPMENT PARTNERS HAD INSTALLED 55 MINIGRIDS (53 SOLAR AND 2 RE-BASED HYBRID SYSTEMS) BY 2018

Majority of the minigrid expansion in Sierra Leone has taken place through development partner programmes as given below:

Rural Renewable Energy Project (RREP)

- Installed 54 solar PV systems in Community Health Centres (CHCs) by July 2017 and expanded 50 of these to solar minigrids with a total capacity of 1,324 kW, in 2018
- Electrified 838 homes in three villages

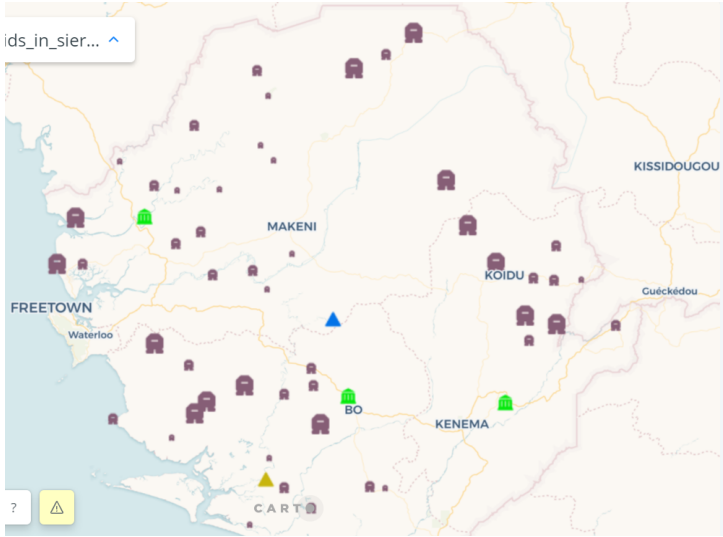
Promoting Renewable Energy Services for Social Development (PRESSD) project

- Gbinti solar minigrid with installed capacity of 79 kW, located in Dibea, Karene
- Panguma solar minigrid with installed capacity of 66 kW, located in Lower Bambara, Kenema
- Segbwema solar minigrid with installed capacity of 127 kW, located in Njaluahun, Kailahun

Additionally, there are 2 RE-based minigrids operated by **Powered and ECOWAS Renewable Energy and Energy Efficiency Centre (ECREE)** in Sierra Leone

REGIONAL FOCUS

RE-based minigrids supported by GoSL and Development Partners



Sources: Location of Minigrids in Sierra Leone, Renewables Salone (Link)

Products: Off-grid ecosystem is commonly divided into Pico lamps, Solar Home Systems (SHS) and Minigrids

- Basic Lighting
- Phone Charging
- Lighting
- Basic Appliances
- Productive use power
- Heavy Appliances
- Small commercial

Minigrids

Larger solar home systems (component based)

Smaller solar home systems (multi-light point)

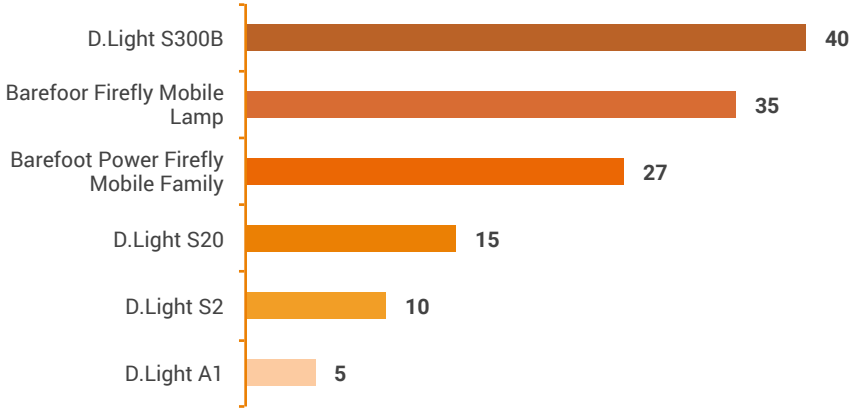
Pico Lamps

Increase in size (kW)

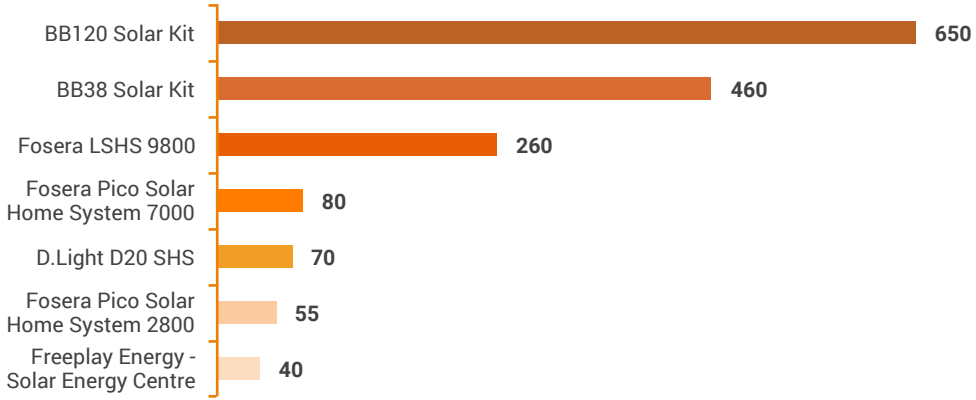
Source: Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data, GOGLA

Products: Product landscape is wide-ranged & divided, with price driven by quality, warranty, PAYGO options and after sales service

Solar Lights/Lanterns Product And Prices* (USD)



Solar Home Systems Products And Prices* (USD)

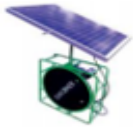


	Off-Brand Generics	Branded Retail	Branded Service Level
Description	Low cost, may offer similar specifications to branded products but maybe of lower quality	Brand-name, reputable systems sold via retail or through distributors	Brand-name, reputable systems sold via retail or through distributors and sold through PAYGO Higher cost due to PAYGO technology
Examples Of Operators In Sierra Leone	Labelling varies		

Sources: Pico PV Database, Energypedia (Link); MIT D-Lab Solar Lighting Product Comparison - Full Product Database (Link)

*List of products and prices is Indicative

Products (Productive use technologies): A few companies are incorporating productive use solar products in their offering such as solar water heaters, water pumps, fans, fridges etc.

Category	Products	Private dealers in Sierra Leone (illustrative)
Household & Institutional use	 Solar water heater  Fan	African Energy, AptechAfrica
Small businesses	 Solar refrigerator  Hair Clippers	FLS POWER Affordable Energy
Agricultural Use	 Solar water pump	Ignite

Sources: Mangoo Marketplace (Link)

SUPPLIER MARKET TRENDS

Source: https://www.npr.org/sections/goatsandsoda/2016/06/24/483259247/what-s-the-secret-to-getting-people-to-sign-up-for-solar-energy

Supplier landscape: The OGS value chain comprises of developers (manufacturers); distributors (assemblers, wholesalers, retailers), last mile distribution agents and consumers

Active
- Can also provide productive use tech
- Can also provide minigrids

Manufacturers/Developers		Distributors and retailers				Consumers
Design And Engineering	Production	International Distribution	National Distribution	Retailing	After Sales	Consumer Financing
azuri, Teleficient			Partnered with Teleficient communication for distribution			PAYGO
Sunlabob Renewable Energy						Provides energy as a service, PAYGO
BBOXX						PAYGO
Barefoot Power						PAYGO
EnerGen WAO						PAYGO, Systems Lease, MFI
easy solar, Teleficient						Partnered with Teleficient communication for distribution and PAYGO
Ignite						PAYGO
AptechAfrica						
d.light			Partnered with Energy Efficient Solutions for distribution			PAYGO
Leks Environmental						
barefoot college						Distributes through women solar technicians

Note: For more details on suppliers, refer to Annexure (Slides 45 to 47)

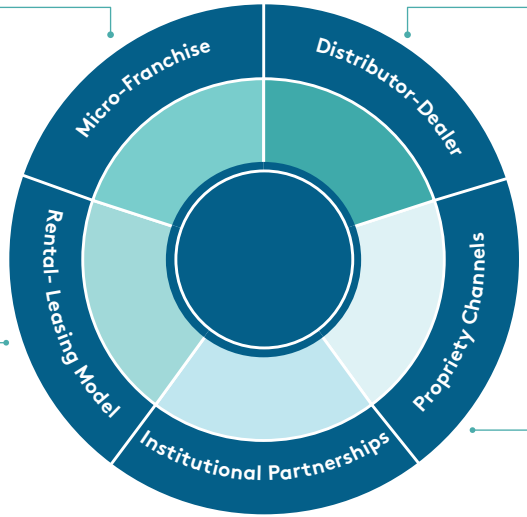
Distribution models: Most common distribution models involve distribution through conventional dealer networks and institutional partnerships with local retailers or NGOs

Microfranchise Model

The company offers franchising packages (such as financing, training, marketing support etc.) to micro-entrepreneurs who wish to become formalized retailers of exclusive company products

Distributor-Dealer

The company sells through established networks of generalist or specialist distributors, leveraging the traditional consumer durables supply chain. Products are retailed in a basket of consumer durables. A distribution hierarchy of at least two levels (distributor and dealer/retailer) is maintained



Rental-leasing Model

The solar company franchises to micro-entrepreneurs who set up solar charging kiosks. The micro-entrepreneurs either (1) rent products to consumers on an hourly/daily basis or (2) sell systems without a power source, offering a fixed fee for charging

Proprietary Channels

Products move through a proprietary distribution channel from manufacturer to in-house storage/ assembling facilities to a salaried/ contracted salesforce, which delivers them to customers directly

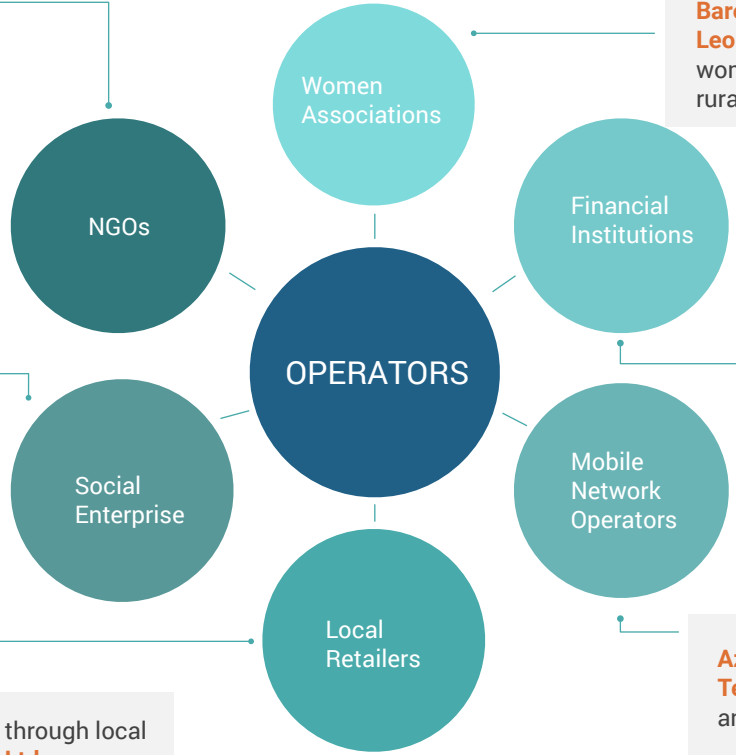
Institutional Partnerships

The company partners with an institution (e.g., NGO, MFI, rural bank, assemblers, with links to a large potential customer base) to market its products to its customer base/members and/or to leverage its assembling & after-sales support services

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link)

Distribution models: Businesses are exploring a variety of last mile distribution channels such as financial institutions and social enterprise models

International foundations like **Welthungerhilfe** have partnered with local NGOs like **Energy for Opportunity (ENFO)**, planning to install stand-alone solar systems and minigrids for provision of electricity to households, businesses and institution by 2020



Barefoot Women Solar Engineer Association of Sierra Leone (BWSEASL) provides technical training to women on installation and maintenance of solar PVs in rural communities

Sierra Leone Association of Microfinance Institutions (SLAMFI) and the **Renewable Energy Association of Sierra Leone (REASL)** undertook a pilot household solar project. The MFI is providing consumer financing to its customers to buy SHS

EnerGen WAO partnered with Union Trust Bank for providing SHS to Small and Medium Enterprises (SMEs) through a community leasing model

Barefoot Power and Easy Solar are social enterprises that manufacture and distribute solar kits, phone charging and lighting products

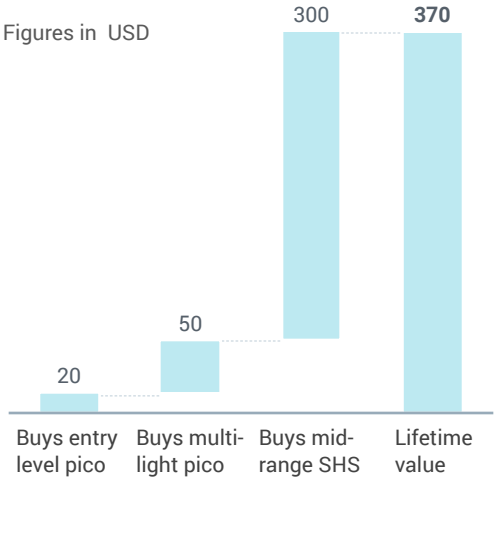
Azuri and Easy Solar partnered with **Teleficient Communication** for distribution and end-user financing

Manufacturers like **D.Light** distribute products through local retailers such as **Energy Efficient Solutions SL Ltd**

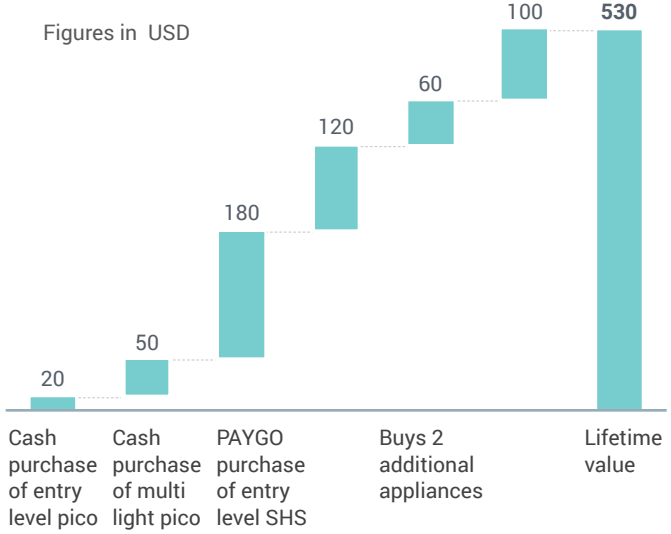
Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Lighting-up Ebola-hit homes in Sierra Leone, Azuri Group (Link); Barefoot Power, Business Call to Action (Link); First-of-Kind Solar Pilot in Sierra Leone, Power for All, Dec 2016 (Link); Energy for the Future Sierra Leone, Welthungerhilfe (Link); Getting Power from Kiosks in Sierra Leone, Welthungerhilfe (Link)

Financing models: The lifetime value of a customer through PAYGO models is much higher than it is with Cash based or Cash + PAYGO payment mechanisms

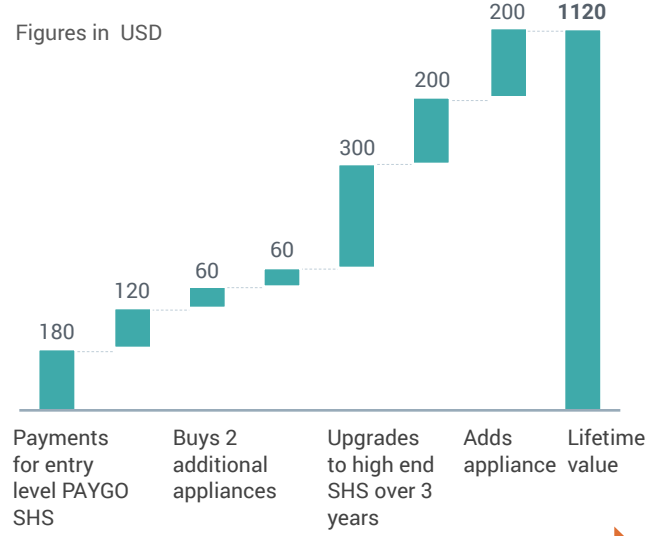
Cash



Cash + PAYGO



PAYGO



8-Year Horizon

- Players are **increasingly focusing on the lifetime value** they can derive from a consumer as consumers migrate from basic products to products with higher functionality
- **PAYGO models offer the highest lifetime customer value**, as is reflected by the increasing adoption of PAYGO models by most suppliers in the market

Source: Accelerating Access to Electricity in Africa with Off-grid Solar, ODI, Jan 2016 (Link)

Financing models: "Lease to own" is the most common customer relationship model. For payments, most companies use a off-network prepaid credit agent-based model

Business model	Benefits
PAYGO is a financing platform for off-grid energy systems with high up-front capital costs. An IT system underlies the platform, allowing automated payments and system monitoring/activation	• Ability to provide longer duration and big-ticket loans to users • High consumer confidence in product due to financing by the supplier • Improved operational efficiency of suppliers as no coordination needed between financial and technology providers • Reduced cost of payment collection (incase of mobile payments)

Companies on PAYGO platforms

easy solar · Barefoot Power · azuri · BBOXX · EnerGenWAO POWER TO THE LAST MILE · Ignite Power on a Different Scale

PAYGO BUSINESS MODEL ATTRIBUTES

Payment Platform

- **Full connectivity model** – M2M and mobile money
- **Prepaid credit agent-based model** (off-network) – requires manual input of unique code (e.g. **Azuri, D.Light, Bboxx, Easy Solar)**
- **Use of airtime as prepaid credit USSD models**
- **Partial PAYGO models:** Agents accept cash and activate products via cable, bluetooth or manual SMS code

Customer Relationships

- **Lease to own:** Transfer of asset ownership to user after limited payment period. Payment via licensed platform (e.g. **Azuri, Easy Solar**)
- **Energy service:** Co. provides electric service rather than financing. Service comes from a company-owned solar system. (e.g. **Sunlabob**)
- **B2B players:** Hardware/software support for energy service and payment logistics. (e.g. **Lumeter**)

System Size

PAYGO solar products can be divided by system size, which dictates the service level that each provides.

- HH products: Solar lanterns, SLS, SHS
- Community level shared minigrids

Connectivity

- Systems that are fully online, including **mobile money and remote, real time connections** with the energy system
- Systems that are intermittently connected

Partnership Strategy

- Partnerships could be made on distribution, payment portals, hardware/software service support, or other core business aspects

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Sierra Leone is Ground Zero for the Launch of KWHCoin Green Economy, Medium, Sep 2018 (Link)

Financing models: Franchise/dealership model is often used for extending end-user financing

	DESCRIPTION
One Stop Shop Model	In this model, the same organization provides the products and finance. This happens when a finance provider decides to offer energy products, or when an energy enterprise decides to offer finance. (e.g. **BBOXX, Sunlabob, Barefoot Power**)
FI Partners With Energy Enterprise	In this case, an energy enterprise enters into a partnership with a local financial institution to sell OGS products. This model typically involves a financial institution (FI) providing credit to an end-user and managing the monitoring and repayment processes, while the energy company provides the energy product, installation, service and maintenance. (e.g. **EnerGen WAO**)
Umbrella Partnership Model	The energy enterprise enters into a partnership arrangement with an "apex institution" that manages a network of local FIs (e.g. a union of credit cooperatives, credit unions, or other village-based FIs). The apex institution lends money to the local finance providers, who lend to an end-user and manage the monitoring and repayment processes. The energy enterprise provides the product, installation, service and maintenance
Franchise/ Dealership Model	The energy enterprise provides credit to dealers and/or franchises to allow them to sell to clients on an instalment basis. This particular model is common for relatively inexpensive products — usually those that cost under $50. (e.g. **Azuri, D.Light, Fosera**)
Brokering Model	A third-party organization is paid by the finance provider and the energy enterprise to market energy products and assess customers' suitability for financing. They bring viable customers forward to buy energy products. The broker may also be involved with loan payment collection, after-sales service, and technical upkeep

Value proposition offered by select suppliers

Salient Features

- **Azuri** has partnered with **Teleficient Communication** to distribute its SHS that has phone charging and delivers 8 hours of lighting
- **PAYGO (scratch card or SMS code)** financing option is available with **low upfront cost and easy installments**
- Distribution is carried out through **commissioned agents, MNO outlets or community members** in the rural areas
- Teleficient has distributed over **6000 Azuri "pay as you go"** energy systems, with plans to install over 50,000 systems
- **KWHCoin** has signed an MoU with Teleficient to provide a **medium of payment services** through cryptocurrency. KWHCoin will integrate its token into the Teleficient home system ecosystem offering cryptocurrency as a digital solution to provide micro payments

Salient Features

- Product offering: **Battery box 5 kit BB5** (power four bulbs, charge phones and 12 volts DC equipment); **BB7/12/17 solar kits** (power homes with basic light and entertainment); **BBOXX home system** (12 V Battery, 50 W solar panel, Outlet for phones and tablets, TV, radio and flashlight)
- BBOXX provides SHS on a **monthly plan with easy installments from 12 to 36 months (PAYGO using mobile money)** which includes maintenance cost
- BBOXX owns **subsidiaries** who sell directly to consumers through a network of **local shops and hubs**
- It has a platform for **remote monitoring and management system (SMART Solar)** that links customers, equipment and support and payment systems. This enhances operational management and maintenance
- Payment can be made through monthly installments ranging between **$40- $200,** to replace generators with solar electricity

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Sierra Leone is Ground Zero for the Launch of KWHCoin Green Economy, Medium, Sep 2018 (Link); BBOXX Solar Light Is For All (Link); Bboxx (Link); Azuri PAYGO Energy Factsheet, UNFCCC (Link)

Value proposition offered by select suppliers

Salient Features	Salient Features
Barefoot Power • Manufactures and distributes **Pico PV and SHS -** systems use a **1W to 15W** photovoltaic (PV) module and a rechargeable battery to store electricity • Provides **end-to-end solutions** including financing, installation, maintenance and lifecycle management	**Ignite** Power on a Different Scale • **Independent Power Producer (IPP),** Ignite Power provides electricity through **solar kits** to off-grid HHs • Solar kits cost less than **$0.15 a day for a lease-to own model** with **PAYGO financing** (monthly installments for 2-3 years). These payments can be made through **cash or mobile money**
EnerGen WAO POWER TO THE LAST MILE • Provide **SHS and solar hybrid solutions with 6-7 years usability lifetime** for residential, commercial and rural customers • **Financing Models: Cash sales** through a dealer network of sales agents; **PAYGO** with 20% down payment and installments of 6-12 months leading to end-user system ownership; **Systems Lease** with nominal installation fee and daily, weekly or monthly payments for energy access credits • Partnered with **Union Trust Bank** for providing SHS to Small and Medium Enterprises (SMEs) through the bank's community leasing model	**easy solar** **Teleficient** Communicating Beyond Boundaries. • Easy solar is the distributor of **Azuri and Greenlight Planet's SunKing solar pico products** including lanterns, home basic and home+TV. Entry level solar products are priced at $20 • Easy solar partnered with **Teleficient Communications for PAYGO financing and distribution** • Customers can pay for **OGS products in weekly or monthly installments.** These payments can be made through **cash or mobile money** • The company distributes through **8 sales outlets** and **40 community-based agents,** and has reached 8,000 HHs by 2018

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Sierra Leone is Ground Zero for the Launch of KWHCoin Green Economy, Medium, Sep 2018 (Link); BBOXX Solar Light Is For All (Link); Bboxx (Link); Azuri PAYGO Energy Factsheet, UNFCCC (Link)

Barriers to Scale: Poor implementation of regulatory/institutional framework, limited access to financing options and poor local technical capacity are the main barriers to scale for suppliers in Sierra Leone (1/2)

Barriers		Initiatives
Regulatory Barriers	• Unclear enforcement of the amendments under the Finance Act has led to **'unofficial' taxes and charges of up to 50% on solar PV systems** • Lengthy import clearance procedures cause delays creating operational and financial difficulties. The lack of transparency in the customs process, leading to uncertainty about the length of delay, is cited by organizations as a major barrier to long term expansion. • Lack of standardized Power Purchase Agreements for electricity, results in **uncertainty regarding electricity tariffs for minigrid operators**	• As per the **Sierra Leone Finance Act 2017**, all solar PV home systems are **exempt** from **Value Added Tax and import duty** • The custom authorities have set up a **"Green Lane"** to allow solar companies to get **faster clearance for quality certified clean energy equipment** (including solar PV systems, solar panels, OGS products etc.) • The Public Private Partnership Unit **under the National Electricity Act, is developing a standardized power purchase agreement** to simplify and expedite negotiations with investors in the energy sector
Lack Of Information/ Data On RE	• There is a lack of data on renewable energy resources as well market trends for specific regions in the country	• **EnDev programme** supported the development of the **Renewables Sierra Leone website,** which provides a database of all RE initiatives including market intelligence news/reports, stakeholders interested in off-grid solutions (solar companies, development partner, Govt.), RE programs etc. • **The Electricity Sector Reform Roadmap** developed by the GoSL has suggested the establishment of a **database** with detailed information about the existing **off-grid projects** (including information on system specifications, cost and performance), along with detailed technology-based resource mapping

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Accelerating Access to Electricity in Africa with Off-grid Solar, ODI, Jan 2016 (Link); Sustainable Energy For All (SE4ALL) Investment Prospectus for Sierra Leone, May 2017 (Link); Sierra Leone Call to Action, Power for All, March 2017 (Link)

Barriers to Scale: Poor implementation of regulatory/institutional framework, limited access to financing options and poor local technical capacity are the main barriers to scale for suppliers in Sierra Leone (2/2)

Barriers		Initiatives
Poor Access To Enterprise Finance	• Interest rates charged by commercial banks are very high due to the high risk perception of OGS businesses • A high risk is posed by currency fluctuations for most suppliers of OGS as most debt raised is in EUR or USD while the customers pay in local currency. Any devaluation of local currencies can adversely affect the business • There is lack of efficient banking and financial institutions to facilitate fund transfers locally or internationally	• **Electricity Sector Reform Roadmap** has mandated establishment of **Rural Electrification Fund** for co-financing priority projects (electricity access, renewable energy, and energy efficiency). It has also suggested financial support for off-grid electricity supply commercial projects through targeted **risk guarantee schemes** • As part of the **Sierra Leone Opportunity for Business Action (SOBA) project, £4.6 Mn private sector investment** was leveraged of which a large proportion was for the HH solar market • **Acumen** through its **Pioneer Energy Investment Initiative (PEII)** is supporting investment in energy generation and usage, through a **$20 Mn fund** for energy companies in Sierra Leone
Limited Technical Capacity	• Low skill level of the local population hinders operations of solar companies providing off-grid solutions • Solar companies need to invest heavily on training of unskilled labor for successful implementation of their business models which impacts cost-effectiveness of their projects	• **MoE** is supporting **technical training initiatives** on solar PV maintenance and installation, by organizations such as **Barefoot Women Solar Engineer Association of Sierra Leone (BWSEASL) and Government Technical Institute - Renewable Energy Centre (REC)** • Under the **Promoting Renewable Energy Services for Social Development (PRESSD) programme, a Solar PV Technologies National Technical Certificate (NTC)** was developed by Oxfam IBS in partnership with the National Council for Technical, Vocational and Other Academic Awards (NCTVA). • **Capacity building and technical training initiatives** are a core component across most **donor funded development programmes**

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Accelerating Access to Electricity in Africa with Off-grid Solar, ODI, Jan 2016 (Link); Sustainable Energy For All (SE4ALL) Investment Prospectus for Sierra Leone, May 2017 (Link); Sierra Leone Call to Action, Power for All, March 2017 (Link); Programme Profile: Sierra Leone Opportunities for Business Action (Link)

DEMAND **TRENDS**

Source: https://www.greenlightplanet.com/solar-news/

3.1 Affordability
3.2 Demand Barriers

Affordability: Willingness to pay (WTP) for OGS products is low due to the low purchasing power among households. Sierra Leone is also one of the weakest markets for PAYGO in Africa

Market Attractiveness Index, IFC

Country	Demand Score			Supply Score				Enabling Environment Score		
	Market Size	Ability to Pay	Willingness to Pay	Access to Finance	Operational Considerations	Market Penetration	Human Capital	ICT	Legal and regulatory	Trade and Commerce
Angola										
Cameroon										
Congo Dem Rep.										
Cote d'Ivoire										
Ethiopia										
Guinea										
Kenya										
Madagascar										
Malawi										
Mozambique										
Niger										
Nigeria										
Senegal										
Sierra Leone										
Tanzania										
Togo										
Uganda										
Zambia										
Zimbabwe										

- **Sierra Leone is one of the poorest nations in the world, which greatly impedes the ability of the consumers to pay for off-grid solutions**
  - On average, Sierra Leonean consumers **spend $32 per year for their primary lighting source**
  - For low-income consumers, such expenditures can amount to 30-50% of their disposable income
- **According to the PAYGO market attractiveness index, Sierra Leone scores low on both ability to pay and willingness to pay for OGS solutions**
  - The limited ability and willingness to pay is further exacerbated by poor access to finance, operational challenges and regulatory barriers on the demand, supply and ecosystem side, respectively

Less than 100

Less than 70

Less than 50

Sources: PAYGO Market Attractiveness Index, Lighting Global IFC, 2019 (Link)

Demand Barriers: Limited purchasing power and poor quality of off-grid solar products are critical barriers to the adoption of OGS solutions

Barriers		Initiatives
Poor Purchasing Power And Limited Access To Consumer Financing	• High grid tariff rates is a deterrent for poor HHs to access electricity • Only 65% of mobile phone coverage in rural areas limits the use of innovating consumer financing models for OGS such as PAYGO • There are limited consumer financing options available to reduce the upfront cost of SHS	• Several solar companies are providing OGS solutions on a **lease-to-own model on PAYGO basis with micro-installments** over a payment periods of 6,12 or 24 months • Sierra Leone **Association of Microfinance Institutions (SLAMFI)** undertook a pilot household solar project, whereby MFIs are providing **consumer financing** for purchase of SHS • **Energen WAO** partnered with **Union Trust Bank** for providing SHS to **Small and Medium Enterprises (SMEs) through a community leasing model**
Poor Quality Standards	• There is a large inflow of solar equipment in the market with no discernible brand name, warranty or quality certification • There are limited policy interventions for quality certification of OGS products	• **Sierra Leone Finance Act 2017,** requires that products meet **IEC global quality standards** in order to **qualify for tax-free status** (harmonized with IFC/World Bank Lighting Africa/Lighting Global standards) • **Renewable Energy Association of Sierra Leone (REASL)** has proposed a pathway towards the development of a **Standard and Quality Assurance Regulatory Framework Ecosystem** to the GoSL • **Sierra Leone Standards Bureau** has defined **specifications for off-grid** and mains-voltage lighting products

Sources: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Accelerating Access to Electricity in Africa with Off-grid Solar, ODI, Jan 2016 (Link); Sustainable Energy For All (SE4ALL) Investment Prospectus for Sierra Leone, May 2017 (Link); Sierra Leone Call to Action, Power for All, March 2017 (Link)

ENABLING **ECOSYSTEM**

Source: https://solarmagazine.com/december-caps-a-bright-busy-year-for-off-grid-solar-in-sub-saharan-africa/

Government: The National Renewable Energy Policy provides the framework for provision of productive electric power to 60% of the remote communities in Sierra Leone, through off-grid solutions

Programmes	Mandate
National Renewable Energy Action Plan - 2020/30 (NREAP), 2015	Aims to advance RE development in Sierra Leone by setting measures and plans to meet 2020 and 2030 targets. It comprises strategies for on-grid generation, off-grid electrification, and renewable energy intensification
National Renewable Energy Policy (NREP), 2016	Provides regulatory, legal and institutional framework for achieving and financing the energy efficiency and electrification target. It details the policy measures that need to be taken to achieve the target of universal access as per the Sierra Leone Sustainable Energy for All (SE4ALL) Action Agenda
Sierra Leone Intended Nationally Determined Contribution (INDC), 2015	States the climate change adaptation and mitigation strategies for transition of Sierra Leone to a low carbon and climate resilient economy by 2030

Off-Grid Solar Targets

- By 2030: Increase acess to electricity to 37% of the population through RE-based minigrids or stand-alone systems
- By 2030: Install off-grid solutions to provide energy services for 60% of the rural population
- By 2035: Maintain emission levels close to the world average of 7.58 $MtCO_2$ eq. by 2035

Sources: National Renewable Energy Policy of Sierra Leone, MoE, May 2016 (Link); National Renewable Energy Action Plans (2015-2030) of Sierra Leone, MoE, July 2015 (Link); Sierra Leone Sustainable Energy for All (SE4ALL) Action Agenda, MoE, July 2015 (Link)

Government and Quasi-Government: Several ministries and agencies are working towards advancing access to energy, through both on-grid and off-grid solutions

Institutions	Mandate
Ministry of Energy (MoE)	• Formulates, implements and monitors energy policies and regulations
Directorate of Energy (DoE) – Est. 2010	• Conducts strategic planning on energy security and access issues • Lays down strategies to introduce renewable energy resources for electrification and ensures efficient utilization of energy resources
Renewable Energy and Energy Efficiency and Rural Electrification Unit – Est. 2013	• Conducts research and development on energy efficiency (EE) and rural electrification (RE) • Trains public and private stakeholders as well as students on EE technologies
Electricity Distribution and Supply Authority (EDSA)	• Manages the distribution networks and the sale of on-grid electricity
Electricity Generation and Transmission Company (EGTC)	• Generates, transmits electricity and sells it to the EDSA subject to a power purchase agreement • Manages imports/exports of electricity transmission such as from West Africa Power Pool
Electricity and Water Regulatory Commission (EWRC)	• Regulates market access through licensing of all producers, transmitters, distributors and sellers of electricity and water
Environmental Protection Agency (EPA)	• Ensures that environmental impact assessment measures are adhered to for energy programmes • Supports MoE in design of Global Environment Facility (GEF) funded projects and enhances their capacity in the coordination and networking of clean technology
Ministry of Local Government and Rural Development (MoLGRD)	• Supports implementation of rural electrification programmes (on-grid and off-grid) • Coordinates, implements and evaluates energy service projects
The Office of the President	• Coordinates and monitors the implementation of Presidential Delivery Plan (PDP), that lays down the plan for improving electrification (on-grid and off-grid) in rural health centres/HHs

Sources: National Renewable Energy Policy of Sierra Leone, MoE, May 2016 (Link); Sierra Leone Sustainable Energy for All (SE4ALL) Action Agenda, MoE, July 2015 (Link)

Government: National Renewable Energy Policy, National Renewable Energy Action Plan 2017-2030, and Draft Minigrid Regulations are key government policies guiding the country's off-grid market (1/2)

Policies/Plan/Frameworks	Actions
National Energy Policy, 2009	• Lays down the framework for implementation of renewable energy policies and programmes
National Energy Strategic Plan, 2009	• Defines a strategic plan for the implementation of the Energy Policy • Prioritizes small-scale decentralized solar power supplies to meet the basic needs of lighting, refrigeration and media and information technology in rural areas • Calls for the development of a strategy, plan and mechanism for rural electrification
National Electrification Act, 2011	• Clarifies and extends the 2009 National Energy Policy and Strategic Plan with goals, policies, and extensive measures for solar and other forms of renewable energy
ECOWAS Renewable Energy Policy (EREP) and the ECOWAS Energy Efficiency Policy (EEEP), 2013	• Defines the targets and scenarios with respect to renewable energy (RE) and energy efficiency (EE) in the West Africa region • Notably, the ECOWAS Renewable Energy Policy (EREP) has set a target of promoting 60,000 minigrids and 2.6 Mn stand-alone systems across the region by 2020, at a total cost of €13.6 Bn to serve 71.4 Mn people
National Renewable Energy Action Plan 2017-2030 (NREAP), 2015	• Suggests the action plan for the sustainable development, supply and utilization of energy resources within the economy for both grid and off-grid energy solutions
Draft Energy Efficiency Policy, 2016	• Aims to enhance energy access while transforming the energy sector towards greater sustainability through policy reforms, generating awareness, enabling private sector investment, and strengthening regulations • Aligns its strategy to the ECOWAS Energy Efficiency Policy (EEP) and mandates the implementation of National Energy Efficiency Action Plan

Sources: National Renewable Energy Policy of Sierra Leone, MoE, May 2016 (Link); Sierra Leone SE4ALL Action Agenda, MoE, July 2015 (Link); Draft Energy Efficiency Policy of Sierra Leone, MoE, May 2016 (Link)

Government: National Renewable Energy Policy, National Renewable Energy Action Plan 2017-2030, and Draft Minigrid Regulations are key government policies guiding the country's off-grid market (2/2)

Policies/Plan/Frameworks	Actions
National Renewable Energy Policy, 2016	Sets out Government principles, objectives and strategies for renewable energy which include the following: • Create market incentives for the deployment of efficient private sector-driven renewable energy solutions for remote and off-grid areas • Provide electricity to all remote and off-grid areas of Sierra Leone as well as increasing grid supplied electricity in line with the regional/ECOWAS policy and target • Remove bottlenecks in the development of off-grid electricity in Sierra Leone • Undertake measures to attract investment capital, both foreign and domestic, for the development of renewable energy for both on and off-grid projects • Reform existing policies and strategies to enable better market systems, improve electricity access and increase renewable energy sources in the energy mix
Finance Act, 2017	• Lays down the rules for taxation and duties for goods and services in the economy • States that the imports of PV system equipment and low energy or energy efficient appliances for resale or use by third parties shall be duty-free
Electricity Sector Reform Roadmap (2018-2030), 2018	• States the implementation approach for advancement of power sector incorporating both grid connected and off-grid electrification planning
Draft Minigrid Regulations, 2018	• Entails the tariff arrangements and licensing procedure for minigrid suppliers along with rules for minigrid interconnections and supply to consumers. Licensing requirements and processes are differentiated by minigrid size.

Sources: National Renewable Energy Policy of Sierra Leone, MoE, May 2016 (Link); Draft Minigrid Regulations, GoSL, 2018 (Link); Finance Act of GoSL, June 2017 (Link)

Development Partners: Development programmes in Sierra Leone are working towards developing the OGS market especially through BD and financing support, policy enablement and market intelligence

Programme	Consumer awareness	Policy enabling	Access to finance		Transaction advisory	BD support and TA*	Quality assurance	Market intelligence	Funding (Mn USD)
			Consumer	Enterprise					
PRESSD	●					●	●	●	7.7
We Care Solar						●	●		
SOBA	●	●		●	●	●		●	11.5
RREP						●	●		43.4
SE4All		●		●	●	●	●	●	18.8**
ACE		●		●		●	●	●	81***
ROGEP		●		●	●	●	●	●	200****
EnDev	●					●	●	●	374*****
Power for All	●	●		●	●	●	●	●	
RECP		●		●		●		●	

*BD support includes skills development and capacity building; TA – technical assistance
**Covers Africa and Asia (donor income as on Dec 2018)
***Covers 14 African countries
****Covers 19 countries
*****Covers 26 countries

Programmes covering minigrids

Exchange Rate: 1 EUR = 1.09 USD and 1 GBP = 1.26 USD

Development Partners: The EU supported the MoE through a $7.71 Mn fund to increase access to electricity through OGS at the household and community level across 4 districts in Sierra Leone

Implementing agency	Programme	Intervention areas	Results	Donors/ Partners	Funding
OXFAM IBIS COOPI COOPERAZIONE INTERNAZIONALE welt hunger hilfe ENFO	Promoting Renewable Energy Services for Social Development (PRESSD) (2014-2018)	• Provide off-grid solutions to households, schools community associations and universities • Build awareness on renewable energy in rural communities • Train various stakeholders on renewable energy technologies, such as lecturers of polytechnic institutes and government officials	• Enabled sale of 10,000 pico lights • Electrified 22 Agricultural Business Centres or Agricultural Processing Centres (ABCs/APCs) as energy hubs • Installed 100 solar community charging stations that enabled creation of 200 direct jobs • Enabled access to off-grid lighting to more than 15,000 HHs • Installed 3 solar minigrids with a total capacity of 272 kW • Institutionalized a National Technical Certificate (NTC) on Solar PV Technology Programme • Supported 12 schools to manage 1.5kW – 10kW off-grid solar PV systems • Developed a scholarship programme for solar PV studies that targets women • Piloted successful pico-lights School Campaigns • Installed and equipped 3 Solar PV Laboratories in Government Technical Institutes (GTI) • Electrified around 35 community institutions (health centres, hospitals, banks etc.)	• EU • Ministry of Energy	**$7.71 Mn**

Source: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Sierra Leone Call to Action, Power for All, March 2017 (Link); Promoting Renewable Energy Services for Social Development (Link)

Development Partners: The EU supported the MoE through a $7.71 Mn fund to increase access to electricity through OGS at the household and community level across 4 districts in Sierra Leone

Implementing agency	Programme	Target areas	Results	Donors/ Partners	Funding
DFID Department for International Development	Africa Clean Energy Programme (ACE) (2016 - 2022)	• Advise GoS to institutionalize favorable regulatory & legislative reforms for expansion of off-grid market • Provide technical advisory to private sector players on market development of solar home system (SHS) and minigrids • Enable financing for OGS enterprises • Test innovative approaches to stimulate private sector investment and market development in the off-grid sector • Support initiatives on consumer protection and awareness	• Invested $7.4 Mn in 10 HH solar companies in 4 countries including Sierra Leone • Developed the "Energy Africa Compact for Sierra Leone" which lays down the priority actions for improving policies/ regulations to facilitate a market for HH solar energy • Provided technical assistance to the Renewable Energy Association of Sierra Leone (REASL) across areas of consumer protection and awareness, and quality control	• DFID , UK • Partners • Coffey International • World Resources Institute (WRI) • Open Capital Advisors	**$81 Mn** (14 African countries)

Sources: Africa Clean Energy Programme, DFID (Link); About Africa Clean Energy Programme, GOGLA (Link)

Development Partners: DFID has enabled private solar companies to import over 130,000 pico and small SHS and has enhanced off-grid market development by facilitating collaboration between GoSL and private solar companies

Implementing agency	Programme	Intervention areas	Results	Donors/ Partners	Funding
WE CARE SOLAR	We Care Solar (2014 onwards)	• Develop programmes to distribute compact 'We Care Solar Suitcases'* to under-resourced health centers . The suitcase has a solar-electric system that contains a battery charged by solar panels, lighting sockets, USB ports and expansion ports. It provides lighting for medical services, and power for mobile communication and medical devices • Innovate on technology of solar suitcases, with an aim to install 300 solar suitcases by 2019-2020	• Installed solar suitcases in 141 health facilities in 2018 • Deployed solar suitcases to 41 labor rooms in 2014-15 • Deployed 110 solar suitcases in response to the Ebola outbreak in 2014-15 • Conducted training programmes for health workers	• Doctors with Africa CUAMM • Direct Relief • Medical Research Center (MRC)	
Adam Smith International	Sierra Leone Opportunity for Business Action (SOBA) (2013-2017)	• Provide technical support and targeted financial investment for development of OGS market • Collaborate with private players for enabling investment in areas of agriculture, sustainable energy, and financial services • Increase solar brand and product awareness amongst consumers • Demonstrate investment opportunity in Sierra Leone's solar market	• Supported imports of over 130,000 small SHS and pico to Sierra Leone • Mobilized £4.6 Mn of private sector investment which constituted a large proportion for HH solar market • Provided technical assistance to the GoSL for "Sierra Leone Energy Revolution" and "Energy Africa Compact for Sierra Leone" • Strengthened Renewable Energy Association of Sierra Leone to drive collaboration in the RE industry.	• World Bank • IFC • Lighting Africa	**$11.5 Mn** (all 3 components of the project including OGS)

Sources: Africa Clean Energy Programme, DFID (Link); About Africa Clean Energy Programme, GOGLA (Link)

Development Partners: UNOPS is supporting GoSL to improve access to electricity in rural areas through installation of 50 solar minigrids by 2020

Implementing agency	Programme	Intervention areas	Results	Donors/ Partners	Funding
UNOPS	Rural Renewable Energy Project (RREP) (2017-2020)	• Support GoSL in improving electricity access by provision of off-grid solutions in rural areas • Provide technical assistance to private sector players in the off-grid sector	• Installed solar PV stand-alone systems in 54 Community Health Centres (CHCs) by July 2017 • Expanded 50 of these to solar minigrids, which are sustainably maintained and operated by three international companies (PowerGen, PowerLeone, WINCH) in 2018 • Electrified 838 homes across three villages	• Doctors with Africa CUAMM • Direct Relief • Medical Research Center (MRC)	$43.4 Mn
ECREEE Towards Sustainable Energy	Regional Off-Grid Electrification Project (ROGEP) (2019-2024)	• Conduct market assessment studies for solar products and identify demand and supply barriers • Develop a guarantee fee to mitigate risk exposure of banks and solar companies • Provide regulatory support • Support electrification through stand-alone systems by enabling access to credit lines from WB to financial institutions • Improve financial landscape by matching grants from impact investors	• Undertaking examinations and operationalising the Regional Certification Scheme (RCS) for solar PV technicians in 8 pilot countries (Senegal, Ghana Benin, Burkina-Faso, Mali, Nigeria and Sierra Leone) • Conducted a market assesment study on OGS for Sierra Leone	• World Bank • IFC • Lighting Africa	$200 Mn (19 countries)

Source: Access to Energy: Giving Sierra Leone the Power to Change Lives, UNOPS (Link); Regional Off-Grid Electrification Project of World Bank, Renewables Liberia (Link); MoE Progress Report 2014-2017 (Link); Regional Off-Grid Electrification Project, World Bank (Link)

Development Partners: UNOPS is supporting GoSL to improve access to electricity in rural areas through installation of 50 solar minigrids by 2020

Implementing agency	Programme	Intervention areas	Results	Donors/ Partners	Funding
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Netherlands Enterprise Agency	Energising Development (EnDev) (2014-2018)	• Provide technical assistance to retailers to overcome market obstacles and promote solar products • Enhance energy at HH level through off-grid solutions • Promote renewable energy applications for productive use amongst Small and Medium Enterprises (SMEs), cooperatives and craftsmen • Undertake capacity building and training for private sector operators with respect to off-grid solution on topics such as: business models/procedures, technical skills, and operations and maintenance	• Installed 28 OGS projects including Pico PV and solar minigrids in Sierra Leone • Installed minigrids with 6,500 Wp covering 61 public facilities in Sierra Leone as of Dec 2019 • Conducted training for minigrid technicians in Sierra Leone	• Netherlands Ministry of Foreign Affairs (MFA NL) • German Federal Ministry for Economic Cooperation and Development (BMZ) • Norwegian Ministry of Foreign Affairs (MFA-NOR) • Department for International Development (DFID) • Swiss Agency for Development and Cooperation (SDC) • Swedish International Development Cooperation Agency (SIDA)	**$374 Mn** (26 countries)

Source: GIZ, Endev Empower Technicians on Renewable Energy in Sierra Leone, Medium, Sep 2019 (Link); Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Analytical Map of Solar Installations in Public Facilities in Sierra Leone, Renewables Salone (Link)

Development Partners: Power for All is creating an enabling environment for off-grid solutions by collaborating with GoSL on policy reforms and creating interlinkages with other donor programmes

Implementing agency	Programme	Intervention areas	Results	Donors/ Partners	Funding
DFID Department for International Development	Power for All	Accelerate market transformation by working with public and private sectors to: • Include decentralized renewables in energy policy • Mobilize capital for the entire value chain • Focus on market building and policy making for off-grid solutions • Drive higher quality and efficiency of off-grid products	• Supported GoSL to design the "Energy Revolution Initiative" that raises awareness on decentralized solar technologies • Enabled formation of the "Renewable Energy Association of Sierra Leone" (REASL) • Prepared the "Sierra Leone Call for Action". This includes strategies and recommendations for acceleration of distributed renewable energy (DRE) market	• Energizing Development (EnDev) • GIZ • Oxfam IBIS • REASL • SOBA	
	Africa-EU Renewable Energy Cooperation Programme (RECP)	• Advise GoSL on development of renewable energy policies • Support training and certification programmes for solar PV installers • Undertake solar PV market studies • Promote private sector participation by organizing off-grid investment forums	• Assisted ECOWAS to develop a "Regional Renewable Energy Policy for West Africa" including Sierra Leone. This plan lays down the strategy for improving access to electricity by increasing the share of renewable energy through on-grid and off-grid solutions	• European Commission	

Source: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link); Sierra Leone Call to Action, Power for All, March 2017 (Link)

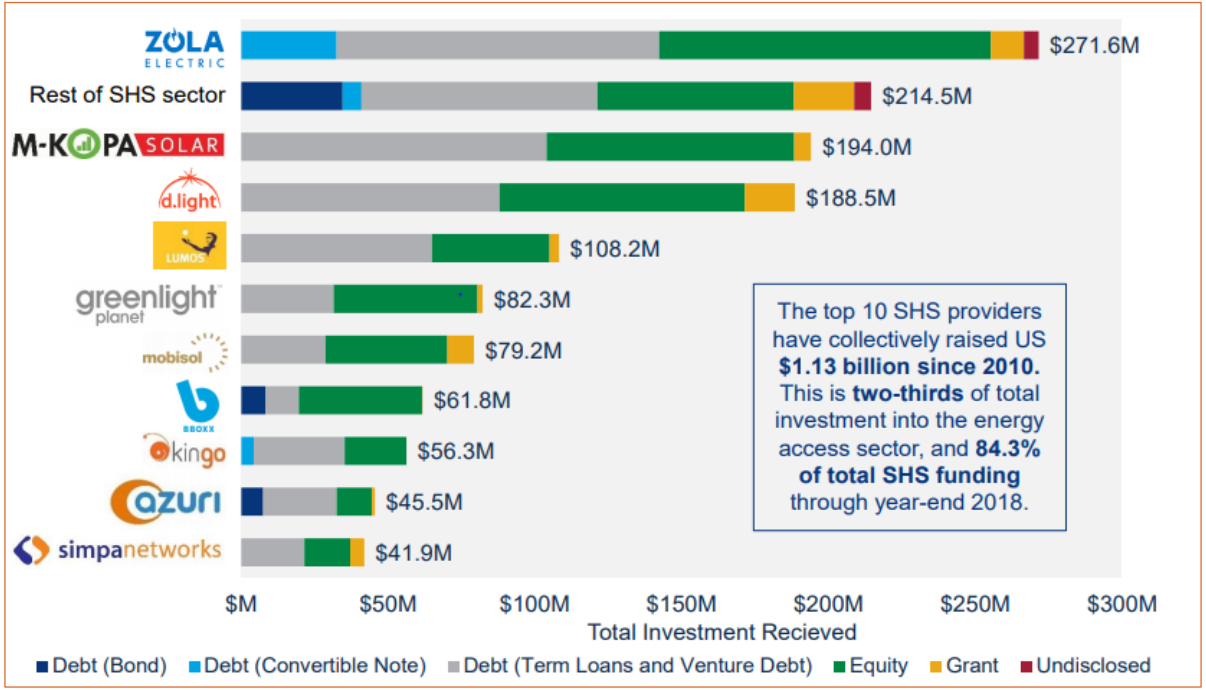
Development Partners: SE4All provides the strategy and framework for implementation of rural electrification policies and programmes (including off-grid sector) of the GoSL

Implementing agency	Programme	Intervention areas	Results	Donors/ Partners	Funding
BANQUE AFRICAINE DE DEVELOPPEMENT AFRICAN DEVELOPMENT BANK	Sustainable Energy for All (SE4all) (2016-19)	• Provide market Intelligence on OGS solutions • Provide business development support services • Support GoSL in designing policy frameworks for achieving energy targets • Develop RE financing mechanisms for HHs and developers • Assist GoSL on technical standardization and quality control of off-grid solutions	• Prepared the Action Agenda - framework for achieving SE4All objectives and monitoring process • Prepared the Investment prospectus which entails key activities, investment opportunities etc. to operationalize the Action Agenda	• AfDB • African Union Commission • NEPAD Planning and Coordination Agency • UNDP	**$318.8 Mn** (Donor income as on Dec 2018)

Sources: Sustainable Energy for All: Annual Report 2017 (Link)

Financiers (Enterprise): Globally, off-grid access companies raised $1.7 Bn since 2010, of which 80% ($1.1 Bn) went to SHS providers (90% of whom used PAYGO models) and 80% was deployed in Africa

TOP 10 SHS RECIPIENTS BY DISCLOSED FINANCING TYPE, CUMULATIVE TO YEAR-END 2018

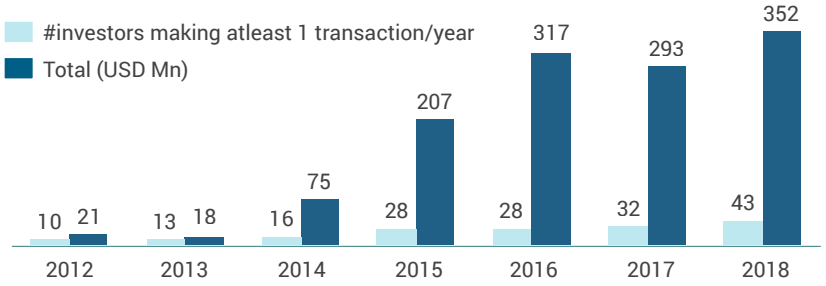


A few of these SHS market leaders such as Bboxx, D.Light and Azuri in partnership with local retailers have presence in Sierra Leone

- **Country:** Africa is an attractive market for investors absorbing 80% of total OGS funding globally. The customers of the top scaled companies in the OGS sector are concentrated in East Africa. Mobile money penetration and sensitization has helped attract 58% of disclosed capital to East Africa but market saturation is a risk
- **Product segment and financing models:** Companies deploying solar home systems (SHS), pay-as-you-go (PAYGO) business models have attracted 81% and 91% of investment, respectively
- **Asset Class:** Over 50% of total capital raised is debt, ~44% is equity and ~6% is grants
- **Source of financing:** 71% of energy access finance is sourced from private capital markets while 86% of investments are dollar-denominated, but local currency is on the rise

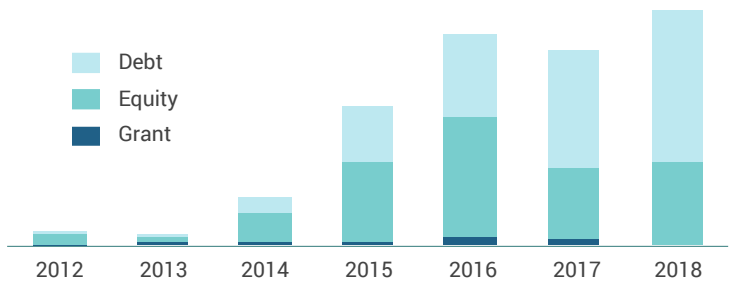
Source: Strategic Investments in Off-grid Energy Access (Link)

Financiers (Enterprise): In 2018, the OGS energy sector attracted a total investment of $352 Mn, 20% more than 2017, and highest since 2012. However, investment by local banks remained low



Funding overview

- **West Africa has high market potential as East African markets get saturated:** While East Africa received the largest amount of investment (44% of total) in 2018, it received the lowest absolute amounts of investment since 2012. Companies and investors are seeing growth potential in West Africa which attracted 19% of investments.
- **Highest debt funding of $225 Mn since 2012:** Specialised intermediary debt finance providers along with crowdfunding platforms and DFIs have contributed significant amounts of debt funding for inventory finance, working capital and financing of receivables.
- **Concentration of transactions dipped slightly from 2017 levels:** Top 10 fund recipients attracted 77% of the total funding compared to 85% in 2017 suggesting that more recipients now have access to capital.



Barriers to investment in OGS by local FIs in East Africa

Investments from local banks and MFIs is limited due to the following factors:

- **Mid-sized banks:** Inadequate data quality of OGS players, weak credit management systems and controls, default risk due to poor product quality and limited internal capacity of banks in OGS sector
- **Regional banks:** Limited data transparency, management related challenges, inability to meet disbursement criteria and mismatched interest of banks and other providers of guarantees/ credit lines
- **MFIs:** Competition from PAYGO businesses, high transaction cost of small sized loans for low cost SHS systems, low quality standards and limited internal capacity

Source: The Top 5 Investment Trends in the Off-Grid Solar Energy Sector, GOGLA, May 2019 (Link); Increasing Local Financial Institution Investment in the Off-grid Solar Sector, GOGLA, Sep 2018 (Link)

Financiers (Enterprise): Listed below are a few recent deals in OGS sector involving players who have operations in Sierra Leone

Investor	Company	Asset class	Amount (USD)	Date	Sources of fund deployment
Engie	**Bboxx**	Equity	20 Mn	2016	Scale up operations in Africa (including Sierra Leone)
Apis Partners	**Greenlight Planet**	Debt and equity	60 Mn	Dec 2017	Expand its solar energy product lines, distribution networks, and financing capabilities in Africa and Asia
Bamboo Capital Partners	**Bboxx**	Debt	50 Mn	2018	Enable distributed energy service companies (DESCO*) to benefit from BBOXX's data-driven smart technology to improve operational efficiency and enhance customer service; across Africa and Asia
Acumen, Gaia Impact Fund	**Easy Solar**	Equity	Undisclosed	Feb 2018	Provide off-grid solar solutions to HHs through its PAYGO model in Sierra Leone
Undisclosed	**Bboxx**	Equity	35 Mn	2019	Manufacture and distribute SHS
Marubeni Corporation	**Azuri**	Equity	26 Mn	Jun 2019	For its Africa clean energy initiative (Provide SHS on PAYGO to off-grid consumers in Sub-Saharan Africa Region)

Sources: Azuri Technologies $26 Mn investment to accelerate Africa's Clean Energy Drive, June 2019 (Link); Greenlight Planet Raises $60 Mn for Off-Grid Solar Financing Business, Dec 2017 (Link); Azuri set for growth with Innovative $20 Mn Debt Financing (Link); Acumen Makes First Investment in Sierra Leone, Feb 2018 (Link); Engie Leads $20 Mn Investment in Off-Grid Solar Startup Bboxx, Sep 2016 (Link)

Financiers: Funding opportunities in Sierra Leone

	Financiers	Overarching Goal	Funding Amount
ACUMEN	**Acumen Fund – Pioneer Energy Investment Initiative (PEII)**	• Invests in projects that aim to accelerate access to electricity (on-grid and off-grid) and provides financing to innovative energy companies for scaling up operations. Two key focus areas include:1) Energy generation (SHS in new markets solar & hybrid minigrids); and 2) Energy usage (innovations for energy use including promotion of renewable energy sources)	**$20 Mn for the West and East African region including Sierra Leone**
POWER AFRICA A U.S. GOVERNMENT-LED PARTNERSHIP	**Power Africa Off-Grid Project – West and Central Africa Market Entry and PAYGO integration**	• Aims to facilitate 6 Mn new electricity connections through SHS and microgrids by 2022. There are two opportunities companies can apply for 1) Establish a market entry in a new off-grid product or new geographical location and 2) PAYGO integration into off-grid solutions	**$100K and $250K across 12 African countries including Sierra Leone**
EDFI ElectriFI	**ElectriFi**	• Provides debt and equity financing for small scale private companies focusing on new or improved electricity connections as well as generation capacity from sustainable energy sources in emerging market	
ecf	**REACT Window of the Africa Enterprise Challenge Fund**	• Focusses on off-grid electrification solutions in Sierra Leone, Zambia, Zimbabwe and Malawi by providing financing through a household solar challenge fund window	**$10 Mn invested in 10 companies across 4 countries including Sierra Leone**

Source: REACT Household Solar Programme Portfolio (Link); Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link)

Associations: There are a few associations that represent private sector interests in Sierra Leone and work with the government to promote the development and adoption of RE technologies

Organization	Work In Sierra Leone

GOGLA (Global Off-Grid Lighting Association)	• GOGLA is the global association for the off-grid solar energy industry established in 2012, representing 150 members
	• It supports members with the following services:
	  ◦ Market intelligence, building an understanding of market opportunities and impact
	  ◦ Knowledge-sharing and networking through events and communications
	  ◦ Advocacy, for creating an enabling policy environment and investment climate
	  ◦ Creating and promoting industry standards and guidelines

ECOWAS Renewable Energy and Energy Efficiency Centre	• Enhances the regulatory, financial and technical capacity of the MoE to formulate RE and EE policy, action plans and SE4ALL action agenda
Renewable Energy Associate of Sierra Leone (REASL)	• It is a trade association focused on the development of an efficient renewables market in Sierra Leone, with an aim to accelerate the adoption of renewable energy for achieving universal access to energy and economic empowerment
Energy Revolution Task Force	• Builds demand for solar technologies amongst households and enterprises • Strengthens the supply of high-quality solar technologies into the country • Drives policy reform to accelerate access to solar solutions and to finance
Barefoot Women Solar Engineer Association of Sierra Leone (BWSEASL)	• Responsible for provision of technical training to women on installation and maintenance of solar PVs in rural communities. Key results from 2014-17 include the following: (1) Completed training of 50 solar women technicians; (2) Installed solar PV systems in 3,500 HH; and (3) Constructed and equipped 18 rural electronics workshops with solar PV materials

Source: Technical Assistance to the Renewable Energy Association of Sierra Leone (REASL) Report, July 2017 (Link)

Others: There are some research institutions, non-governmental organizations and universities active in Sierra Leone working to support and promote renewable energy technologies

Organization	Work In Sierra Leone
Government Technical Institute, Renewable Energy Centre (REC) Freetown	• Conducts research and development on solar, hydro and biogas technology • Implements renewable energy and energy efficiency projects in partnership with MoE and ECREE • Undertakes capacity building and training of key players in the RE sector
Universities of Sierra Leone – Fourah Bay College, Njala University	• Conducts research and development on new energy technologies (including off-grid solutions) • Undertakes capacity building and training programmes on these technologies
Environmental Foundation of Africa (EFA)	• EFA is an NGO that works closely with the MoE on renewable energy and rural electrification programmes • EFA is currently conducting a household energy usage survey as part of the EU funded project titled "Renewable Energy Empowerment in Rural Sierra Leone: A Vision to Electrify Rural Sierra Leone".
Energy for Opportunity (EFO)	• Implements projects on improving access to energy through on-grid and off-grid solutions and conducts energy assessments and surveys • Provides training on design and installation of solar projects • Installed solar PV systems in schools, health facilities and communities, including micro-grids of up-to 5.5kW, and also set up community charging points

Source: Ministry of Energy Progress Report 2014-2017 (Link)

ANNEXURE

Source: https://preprod.one.org/international/blog/for-two-kenyan-farmers-solar-lamps-benefit-every-part-of-life/

Private operators: The off-grid product enablers in Sierra Leone are commonly divided into developers, assemblers, wholesalers and last mile distribution agents (1/3)

Company Name	Products	Activities	Contact details
BBOX SL	• Solar Home Systems	• Franchise from BBOX , UK • Wholesale and retail distribution	Mansoor Hamayun, CEO m.hamayun@bboxx.co.uk
African Energy	• Solar water pumping • Solar lighting • Solar refrigeration	• Wholesale distribution with 10 depots in Africa • Trains and supports their dealers in Africa	h.idriss@ymail.com
Azuri Technologies	• SHS	• Manufacturer/Assembly • PAYGO • Local partner is Teleficient Communications	Simon Bransfield-Garth, CEO sbg@azuri-technologies.com
Aptech Africa Limited	• Solar water pumps • Solar water heating • Portable solar home kits • Solar Street Lights • Solar powered refrigerators	• Distribution • Soon to launch its own solar products under the brand name - Aptech Solar	asteway@aptechafrica.com/ filmon@aptechafrica.com

Private operators: The off-grid product enablers in Sierra Leone are commonly divided into developers, assemblers, wholesalers and last mile distribution agents (1/3)

Company Name	Products	Activities	Contact details
Easy Solar	• Pico solar lanterns • Solar Home Systems • Larger KW Systems	• Distribution • Offers affordable payment plans to communities underserved by the grid	Alexandre Touew alex@easysolar.sl
Total Awango	• Solar Lanterns	• Distribution	
Leks Environmental Ltd	• Minigrids • Solar Home Solutions	• Installation and distribution	info@leks-re.com
EnerGen WAO	• Solar Home Systems • Pico solar lights	• Distribution • Offers financing for products	Sam Zoker, Managing Director sam.zoker@wao-grid.com
Energy Efficient Solutions SL Ltd	• Off-grid solar systems	• Wholesale Distribution (d.light distributor) • Retail/Last mile distribution	
Ignite	• Solar home lighting • Cooking stoves • Irrigation products	• Distribution • Financing model - PAYGO	Peter Mathey Support@ignite.solar

Private operators: The off-grid product enablers in Sierra Leone are commonly divided into developers, assemblers, wholesalers and last mile distribution agents (3/3)

Company Name	Products	Activities	Contact details
FLS Power – Energy Service Unit of FLS Group	• Small scale power plants • Stand-alone solar home systems • Productive use – water pumping and irrigations	• Distribution • Installation and Maintenance	academy@flsgroup.sl
Helios Solutions	• Solar Home Systems • Solar Lanterns • Solar Lighting Kits	• Wholesale Distribution	mail@helios-solutions.net
Sunlabob	• Prepaid Meters • Solar PV Plants • Energy Efficiency • Solar Lantern Rental System	• Manufacture • Installation and Maintenance • Retail/Last mile distribution • Financing	contact.myanmar@sunlabob.com
D.light	• Solar Home Systems • Pico solar lights	• Manufacturing/Assembly	Ned Tozun, CEO and Founder ned@dlight.com
Barefoot Power	• SHS • Pico PV	• Design & distribution • Installation and maintenance • Lifecycle management • Financing	Rick Hooper, CEO rickh@barefootpower.com
Solar Era	• SHS (Fosera Products)	• Distribution • Financing model - PAYGO	Sophie Johnson, Director sophie@solarera.eu

About The Organizations

signify foundation

The Signify Foundation is dedicated to supporting underprivileged and underserved communities across the world by enabling access to light. When pursuing this mission, the Foundation expects to leverage Signify's expertise and knowledge to help develop and provide easily-accessible, sustainable lighting systems that have a meaningful impact on people's lives.

For more details please visit https://www.signify.com/global/our-company/signify-foundation

intellecap
AAVISHKAAR GROUP

Intellecap, a part of the Aavishkaar Group, is a pioneer in building enabling ecosystems and channelling capital to create and nurture a sustainable & equitable society. Founded in 2002, Intellecap works across critical sectors like clean energy, climate change, agriculture, livelihoods, financial services, gender and inclusion, healthcare, water and sanitation. The organization has delivered over 500 global engagements across 40+ countries and syndicated investments of over $500 Million USD in Capital. Intellecap through its presence in India and Africa, provides a broad range of consulting, research and investment banking services, to multilateral agencies, development finance institutions, social enterprises, corporations, investors, policy makers and donors.

For more details please visit www.intellecap.net