

Methodology of the Sales Data Collection

This document/webpage provides a comprehensive overview of the methodology applied by GOGLA and partners to collect, process and analyze the sales and impact data shared in the semi-annual Global Off-Grid Solar Market Reports.

Scope

Eligible Products

The off-grid solar sector has brought access to light and modern energy into homes for over a decade and became a key part of electrification strategies around the world. In addition to the essential lighting access, off-grid solar now powers a growing selection of appliances. **To accurately reflect this, the report presents sales data for two separate product segments** using the same methodology.

1. **Off-Grid Solar Lighting Products:** Systems that include a solar panel, a battery and at least one light point. Products which are sold as components such as individual panels, lights, batteries, or mobile phone chargers are not included.
2. **Off-Grid Solar Appliances:** A range of energy-efficient electrical appliances appropriate for both off-grid or weak-grid areas. These devices are typically DC-powered and usually more energy efficient than traditional counterparts. This report focuses on TVs, fans, refrigeration units, and solar water pumps. Scope is further narrowed to those appliances most suitable for purchase by individual customers on a household or micro-enterprise level. In the case of solar water pumps, this means they must be less than 3 kW and solar-powered, while for refrigeration, large commercial scale walk-in units are not considered. Besides these four appliance types, sales are also gathered for other solar-powered appliances which include hair cutters, irons, agro-processing machines, air conditioners, stereos and others. Radios are currently excluded.

Eligible Companies

This report solely includes data on products sold by affiliates. Affiliates are companies connected to the partner organizations involved in the reporting process. Companies include GOGLA members, companies selling products that meet VeraSol Quality Standards, and appliance companies that participated in the Global LEAP Awards or are engaging with the Low Energy Inclusive Appliances (LEIA) program.

Market Share Represented

For Off-Grid Solar Appliances, the proportion of the total market that is represented by our affiliates has not yet been estimated. This is partly due to insufficient data on the total size and number of players in this market. Continuous efforts are made to estimate

such coverage as well as ongoing efforts to engage a larger number of companies in upcoming rounds.

For Off-Grid Solar Lighting Products, based on the recently completed analysis for the ‘2020 Global Off-Grid Solar Market Trends Report’, it is **estimated that in 2018 sales of affiliates represent over 50% of the market for plug-and-play solar home systems. When including portable lanterns and multi-light systems the percentage of affiliates in 2018 decreases to 28%**, as non-affiliate products are particularly dominant in those two pico segments. It is estimated that 72% of the overall global market consists of sales from approximately 200 non-affiliate manufacturers. These market share percentages vary dramatically from country to country, as demonstrated in Table 6.

Table 22 – Market share estimates of affiliate and non-affiliates manufacturers for both Pico & SHS

Country	Affiliates	Non-Affiliates
Global	28%	72%
Rwanda	97%	3%
Zambia	68%	32%
Kenya	54%	46%
Cambodia	47%	53%
Nigeria	33%	67%
Ethiopia	29%	71%
India	25%	75%
Uganda	22%	78%
Niger	14%	86%
Togo	7%	93%
Myanmar	5%	95%

NOTE:

The global market share is calculated using a weighted average of non-affiliate market share for 12 countries.

Countries and Regions

The regional groupings in this report follow those outlined by the World Bank country and lending groups. Sub-regional groupings in sub-Saharan Africa follow the United Nations’ categorization of geographical sub-regions.

Data Collection

Partner Organizations

In line with previous reports, data collection and affiliate reporting were overseen by Berenschot, a Dutch management consultancy firm. Specialized industry knowledge and

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insight was provided by a research team, consisting of GOGLA, Lighting Global, Energy Saving Trust, and CLASP. The online questionnaire and results platform were programmed by Outfox, a Dutch web development company.

Data Collection Process

This data collection process takes place semi-annually, collecting sales information for the January-June period and the July - December months of a given year. Affiliates are requested to provide their product and country-level sales through an online questionnaire in a three-week period every January and July. Great effort is made to ensure maximum participation, with GOGLA offering one-on-one support to companies throughout the reporting process. The data is then monitored for accuracy, aggregated with strict confidentiality rules, and analyzed to compile the Global Off-Grid Solar Market Report.

Results Visualization

Each participating company receives access to a recently enhanced and improved online platform that provides each company with a dashboard to view and download the consolidated sales figures for all affiliates and their own performance since 2016. The interactive platform illustrates the market share in all geographies and product segments for which they have reported sales. We are confident that this information strengthens the companies' strategic decisions by providing an understanding of their relative position in markets and the competitive trends in the sector.

Accuracy

All data in this report is self-reported by the companies. Although it is cross-checked for consistency, **the companies are ultimately responsible for accurate reporting** of product specifications, pricing information, sales volumes, and locations of sales. **It is also important to note that companies may choose to report sales volumes but not pricing information used to estimate the market value of such products.**

Data Checks

The research team monitored the reported data for consistency and logic with respect to previous data records. Based on these checks, some small adjustments have been made concerning product performance specifications and the 'quality verified' status of products where necessary. Companies were contacted, prior to publication, in any instances where changes to their data were required.

Data Aggregation and Segmentation

Definition of Manufacturers / Distributors to Avoid Double-counting Sales

Companies are classified as distributors when they are selling other companies' branded products, or as manufacturers when they are selling their own-brand

products. Only data compiled from companies categorized as manufacturers is presented here to avoid any duplicate figures.

For Off-Grid Solar Lighting Products, companies are classified as either manufacturers or distributors (see Table 1). For Off-Grid Solar Appliances, it was necessary for any information provided to be classified by product. This means there may be companies classified as both manufacturers and distributors (see Table 1). This is a necessary allowance, because companies in this segment often sell both their own branded appliances while also distributing other companies' products.

Confidentiality and the Three-data Point Rule

Data on a specific region, country or product category is only included when at least three separate product manufacturers have reported sales for any single data point (**three-data point control**). Where there are fewer than three responses for a region, country or product category, no results are shown to protect the proprietary interests of the companies who have supplied data in support of this industry report. This is signaled by an empty bar next to the name of the region, country, or product category. To differentiate, if there are no companies reporting data, the graph shows a '0'.

Distinction between Cash and PAYGo Sales

Sales are split into two categories based on whether the products are sold to a customer:

- a. As a **cash sale**, in a single transaction to the customer. Note that this category also typically includes products purchased as a tender by governments and humanitarian agencies.
- b. On a **Pay-As-You-Go (PAYGo) basis**, where the customer pays for the product in instalments over time or pays for use of the product as a service. This includes products sold by distributed energy service companies (DESCOs), as well as those sold as lease-to-own.

Following the confidentiality rule, the split in sales volumes is shown for any single data point where at least three separate manufacturers have reported data for both cash and PAYGo products. Otherwise, when only one of the two payment categories passes this confidentiality rule, only the combined total is shown.

Computations

For both off-grid solar appliances and lighting products, the **sales volumes (in units)** are given by the sum of all the products sold by companies classified as manufacturers (products sold by distributors are not included to avoid double-counting as noted above).

Only for the off-grid solar lighting products, the report presents the **newly installed capacity (in MW)**; this represents the total peak power output of solar panels deployed during this reporting round. This metric provides further insight and enables calculation of the average size of systems sold in a region or country.

Another indicator presented in this report is the **market value of the products (in USD)**, currently reported only for off-grid solar lighting products. In future rounds of data collection, the research team will evaluate the best methodology to measure the market value of off-grid solar appliances.

Given the difference in the nature of cash and PAYGo segments, two different proxies are used to compute their market value; therefore, the total value of all the products sold in each round cannot be calculated by combining the two values reported.

a. **The value of cash products** is determined by multiplying the sales volume by a wholesale per unit price reported by the product manufacturer and a multiplying factor to estimate the costs incurred in getting the product to customers. This includes transport, duties, taxes, clearance costs, sales channel overhead, and markups. The **wholesale Free-on-board (FOB) price** is defined as the United States dollar (USD) per unit price for a 1,000-unit minimum order quantity, at the point of supply.

b. Using the FOB price as a proxy for the value of PAYGo products would not be accurate because the time frame of payment is projected to the future in line with the business model, allowing customers to pay for their products over several months or years. **The value of PAYGo products sold** is calculated here by multiplying the sales volumes by the **Estimated Total Cost of Ownership (TCO)** in USD reported by the PAYGo company and applying a standard estimated loss rate to account for cases where customers do not pay back for the product in full (e.g. products lost or destroyed or customer default). The TCO represents the average amount received from a customer repaying the product in full and on time, including deposit payment and all regular daily, weekly, or monthly payments, without applying a financial discount rate to this value.

Product Categorization

Off-Grid Solar Lighting Products

This segment consists of systems that include a solar panel, a battery and at least one light source. This means that products sold as components such as individual panels, lights, batteries or mobile phone chargers, are not included.

Data has been grouped into product categories to present sales in a segmented manner that provides the most value and information to the market. **The categories of all products with less than 11 Wp solar module capacity are determined by the services provided by the product in question.** An example of this would be the number of light points and the possibility of mobile charging. Each of these categories is represented by an indicative wattage range of PV modules that is typical for most products providing these services. **Panel wattage in watt-peak (Wp) is used to categorize off-grid solar lighting products with solar modules of 11 Wp and above.** The definitions of these categories are presented in Table 7.

The level of energy access these off-grid solar lighting products provide is shown using the multi-tier framework for measuring energy access. This framework was developed by the

World Bank’s Energy Sector Management Assistance Program (ESMAP) under the Sustainable Energy for All initiative.

Table 23 – Product Categories – Off-Grid Solar Lighting Products

Overall category	Solar module capacity, Watt Peak (Wp)	Categorization by services provided by product	Corresponding level of Multi-Tier Framework energy access enabled by use of product
Portable Lanterns 	0 – 1.499 Wp (indicative)	Single Light only	Enables partial Tier 1 Electricity Access to an individual person
	1.5 – 2.999 Wp (indicative)	Single Light & Mobile Charging	Enables full Tier 1 Electricity Access to at least one person and contributes to a full household
Multi-light Systems 	3 – 10.999 Wp (indicative)	Multiple Light & Mobile Charging	Enables full Tier 1 Electricity Access to at least one person up to a full household
Solar Home Systems 	11 – 20.999 Wp	SHS, Entry Level (3-4 lights, phone charging, powering radio, fan etc.)	Enables full Tier 1 Electricity Access to a household
	21 – 49.999 Wp	SHS, Basic capacity (as above plus power for TV, additional lights, appliances & extended capacity)	Enables full Tier 2 Electricity Access to a household when coupled with high-efficiency appliances
	50 – 99.999 Wp	SHS, Medium capacity (as above but with extended capacities)	Enables full Tier 2 Electricity Access to a household even using conventional appliances
	100 Wp +	SHS, Higher capacity (as above but with extended capacities)	

Off-Grid Solar Appliances

This report features a range of off-grid solar appliances; TVs, fans, refrigeration units and solar water pumps, sold to targeted customers living in off-grid or weak-grid areas. At this early stage of data collection for appliances, just a small subset of all available appliances is considered, as only solar-powered appliances are accounted for. Our scope is further narrowed to focus on appliances most suitable for purchase by individual customers on a household or micro-enterprise level. In the case of solar water pumps, they must be less than 3 kW and solar-powered, while for refrigeration, large commercial scale walk-in units are not considered.

Companies and sector experts assessed how best to categorize and present the findings in this report to offer the greatest possible clarity for each appliance type and their sub-categories. The Global LEAP Awards’ categorization for refrigerators and solar water pumps was adopted, as it was designed to recognize high standards of technical performance, energy efficiency, and innovation specifically for off-grid appropriate appliances. Using this product categorization means the data in this report is presented as clearly and consistently as possible. In future rounds, there may be a review of the solar



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water pumps categorization and the terminology of the refrigeration units' section, due to the continued growth and evolution in these appliance areas.

Two of four appliance types were segmented not only by their size (e.g. the diameter in inches for the fans), but also by the type of products (e.g. table fans vs. ceiling fans). **The categorization below in Table 8 was adopted as a way of future-proofing** and we accept that for now, most of these single categories will not be shown, as the three-data point rule hides all data points where less than three responses have been collected.

Currently, the other appliances are not being segmented, because, if separated, these volumes would not pass our confidentiality rules. Therefore, for the time being we are going to keep reporting them bundled together while monitoring progress of each appliance type.

Table 24 - Product Categories - Off-Grid Solar Appliances

Methodology of Impact Metrics Estimation

Impact for lighting products is calculated using the Standardised Impact Metrics for the Off-Grid Solar Energy Sector. These metrics were first launched in 2015 and revised in April 2020. Impact for appliances products is calculated using the Standardised Impact Metrics for High-Performing Appliances: Fans and TVs. These metrics were first launched in 2020, and currently cover fans and TVs only. Metrics for solar water pumps are currently being developed.

The metrics are a framework for the off-grid solar sector to collectively estimate social, economic and environmental impact in a consistent and comparable way. **They help build the evidence base for the many benefits that off-grid solar products and services unlock for people previously living in energy poverty.** These include unlocking financial savings, generating additional income, and using the light hours to work, study or spend time with family.

Methodology

Each impact metric in this report combines relevant company data, such as sales and product characteristics, with coefficients and default values. The default values of the coefficients have been developed by the GOGLA Impact Working Group, a body of industry practitioners and academic observers. They incorporate findings from publicly available research, data made available by participating companies, and by the application of informed assumptions and calculations. The metrics have been reviewed by external experts and are aligned with the IRIS impact metrics (lighting only).

The impact estimates for this reporting round were calculated by applying these standardized impact metrics to the off-grid solar lighting and appliance product sales reported by affiliates. The impact of sales between January and June 2021m, as well as all sales of off-grid solar lighting products reported by participating companies in previous reports since July 2010, and the sales of off-grid appliance products since July 2018, are included in these calculations.

Affiliates include GOGLA members, companies selling products that meet Lighting Global Quality Standards, and appliance companies that participated in the Global LEAP Awards or are engaging with the Low Energy Inclusive Appliances (LEIA) program. To avoid double-counting, the results are only drawn from data provided by manufacturers.

Limitations

This report estimates the impact made by participating companies. **Therefore, while the numbers shown represent the aggregate impact of key players in the off-grid solar sector, this report does not present an estimate of the overall global impact of off-grid solar lighting products sold outside the scope of this report for this reporting period.**

This report takes a conservative approach to data inclusion and may underestimate the total impact of participating companies. For example, to estimate when a product



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reaches its end of life, 1.5x its warranty period is used. This means that no impact is attributed to a product after that time. However, it is possible that a significant number of these products are continuing to benefit households beyond this estimated period. In addition, if companies have not provided all the product specifications needed for a particular impact metric, such as lumen output or runtime, the product is not included in the analysis for that metric.

Please note that the current approach is based on best available research information and data. All metrics used to create the impact numbers in this paper, as well as the default values and definitions including the methodology and sources, can be found in the GOGLA Standardised Impact Metrics for the Off-Grid Solar Energy Sector. **Note that all numbers calculated using the metrics should be expressed as estimates.**

List of Impact Metrics

Table 9 and 10 provide an overview of all the metrics for which the estimated results are presented in this report.

Table 25 - List of Impact Metrics for Lighting Products

1ai.	Number of people with Improved energy access, cumulatively Cumulative number of people who have ever lived in a household with improved energy access (as a result of access to off-grid solar)
1a.ii.	Number of people with Improved energy access, currently Number of people who currently live in a household with improved energy access (as a result of access to off-grid solar)
1bi.	Number of people with access to Tier 1 energy services Number of people who currently access Tier 1 energy services, based on the Sustainable Energy for All Global Tracking Framework (as a result of access to off-grid solar)
1b.ii.	Number of people with access to Tier 2 energy services Number of people who currently access Tier 2 energy services, based on the Sustainable Energy for All Global Tracking Framework (as a result of access to off-grid solar)
2a.	Number of people undertaking more economic activity Number of people who are currently undertaking more economic activity as a result of using off-grid solar
2b.	Number of people using products to support enterprise Number of customers using their system to support an enterprise or income generating activities e.g. charging phones for a fee or operating a bar, restaurant or shop/stall at night
2c.	Number of people that spend more time working Number of customers spending more time working as a result of using off-grid solar e.g. as a household member can shift tasks to the evening time as a result of increased light hours or as they spend less time travelling to buy fuel – unlocking time for work
3b.	Additional income generated, cumulatively Cumulative amount of additional income generated as a result of off-grid system ownership; generated over the expected lifetime of the solar products
4.	Kerosene lanterns replaced Number of kerosene lanterns no longer in use because users have replaced them with solar lighting
5.	CO2e emissions avoided Metric tons of CO ₂ and black carbon averted due to reduction in kerosene use (in CO ₂ e) over expected lifetime of all solar products
6ai.	Additional light hours used, by household Average additional hours of light usage, per household; over the expected lifetime of their solar product
6a.ii.	Additional light hours used, cumulatively Cumulative number of additional light hours used by all households; over the expected lifetime of their solar products
6b.	Change in quality of light, by household Change in lumens of light used, per household (on average)
7ai.	Savings on energy expenditure, by household (solar lanterns and multi-light systems <11Wp only) Amount of US\$ savings on energy-related expenditure, per household; over expected lifetime of solar product
7a.ii.	Savings on energy expenditure, cumulatively (solar lanterns and multi-light systems <11Wp only) Amount of US\$ savings on energy-related expenditure, in aggregate of all sales ever; over the expected lifetime of products

NOTE:

In this context, ‘improved’ is used to reflect lighting and energy provided by appropriate (less expensive, less harmful, better quality) technologies such as solar, instead of baseline technologies such as kerosene lanterns, battery lights, candles, or even poor-quality solar products etc.

Table 26 – List of Impact Metrics for Appliances Products



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1a.	Number of people benefitting from high-performing appliances, cumulatively
	Cumulative number of people who have ever lived in a house with a high-performing [insert type of] appliance
1b.	Number of people benefitting from high-performing appliances, currently
	Number of people who currently live in a house with a high-performing [insert type of] appliance
2a.	Number of people using high-performing appliances to support enterprise
	Number of people who are using their high-performing appliance to support an enterprise, or income generating activities (e.g. showing TV for a fee, or using their fan to improve the temperature within an office or shop to improve working conditions / attract customers)
2b.	Number of people generating additional income
	Number of people that are generating additional income as a result of using their highperforming appliance (for example to open a business or to charge a fee for use of the appliance)
3a.	Metric tons of CO2e emissions avoided from diesel displacement
	Metric tons of CO2e averted due to estimated reduction in diesel generator emissions of CO2, CH4 and N2O, per off-grid high-performing appliance; over expected lifetime of the product