GOGLA

The Voice of the Off-Grid Solar Energy Industry

Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data

January - June 2019, Public Report

LIGHTING GLOBAL | WORLD BANK GROUP | EFFICIENCY FOR ACCESS | Berenschot

Authors' Note

The off-grid solar industry is growing and adapting to meet increasingly diverse customer demand. The industry's efforts to meet such demand have seen a 40% worldwide increase, compared to the previous six months, in sales of solar home system (SHS) with wattage higher than 11 Wp, surpassing for the first time the sales of multi-light systems. This high demand for larger systems is a genuine reflection of their popularity with customers, who are taking advantage of the PAYGo model to finance their SHS and diversifying the way they use solar in their homes and businesses thanks to systems capable of powering off-grid solar appliances. In fact, we have witnessed a surge in the number of customers choosing the PAYGo model with PAYGo sales reaching record volumes of 1 million lighting units and 195,000 appliances.

GOGLA's recent 'Powering Opportunity' publication shows that SHS have significant impact for our customers. In terms of social impact, 94% of the owners say their quality of life has improved since their purchase, while 91% say they feel safer. Moreover, these systems are a tool for economic empowerment, unlocking extra working hours for customers who, in turn, are generating additional income for their families. Another GOGLA report, 'Off-grid Solar: A Growth Engine for Jobs' revealed that the companies selling off-grid solar products have a ripple effect in creating many jobs across the supply chain, causing even wider economic impact.

This report is the second of its kind to include data not only for lighting products, but also for off-grid solar powered appliances. We are pleased to report greater visibility of products across appliance markets in this second iteration, with increased participation from companies leading to more comprehensive data. Off-grid appliances bring life-changing developments to households, impacting virtually every one of the 17 United Nations' Sustainable Development Goals. The '2019 State of the Off-Grid Appliances Market' report published by the Efficiency for Access Coalition, highlights the potential for rapid growth of these products in the coming years.

While flagging affordability as a key constraint, especially for larger appliances such as refrigerators and solar water pumps; increased innovation is needed to move forward, with PAYGo playing a critical role to increase adoption. Similar findings are reported in a report published by the World Bank Group Lighting Global program, the 'Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa'. The report details how these appliances can provide livelihoods for a large number of off-grid households and micro-enterprises across the agricultural, industrial, commercial, and public sectors.

The portability, high-performance and fast deployment of off-grid solar lanterns makes them particularly high value products for displaced people in times of humanitarian need. In this round of reporting, we recorded large sales volumes in the Middle East and North Africa (MENA) region due to bulk purchases by donors for this purpose. This marketplace for displaced people increases the supply of life-improving services such as lighting and mobile charging. This is but a snapshot of the true life-changing potential of the off-grid solar industry in leaving nobody behind.

At GOGLA, we believe that off-grid solar is a power tool to drive social and economic change around the world. In the first half of 2019 we have seen off-grid solar products gain new ground and provide increased and improved access to energy for customers, enabling the use of energy-efficient appliances and unlocking new income generating activities or boosting productivity of existing ones. Across the lighting and appliances sections of this report we are seeing confident and steady growth of markets globally.

By monitoring the status of these markets, we can mobilise the sector to go further, faster. Together we can bring clean, modern energy and economic empowerment to millions of people around the globe.

Sincerely,

Koen Peters
Executive Director, GOGLA

Itotia Njagi
Lighting Global Program Manager, International Finance Corporation

Martin Hyland and Stephen Pantano
Efficiency for Access Coalition Secretariat (Energy Saving Trust and CLASP, respectively)

Content Team

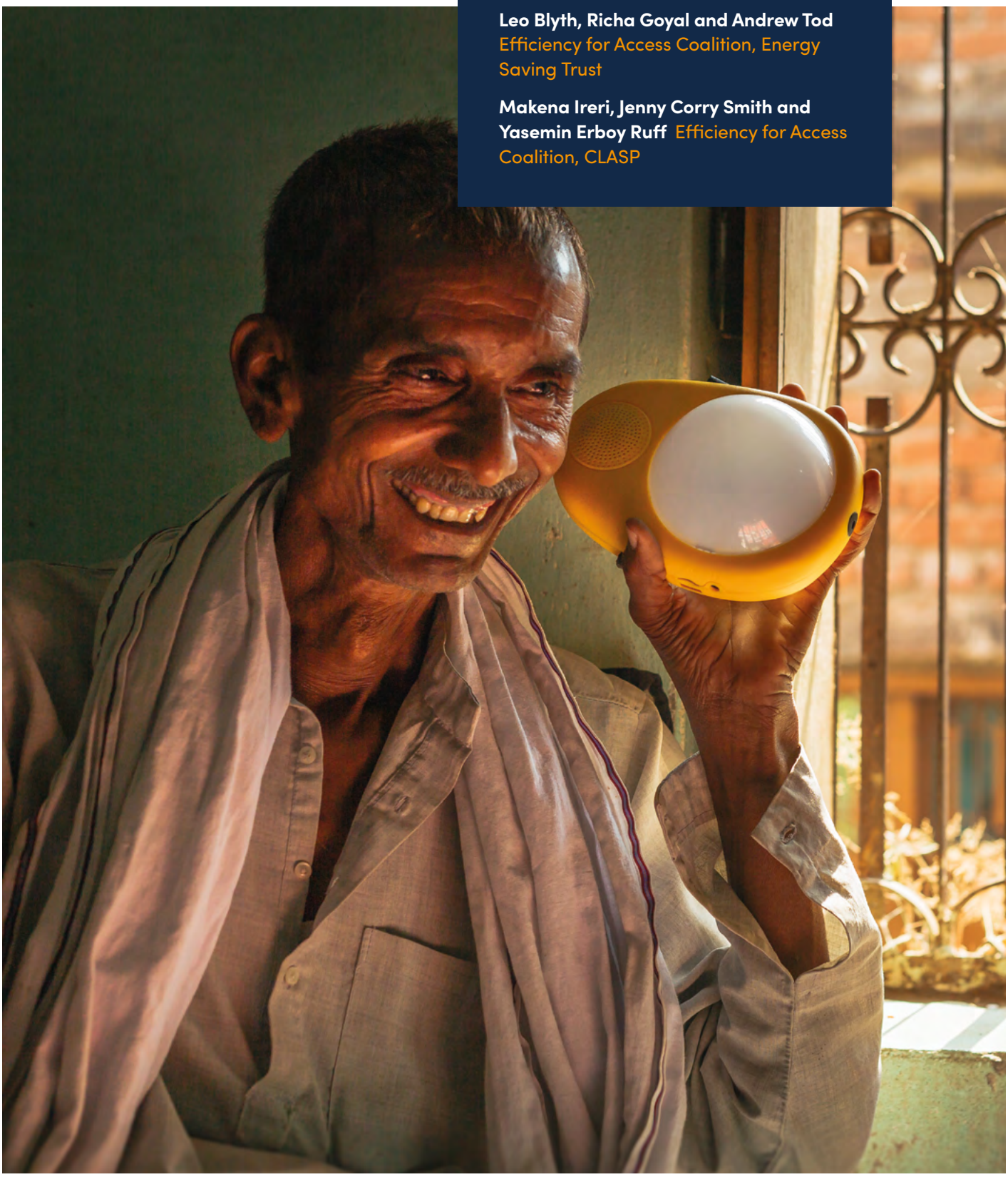
Silvia Francioso, Eveline Jansen and Rebecca Cooke GOGLA

Leo Blyth, Salman Zahir and Itotia Njagi Lighting Global, IFC

Marlon Drent, Ard Kot and Thomas van Biemen Berenschot

Leo Blyth, Richa Goyal and Andrew Tod Efficiency for Access Coalition, Energy Saving Trust

Makena Ireri, Jenny Corry Smith and Yasemin Erboy Ruff Efficiency for Access Coalition, CLASP



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About the Report

Authors

GOGLA – The Voice of the Off-Grid Solar Energy Industry

GOGLA is the global association for the off-grid solar energy industry. Established 2012, GOGLA represents over 150 members as the independent, not-for-profit voice of our industry association. Our purpose is to help our members build sustainable markets that deliver quality, affordable products and services to as many households, businesses and communities as possible across the developing world. The products and solutions that GOGLA members sell transform lives. They improve health and education, create jobs and income opportunities and help consumers save money. To find out more about GOGLA, our work and our members head to www.gogla.org.

Lighting Global

Lighting Global is the World Bank Group's initiative to rapidly increase access to off-grid solar energy for the 840 million living without grid electricity around the world. Lighting Global works with manufacturers, distributors, governments, entrepreneurs, and other development partners to build and grow the modern off-grid solar energy market for household, productive, and commercial use. Our country programs provide market intelligence, quality assurance, consumer education, business support services, as well as support for access to finance. Lighting Global's activities now include support for the productive use of solar. These include solar irrigation and milling, community services for schools and health centers, super-efficient household appliances, and innovative Pay-as-you-go (PAYGo) business models that enable rural, low income populations to access modern, clean energy solutions.

Lighting Global is managed by the International Finance Corporation (IFC) and the World Bank, with support from the Energy Sector Management Assistant Program (ESMAP). For more information, please visit www.lightingglobal.org.

Efficiency for Access Coalition

Efficiency for Access is a global coalition promoting energy efficiency as a potent catalyst in clean energy access efforts. Since its founding in 2015, Efficiency for Access has grown from a year-long call to action and collaborative effort by Global LEAP and Sustainable Energy for All to a coalition of 14 donor organizations. Coalition programmes aim to scale up markets and reduce prices for super-efficient, off- and weak-grid appropriate products, support technological innovation, and improve sector coordination. Current Efficiency for Access Coalition members lead 12 programmes and initiatives spanning three continents, 44 countries, and 22 key technologies.

The Efficiency for Access Coalition is coordinated jointly by CLASP, an international appliance energy efficiency and market development specialist not-for-profit organisation, and UK's Energy Saving Trust, which specialises in energy efficiency product verification, data and insight, advice, and research. For more information, please visit www.efficiencyforaccess.org.

The appliance section of this report has been funded by UK aid from the UK government. However, the views expressed do not necessarily reflect the UK government's official policies.

Berenschot

Berenschot is a leading Dutch management consultancy firm with an extensive track record in supporting industry associations on market data collection. Berenschot has been elected by clients as one of the best management consultancy firm of the Netherlands. Berenschot maintains a high standard of confidentiality, as stated in the Berenschot Terms and Conditions.

About the Report

Participating Companies

Table 1 - List of Participants reporting sales of Off-Grid Solar Lighting Products

Manufacturers		
Azuri Technologies	Mibawa Suppliers	SELCO
Barefoot Power Africa	Mobisol	Shanghai Easy Renewable Energy
BBOXX	Moon	Shenzhen LEMI Technology Development
Bengal Renewable Energy	Nadji-Bi	Shenzhen Power Solutions
BioLite	Namene Solar Light	Shenzhen Solar Run Energy
Bright Products AS	National Solar Power Authority (NASPA)	Sherpa Power Engineering
CLOUD ENERGY PHOTOELECTRIC	Niwa	Signify Innovations
Cygni Energy	NRS Relief FZE	Sinoware Technology
d.light	Offgrid Sun	Smarter Grid International
Devidayal Solar Solutions	OmniVoltaic Energy Solutions	Solaris Offgrid
DGridEnergy	Orb Energy	SolarNow
Fenix International	OvSolar	SolarWay
Fosera	Plug The Sun	SunCulture
Greenlight Planet	Poly Solar Technologies	Super Star Renewable Energy (SSG Solar)
INTELIZON ENERGY	Qingdao LEFF International Trading	The Solar Warehouse
Jua Energy	Qotto	Village Boom
Lagezel	Rahimafrooz Renewable Energy	Village Power
Little Sun	RAL Consumer Products	Zola Electric (former Off-Grid Electric)
Lumos Global	Renewit Solar	
M-KOPA	Schneider Electric	
Non-manufacturing distributors		
ARESS Sarl	Oolu Solar	Sunny Money (Solar Aid)
Azimuth	Pawame	Total
Baobab+	PEG Africa	UpOwa
Bright Life by Finca	Power Trust Uganda	Vitalite
EcoEnergy	Solar Sister	Zonful Energy
Lumi	SolarHome	Zuwa Energy
Mwezi Limited	SolarWorks!	
National Solar Power Authority (NASPA)	Sosai Renewables Energy	

Table 2 - List of Participants reporting sales of Off-Grid Solar Appliances

Manufacturers		
Azuri Technologies	GLOBAL ICE TEC	RAL Consumer Products
Barefoot Power Africa	GREE ELECTRIC APPLIANCES	Renewit Solar
BBOXX	INTELIZON ENERGY	Royal Fans
Bengal Renewable Energy	Jua Energy	SELCO
C4P	M-KOPA	Shenzhen Power Solutions
Camfridge	Moon	Smarter Grid International
CLOUD ENERGY PHOTOELECTRIC	Nadji-Bi	Steca
d.light	Niwa	SunCulture
Devidayal Solar Solutions	Offgrid Sun	Super Star Renewable Energy (SSG Solar)
DGridEnergy	OmniVoltaic Energy Solutions	Tamoor Fan Company
Dulas	OvSolar	The Solar Warehouse
Ennos	Plug The Sun	The Sure Chill Company
Fenix International	Poly Solar Technologies	Youmma Solar
Fosera	Qotto	Zola Electric (former Off-Grid Electric)
Futurepump	Rahimafrooz Renewable Energy	
Non-manufacturing distributors		
ARESS Sarl	Pawame	Sosai Renewables Energy
Azimuth	PEG Africa	Sunny Irrigation
Baobab+	Power Trust Uganda	Total
Cygni Energy	Shenzhen Solar Run Energy	Village Power
EcoEnergy	SolarHome	Vitalite
Mwezi Limited	Solaris Offgrid	Zonful Energy
Oolu Solar	SolarWorks!	Zuwa Energy
Both Manufacturers and Non-manufacturing distributors (depending on the appliance)		
Greenlight Planet	Sherpa Power Engineering	SUNami Solar Kenya
Mobisol	Simusolar	
Shenzhen LEMI Technology Development	SolarNow	

Methodology Sales Data Collection

Scope

Eligible Products

Our sector is continually growing and adapting to the demands of its customers. As a result, the way that solar power is being used in households is evolving. Off-grid solar products are increasingly used for more than lighting homes and powering mobile phones, offering access to a growing variety of off-grid solar appliances.

To accurately reflect this, this report presents sales data for two separate product segments

1. **Off-Grid Solar Lighting Products,** defined as systems that include a solar panel, a battery and at least one light point. This means that 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 that are appropriate for both off-grid or weak-grid areas[1] where low-capacity power systems are not suitable for use of conventional appliances. These devices are typically compatible with a DC-powered system and should be more energy efficient than traditional counterparts. In this report, our focus is on TVs, fans, refrigeration units and solar water pumps. At this early stage of data collection for appliances, only a small subset of all available appliances are considered, as only the solar-powered appliances are accounted for. Our scope is further narrowed to focus on 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.

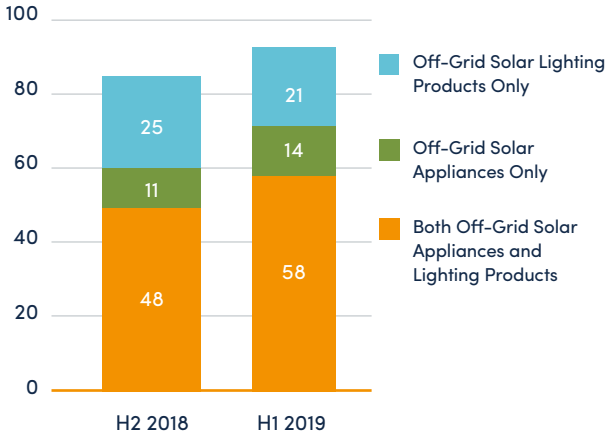
The methodology detailed in the following paragraphs was applied to sales data for both off-grid solar lighting products and appliances. FFor the time being, these two segments are collected separately, without identifying whether off-grid solar appliances are sold bundled with SHS, or as standalone to be powered by a solar panel. In future rounds, efforts will be made to link these segments to identify key connections and trends.

Eligible Companies

This report solely includes data on products sold by affiliates. Affiliates are companies that are connected to any of the partner organisations involved in the reporting process. This matrix of companies includes 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) programme.

Out of a pool of 206 eligible companies, 93 participated in this round covering the period January-June 2019. Out of these 93 companies, 58 sell both off-grid solar lighting products and appliances. This showcases the need for a single, streamlined data collection process to avoid all these companies reporting twice and separately on their lighting products and appliances sales.

Figure 1 - Breakdown Company per section



1 "Off-grid" refers to populations that live beyond the reach of the national grid; "weak-grid" refers to populations that have unreliable grid connectivity and suffer frequent and sometimes lengthy outages.

Methodology Sales Data Collection

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 the lack of data on the total size and number of players in this market. Continuous efforts will be made to estimate such coverage as well as efforts to engage a larger amount of companies in following rounds.

For Off-Grid Solar Lighting Products, based on a previous analysis by Dalberg Advisors for the 'Off-Grid Solar Market Trends Report 2018', we estimate that the **sales data reported here represents around 30% of all solar lanterns and multi-light systems sold globally and 60-80% of off-grid SHS with panel larger than 11 Wp**. This proportion varies dramatically from country to country; the market share estimates for non-affiliate devices globally and across nine key national markets are shown in the table below. **New and updated estimates of the market share are expected in the 'Off-Grid Solar Market Trends Report 2020, expected to be released in early 2020.**

Table 3 - Market share estimates of affiliate off-grid solar lighting products against the whole market[2]

	Share represented by affiliates selling off grid solar lighting products against the whole market	
Country	**Solar Lanterns and Multi-light Systems** (<11 Wp)	**Solar Home Systems** (>11Wp)
Global	**29%[3]**	**60-80%**
Kenya	65%	61%
Tanzania	28%	43%
Ethiopia	43%	79%
Uganda	45%	60%
Nigeria	30%	70%
India	25%	29%
Myanmar	10%	25%
Ghana	30%	70%
Bangladesh	5%	75%

Countries and Regions

The regional groupings in this report follow those outlined by the World Bank country and lending groups[4]. For sub-regional groupings in Sub-Saharan Africa, the United Nations categorisation of geographical sub-regions is used[5].

Sales data is represented in this report for all countries in which at least three companies reported sales. For Off-Grid Solar Lighting Products, this amounted to 45 countries. For Off-Grid Solar Appliances, 25 country market sales are reported here for all appliances combined, and no country breakdown is offered for less established technologies such as refrigeration units and solar water pumps, due to insufficient data.

Data Collection

Partner Organizations

In line with previous reports, data collection and affiliate reporting was overseen by Berenschot, a Dutch management consultancy firm. Specialised industry knowledge and insight was provided by a research team comprised of GOGLA, Lighting Global, the 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 is run semi-annually, collecting sales information for either January-June or July-December of a given year. Affiliates are requested to provide their product- and country-level sales through an online questionnaire in a three-week time window every January and July. Great effort is placed to ensure maximum participation, with GOGLA offering one-on-one support to companies throughout the reporting process. The data is then checked for accuracy, aggregated with strict confidentiality rules and analyzed to compile the Global Off-Grid Solar Market Report. Each participating company receives access to a dashboard and a personalized Individual Report providing them with their own market share in each geography and product segment for which they have reported sales.

2 Adapted from: Lighting Global/Dalberg, Off-Grid Solar Market Trends Report 2018. Full report here: https://www.gogla.org/sites/default/files/resource_docs/2018_mtr_full_report_low-res_2018.01.15_final.pdf
3 Based on weighted average of final non-affiliate estimates from 16 countries.
4 For more information, please visit: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
5 For more information, please visit: http://unstats.un.org/unsd/methods/m49/m49regin.htm#africa.

Methodology Sales Data Collection

Accuracy

All data is self-reported by t**he 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 checked the 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 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 either distributors of other companies' branded products, or as manufacturers if they are selling their own-brand products. Only data compiled from companies categorised 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 2). 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 it has satisfied the three-data point rule. This means that at least three separate product manufacturers need to have reported sales for any single data point to be shown in the figures throughout the report. When 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 at all, 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 either:

a. As **a cash sale**, in a single transaction to the customer. Note that this category also typically includes products purchased via tender by governments and humanitarian agencies.
b. On a **Pay-as-you-go (PAYGo)** basis, when 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) and microfinance institutions (MFIs), 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 (no product sales by distributors are included to avoid double-counting as noted above). These volumes are further segmented in region/countries, in cash/PAYGo, and in product categories shown in the following section.

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.

Methodology Sales Data Collection

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 Categorisation

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 which are 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 module that is typical for most products providing these services. **Panel wattage in watt-peak (Wp) is used to categorise off-grid solar lighting products with solar modules of 11 Wp and above.** The definitions of these categories are presented in Table 4.

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)[6] under the Sustainable Energy for All initiative.

6 Energy Sector Management Assistance program of the World Bank group (ESMAP), Beyond Connections: Energy Access Redefined, 2015. Full report here https://www.esmap.org/node/55526

Methodology Sales Data Collection

Table 4 - 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 segment of the report features a range of off-grid solar appliances (TVs, fans, refrigeration units and water pumps) sold targeting customers living in off- or weak-grid areas.

At this early stage of data collection for appliances, only a small subset of all available appliances are considered, as only the solar-powered appliances are accounted for. Our scope is further narrowed to focus on 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. Companies and sector experts assessed how best to categorise 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' categorisation for refrigerators and solar water pumps was adopted, as it was designed to recognise high standards of technical performance, energy efficiency, and innovation specifically for off-grid appropriate appliances. Using this product categorisation means the data in this report is presented as clearly and consistently as possible across the sector. In future rounds, we may review the solar water pumps categorisation and the terminology of the refrigeration units' section, due to the continued growth and evolution in these appliance areas.

Two out of four appliance types were segmented not only by their size (e.g. the diameter in inches for the fans), but also by the typology of products (e.g. table fans vs. ceiling fans). **The categorisation below 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 the data points where less than three responses have been collected.

Methodology Sales Data Collection

Table 5 - Product Categories – Off-Grid Solar Appliances

Appliance Type	Categorization (in orange) and definition (in blue bold)
TVs	**Screen Size (diagonal,inches)**
Small	12–17"
Medium	18–23"
Large	24–29"
Extra large	30+"
Fans	**Diameter (inches)**
Table Fan	**A smaller-diameter propeller-bladed fan having two or more blades and intended for use with free inlet and outlet of air. It may be a table fan or bracket-mounted fan for wall or ceiling mounting.**
Small	<12"
Large	12+"
Pedestal Fan	**A propeller-bladed fan having two or more blades mounted on a pedestal of fixed or variable height and intended for use with free inlet and outlet of air.**
Ceiling Fan	**A propeller-bladed fan having two or more blades and provided with a device for suspension from the ceiling of a room so that the blades rotate in a horizontal plane.**
Small	<48"
Large	48+"
Refrigeration Units	**Size (liters)**
Refrigerator	**One or more fresh food compartments for the storage and preservation of unfrozen food and beverages.**
Small	5–50 L
Medium	51–100 L
Large	101+ L
Refrigerator-Freezer Combination Unit	**At least one fresh food compartment and at least one freezer compartment**
Small	5–100 L
Medium	101–150 L
Large	151–200+ L
Extra Large	201+ L
Multi-temperature Refrigerator	**One or more compartments that can be operated either as a refrigerator or freezer by adjusting the thermostat control.**
Small	5–50 L
Medium	51–100 L
Large	101+ L
Solar Water Pumps	**No breakdown was possible due to limited variety of data reported**

Off-Grid Solar Lighting Products

Behind the numbers

The Global Off-Grid Solar Market data collection for solar lanterns, multi-light systems and solar home systems (SHS) has undergone profound changes since it was started in 2010 by Lighting Global, who deserves to be recognised for initiating this crucial data gathering exercise. GOGLA became part of this process in 2014 and, since 2016, has been the lead coordinator on the reporting process.

The number of countries included in the data gathering and analysis has grown rapidly. Initially, only countries acknowledged under the Lighting Global programme had data reported, but since 2014, all countries are included, with 45 countries showing more than three manufacturers reporting. Similarly, the number of companies involved has dramatically increased from a handful of active players, to a record-breaking 93 companies sharing their data in this latest round. The report has also evolved from solely reporting sales units to include an estimate of the impact generated by the sales using the formulation of the GOGLA 'Standardised Impact Metrics for the Off-Grid Solar Energy Sector'.

Another important step in the evolution of this data collection was undertaken in 2018 with the revision of the data collection to separate PAYGo and cash sales. This proved necessary to reflect the growth and development of the off-grid solar lighting sector, since PAYGo has become a significant part of it in recent years. By analysing the cash sales and PAYGo data individually, we are able to estimate the market value of PAYGo off-grid solar lighting products deployed, which was not possible in previous reporting.

This report is a work in progress and offers a snapshot of our diverse and eclectic industry, working across many countries. We welcome any suggestions or recommendations to improve it, in order to better support our industry to contribute to the achievement of Sustainable Development Goal 7: affordable, reliable, sustainable and modern energy access for all.

Off-Grid Solar Lighting Highlights

Key Figures

Sales refer to all off-grid solar lighting product sales reported by participating affiliates[7] in the period between January 1st-June 30th, 2019.

Global Sales Highlights

4.11 million
off-grid solar lighting products sold globally

3.10 million
have been sold as cash products
for a value of $ 85.34 million

1.00 million
sold via Pay-As-You-Go (PAYGo)
for a value of $ 216.85 million

2.83 million
solar lanterns sold globally

600,000
multi-light systems sold globally

680,000
SHS sold globally

40.88 MW
newly installed capacity globally through the off-grid solar lighting products

Regional Sales Highlights

1.74 million
East African sales volumes of off-grid solar lighting products

1.16 million
South Asian sales volumes of off-grid solar lighting products

360,000
West African sales volumes of off-grid solar lighting products

150,000
East Asian and Pacific sales volumes of off-grid solar lighting products

120,000
Central African sales volumes of off-grid solar lighting products

410,000
Middle Eastern and North African sales volume of off-grid solar lighting products

7 Affiliates include GOGLA members, companies selling Lighting Global quality-verified products, and appliance companies that participated in the Global LEAP Energy Efficient Appliance Awards or are engaging with the Low Energy Inclusive Appliances (LEIA) programme.

Off-Grid Solar Lighting Highlights

Impact estimates relate to all off-grid solar lighting product sales reported to date by participating affiliates (as of June 2019).

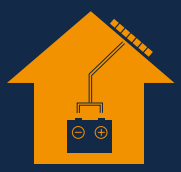
279.4 million
people who have ever lived in a household with improved energy access[8] as a direct result of off-grid solar lighting products sold since July 2010

109.3 million
people with improved energy access currently, applies exclusively to those using off-grid solar lighting products within their estimated lifetime

65.5 million
people currently accessing Tier 1 energy services, based on the Sustainable Energy for All Global Tracking Framework, considering only the off-grid solar lighting products still within their estimated lifetime

6.6 million
people currently accessing Tier 2 energy services based on the Sustainable Energy for All Global Tracking Framework, considering only the off-grid solar lighting products still within their estimated lifetime

2.7 million
people using their SHS to support an enterprise (e.g. charging phones for a fee or operating a bar, restaurant or shop/stall at night), considering only the off-grid solar lighting products still within their estimated lifetime



$4.9 billion
additional income generated as a result of off-grid system ownership, over the expected lifetime of all off-grid solar lighting products sold since July 2010

$10.5 billion
savings on energy expenditure, over the expected lifetimes of all solar lanterns or multi-light systems sold since July 2010

66.6 million
metric tons of CO_2e emissions avoided, over the estimated lifetime of all off-grid solar lighting products sold since July 2010

NOTE:
The estimated lifetime of products is calculated using the GOGLA 'Standardised Impact Metrics for the Off-Grid Solar Energy Sector'. and is based on an average of one and a half times the manufacturer's warranty. For further details on the impact created, please refer to the "Impact Metrics" section on page 82.

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

Global Market Insights

We continue to see strong growth in the sales of off-grid solar lighting products. Global sales have reached 4.11 million, with a standalone capacity of 40.88 MW worldwide.

The vast majority of these are cash sales, accounting for 3.10 million 76% of global sales) with an overall value of $85.34 million. These typically smaller products generate steady cash revenues, as they are predominantly sold in full in a single cash transaction.

As Figure 5 shows, **PAYGo has reached its greatest volumes ever recorded in this reporting round, at 1 million units** with a value of $216.85 million, accounting for 24% of global sales volumes. This is PAYGo's highest market value, driven by sales of larger products. However, the value for the reported PAYGo products is not yet realised in full as our calculation is the market value, based on the expected amount to be received once the product has been paid in full by the customer. There are of course a variety of factors which can lead to this full value not always being realised and this variability around repayment in full is embedded in the pricing of products as part of the PAYGo sales model.

Globally, both cash and PAYGo sales volumes increased by 5% compared to the second half of 2018, although we see the two segments as having different trajectories in different geographies because they are driven by different categories of products. Therefore, the two are not expected to be as aligned in future reporting rounds. Moreover, there has been a significant increase in Megawatts of 26% compared to the last reporting round, with the boost in sales largely driven by the overall increase in sales of solar home systems (SHS).

Portable Lanterns

The first half of 2019 saw 2.83 million portable lanterns sold globally, accounting for 69% of total sales worldwide. The majority of these were sold on cash basis, though an increasing amount of solar lanterns with mobile charging were sold through PAYGo channels, more than doubling from 7% in the second half of 2018 to 15% in the first half of 2019.

Larger and brighter solar lanterns capable of charging mobile phones (with an indicative wattage of 1.5-2.999 Wp) remain the bestseller in terms of volume across all product categories. These solar lanterns make up around 37% of all product categories global sales volumes for this reporting period, at 1.5 million units. With a dollar value of $45.8 million, this category represents 54% of the global cash sales value and 11% of the newly installed capacity at around 4.5MW.

Globally, the second best-performing category for sales volumes is the solar lantern without mobile charging (with an indicative wattage of 0-1.4999 Wp). 1.3 million of these solar lanterns were sold worldwide, representing around 30% of the total sales volumes. The value of these products, however, accounts for only 11% of the total at $9.5 million and only 1% of the total newly installed capacity at 0.49 MW. This is due to the lower retail price and the smaller panel sizes of the products in this category.

Between the two portable lantern categories, different trends appear. There is a 20% increase in sales for lanterns without mobile charging. This is mostly due to bulk purchases happening in Sub-Saharan Africa, especially in West and Central Africa. The reasons are varied, but historically the size of these orders is often significant and highly variable from one reporting round to the next. This can cause significant fluctuations in overall sales volumes.

Conversely, there is a 10% sales decrease for lanterns with mobile charging. This could indicate a possible seasonal pattern when looking at Figure 3, where usually the first half of the year sees less strong sales than the second half. However, this decrease could have been much more substantial had there not been large bulk purchases in the Middle East and North Africa (MENA) region for humanitarian purposes.

Global Market Insights

Multi-light Systems

A total of 600,000 multi-light system units were sold in the first half of 2019, accounting for 15% of the global total and installing a total capacity of 3.92 MW. 57% were sold through PAYGo channels. Historically, the majority of these systems were sold on PAYGo, however the increase of cash sales decreased PAYGo's share to 57% in the first half of 2019 from the 70% recorded in the second half of 2018. The cash value of total sales was $10.5 million, and the PAYGo sales value standing at $33.3 million.

Multi-light systems observe stable sales, confirming the importance of this product category which offers Tier 1 level of modern energy access to a full household. If the outlier in the reporting round of July-December 2017 - caused by a single bulk purchase - is removed, the segment then proves to be stable with sales of around 600,000 units per reporting round.

In general, it is difficult to trace a trajectory for multi-light systems. Trends in this category have to be observed in close connection with sales of SHS, due to the similarities in the level of service they provide and the increased cost competitiveness of SHS products in the 11-20 and 21-49 Wp range. It may be that those segments will see strong competition in the coming rounds.

Solar Home Systems (SHS)

SHS - consisting of larger, higher-cost products - **recorded the highest percentage growth of all segments in this reporting round, with a 40% increase compared to the second half of 2018**, and exceeded the sales volumes of multi-light systems for the first time. This continues the great growth reported in the last round.

A total of 680,000 units were sold across the 4 categories, installing 31.88 MW and accounting for a PAYGo value of $177.5 million and a cash value of $19.5 million. This segment saw a significant increase in the percentage of global sales, now representing 17% of the global total. This increase is in part due to the increasing number of customers using SHS to power appliances.

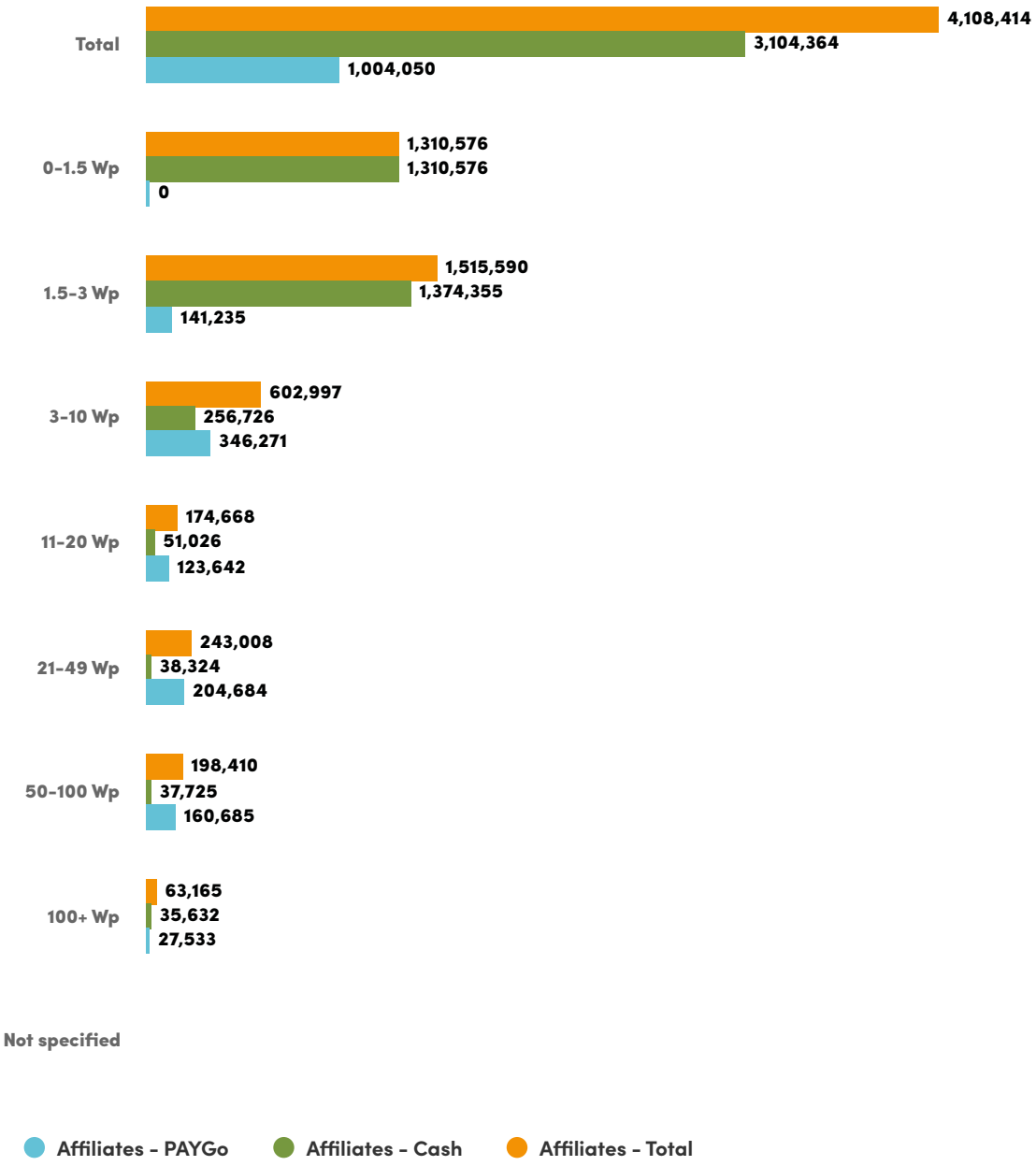
For solar home systems, PAYGo is the most popular method of payment, due to the larger product and higher pricing. PAYGo represents 76% of all SHS sales. Only in the 100+Wp segment, there is a large majority of systems purchased via cash sales. It may be that these products are sold as back-up systems for relatively wealthy customers, who may not require the same level of financing as the average off-grid household. It is also possible that they are included in government financing schemes, especially in the East Asia and Pacific region.

The top selling segment of this category is not yet firmly in place, and shifts in each reporting round. For the first half of 2019, the top seller is the 21-49Wp category with over 240,000 units sold, seeing a 48% increase compared to the last reporting round. Given that this is the first segment capable of powering TVs, the increase in sales is strongly connected with the customer demand for this entertainment appliance. The second best performing category is the 50-100Wp one, which almost reaches 200,000 units for the first time ever and records the sharpest percentage growth: a 147% increase compared to the previous round of reporting. The 11-20 Wp category products currently sits in third place, with sales similar to the last reporting round of 170,000 units. This is a good sign given that the volumes reported in the second half of 2018 were record-breaking for the category. Sales in the 100+ Wp category are also stable, with volumes clocking in at around 60,000 units.

As mentioned in the previous paragraph, it is possible that we will continue seeing increased sales in SHS segments, as customers opt for these systems to provide lighting and to power appliances such as fans and TVs.

Global Market Insights

Figure 2 - Volume of Products Sold Globally by Product Category

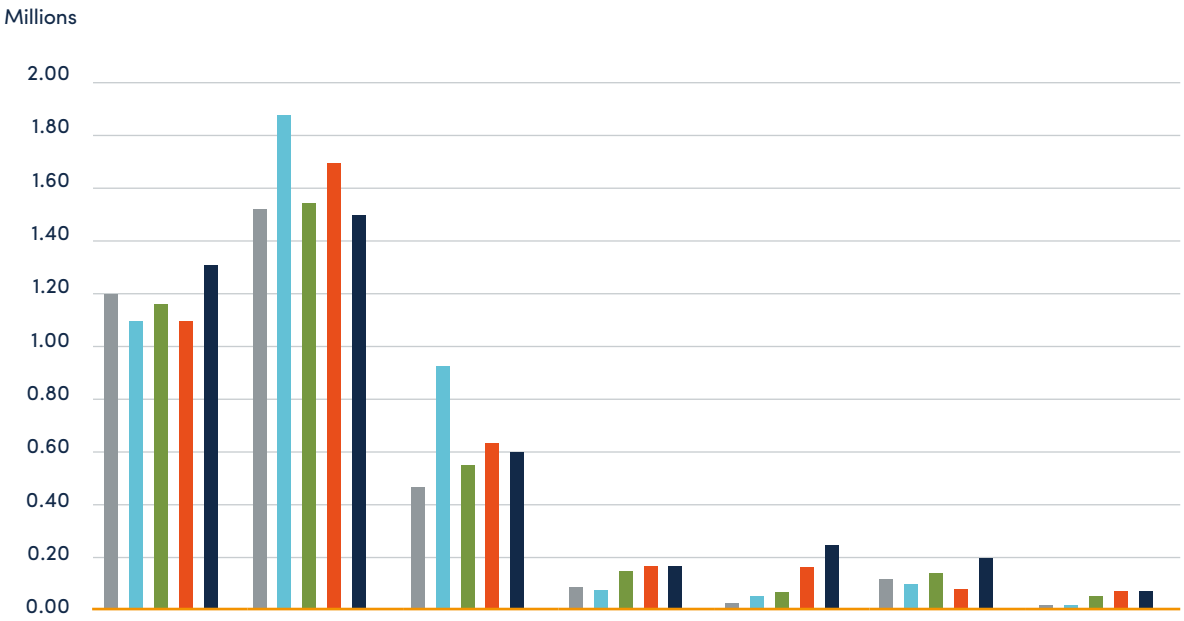


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The split Cash/PAYGo is shown only if both segments passed the three-data point control

Global Market Insights

Figure 3 - Semi-annual Evaluation: Global Sales Volumes



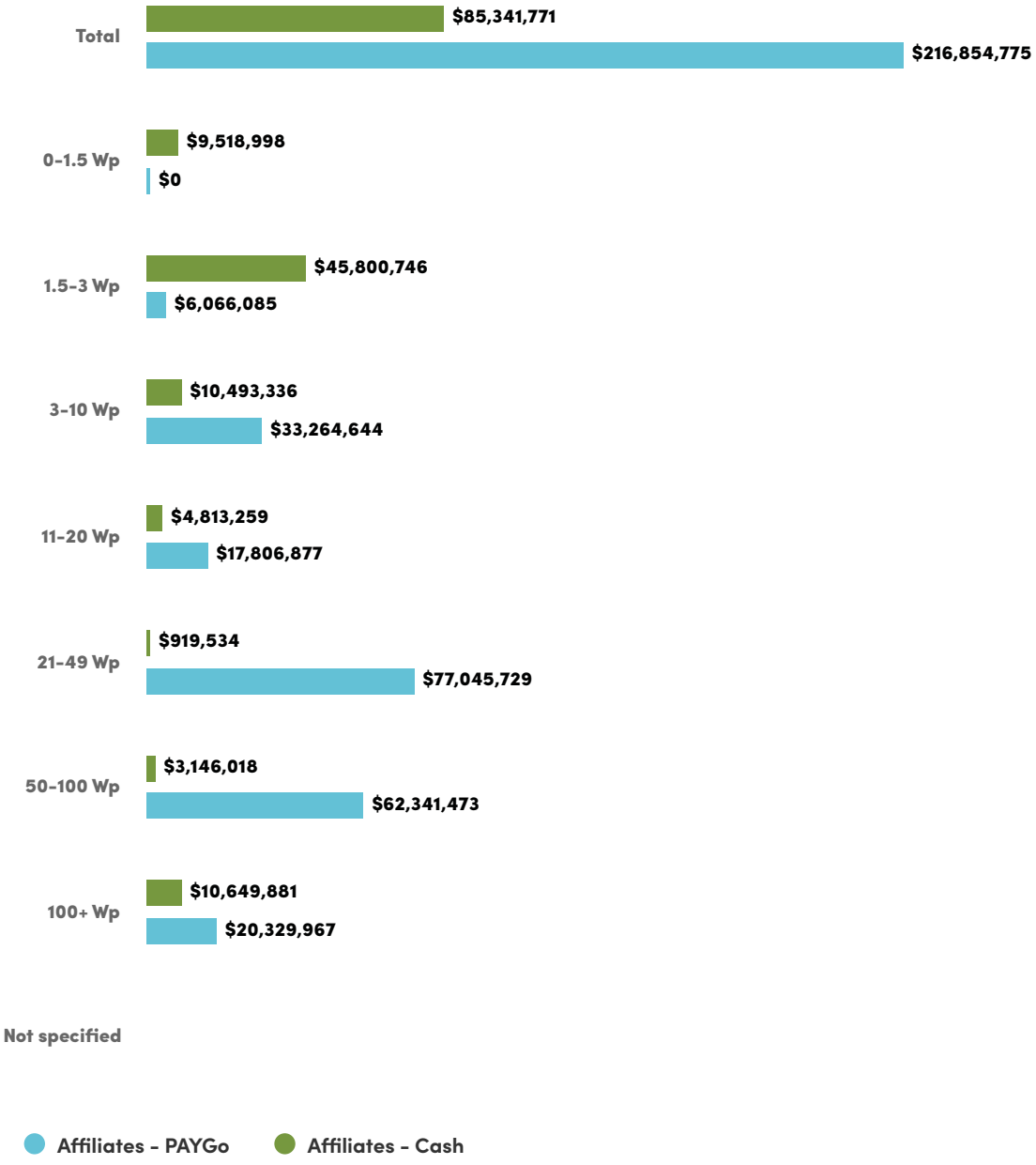
	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100+Wp
Jan-June 2017	1,209,586	1,526,460	469,072	81,918	20,905	124,065	14,538
Jul-Dec 2017	1,103,796	1,862,084	922,196	65,871	70,554	104,655	14,210
Jan-June 2018	1,163,522	1,537,513	560,984	130,502	80,947	140,184	43,850
Jul-Dec 2018	1,104,366	1,681,418	630,784	175,044	164,592	80,187	61,577
Jan-June 2019	1,310,576	1,515,590	602,997	174,668	243,008	198,410	63,165

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.

Global Market Insights

Figure 4 - Global Value of Products Sold by Product Category

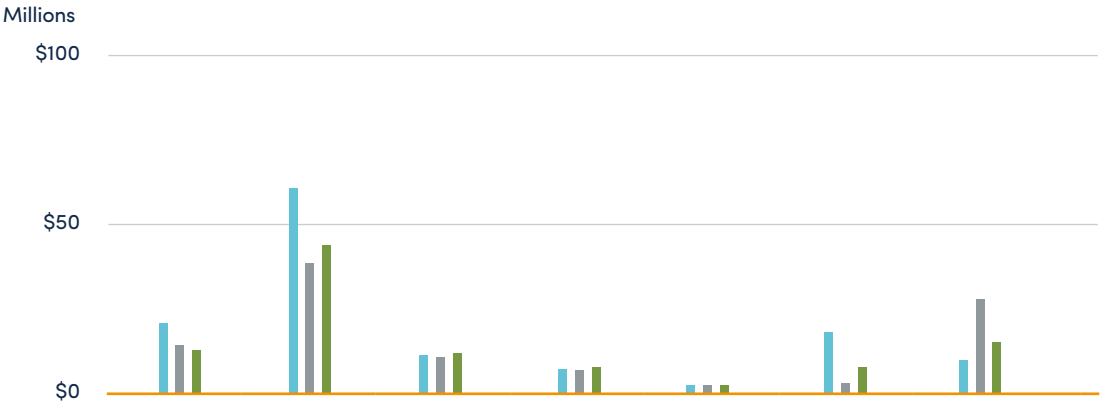


NOTE:

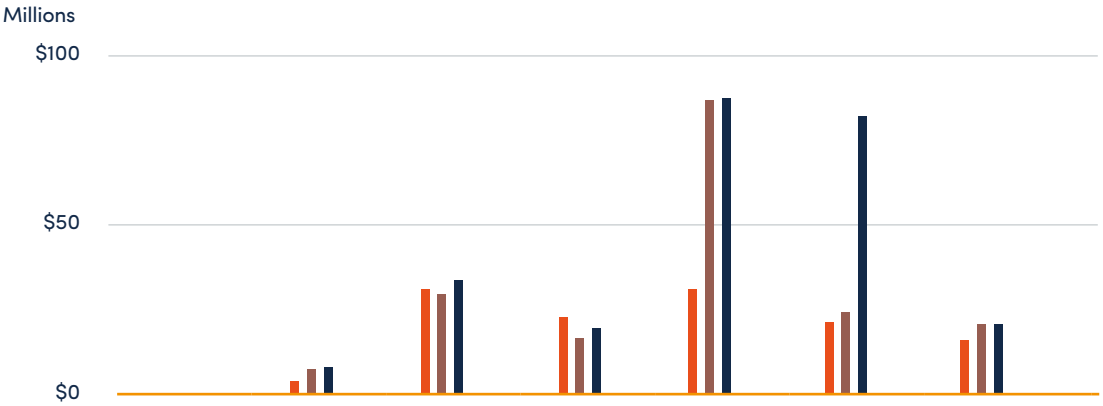
1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Global Market Insights

Figure 5 - Semi-annual Evolution: Global Cash and PAYGo Market Value



	0-1,5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100+Wp
Cash Value Jan-June 2018	$ 17.534.996	$ 55.813.886	$ 9.795.024	$ 4.693.434	$ 1.090.133	$ 12.046.317	$ 6.532.109
Cash Value Jul-Dec 2018	$ 12.117.837	$ 40.732.450	$ 8.701.133	$ 3.671.152	$ 2.647.984	$ 1.998.962	$ 29.531.896
Cash Value Jan-June 2019	$ 9.518.998	$ 45.800.746	$ 10.493.336	$ 4.813.259	$ 919.534	$ 3.146.018	$ 10.649.881



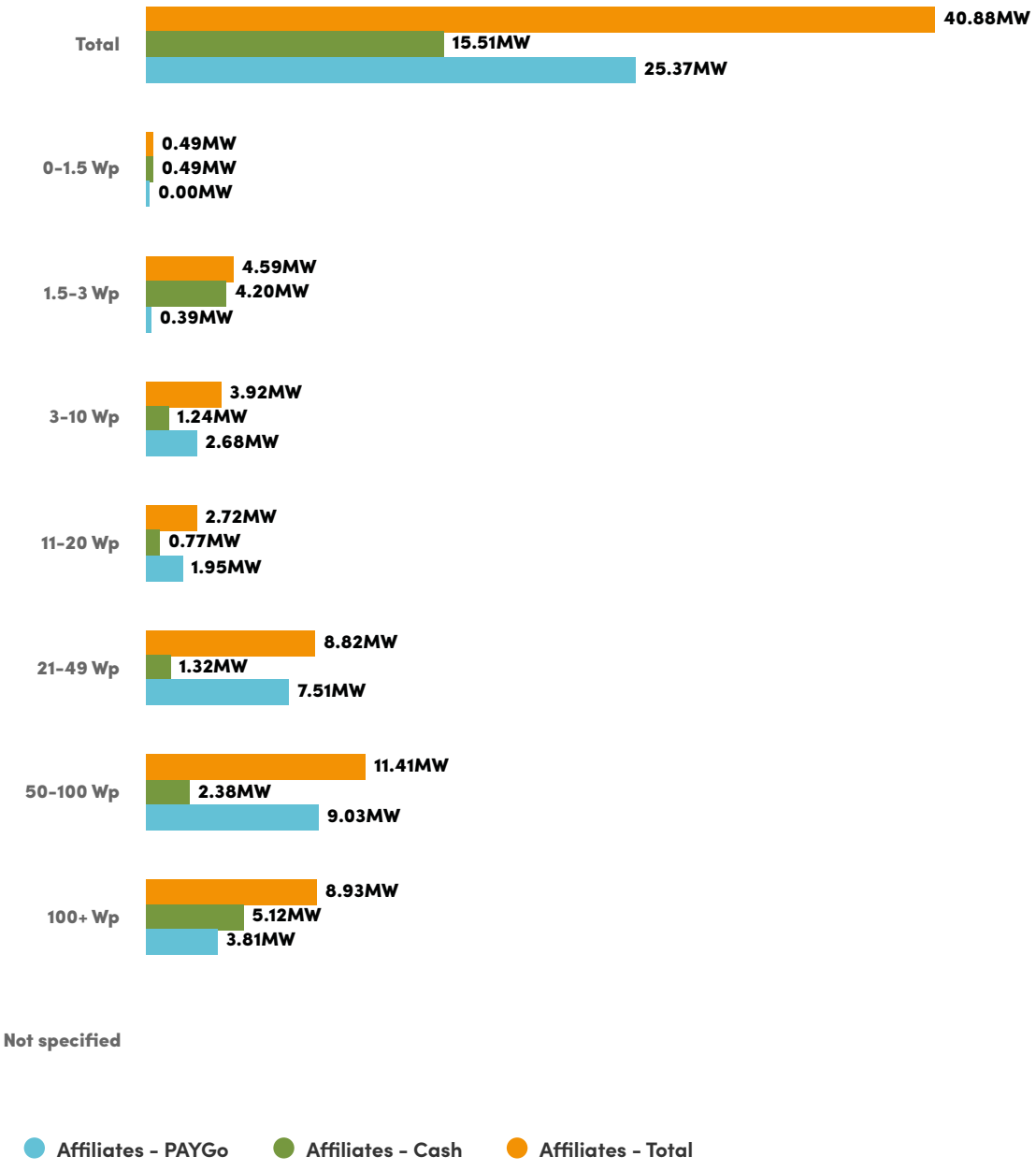
	0-1,5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100+Wp
PAYGo Value Jan-June 2018	$ 0	$ 2.711.574	$ 30.186.746	$ 22.463.059	$ 26.921.296	$ 15.707.631	$ 12.895.628
PAYGo Value Jul-Dec 2018	$ 0	$ 4.284.960	$ 28.309.314	$ 14.761.180	$ 74.528.320	$ 23.119.713	$ 19.774.909
PAYGo Value Jan-June 2019	$ 0	$ 6.066.085	$ 33.264.644	$ 17.806.877	$ 77.045.729	$ 62.341.473	$ 20.329.967

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYG products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYG products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Global Market Insights

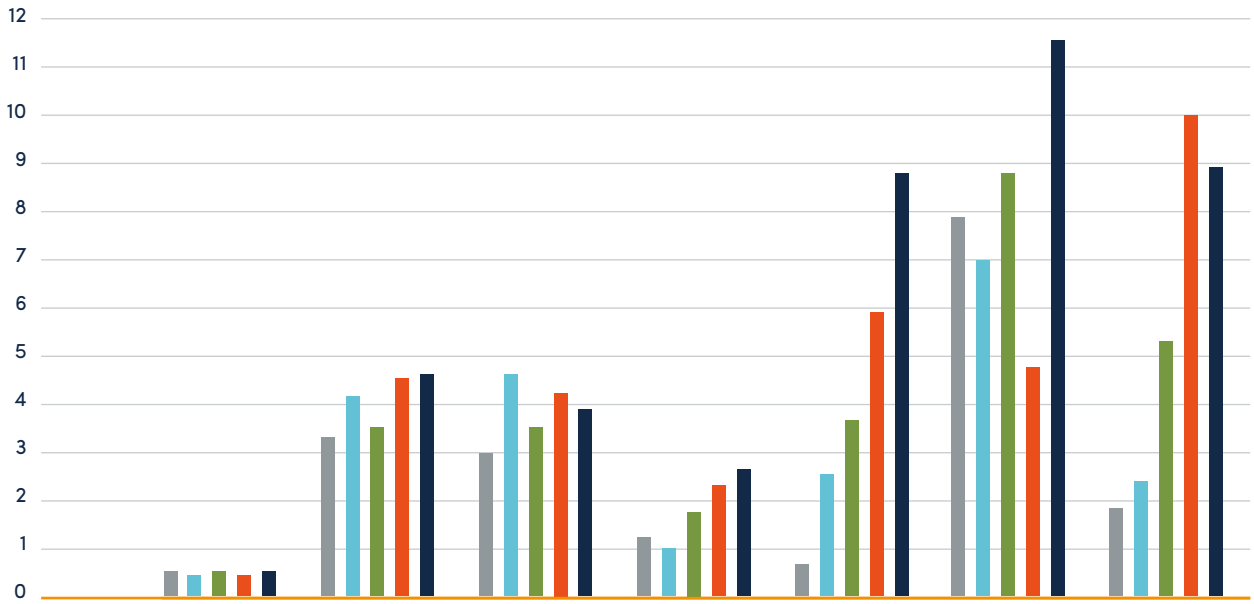
Figure 6 – Global Newly Installed Capacity by Product Category



NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The installed capacity should be considered as newly installed capacity during the reporting period, computed using the reported panel size per product.
4. The split Cash/PAYGo is shown only if both segments passed the three-data point control

Figure 7 – Semi-annual Evolution: Newly Installed Capacity of Products sold in MW



	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100+Wp
Jan-June 2017	0.48	3.23	3.00	1.30	0.67	7.94	1.94
Jul-Dec 2017	0.42	4.04	4.74	1.01	2.50	7.00	2.41
Jan-June 2018	0.53	3.48	3.57	1.86	2.93	8.81	5.25
Jul-Dec 2018	0.45	4.46	4.33	2.36	5.96	4.84	9.99
Jan-June 2019	0.49	4.59	3.92	2.72	8.82	11.41	8.93

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The installed capacity should be considered as newly installed capacity during the reporting period, computed using the reported panel size per product.

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Further Sales Data Trends and Analysis

Global and Country Market Dynamics

It is important to emphasise that the reported sales volumes presented here are influenced by a range of market drivers. These include:

- Policy changes affecting duties, taxes, and the regulation of the off-grid sector
- Actions by development finance institutions, donor agencies and government market interventions
- Developments in technology and increased competition on price
- Availability of finance, in particular working capital and local currency financing
- Macroeconomic factors, including general economic conditions, currency fluctuations, and other factors affecting the purchasing power of customers
- Seasonal trends as well as climate and other environmental factors
- Competitive dynamics. For several years now - and particularly in relation to portable lanterns - copycat and counterfeit products sold by non-affiliate companies have been creating intensified price competition. The design advantage held by affiliates' superior products in the early years of the thriving sector is now diminishing with increased competition and a surge in non-affiliate products of variable quality, directly affecting the market narrative.

During this reporting round (January - June 2019), we identified the following country-specific dynamics that are likely to have affected the sales volumes. In identifying them, we focused on twelve countries with the largest reported volumes or with the biggest fluctuations compared to the second half of 2018. The evolution of sales volumes for these countries is reported in Figures 8 and 9. For the trajectories of all the other countries, please refer to the "Market Insights by Country" section on page 50.

Kenya has observed impressive growth over time, which has further accelerated since the last reporting rounds. Companies have reported that this strong growth is largely due to more effective and increased agent networks and sales of TVs both through upgrade of existing clients and targeting new ones. The greatest growth has been in the PAYGo segment, with a 45% increase, especially for systems with panels of 21+ Wp, visible also in the 10% increase in TVs sales. There was also a large percentage of growth observed for small lanterns without mobile charging, which represented 40% of total sales. In general, competition in the country is ever increasing, keeping prices down and stimulating companies, together with a stable regulatory environment, makes it possible for this segment to thrive.

In **Rwanda,** reported sales are lower than the last half of 2018 but still higher than the first half of 2018. Difficulties are seen across all segments, especially for cash sales, which recorded a significant decrease of 89%. There have been reports that sales of lanterns, mostly sold on cash, have been challenged by uncertainty around government policy on imports. This is visible in sales of portable lanterns accounting for only a few hundred units in these past reporting rounds. Another challenge may be that the crop-planting season occurs between February and May, when farmers are less likely to invest in a product. On the other hand, the PAYGo segment focused on SHS registers a more moderate 14% decrease.

Tanzania records a decrease in sales volumes across all product segments, which have been stagnating for the past year. Companies have reported some challenges in the commercial environment. These include issues with customs valuations of their imports which slows importation, as well as a current lack of legal clarity around microfinance regulations potentially affecting companies PAYGo strategies under the Tanzania Microfinance Act 2018. Sales in the PAYGo segment have essentially been halved, with a 54% decrease overall and particularly strong decreases in the SHS. On the other hand, cash sales see an increase of 35%, concentrated mostly on multi-light systems.

In **Burkina Faso**, larger sales are recorded compared to those in 2018. Cash sales are still predominant here and they likely include systems provided as part of World Bank Results-Based Financing (RBF) schemes. Bucking the global trend, the most common products are lanterns without mobile charging. However, PAYGo sales doubled compared to the second half of 2018 and quadrupled compared to 2018's first half, reaching almost 3,000 units and recording very steep growth.

Further Sales Data Trends and Analysis

In **Côte d'Ivoire**, sales volume growth continues consistently for the fifth reporting period in a row, with the first half of 2019 recording its highest sales volumes to date. This is clearly driven by PAYGo sales, which represent 100% of total sales in this round. The slow and steady improvements reflect the growing number of companies active in the country and taken together, this provides some indication that Cote d'Ivoire is a growing commercial market for off-grid solar lighting products and appliances.

Sales volumes in **Senegal** have recovered compared to the last round and now reach similar volumes to those seen in the first half of 2018. This seems to signal a strong pattern in sales between the two halves of the year, as, incidentally the strongest harvest season also happens in the first half of the year. All the growth has been witnessed in the cash segment which remains larger in terms of unit sales volumes. PAYGo sales remain stable at around 12,000 units.

Togo's off-grid solar success story continues mostly thanks to the Togo Electrification Strategy, through which the government began partnering with off-grid solar companies to guarantee ongoing service in return for citizens receiving subsidies towards the cost of electricity access using SHS. As all the systems in this scheme are SHS sold as PAYGo, this segment represents the majority of the country's sales. It also should be noted that sales of systems not involved in the subsidy scheme are recording great percentage growth, showing an expanding market for off-grid solar products.

Sales seem to have picked up again in **Bangladesh** after the dip observed last round, and are likely still connected to the Rohingya refugee crisis, as 64% of the total sales reported are lanterns without mobile charging. This segment had seen no reported sales in the second half of 2018, most likely causing the dip observed. Moreover, new participation of companies was leveraged in Bangladesh due to the addition of the appliances section, leading to increased data collection in the country and more coverage of large systems. The sale of 62,000 units is reported in the SHS segment, which may not include the total number of the component-based systems that have long been associated with the "Solar Home System Program" run by the Infrastructure Development Company Limited (IDCOL).

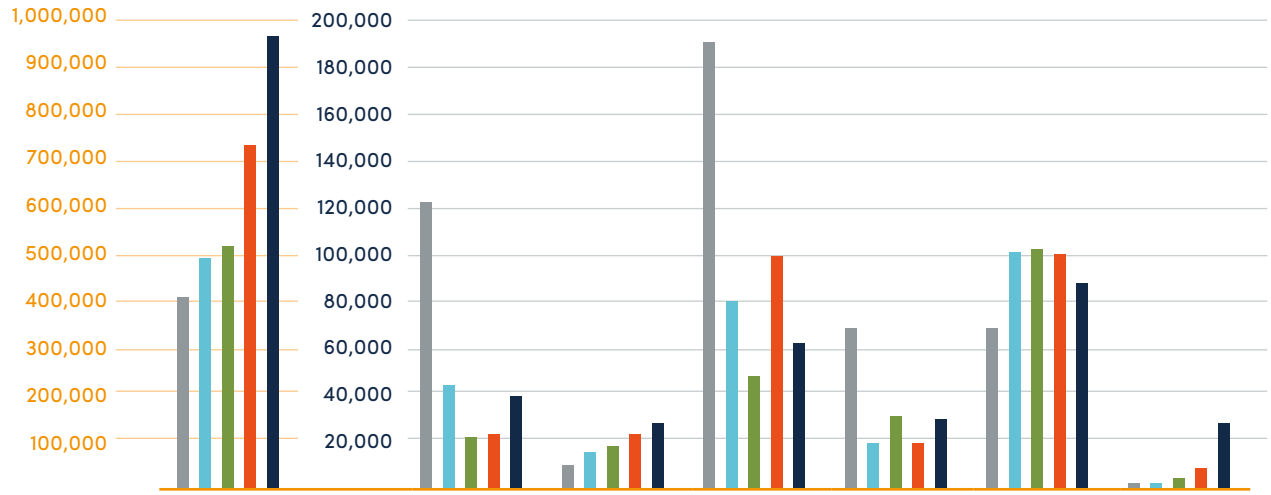
In **India**, the Government has officially declared having reached 100% household electrification through grid extension under the Saubhagya Scheme; this is reported to have a direct influence on the off-grid solar market. A 20% decrease in sales is registered, with the largest drop recorded in the lantern categories. This is likely to be due to the increase in import and sales in the country of non-solar portable lanterns in 2018 and early 2019, which are direct competition for our affiliates' products.[9] Moreover, in the first half of 2019 uncertainty was caused by the possibility of strict government regulation on the importation of lanterns, aimed at stimulating local manufacturing of such products. On the other hand, sales in the larger segments are increasing, showing the transition for our affiliates in the Indian market towards larger products. The multi-light and solar home systems segments have recorded an increase in sales, with the former reaching 92,000 units sold (almost double the numbers recorded in July-December 2018) and the latter passing 50,000 units for the first time.

In **Myanmar**, again, a large increase in sales volumes is recorded after the sizeable drop recorded in the last reporting round. This increase is again due to bulk procurements under cash sales. The PAYGo segment in the country is stable, holding at around 20,000 units sold.

9 Power for All, Is off-grid solar lighting still relevant in India?, 2019. Full article here: https://www.powerforall.org/insights/dre-technologies/grid-solar-lighting-still-relevant-india

Further Sales Data Trends and Analysis

Figure 8 – Semi-annual Evolution: Volume of Products Sold in Selected African Countries (Historical)

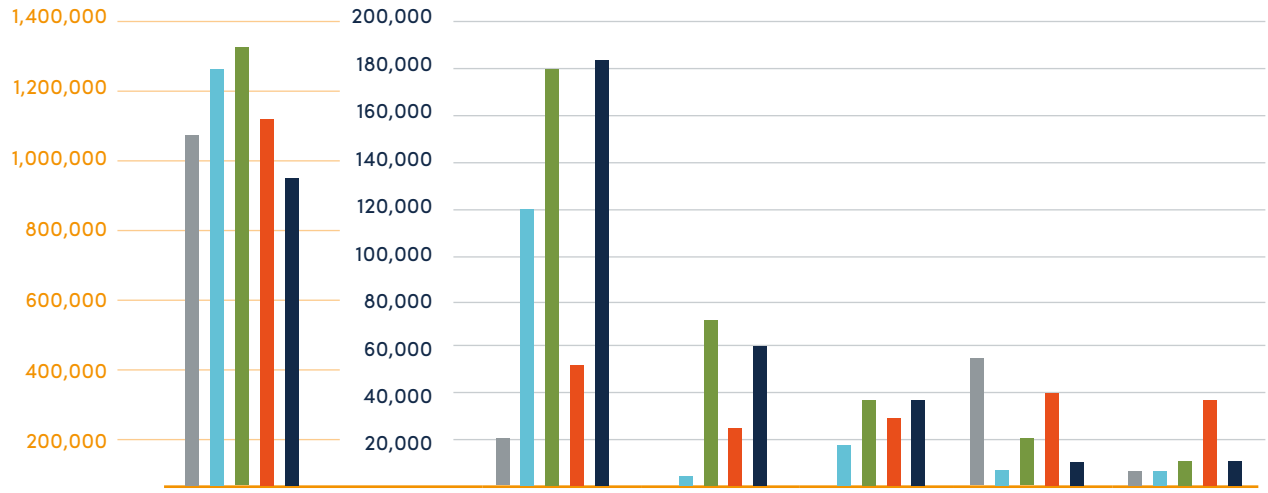


	Kenya	Burkina Faso	Cote D'Ivoire	Rwanda	Senegal	Tanzania	Togo
Jan-June 2017	413,544	123,945	9,533	190,781	67,503	69,143	2,668
Jul-Dec 2017	502,099	46,581	15,360	80,529	17,883	103,299	1,920
Jan-June 2018	519,154	22,809	17,446	47,741	31,335	103,695	4,505
Jul-Dec 2018	749,909	23,725	22,921	98,723	18,104	102,038	7,727
Jan-June 2019	974,972	38,188	27,682	65,030	29,572	87,552	26,809

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided

Figure 9 – Semi-annual Evolution: Volume of Products Sold in Selected Asian Countries (Historical)



	India	Bangladesh	Myanmar	Papua New Guinea	Philippines	Vanuatu
Jan-June 2017	1,087,282	21,707	0	0	55,197	7,983
Jul-Dec 2017	1,255,174	119,050	4,343	16,410	6,163	7,840
Jan-June 2018	1,331,320	179,708	71,746	36,908	24,855	9,729
Jul-Dec 2018	1,184,003	51,802	27,196	30,249	38,891	38,962
Jan-June 2019	953,466	185,405	59,474	37,298	11,087	9,350

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided

Further Sales Data Trends and Analysis

Regional Market Insights

Why do some graphs have empty bars?

Data on a specific region, country or product category is only included when it has satisfied the three-data point rule. When 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. While if there are no companies reporting data at all, the graph shows a "0".

This section offers an overview and narrative behind the regional sales volumes, market value and newly installed capacity reported for the period January-June 2019 (Figures 10-12) with a comparison with previous rounds offered in Figure 13. Nuanced insights by product category in each region are given in Figures 14-24. For more insights into the countries causing these regional trends, please refer to the "Market Insights by Country" section on page 50.

Sub-Saharan Africa

Sub-Saharan Africa does not record any increase in volumes since the last reporting round, which was a record high. It remains the largest region with sales topping 2.25 million.

East Africa witnesses similar numbers compared to the previous round and only a small decrease. This small drop seems associated with the crop-planting season which falls in January and February and causes a seasonal dip in sales in most countries in the region. The second half of the year, starting in June, usually records higher sales after the previous low season. This seasonal pattern has been highlighted in previous reports and seems visible in Figure 13. **The region recorded 1.74 million units** sold with around 1 million products sold by cash and the rest using the PAYGo finance model. This makes it the **largest PAYGo region worldwide.**

West Africa presents a significant area of opportunity with a sizeable percentage of the population not connected to the grid. **Sales in the first half of 2019 were over 350,000 units, a 32% increase from the second half of 2018.** The PAYGo segment in particular was responsible for a 50% increase, almost reaching parity with cash sales in the region, with 170,000 units sold.

Central Africa sees similar sales as the last round with over 120,000 units sold. Yer it is premature to draw conclusions about the future stagnation of sales within this region which may still experience fluctuations in the coming rounds, especially as it is still cash-dominated due to the prevalence of bulk procurements in the region.

South Asia

South Asia records 1.16 million sales, slightly less than the last reporting round, continuing a downward trend of sales volumes. This decrease is mainly due to dwindling sales volumes in India since it is still the largest market in the region. Yet sales in the larger product segments in the region are increasing with the **multi-light and solar home systems segment recording an increase in sales**, indicating a shift in customer preference towards these larger systems. Penetration of PAYGo remains limited, as the region is dominated by largely cash-based economies and there are stringent government regulations for PAYGo finance models.

Further Sales Data Trends and Analysis

Other Markets

The Middle East and North Africa region reaches over 400,000 units sold after the dip observed in the last round, matching the volumes recorded in 2017 and early 2018. A significant number of these sales can be attributed to **purchases of solar lanterns with mobile charging by humanitarian agencies**, which lead to large fluctuations in sales caused by one-off bulk purchases. This percentage decrease isn't necessarily representative of commercial markets for off-grid products as purchases are not made directly by end-users but rather by relief agencies in bulk purchases. However, these markets do turn over sizeable revenues. The study conducted by Lighting Global on Syrian refugees in Lebanon[10] their energy need and willingness to pay may be used to corroborate the results. The study finds that 25% of Syrians living in camps are familiar with solar lanterns, most likely due to prior distributions by aid organisations.

East Asia and Pacific slides back to being the fourth largest regional market, with 140,000 units sold, a 27% decrease compared to the second half of 2018. There is a decrease both for cash and PAYGo sales with the latter seeing the most significant decrease. This region is still dominated by cash sales which stand at almost 120,000 units, and can be attributed to government incentive schemes and bulk procurements. In the coming months and years, as our data matures, we will be more able to track this growth and determine if the current sales spikes are incidental.

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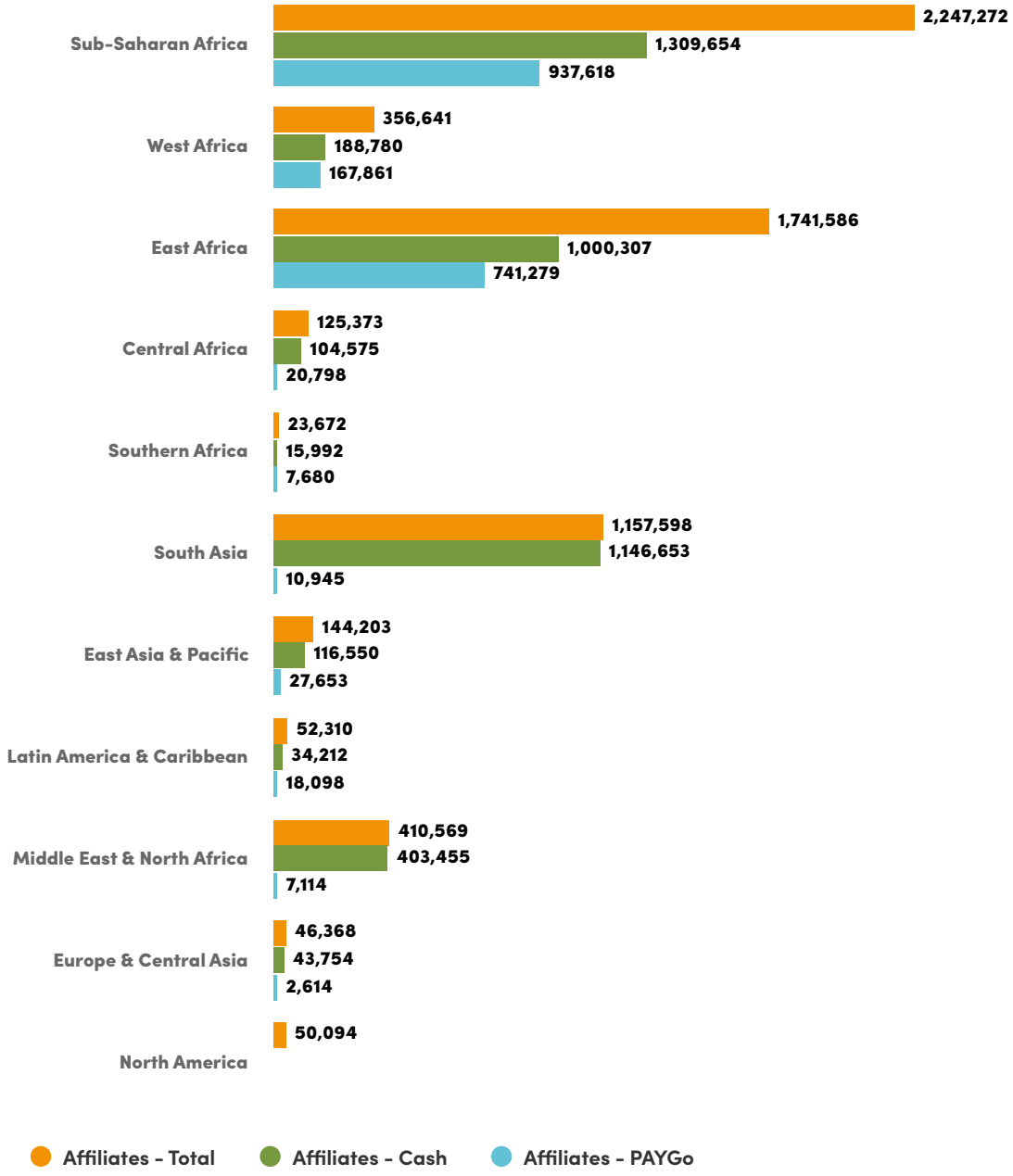
10 Lighting Global, Energy Access and the Syrian Refugee Crisis: A Situational Report on the Solar Energy Sector in Lebanon, 2019. Full report here: https://www.lightingglobal.org/wp-content/uploads/2019/02/Solar-Energy-in-the-Syrian-Refugee-Crisis-Updated-3.20.19.pdf

Further Sales Data Trends and Analysis

Figure 10 - Volume of Products Sold per region

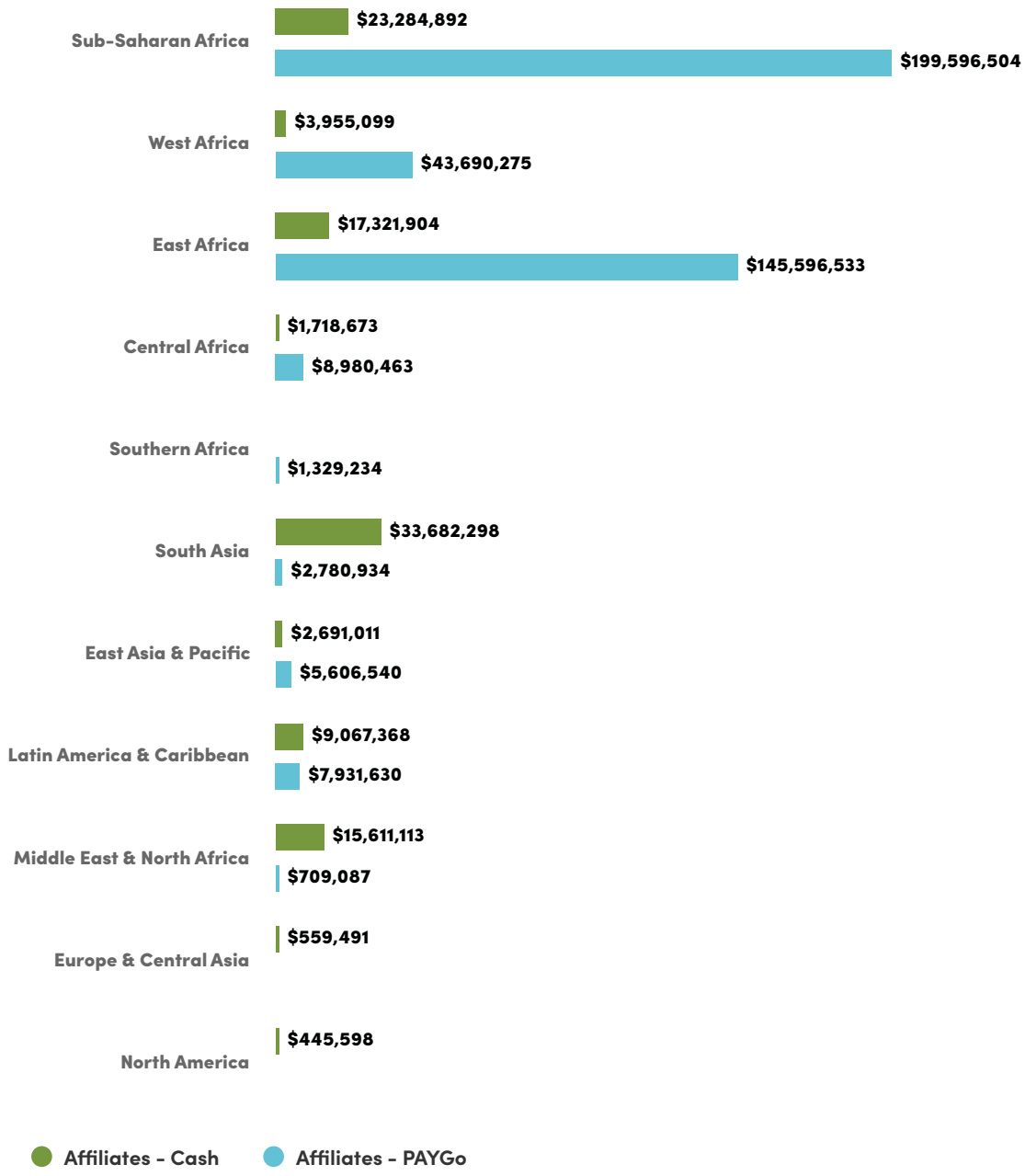


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYGo is shown only if both segments passed the three-data point control

Further Sales Data Trends and Analysis

Figure 11 - Value of Products Sold per region

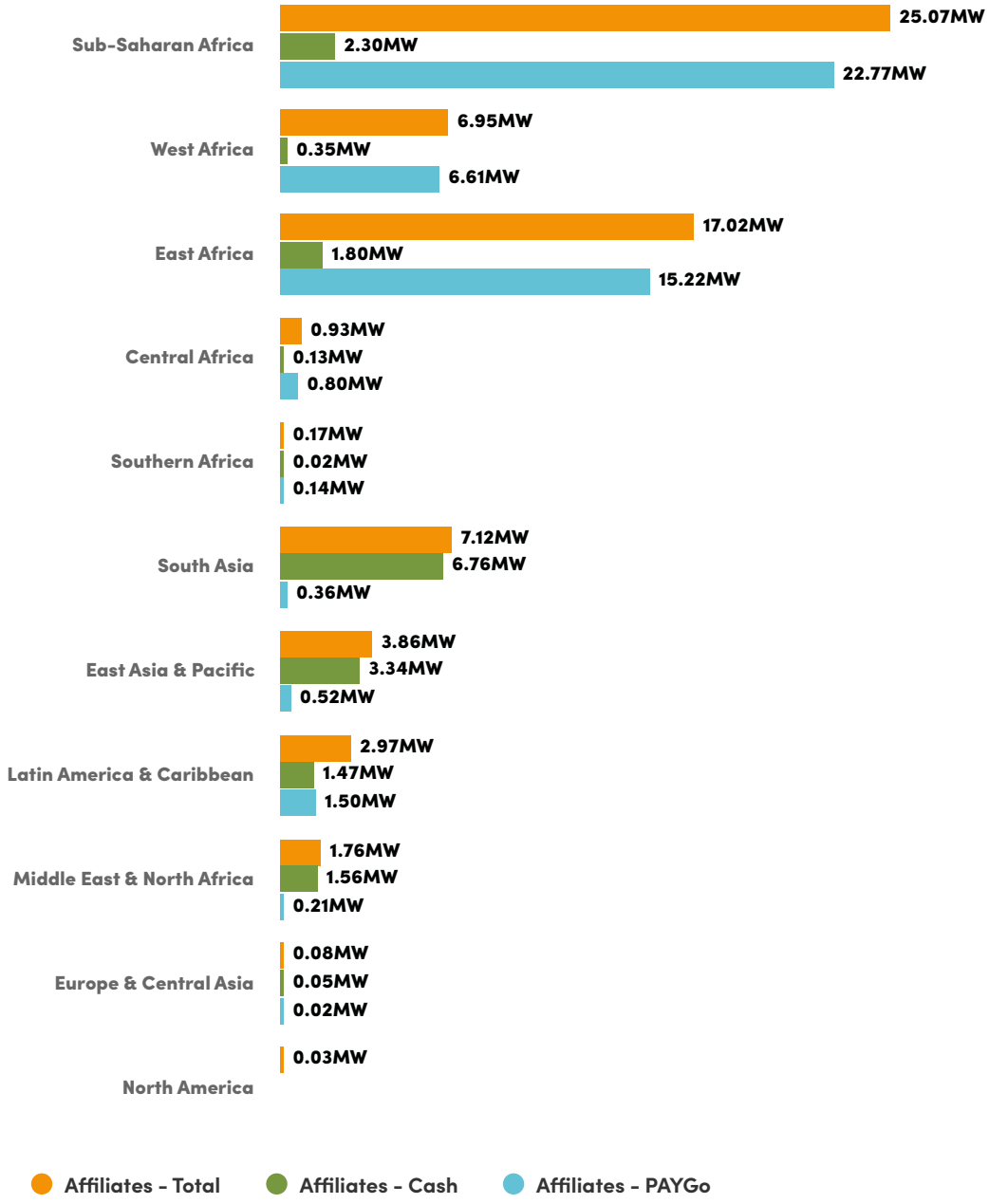


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

Figure 12 - Newly Installed Capacity per region

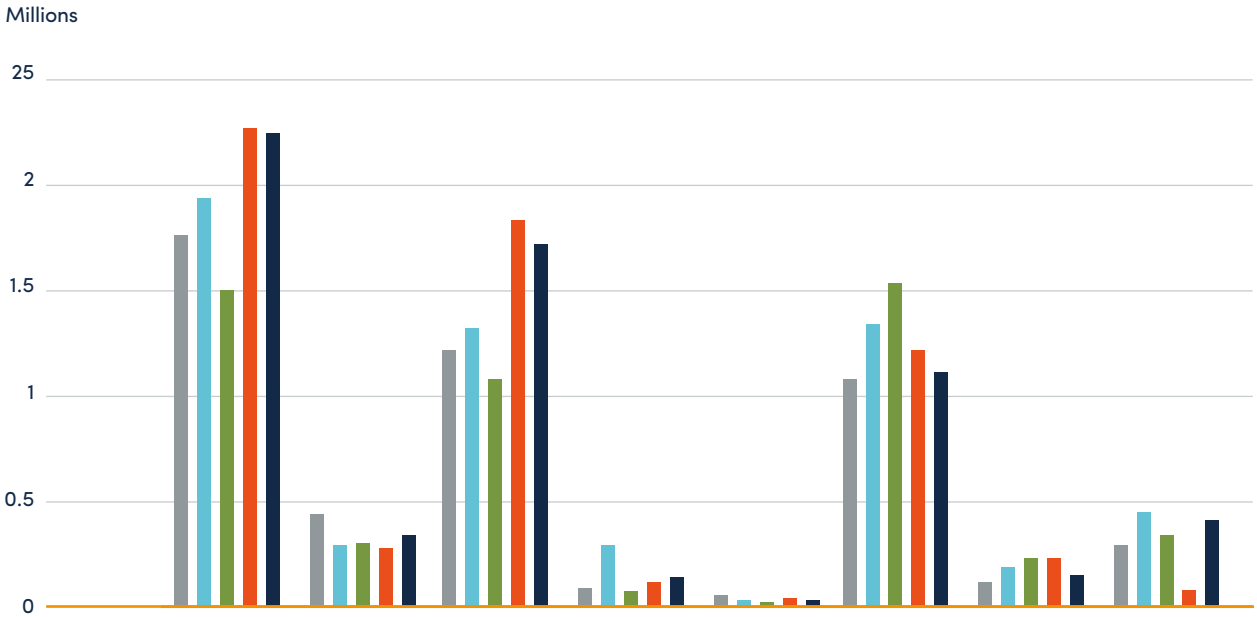


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The installed capacity should be considered as newly installed capacity during the reporting period, computed using the reported panel size per product.
3. The split Cash/PAYGo is shown only if both segments passed the three-data point control

Further Sales Data Trends and Analysis

Figure 13 – Semi-annual Evolution: Volume of Products Sold Regionally



	Sub-Saharan Africa	West Africa	East Africa	Central Africa	Southern Africa	South Asia	East Asia & Pacific	Middle East & North Africa
Jan-June 2017	1,768,196	431,829	1,218,853	80,390	37,119	1,161,648	121,175	293,044
Jul-Dec 2017	1,926,827	291,120	1,327,256	249,665	23,291	1,384,607	173,331	453,022
Jan-June 2018	1,498,242	299,041	1,111,258	69,527	18,416	1,520,373	194,013	334,109
Jul-Dec 2018	2,275,877	269,911	1,854,920	118,440	32,606	1,256,110	194,827	61,902
Jan-June 2019	2,247,272	356,641	1,741,586	125,373	23,672	1,157,598	144,203	410,569

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.

Further Sales Data Trends and Analysis

Portable lanterns

Lanterns remain the largest category sold worldwide. Sub-Saharan Africa accounted for 46% of sales, 1.3 million units. South Asia covers another 34% at 0.9 million units.

Growth has been observed in every region for small portable lanterns without mobile charging, most likely connected to bulk procurements in several countries worldwide. Considerable decreases have been registered in the segment of the lanterns with mobile charging across multiple geographies. Notably, East Africa has seen a 37% decrease going under the 400,000 units sold, and South Asia a 26% one from 800,000 to 600,000 lanterns. In West Africa, the sales have remained stable as visible in Figure 18.

The only region with a different sales pattern is the Middle East and North Africa region, where 90% of the sales are in the large portable lanterns with mobile charging. These sales are connected to humanitarian aid. This region represented 13% of the global sales with 370,000 units.

Multi-light systems

A more complicated trajectory can be observed for multi-light systems. We are seeing decreasing sales of 10% in East Africa and 40% in Central Africa, while West Africa records a modest 15% increase. It is possible that in Sub-Saharan Africa the sales of these systems are seeing increased competition with Solar Home Systems, which are capable of powering appliances, as mentioned in the previous paragraph dedicated to Multi-light systems. In contrast, multi-light systems sales have doubled in South Asia reaching almost 100,000, a figure that is comparable to the volumes sold in Jan- Jun 2018. A large decrease in sales has been registered in East Asia and Pacific.

Solar Home Systems (SHS)

Sub-Saharan Africa remains the major market for these systems accounting for 70% of the global total sales. East Africa shows stable sales with the only major increase being in the 50-100 Wp segment. The market is however, expanding in other regions with East Africa representing less than 50% of the global SHS sales.

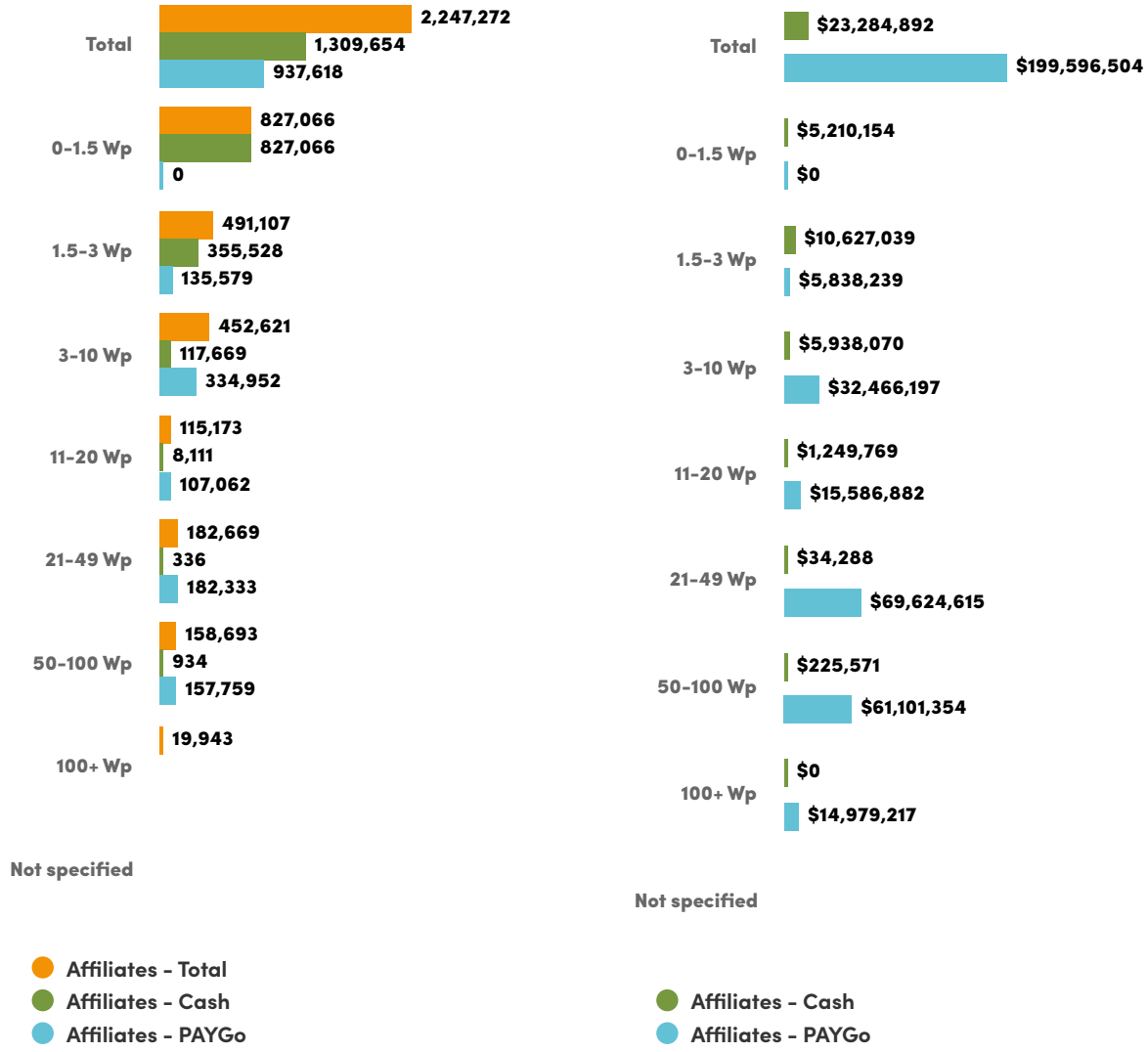
The largest increase in SHS sales was registered in West Africa, which now represents 17% of global sales. This is a significant leap, growing from 50,000 to 120,000 units between the last two reporting rounds. For the first time, there are enough companies reporting in the 100+ Wp category to pass the three-point data rule to give greater visibility of SHS sales in the region. Central Africa is still a marginal market for these systems with only around 15,000 units sold this round. Moreover, unlike other regions, there are not yet enough companies yet reporting to have full visibility of the single product categories.

South Asia represents 14% of global SHS sales, with a notable increase in the 21-49 Wp segment which jumped from 100 units in the last reporting round to 28,000 in the first half of 2019. This is largely due to increased participation from companies active in the region.

East Asia and Pacific sees a decrease in the 11-20 and 21-49 Wp categories, while large increases have been recorded in the 50-100 Wp space, reaching 40,000 units sold. These systems are predominantly sold on a cash basis in the region.

Further Sales Data Trends and Analysis

Figure 14 - Sales Volumes and Values by Product Category – Sub-Saharan Africa

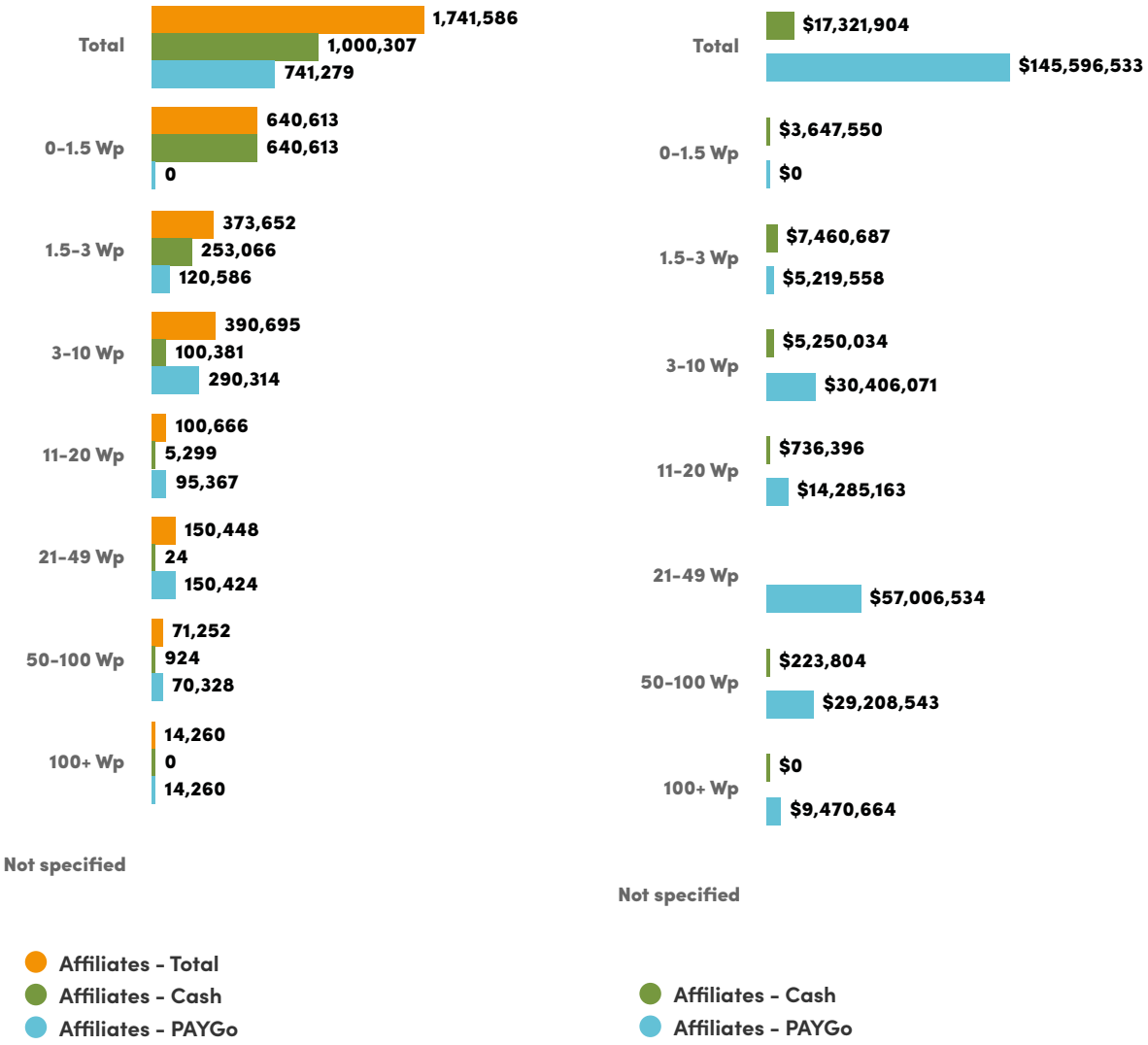


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).).

Further Sales Data Trends and Analysis

Figure 15 - Sales Volumes and Values by Product Category – East Africa

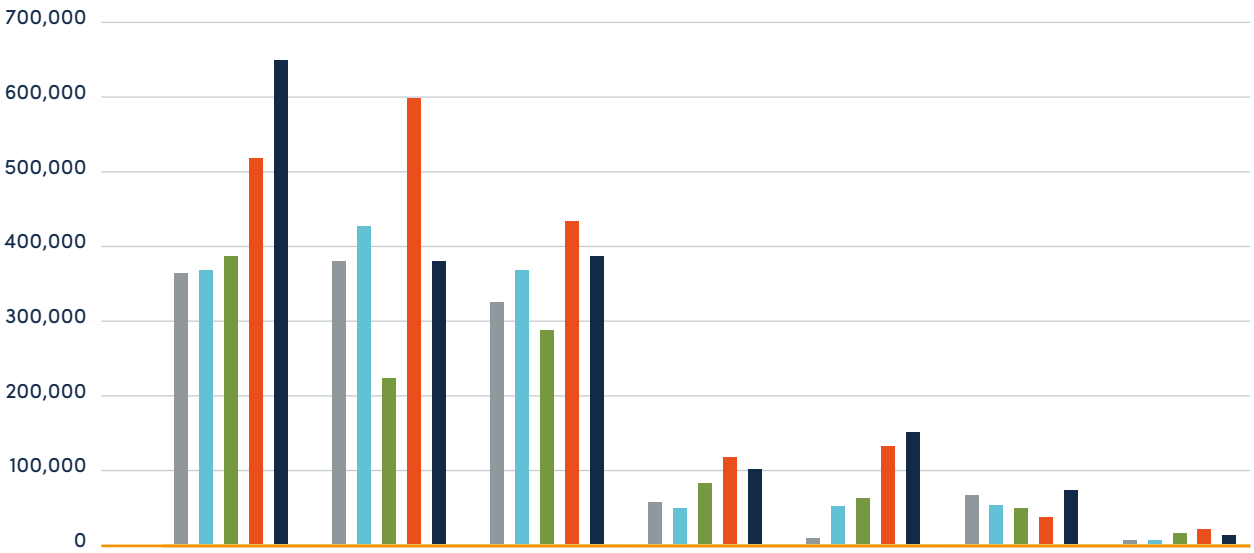


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

Figure 16 – Semi-annual Evolution: Volume of Products Sold by Product Category – East Africa



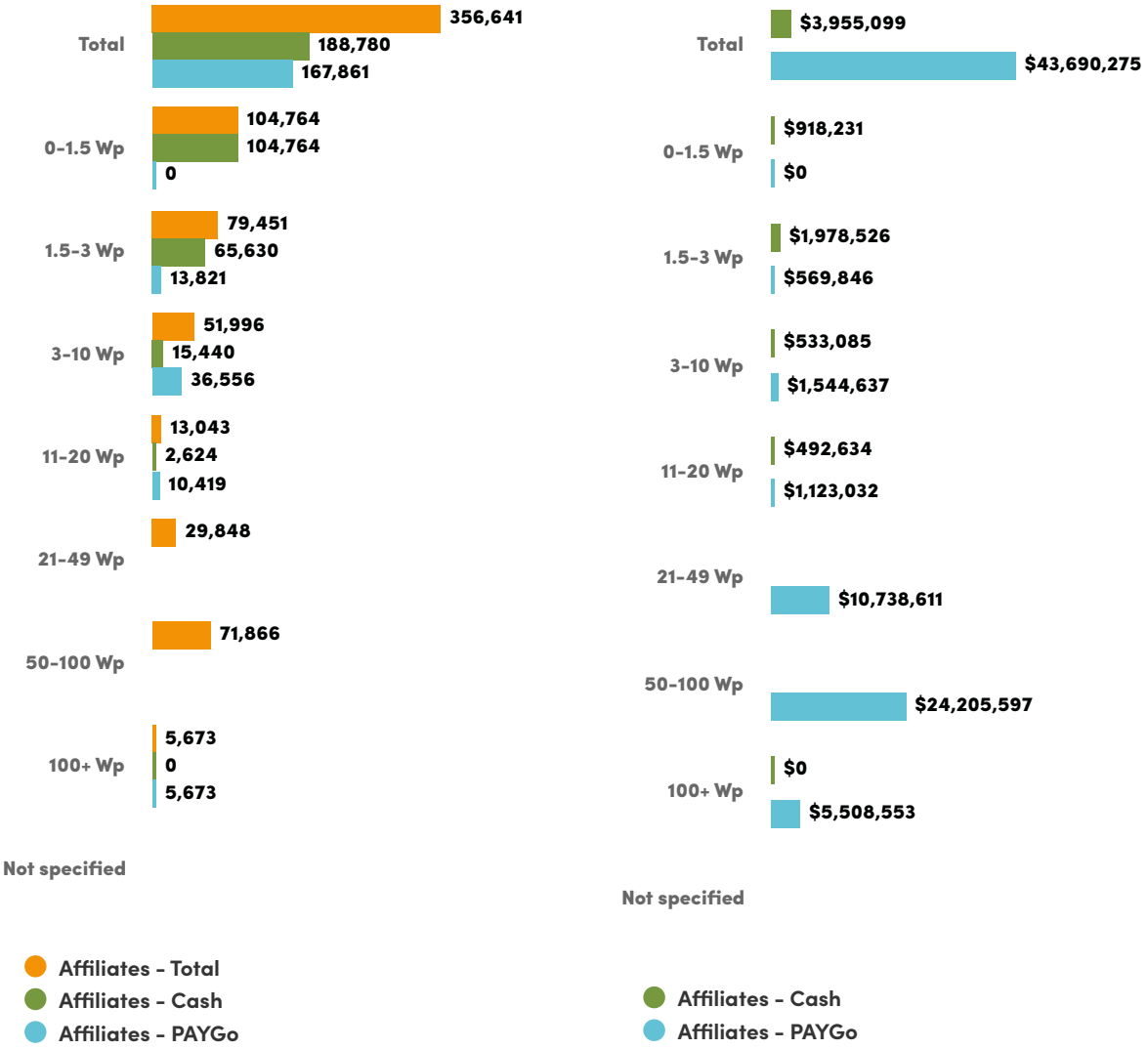
	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100+Wp
Jan-June 2017	364,712	379,687	329,086	53,335	7,450	67,050	10,641
Jul-Dec 2017	366,670	427,640	371,513	43,501	51,388	53,284	13,260
Jan-June 2018	382,874	227,989	296,200	79,758	64,093	44,899	15,445
Jul-Dec 2018	516,850	596,261	436,182	121,622	132,970	30,494	20,541
Jan-June 2019	640,613	373,652	390,695	100,666	150,448	71,252	14,260

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.

Further Sales Data Trends and Analysis

Figure 17 - Sales Volumes and Values by Product Category – West Africa

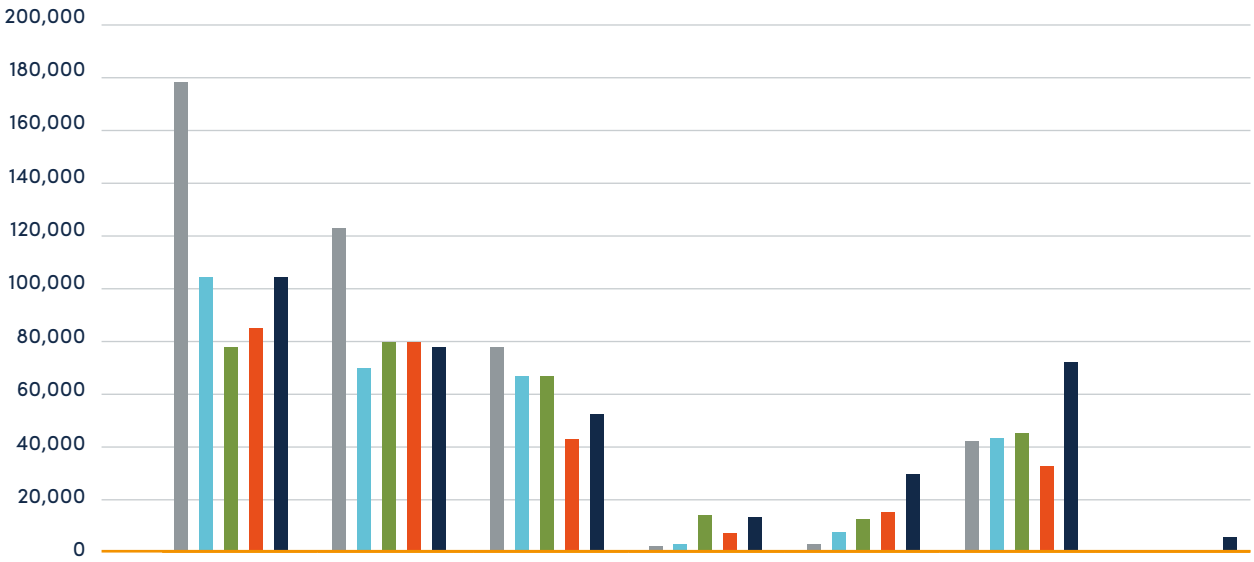


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

Figure 18 – Semi-annual Evolution: Volume of Products Sold by Product Category – West Africa



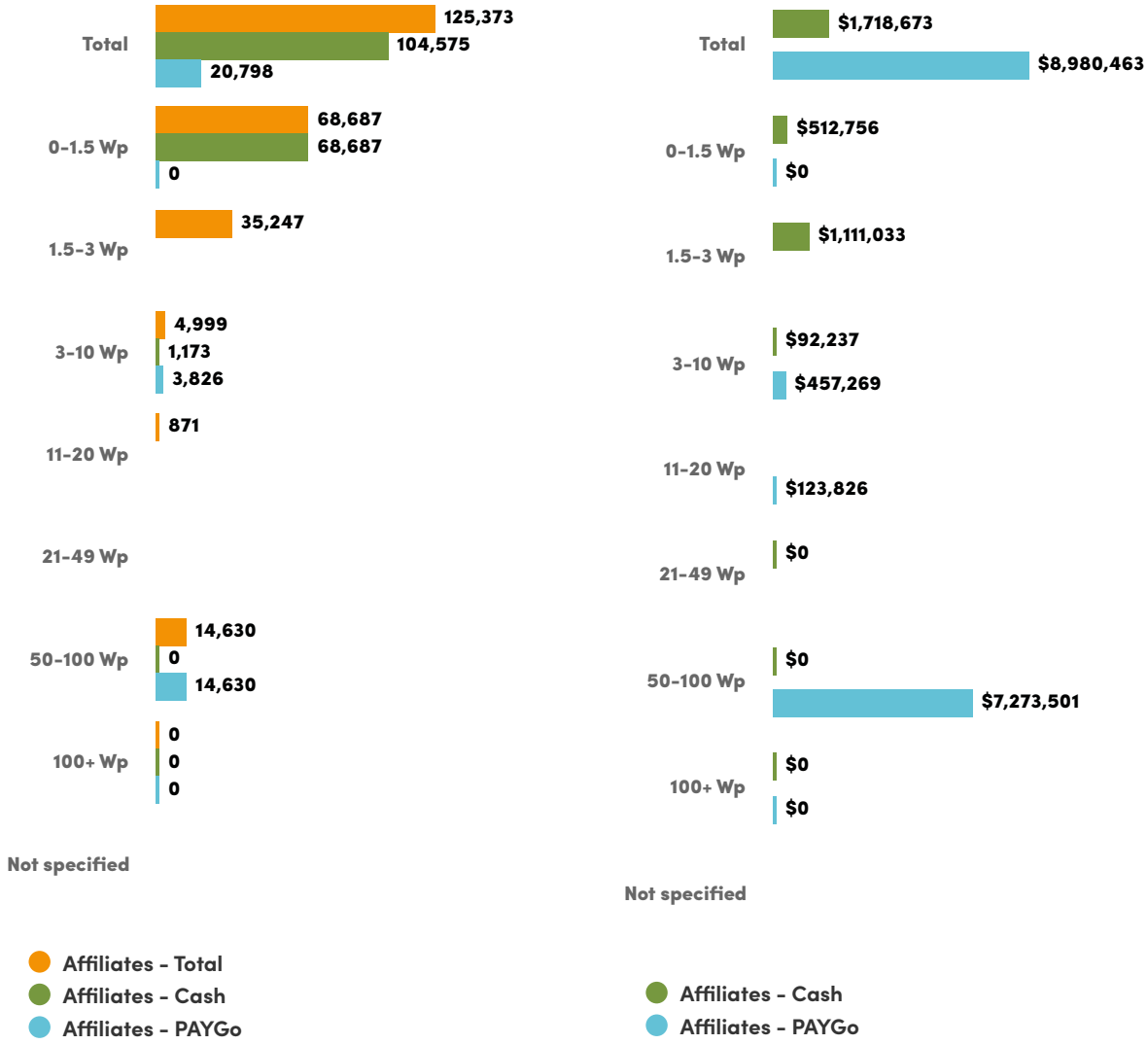
	0–1.5 Wp	1.5–3 Wp	3–10 Wp	11–20 Wp	21–49 Wp	50–100 Wp	100+Wp
Jan–June 2017	178,191	122,939	77,083	1,550	4,458	42,892	–
Jul–Dec 2017	102,992	67,953	67,290	3,020	6,634	43,111	–
Jan–June 2018	79,125	81,050	66,397	13,300	12,125	44,917	–
Jul–Dec 2018	84,042	81,321	45,083	6,504	14,663	32,398	–
Jan–June 2019	104,764	79,451	51,996	13,043	29,848	71,866	5,673

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.

Further Sales Data Trends and Analysis

Figure 19 - Sales Volumes and Values by Product Category – Central Africa

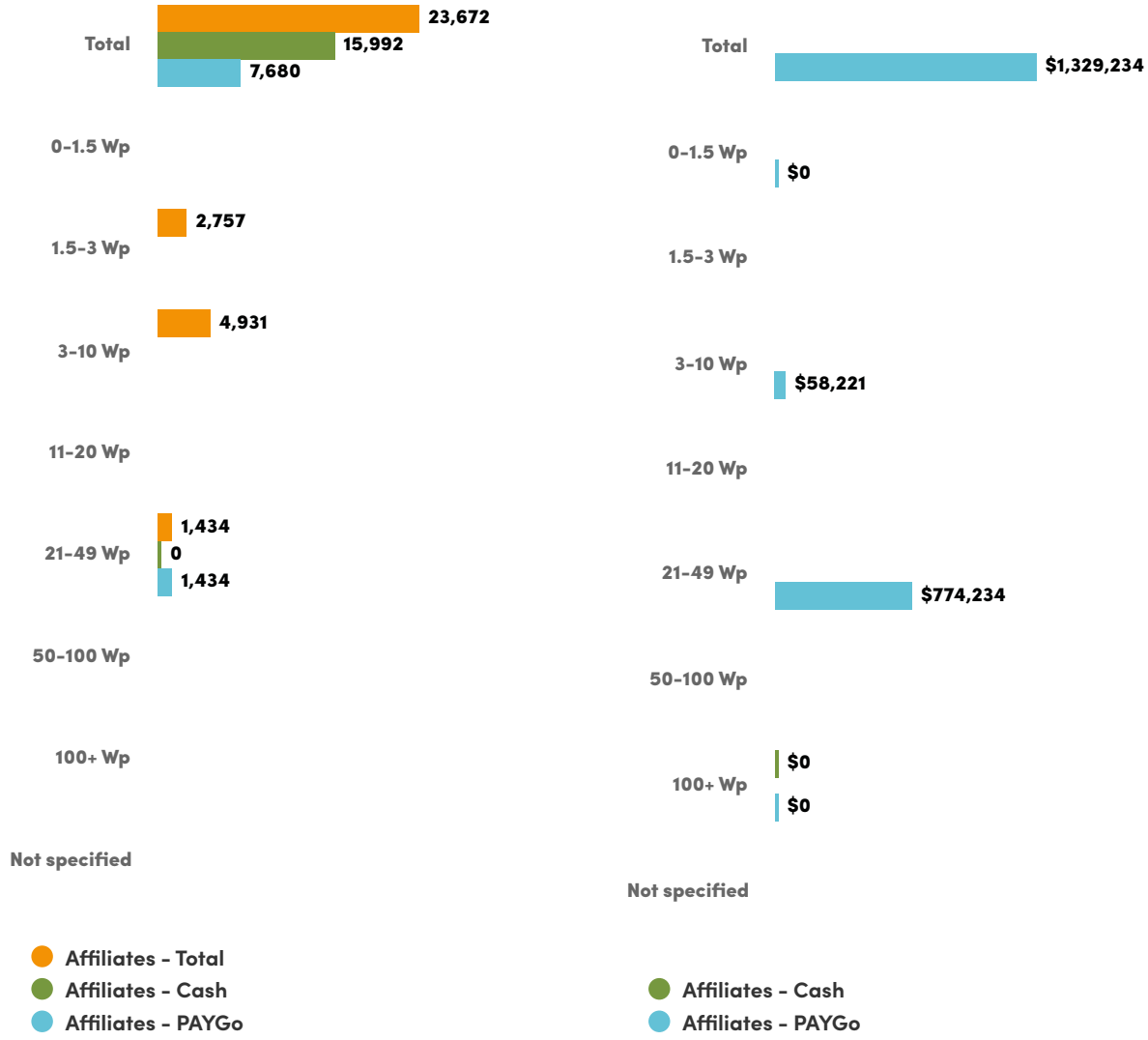


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

Figure 20 - Sales Volumes and Values by Product Category – Southern Africa



NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

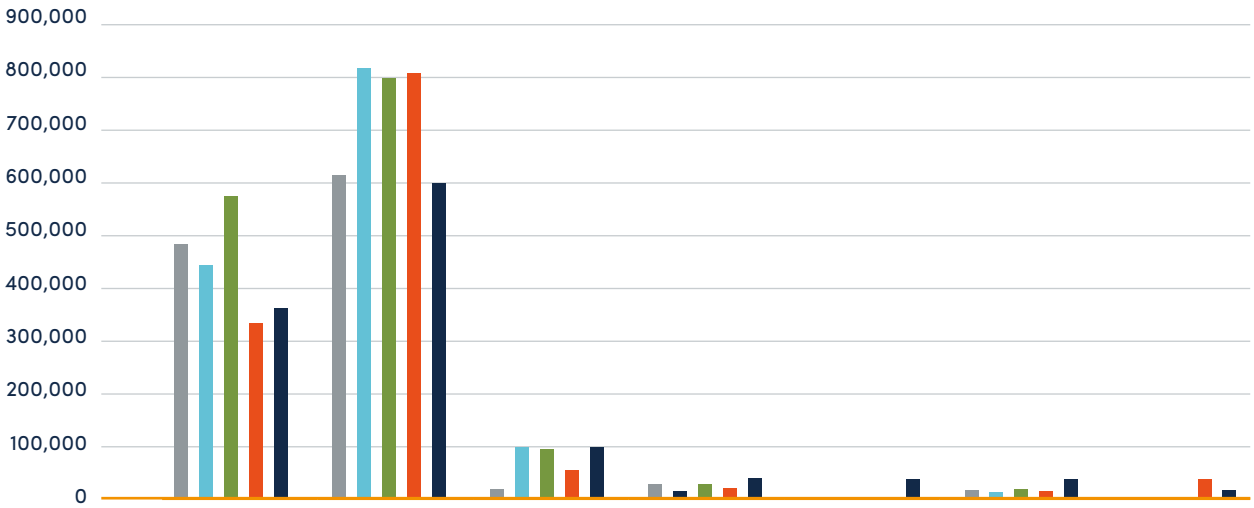
Figure 21 - Sales Volumes and Values by Product Category – South Asia

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

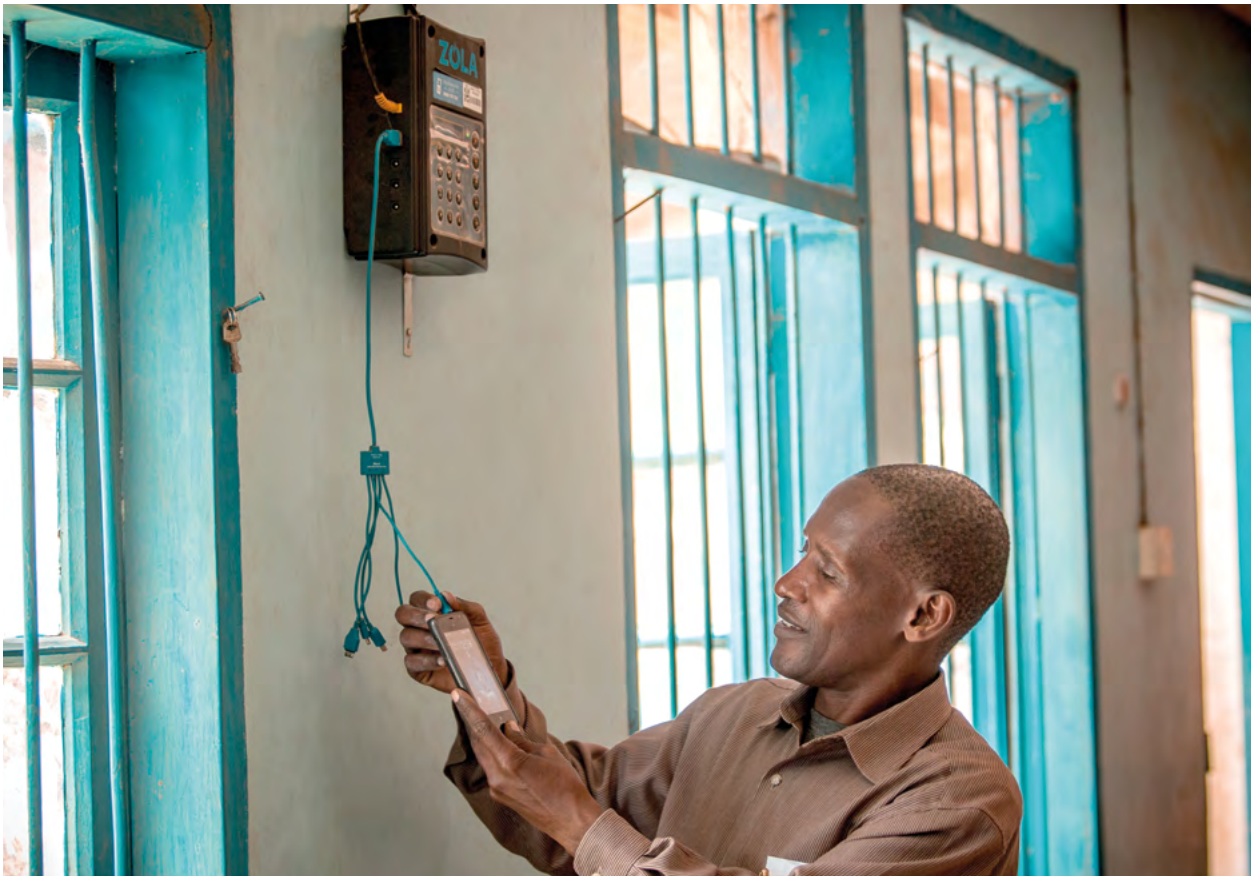
Figure 22 – Semi-annual Evolution: Volume of Products Sold by Product Category – South Asia



	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100+Wp
Jan-June 2017	484,576	615,735	13,891	25,091	-	14,111	-
Jul-Dec 2017	450,657	810,281	99,745	17,357	-	5,432	-
Jan-June 2018	578,636	802,313	92,674	25,188	-	11,237	-
Jul-Dec 2018	338,559	806,411	47,042	20,027	110	9,575	34,386
Jan-June 2019	363,570	597,768	98,419	31,988	28,003	23,659	14,191

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.



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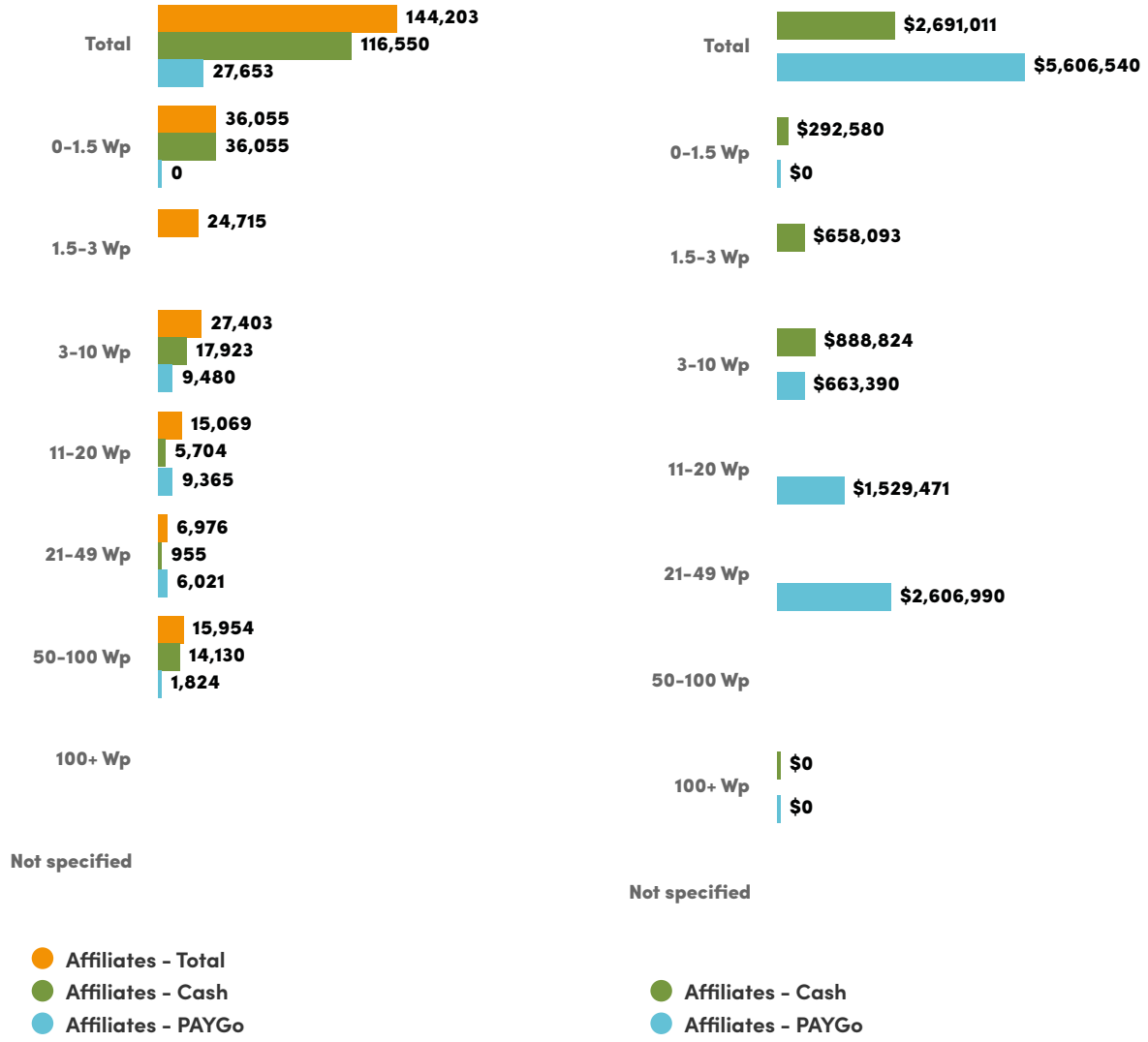
Further Sales Data Trends and Analysis

Figure 23 - Sales Volumes and Values by Product Category – East Asia and Pacific

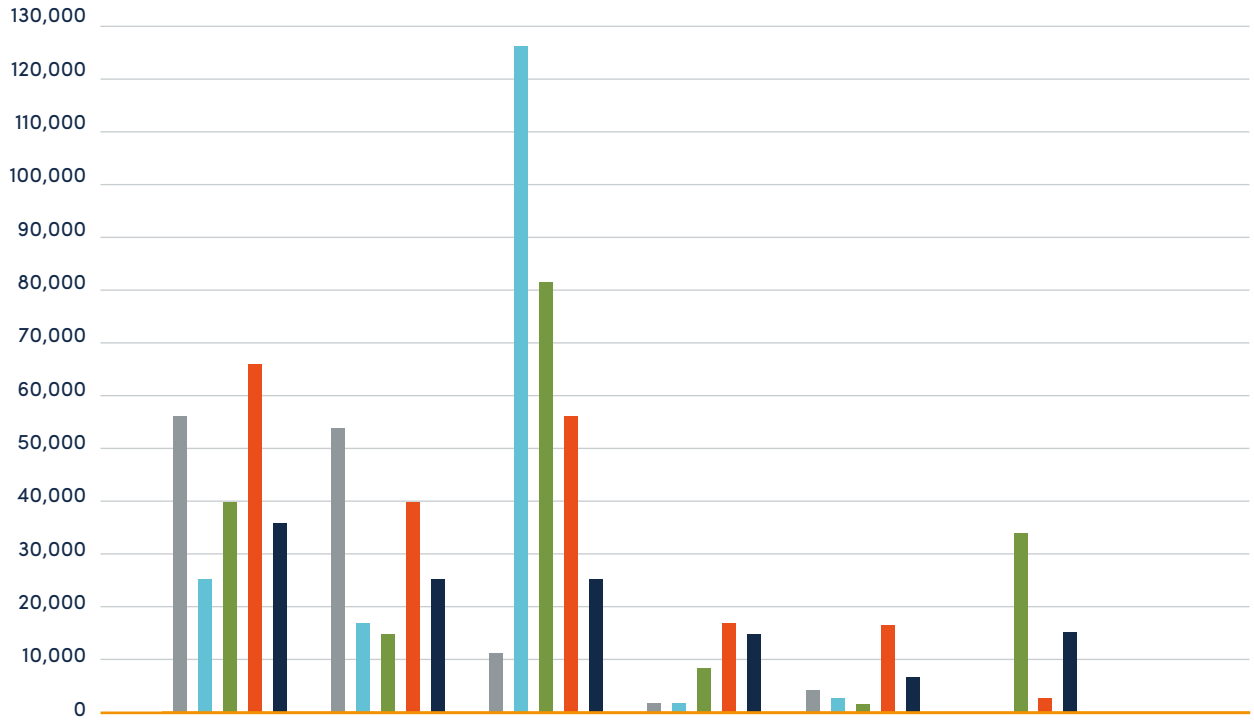


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.
3. The value of products is not presented as a total because it is computed differently for cash and PAYGo products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYGo products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

Figure 24 – Semi-annual Evolution: Volume of Products Sold by Product Category – East Asia and Pacific



	0–1.5 Wp	1.5–3 Wp	3–10 Wp	11–20 Wp	21–49 Wp	50–100 Wp	100+Wp
Jan–June 2017	50,784	53,566	11,787	931	4,106	–	–
Jul–Dec 2017	25,108	17,885	126,357	1,172	2,809	–	–
Jan–June 2018	39,818	14,158	80,316	9,163	1,425	33,153	–
Jul–Dec 2018	65,930	39,486	57,214	18,994	10,789	2,394	–
Jan–June 2019	36,055	24,715	27,403	15,069	6,976	15,954	–

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. Products with solar module capacity of less than 11 Wp are categorized based on services provided, while products with capacity of 11 Wp and over are categorized based on wattage of the solar module provided.

Further Sales Data Trends and Analysis

Market Insights by Country

This report only includes data for national markets where at least three manufacturers reported sales; which in this reporting round (January-June 2019), totalled 45 countries. An explanation of drivers affecting the sales volumes can be found in the "Market Dynamics" section on page 28.

Data is broken down into Top 10 country markets by volume of products sold and further grouped into two sections; products sold for cash and those sold using the PAYGo model. **Only the countries where three-data point control is satisfied in both the PAYGo and Cash segments can be listed using this breakdown. This is the reason why Bangladesh with 185,000 total units sold (counting both cash and PAYGo units), India with 950,000 and Yemen with 84,000 are not listed in the tables.** Since it is common knowledge that these countries are cash-dominated markets, we can estimate they would enter the Top 10 Cash in Table 6. They have therefore been entered in a plausible position in this ranking, based on their market value.

The resulting list of **Top 10 countries by cash sales** is quite similar to the one observed in the second half of 2018, with the exception of Myanmar and Yemen which are now included. Changes are, though, expected in each reporting round as the bulk government purchase of systems, usually lanterns, are mainly sold as cash products. **It is likely that India remains the largest cash market.** However, **Kenya's increases in this round surpassed the 500,000 units mark with an estimated value of almost $8.5 million,** demonstrating a huge achievement in the region. A small decrease has been registered in Nigeria as the number falls under the 100,000 unit mark again, while Cameroon, Tanzania and Uganda record significant increases that bring them over - or close to - 70,000 units. **Overall, due to the installed capacity, we can infer that the largest share of these volumes is contributed by sales of portable lanterns with indicative wattage under 3 Wp.** The exception seems to be Myanmar with over 3 MW installed. This is most likely caused by bulk procurements that have been put in place for larger systems. India is also expected to have quite a large capacity installed, reflecting the increasing number of products of larger capacities that have been sold on a cash basis in this reporting period.

Table 6 - Top 10 Country Markets by Volume of Products Sold - Cash

Country names	Volume of Products Sold - Cash	Global Volume Share - Cash	Value of Products Sold - Cash	Global Value Share - Cash	Newly Installed Capacity (MW) - Cash	Global Newly Installed Capacity Share - Cash
India	-	-	$28,400,177	33%	-	-
Kenya	540,448	17%	$8,405,237	10%	0.72	5%
Ethiopia	251,597	8%	$5,375,741	6%	0.65	4%
Bangladesh	-	-	$4,655,010	5%	-	-
Yemen	-	-	$3,308,037	4%	-	-
Nigeria	88,631	3%	$2,394,903	3%	0.19	1%
Cameroon	73,471	2%	$1,285,673	2%	0.10	1%
Uganda	63,561	2%	$1,254,771	1%	0.12	1%
Tanzania	61,876	2%	$1,447,155	2%	0.10	1%
Myanmar	43,196	1%	-	-	3.06	20%

NOTE:

1. Only countries where more than three companies have provided data are included in this list.

Further Sales Data Trends and Analysis

The PAYGo Top 10 in Table 7 **is fairly consistent with the figures recorded in July - December 2018, aside from the addition of Togo**, and as always showcases quite different countries compared to the cash rankings. One notable omission is the absence of South Asian countries, to where PAYGo has not yet expanded. **Kenya again leads the pack in this chart, breaking another record and surpassing the 400,000 mark**, building on last round when it registered record sales of 300,000 units. Uganda remains stable in second place with a modest decrease, while Zambia and Rwanda switched positions, both recording significant decreases. Nigeria jumped to fourth place with a significant increase, passing to 45,000 units sold. Ethiopia, Cote d'Ivoire and Myanmar each record quite stable sales. **Examining each country by measuring installed capacity and market value allows clarity on the data.** We see that in Cote d'Ivoire, Tanzania and Togo, large systems are being sold through PAYGo, compared to the value recorded by countries like Zambia, which has almost double the sales volumes but does not reach 1 MW of solar capacity.

Table 7 - Top 10 Country Markets by Volume of Products Sold - PAYGo

Country names	Volume of Products Sold - PAYGo	Global Volume Share - PAYGo	Value of Products Sold - PAYGo	Global Value Share - PAYGo	Newly Installed Capacity (MW) - PAYGo	Global Newly Installed Capacity Share - PAYGo
Kenya	434,524	43%	$82,572,791	38%	7.83	31%
Uganda	115,969	12%	$20,267,981	9%	2.12	8%
Rwanda	62,096	6%	$17,402,231	8%	1.78	7%
Zambia	51,994	5%	$10,040,278	5%	0.82	3%
Nigeria	46,779	5%	$5,801,480	3%	2.15	8%
Ethiopia	42,181	4%	$3,595,846	2%	0.83	3%
Côte d'Ivoire	27,682	3%	$10,639,049	5%	1.38	5%
Tanzania	25,676	3%	$10,859,200	5%	1.73	7%
Togo	24,153	2%	$12,310,423	6%	1.21	5%
Myanmar	16,278	2%	$2,252,264	1%	0.21	1%

NOTE:

1. Only countries where more than three companies have provided data are included in this list.

Further Sales Data Trends and Analysis

East Africa

In **East Africa, Kenya is still dominant with a large increase, breaking the country's record registered last round to almost hit the 1 million mark.** The greatest growth has been recorded in the PAYGo segment, of 45% particularly for systems with panels 21+ Wp. It is also interesting to note that a large percentage growth is also observed for small lanterns without mobile charging, which represented 40% of total sales.

Ethiopia is again the second largest market, seeing stable sales with only minor percentage decrease, recording almost 300,000 units sold. Notably, there is a large increase in sales of solar home systems of 11-20 Wp capacity, which now stands at more than 30,000 units compared to only 10,000 in the previous rounds.

Uganda sees similar results. As the third largest market, with recorded stable sales compared to the last few rounds, it is experiencing starkly different trajectories for cash and PAYGo sales as highlighted in the Top 10 section. Overall the sales of small portable lanterns have increased with the sales of multi-light systems and small solar home systems suffering a 25% decrease. This status is a complete contrast to data reported in the last round, in which cash sales decreased and PAYGo increased in the country. It possibly highlights a seasonal trend, although this remains a hypothesis that will need to be evaluated over time.

In Tanzania, a small decrease in volume is reported in the market, which has been stagnating for the past year. This decrease affects all the segments. **The PAYGo segment has been hit hard with sales halved**, seeing a decrease of 54%. Cash sales remain positive and have increased by 35% the majority of units in the multi-light systems category.

Zambia jumps to fifth place, while seeing a 20% decrease compared to the record sales recorded last round, but still recording higher volumes than the first half of 2018.

In **Rwanda**, sales are again lower than the last half year, but still higher than the first half of 2018.

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Further Sales Data Trends and Analysis

This may be due to the harvest season happening from June onwards. In general, the market comprises of mainly multi-light and solar home systems. Difficulties have been registered across all segments for cash sales which recorded an 89% decrease. The PAYGo segment saw a more moderate 14% decrease.

Somalia's sales once again return to smaller volumes after the outlier of almost 200,000 units recorded last round. **Madagascar and Malawi** show quite notable decreases compared to the results of the 2018 rounds, which were particularly good, going down again to around 10,000 units each. Other country markets like **Burundi, Mozambique or Zimbabwe** do not yet have enough companies reporting to pass three-data point control, so no observations can be made for their trajectories.

West Africa

In **West Africa, Nigeria** remains the largest national market, although sales volumes are slowing down, with around 135,000 units sold. PAYGo and cash products have different trajectories in the country, with the former increasing 44% and the latter recording a 13% decrease. This is reflected also in the categories with the lanterns seeing decreases, while multi-light systems and solar home systems recorded very large increases, especially in the 11-20 and 21-49 Wp categories. In West Africa, few other country markets present comparative volumes or sizes of revenue.

Burkina Faso and Mali record relatively great growth, both surpassing 35,000 units sold. These volumes mainly comprise of portable lanterns and a few thousands of multi-light systems. Cash sales are still predominant in the countries, yet PAYGo sales in Burkina Faso doubled when compared to the latter half of 2018 and quadrupled compared to the first, reaching almost 3,000 units and registering a very steep growth curve.

Senegal shows high volumes again similar to the first half of 2018 and signaling a strong pattern in sales, as it seems that the harvesting season happens in the first half of the year, contrary to East Africa. All the growth can be seen in the cash segment which is still predominant in terms of volumes.

Cote d'Ivoire continues to demonstrate consistent market growth, driven by PAYGo sales which now represent 100% of the total sales. The cash segment recorded no sales, but never represented the majority. Notably, all of the sales are either multi-light systems or solar home systems.

Togo's market continues to go from strength to strength as its success story continues, seeing the majority of the sales financed throughout the PAYGo model.

Benin records large increase in sales, with the majority sold in the multi-light systems segment. **Sierra Leone** and **Ghana** both record around 15,000 units. In general, companies are expanding their businesses in the region, with ever more countries passing three-data point control like **Guinea, Liberia, Niger and The Gambia**. These countries overall present few thousands of units sold.

Central Africa

In **Central Africa**, many countries in the Central Africa region did not pass three-data point control, hindering overall sales visibility.

Cameroon locks in the top spot again with almost 80,000 units sold, registering another large increase which suggests consistent growth over time. The cash segment is still predominant, but the PAYGo segment has doubled, reaching 6,000 units.

The **Democratic Republic of the Congo** (DRC) registers a 30% decrease compared to last round. Meanwhile, due to increased participation in the market, the three point rule has been satisfied. This provides visibility on the different cash and PAYGo markets in the country, with cash currently the dominant market with 23,000 units sold, versus PAYGo at 15,000 units.

South Asia

India, the largest market, reports an overall 20% decrease, with the largest decrease recorded in the lanterns categories, whereas the multi-light and solar home systems have recorded an increase in sales, with the former reaching 92,000 units sold and the latter passing for the first time the 50,000 units sold benchmark. This seems to denote a shift for our affiliates towards larger products.

Further Sales Data Trends and Analysis

Sales pick up again in **Bangladesh**, most likely connected to the refugee crisis as 64% of the total sales are lanterns without mobile charging. This segment had seen no sales in the last reporting round. However, part of the increase in this report is due to the increased participation of companies active in the region, owing to their involvement in the appliances segment. An impressive 62,000 units are recorded from the SHS segment.

For **Pakistan**, after the record sales of the previous rounds, volumes stabilise at around 20,000 units.

East Asia and Pacific

Myanmar is again the largest market in the region, recovering to a level comparable to the first half of 2018, after the large drop recorded last round. This increase is again due to bulk procurements which are under cash sales. The PAYGo segment in the country is stable at around 20,000 units sold.

Papua New Guinea records a 23% increase, reaching over 35,000 units, registering a stable growth over time. The large majority of these systems are portable lanterns, and a large decrease in volume has been recorded in the multi-light systems segment.

The **Philippines and Vanuatu** records sliding sales with numbers falling again to 10,000 units sold. This is not unexpected as these markets are primarily influenced by bulk procurements which are vulnerable to fluctuations over time. It is important to not that these bulk procurements are government-related and are not necessarily used in humanitarian work.

Middle East and North Africa

The **Middle East and North Africa** region is still the third largest regional market, reporting 320,000 units sold. However, **little can be said about what countries contribute to the sales due to the three-data point rule applied in this report**, for most countries in the region less than three manufacturer companies reported sales. Only **Yemen and Lebanon** pass the confidentiality rule, recording respectively 84,000 and 1,000 units sold.

Further Sales Data Trends and Analysis

Table 8 Sales Volumes and Values by Country – Sub-Saharan Africa

	Sales volumes			Values	
Countries	**Total**	**PAYGO**	**Cash**	**PAYGO**	**Cash**
Sub-Saharan Africa	**2,247,272**	**937,618**	**1,309,654**	**199,596,504 US$**	**23,284,892 US$**
East Africa	**1,741,586**	**741,279**	**1,000,307**	**145,596,533 US$**	**17,321,904 US$**
Burundi	-	-	-	-	-
Eritrea	-	-	-	0 US$	0 US$
Ethiopia	293,778	42,181	251,597	3,595,846 US$	5,375,741 US$
Kenya	974,972	434,524	540,448	82,572,791 US$	8,405,237 US$
Madagascar	11,013	-	-	-	196,229 US$
Malawi	8,903	-	-	690,138 US$	-
Mozambique	-	-	-	-	-
Rwanda	65,030	62,096	2,934	17,402,231 US$	16,269 US$
Somalia	38,204	-	-	-	-
South Sudan	-	-	-	-	-
Tanzania	87,552	25,676	61,876	10,859,200 US$	1,447,155 US$
Uganda	179,530	115,969	63,561	20,267,981 US$	1,254,771 US$
Zambia	70,260	51,994	18,266	10,040,278 US$	413,850 US$
Zimbabwe	-	-	-	0 US$	-
West Africa	**356,641**	**167,861**	**188,780**	**43,690,275 US$**	**3,955,099 US$**
Benin	24,244	-	-	851,119 US$	-
Burkina Faso	38,188	2,794	35,394	577,381 US$	566,027 US$
Cote d'Ivoire	27,682	27,682	0	10,639,049 US$	0 US$
Equatorial Guinea	0	0	0	0 US$	0 US$
Ghana	13,702	-	-	3,139,982 US$	-
Guinea	4,367	-	-	-	-
Guinea-Bissau	-	-	-	-	0 US$
Liberia	1,225	-	-	-	-
Mali	35,423	6,517	28,906	3,088,920 US$	467,553 US$
Mauritania	0	0	0	0 US$	0 US$
Niger	3,234	-	-	-	55,661 US$
Nigeria	135,410	46,779	88,631	5,801,480 US$	2,394,903 US$
Senegal	29,572	12,079	17,493	4,733,896 US$	264,346 US$
Sierra Leone	15,821	-	-	875,942 US$	-
The Gambia	734	0	734	0 US$	8,622 US$
Togo	26,809	24,153	2,656	12,310,423 US$	77,036 US$
Central Africa	**125,373**	**20,798**	**104,575**	**8,980,463 US$**	**1,718,673 US$**
Angola	-	-	-	-	-
Cameroon	79,134	5,663	73,471	1,424,076 US$	1,285,673 US$
Central African Republic	-	-	-	0 US$	-
Chad	0	0	0	0 US$	0 US$
Congo, Rep,	-	-	-	0 US$	-
Democratic Republic of Congo	38,147	14,989	23,158	7,502,179 US$	207,281 US$
Gabon	-	-	-	0 US$	-
Southern Africa	**23,672**	**7,680**	**15,992**	**1,329,234 US$**	**-**
Botswana	0	0	0	0 US$	0 US$
Eswatini	-	-	-	-	0 US$
Namibia	-	-	-	-	0 US$
South Africa	20,672	4,680	15,992	1,303,734 US$	-

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The value of products is not presented as a total because it is computed differently for cash and PAYG products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYG products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Further Sales Data Trends and Analysis

Table 9 Sales Volumes and Values by Country – South Asia

	Sales volumes				
Countries	**Total**	**PAYGo**	**Cash**	**PAYGo**	**Cash**
South Asia	**1,157,598**	**10,945**	**1,146,653**	**$2,780,934**	**$33,682,298**
Afghanistan	-	-	-	$0	-
Bangladesh	185,405	-	-	-	$4,655,010
Bhutan	0	0	0	$0	$0
India	953,466	-	-	-	$28,400,177
Nepal	-	-	-	-	$0
Pakistan	17742	-	-	-	$623,888

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The value of products is not presented as a total because it is computed differently for cash and PAYG products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYG products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

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Further Sales Data Trends and Analysis

Table 10 Sales Volumes and Values by Country – Other Markets

	Sales volumes			Values	
Countries	**Total**	**PAYGO**	**Cash**	**PAYGO**	**Cash**
East-Asia & Pacific	**144,203**	**27,653**	**116,550**	**5,606,540 US$**	**2,691,011 US$**
Australia	1,188	0	1188	0 US$	14,622 US$
Cambodia	0	0	0	0 US$	0 US$
China	733	-	-	-	-
Hong Kong SAR, China	7,668	-	-	-	-
Macao SAR, China	-	-	-	-	-
Fiji	-	-	-	0 US$	-
Korea, Dem, People's Rep,	0	0	0	0 US$	0 US$
Korea, Rep,	0	0	0	0 US$	0 US$
Indonesia	-	-	-	0 US$	-
Malaysia	500	0	500	0 US$	-
Myanmar	59,474	16,278	43196	2,252,264 US$	-
New Zealand	0	0	0	0 US$	0 US$
Papua New Guinea	37,298	-	-	-	1,346,747 US$
Philippines	11,087	4,204	6883	1,785,192 US$	246,592 US$
Singapore	**-**	**-**	**-**	**0 US$**	**-**
Thailand	506	0	506	0 US$	-
Vanuatu	9,350	-	-	-	-
Vietnam	0	0	0	0 US$	0 US$
Middle East & North Africa	**410,569**	**7,114**	**403,455**	**709,087 US$**	**15,611,113 US$**
Egypt, Arab Rep,	-	-	-	0 US$	-
Iraq	-	-	-	0 US$	-
Israel	-	-	-	-	0 US$
Lebanon	1,350	-	-	0 US$	-
Qatar	-	-	-	0 US$	-
Syrian Arab Republic	-	-	-	0 US$	-
United Arab Emirates	-	-	-	0 US$	-
Yemen, Rep,	83,846	-	-	-	3,308,037 US$

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The value of products is not presented as a total because it is computed differently for cash and PAYG products given their different nature. For Cash products the value is calculated using the reported FOB price, while for PAYG products the reported total cost of ownership (defined as the average amount of USD received from a customer repaying the product in full and on time without applying a financial discount rate).

Off-Grid Solar Appliances

Behind the numbers

Off-Grid Solar Appliances are defined as energy-efficient electrical appliances that are appropriate for off-grid or weak-grid areas[11] where low capacity power systems are not suitable to support the use of conventional appliances. These devices are typically compatible with a DC-powered system and are more energy efficient than traditional counterparts, allowing relatively lower load energy systems to power them.

Our sector is growing and adapting, as the ways in which solar power is being used in households is diversifying. The growing use of solar home systems (SHS) means that more households across the developing world can not only turn on their lights and charge their mobile phones, but can now also run energy efficient off-grid appliances such as fans and TVs. Technological innovations and new business models have further expanded access to a wider range of solar products, including solar powered water pumps and various types of refrigeration options for domestic and commercial applications.

These developments are life-changing, as off-grid solar appliances can provide new and better quality energy services for domestic and commercial applications. This could unlock new income generating activities or boost the productivity of existing ones, as cited in our most recent 'Powering Opportunity' report. In development terms, improving access to modern energy across the globe increases positive economic returns and boosts health, gender equality, education and contributes to achieving virtually every one of the 17 United Nations' Sustainable Development Goals.

The '2019 State of the Off-Grid Appliances Market' report published by the Efficiency for Access Coalition, highlights that the provision of well designed, efficient and cost-effective appliances is crucial to ensure that households can fully benefit from electrification. Solar water pumps and refrigeration units are also highlighted as two of the promising productive uses which can support livelihoods by another report published by the World Bank Group Lighting Global program, the 'Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa'.

In keeping with the evolution of our sector, the way we track and collect data is also adapting to become more inclusive, involving a broader set of companies in the data collection. **Thanks to the partnership that GOGLA has established with the Efficiency for Access Coalition**, we have expanded the scope of this report, this being the second of its kind to include sales data on a range of off-grid solar appliances, focusing to date on TVs, fans, refrigeration units and solar water pumps. Besides these four appliances types, we are also collecting sales of a wide variety of other appliances (e.g. hair clippers, irons, milling machines etc.); however, these volumes are currently scattered and too small to pass our confidentiality rules. Therefore, the sales volumes of these appliances are currently not included in this report.

The data reporting efforts remain concentrated on increasing participation in the data collection, which has so far brought 72 companies to report sales, a great increase compared to the 59 of last reporting round. **This increasing number of companies allows us to improve our insight into these new frontiers for off-grid solar, in particular for TVs and fans** - which have already gained traction in the market and are often sold by international and local SHS companies as well as local electrical goods stores and markets. **More nascent technologies such as solar water pumps and refrigeration units still represent small markets, and therefore still have few visible data points.**

11 "Off-grid" refers to populations that live beyond the reach of the national grid; "weak-grid" refers to populations that have unreliable grid connectivity and suffer frequent and sometimes lengthy outages.

Behind the numbers

Limitations

At this early stage of data collection for appliances, only a small subset of all available appliances are considered, as we only take into account the solar-powered ones. Our scope is further narrowed to focus in on 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 within refrigeration units, large commercial scale walk-in units are not considered.

At times, too few data points on a specific region, country or product category are available to pass our three-data point rule. This means that at least three separate product manufacturers have reported sales for any single data point to be shown. When there are fewer than three responses for a region, country or product category, no results are shown in order 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, while if there are no companies reporting data at all, the graph shows a value of 0. We are pleased to note that the number of countries passing the three-data point control has already greatly improved compared to the last round of data collection, with 25 countries passing instead of 20, and this trend is expected to keep improving as more participation is leveraged and the nascent appliance markets mature over time.

For the time being, the sales of off-grid solar appliances are collected separately from off-grid solar lighting products sales, without distinguishing if appliances are sold bundled with SHS or standalone with own panels. Efforts will be made to link these two segments to identify key connections and trends in future rounds.

This report does not collect data on appliances such as electric cookers or air conditioners, which are desirable by off-grid household but yet require more energy and higher peak power to function, making them more difficult to integrate with existing SHS packages. Such products are part of the appliances market but have not yet reached volumes high enough to be considered in the current data collection scope. This decision will be revisited over time.

Off-Grid Solar Appliances Highlights

Key Figures

Sales refer to all off-grid solar appliances[12] reported sold by participating affiliates[13] in the period between January 1st-June 30th, 2019.

Global Sales Highlights

730,000
off-grid solar appliances sold

535,00
units have been sold as cash products

195,000
units sold via Pay-As-You-Go (PAYGo)

190,000
TVs sold

530,000
fans sold

3,000
refrigeration units sold

3,000
solar water pumps sold

Regional Sales Highlights

120,000
East African sales volumes of off-grid solar appliances

60,000
West African sales volumes of off-grid solar appliances

14,000
Central African sales volumes of off-grid solar appliances

520,000
South Asian sales volumes of off-grid solar appliances

10,000
East Asian and Pacific sales volumes of off-grid solar appliances

12 All off-grid solar appliances refer to the TVs, fans, solar water pumps and refrigeration units sold targeting customers living in off- or weak-grid areas.

13 Affiliates include GOGLA members, companies selling products that meet Lighting Global Quality Standards, and appliance companies that participated in the Global LEAP Energy Efficient Appliance Awards or are engaging with the Low Energy Inclusive Appliances (LEIA) programme.

Market Insights

All Off-Grid Solar Appliance

Global and Regional Insights
The phrase 'all off-grid solar appliances' refers to the sum of all TVs, fans, solar water pumps and refrigeration units reported as sold by affiliates in this time period.

Largely thanks to increased participation from companies in this round of data collection, the total recorded sales of all appliances have passed the 700,000 mark, more than doubling from last round, which recorded 345,000 units only. This is mainly caused by more participation in the fans segment, which caused the reported sales to grow from less than 200,000 units to over 530,000.

Following a similar trend as the off-grid solar lighting products market, the data underscores the prominence of PAYGo sales in Sub-Saharan Africa and the dominance of cash sales in South Asia. This is due to the fact that the latter region is composed of largely cash-based economies fuelled by the sales of low-cost fans and, unlike the African market, mobile money - a key component enabling PAYGo - is not widely used in the region.

TVs and fans represent 99% of all the reported sales. It is important to note that for these two appliances, we have better coverage and visibility as they are already embedded in the market and often sold bundled by SHS companies participating in this data collection. Larger and even more nascent technologies such as solar water pumps and refrigeration units still represent small markets and have few visible data points.

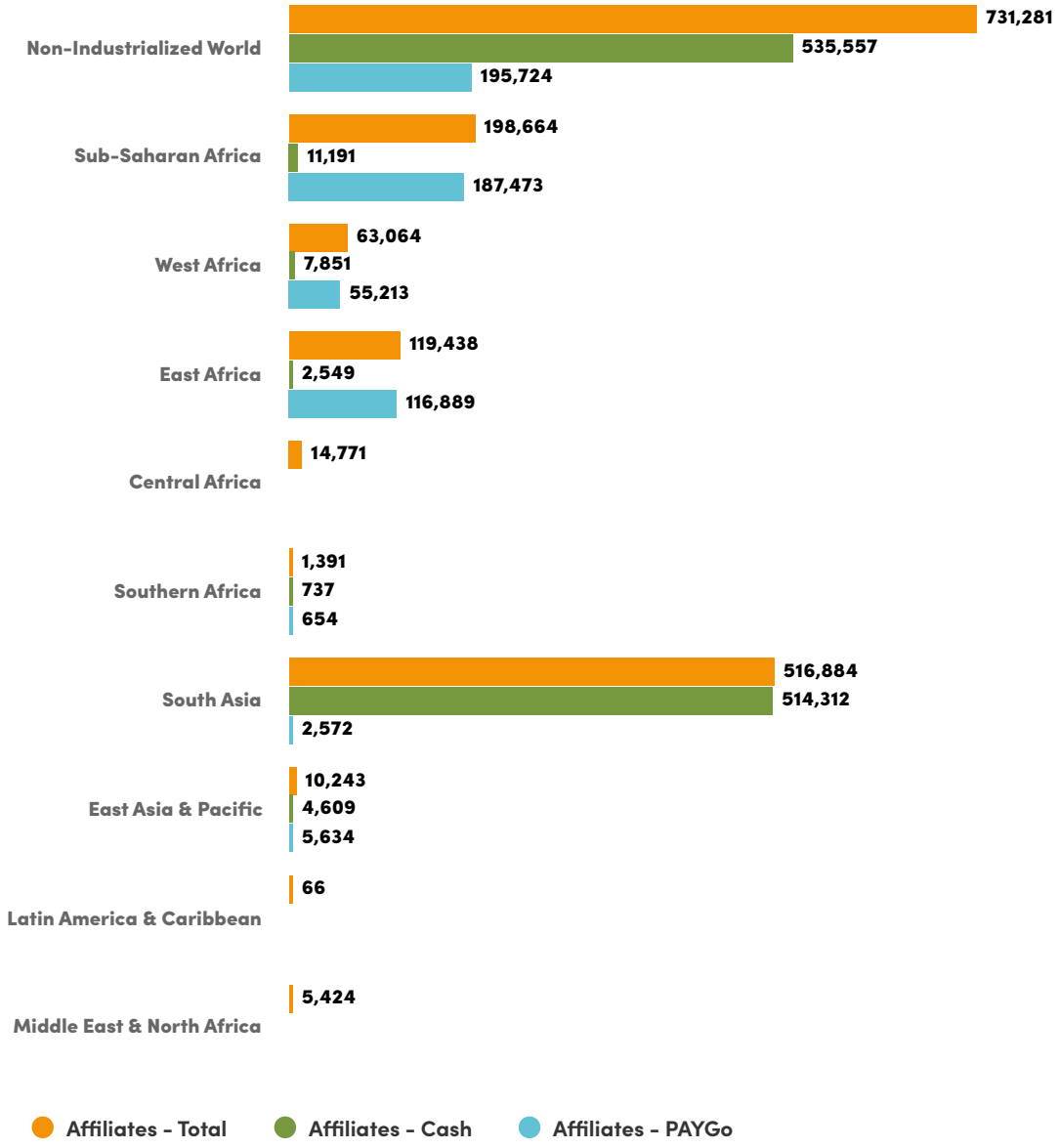
Appliance sales data points shown in Figure 25 indicate that appliances represent an overall primarily cash sales business. Yet, it is critical to note that this aggregate insight is largely driven by reported sales of fans in South Asia. Fans are the most inexpensive appliance of those considered for this report, and are thus more readily affordable for low-income cash buyers. **Fans account for 98% of the total cash sales worldwide reported by our affiliates**.

Excluding fan sales from the overall sales statistics, PAYGo seems to be just as crucial for the bulk of appliance sales as it is for SHS, making up 96% of sales of TVs, refrigeration units and solar water pumps. Notably, this number is significantly higher than the figure reported last round, which amounted to 87%. In this data collection period the second round of Global LEAP Results Based Financing (RBF) for TVs, fans and refrigerators was still in effect. This incentive programme was launched by the Efficiency for Access Coalition to support the deployment of high-performance appliances identified in the 2016/2017 Global LEAP awards for TVs, fans[14] and refrigerators[15]. This RBF incentivised the purchase of 230,000 appliances comprised of TVs, fans and refrigerators across Bangladesh and East Africa.

14 Efficiency for Access Coalition, 2017 Global LEAP Awards Buyer's Guide - Fans and Televisions, 2017. Full report here: https://efficiency-foraccess.org/publications/2017-global-leap-awards-buyers-guide-fans-and-televisions.
15 Efficiency for Access Coalition, 2017 Global-LEAP-Buyers-Guide-Refrigerators, 2017. Full report here: https://efficiencyforaccess.org/publications/global-leap-buyers-guide-refrigerators

Market Insights

Figure 25 - Volume of Products Sold per region – All Off-Grid Solar Appliances



NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

Market Insights

Country Insights

This reporting round achieved sales visibility for appliances in 25 countries, improving on the 20 countries featured in the last round.

As Table 11 shows, Pakistan remains the largest market for appliances, with the majority of sales being fans, followed by Bangladesh, also primarily recording fan sales, and then Kenya, which sold mainly TVs. It was crucial to leverage more participation in the data collection from companies operating in Bangladesh, which was not visible at all last round. There is a large gap between the first three markets and all the others, which each recorded under 25,000 units sold. It is possible that there is a data gap for India as, although it was identified as a leading market in the market assessments, we received few reported sales in this data collection. Both GOGLA and the Efficiency for Access Coalition have planned strategic activity in the country to increase participation and offer increased visibility in future rounds.

Table 11 - Sales Volumes by Country – All Off-Grid Solar Appliances

Country	Total	Cash	PayGo
Pakistan	383,263	-	-
Bangladesh	117,490	-	-
Kenya	77,708	-	-
Cote d'Ivoire	22,824	-	-
India	16,050	-	-
Tanzania	15,646	0	15,646
Uganda	14,697	121	14,576
DRC	14,039	0	14,039
Senegal	10,094	-	-
Ghana	8,826	-	-
Rwanda	5,982	-	-
Nigeria	5,402	4,145	1,257
Mali	4,581	1,198	3,383
Zambia	3,923	-	-
Vanuatu	3,904	-	-
Philippines	3,098	-	-
Myanmar	1,732	-	-
South Africa	1,390	736	654
Ethiopia	727	-	-
Cameroon	690	-	-
Burkina Faso	599	-	-
Malawi	542	-	-
Benin	355	-	-
Madagascar	187	-	-
Zimbabwe	19	-	-

Market Insights

TVs

TVs are one of the most desired appliances by off-grid households and businesses, as reinforced by findings over the years in Efficiency for Access Coalition surveys[16]. The '2019 State of the Off-Grid Appliance Market Report' has found that consumers view television ownership as a reflection of economic and social status, and a critical access point to information and entertainment.[17]

In this section, the results presented are based on the sales of TVs by affiliates, broken down into the following product categories based on the diagonal screen size, as measured in inches:

- Small, screens between 12" and 17"
- Medium, screens between 18" and 23"
- Large, screens between 24" and 29"
- Extra Large, screens larger than 30".

Global and Regional Insights

The data in Figure 26 shows that TVs are mostly sold on a PAYGo basis with Sub-Saharan Africa, specifically East Africa, making up the lion's share of all TVs sold at 92% of the total.

In terms of the diversity of product categories, the majority of TVs sold seem to fall in the large and medium categories (Figure 27). This may be driven by a variety of factors. One rationale is that there is not usually a dramatic increase in price or energy consumption with a larger TV compared to a smaller one, therefore customers may choose to opt for a larger TV. Other drivers for such customer decisions are social ones, like the fact that a larger TV can benefit a larger group of people at a time, and are more likely to be used for commercial, as well as domestic purposes, though these factors can only be reviewed on a case-by-case basis. It is also quite clear that there is almost no market for small TVs, as the extra large ones make up almost double the sales.

Regionally, the same trends as we see globally prevail, with sales of large and medium TVs registering as most popular, and frequently being sold along with SHS. Within East African sales, large TVs represent 60%, and medium TVs 24%.

In West Africa, on the other hand, the TVs sold are mostly large at 45%, and medium size with a 40% market share. The data for East Asia and Pacific in Figure 29 also show that the most common units sold are in the medium and large categories.

As Figure 29 shows, within Sub-Saharan Africa, most of the sales are from East Africa, totaling 136,000 units. This is likely due to the fact that East Africa is the most mature market for SHS sold via PAYGo business models, and is the region where the Global LEAP RBF incentives for TVs were available since late 2017.[18]

West Africa is overwhelmingly represented by PAYGo TV sales, with no cash sales reported. Compared with the second half of 2018, sales have increased in all regions, with the exception of East Asia and Pacific. However, since the region often has bulk purchases driven by government tenders, the fluctuation between rounds is not uncommon, as can be seen in the data for the same region in this report's lighting section.

One particularly high peak in the sales data belongs to the West Africa region, where figures almost doubled to reach over 50,000 units sold, driven by the large increase of SHS sales reported in the region. Another key consideration for West Africa is that, anecdotally, companies reported that the first half of the year is stronger in sales in the region due to the predominantly single annual crop harvest bringing more cash into the pockets of customers. Also, an increasing number of members reported sales in Central Africa, enabling the region to pass the three-data point control and reveal almost 15,000 units sold during the period. A large relative increase has been recorded in South Asia as well, although it is still small in absolute terms since the total sales in the region amount to little more than 6,000 units, compared to 1,000 units last round. This particular sales boost can be traced back to increased participation of companies in the region.

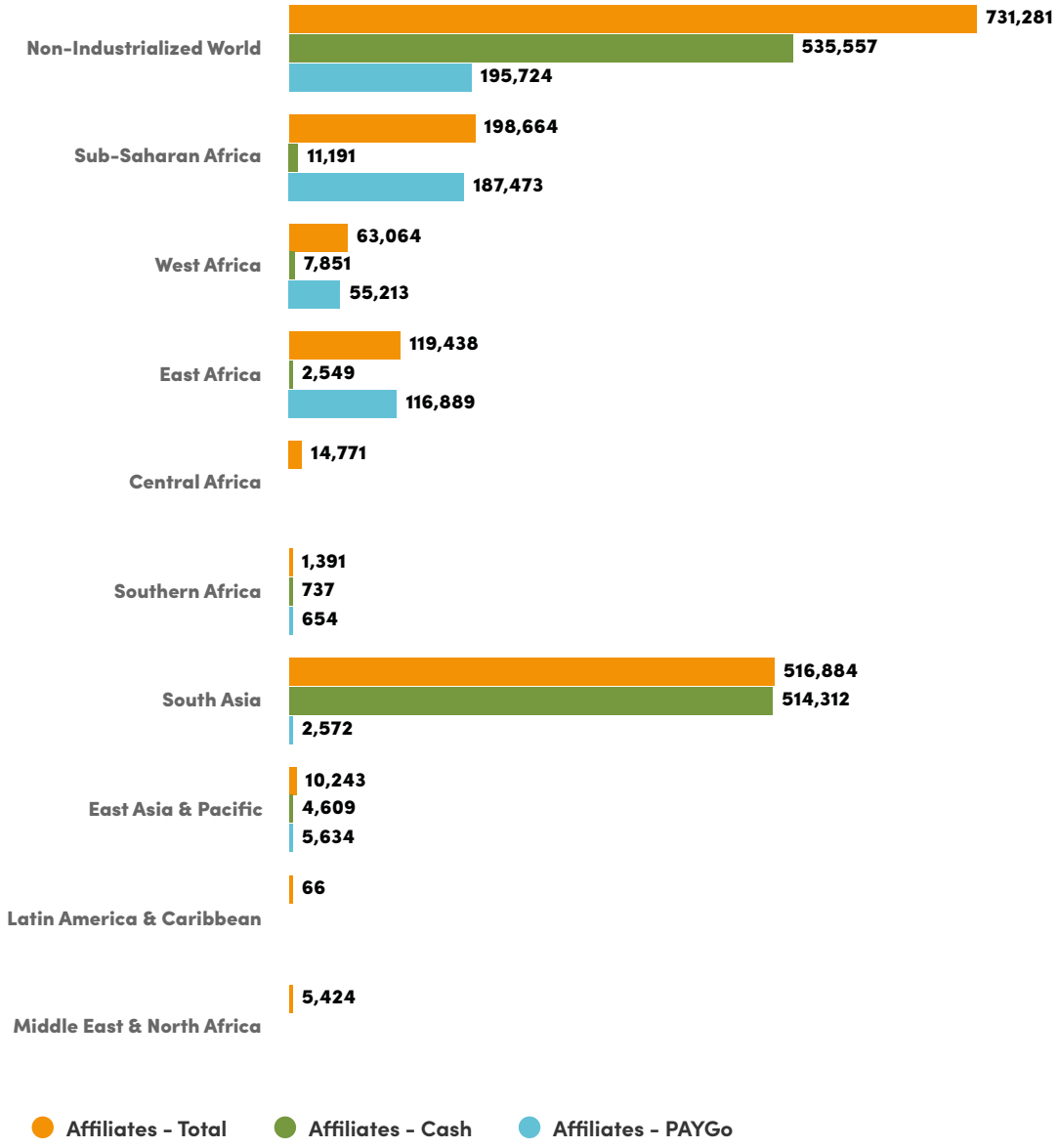
16 Efficiency for Access Coalition, Off-Grid Appliance Market Survey, 2018. Full report here: https://efficiencyforaccess.org/publications/off-grid-appliance-market-survey

17 Efficiency for Access Coalition, 2019 State of the Off-Grid Solar Market Report, 2019. Full report here: https://www.efficiencyforaccess.org/2019-state-of-the-off-grid-appliance-market-report/

18 Efficiency for Access Coalition, 2017 Global LEAP Awards Buyer's Guide - Fans and Televisions, 2017. Full report here: https://efficiencyforaccess.org/publications/2017-global-leap-awards-buyers-guide-fans-and-televisions.

Market Insights

Figure 26 - Volume of Products Sold per region – TVs

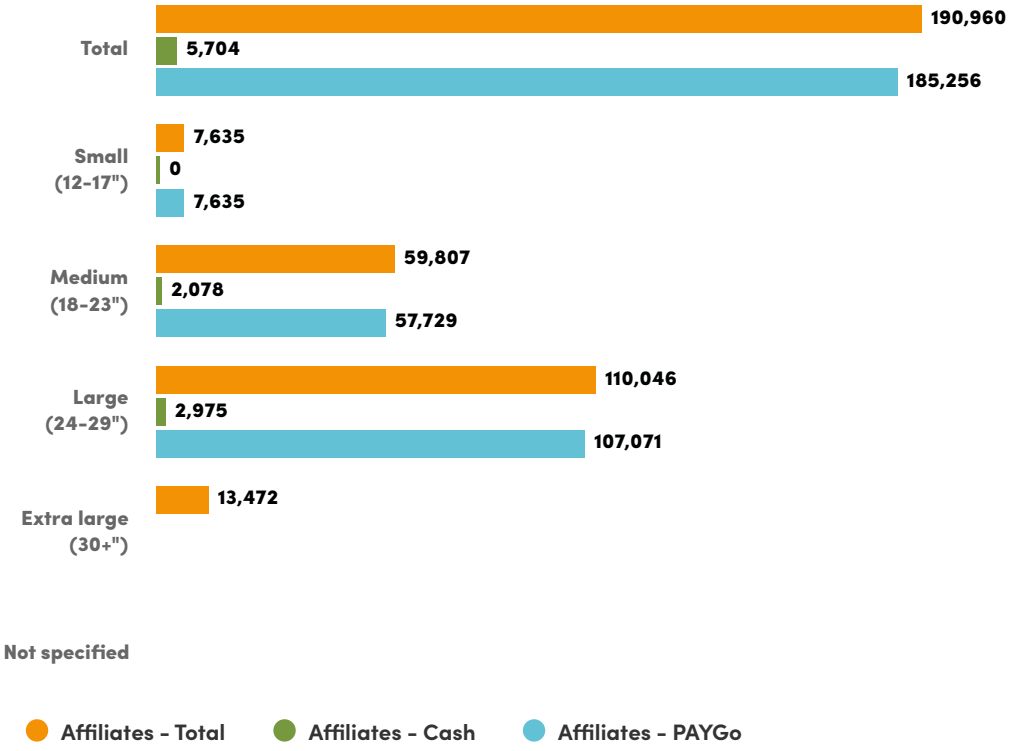


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

Market Insights

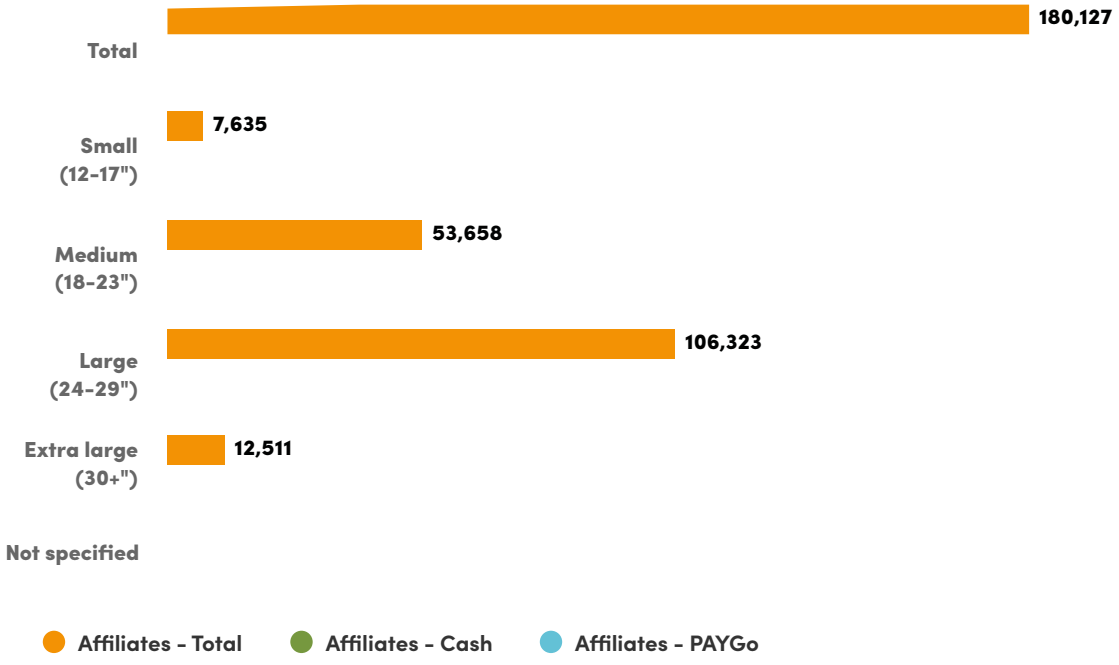
Figure 27 - Volume of Products Sold Globally by Product Category - TVs



NOTE:
1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYGo is shown only if both segments passed the three-data point control.
3. The segmentation of sales is done on the basis of the diagonal display size (in inches).

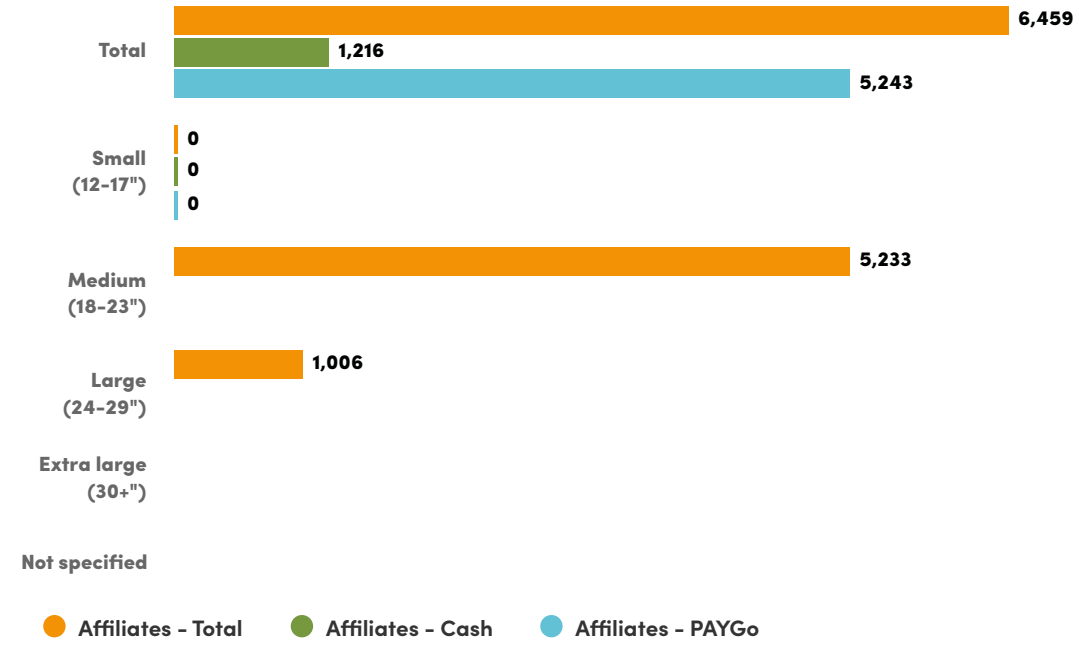
© RAL Consumer Products

Figure 28 - Sales Volumes by Product Category – Sub-Saharan Africa – TVs



NOTE:
1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYGo is shown only if both segments passed the three-data point control.
3. The segmentation of sales is done on the basis of the diagonal display size (in inches).

Figure 29 - Sales Volumes by Product Category – East Asia and Pacific - TVs



NOTE:
1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control
3. The segmentation of sales is done on the basis of the diagonal display size (in inches).

Market Insights

Country Insights

In this round, a total of twelve countries passed the three-data point control, the same as the last round. There was a switch in country focus as visibility was gained on Mali, Tanzania and the Democratic Republic of the Congo (DRC), with the latter being a quite large market; on the other hand, some countries that last time were visible, are now obscured by the three-point rule so nothing can be said about their evolution (Pakistan, Papua New Guinea, and the Philippines) – other than they each amounted to 1,000 units sold in the second half of 2018.

Breaking down the data by country, Kenya has the majority of reported sales, representing 38% of all reported TV sales worldwide. These sales are all made through PAYGo business models, a predictable data point as Kenya is the oldest PAYGo-enabled market housing the largest number of existing players, thanks to its early - and by now comprehensive - mobile money penetration.

Table 12 - Sales Volumes by Country – TVs

Countries	Total	Cash	PAYGo
Kenya	74,032	0	74,032
Cote d'Ivoire	18,825	0	18,825
Tanzania	15,128	0	15,128
Uganda	14,004	0	14,004
DRC	13,963	0	13,963
Senegal	9,450	0	9,450
Rwanda	5,962	-	-
Vanuatu	3,904	-	-
Zambia	3,559	0	3,559
Mali	3,383	0	3,383
Myanmar	1,732	-	-
Nigeria	1,075	0	1,075

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

However, sales register only a slight increase in Kenya, amounting to 10%, **while larger percentage increases can be seen in Cote d'Ivoire 50%, in Rwanda 42%, and in Senegal an impressive 570% sales boost.** These increases are connected to the trends identified for growing volumes of SHS in the countries, as TVs are often sold bundled or as an upgrade of these systems. In fact, Cote d'Ivoire has reported consistent growth in the SHS segment, indicating it is a high potential growth market, and Senegal achieved volumes as high as in the first half of 2018 in the lighting segment, signaling a strong pattern in sales following the strongest harvesting season in the first half of the year. Only in Rwanda, the story seems to be a bit different than in the SHS segment, which has seen a decrease in this reporting round compared to the previous one. This is possibly explained by company sales tactics, which may be focusing on selling TVs to existing customers rather than enlarging their customer base.

Around **30% decreases are reported across Uganda, Nigeria, Zambia and Vanuatu.** It is likely that these decreases are only incidental, and as these are nascent markets with limited data points, it is too early to definitively identify trends in these countries.

Market Insights

Fans

For rural off-grid households, air conditioners are far too expensive and use too much energy to be supported by SHS.[19] Fans are therefore the only currently realistic means of cooling that is within reach, and in the long-run they still represent what is likely to be the most cost-efficient cooling solution for off-grid populations in hot and humid climates.[20] This is crucial and potentially life-saving in South Asia, across a considerable portion of West Africa and many countries in East Asia and Pacific. In this subsection, results are presented based on the sales of fans by affiliates. Sales are broken down in the following three product categories, further categorised based on the diameter in inches where possible:

- Table fan, a smaller-diameter propeller-bladed fan having two or more blades and intended for use with free inlet and outlet of air. Although these are almost wholly free-standing on a table, they may also be bracket-mounted for wall or ceiling mounting.

- Pedestal fan, a propeller-bladed fan having two or more blades mounted on a pedestal of fixed or variable height and intended for use with free inlet and outlet of air.

- Ceiling fan, a propeller-bladed fan having two or more blades with a device for suspension from the ceiling of a room so that the blades rotate in a horizontal plane.

Global and Regional Insights

In terms of global sales, **the majority of fans were sold on a cash basis** (Figure 31). **The lower price of the technology relative to other off-grid solar appliances enables rural customers to buy fans without any consumer financing.** This trend largely reflects the reality in South Asia, even if the split cash/PAYGo data is not available due to a lack of companies reporting on the PAYGo segment. The predominance of cash sales also reflects the significance of sales in established markets in this region, where both on and off-grid fan products are sold over the counter through household electrical goods retailers and component based solar retailers.

Compared to the second half of 2018, sales have increased across all regions. It is, however, difficult to say with certainty which areas saw an increase in sales due to increased participation, especially in South Asia, and give greater visibility of data satisfying the three-point data rule.

Consistent with the previous reporting round, South Asia again represents the largest market, registering over 510,000 units sold. Given the heat waves experienced and expected increase in several countries within the region and beyond[21] the sales of such appliances is highly likely to increase and even accelerate over time. Demand for solar energy in certain countries is largely driven by the need for cooling, for example in Pakistan and much of South India, where average temperatures can reach as high as 50°C .

Conversely, only 13,000 units were reported across Sub-Saharan Africa, with the majority of these are also sold on a cash basis, contrary to the general preference of PAYGo in the region. The sales in Sub-Saharan Africa are predominantly in West Africa, where the humid climate conditions push demand for fans, while the vast majority of East Africa enjoys more mild climate conditions and consequently demand is smaller.

However, this can be dramatically different in specific areas of certain countries (e.g. the coastal regions of Kenya and Tanzania) and could be exacerbated by climate change effects in the coming years.

In terms of the diversity of product categories sold, Figure 32 shows that 65% of the global market share belongs to ceiling fans, driven by South Asia (as visible from Figure 33). Globally, second place goes to table fans with 19% of the market and to pedestal fans with 16% respectively - again, the same order as witnessed in the South Asia region. This reporting round, we are able to show the split for almost all categories in Sub-Saharan Africa where pedestal fans dominate.

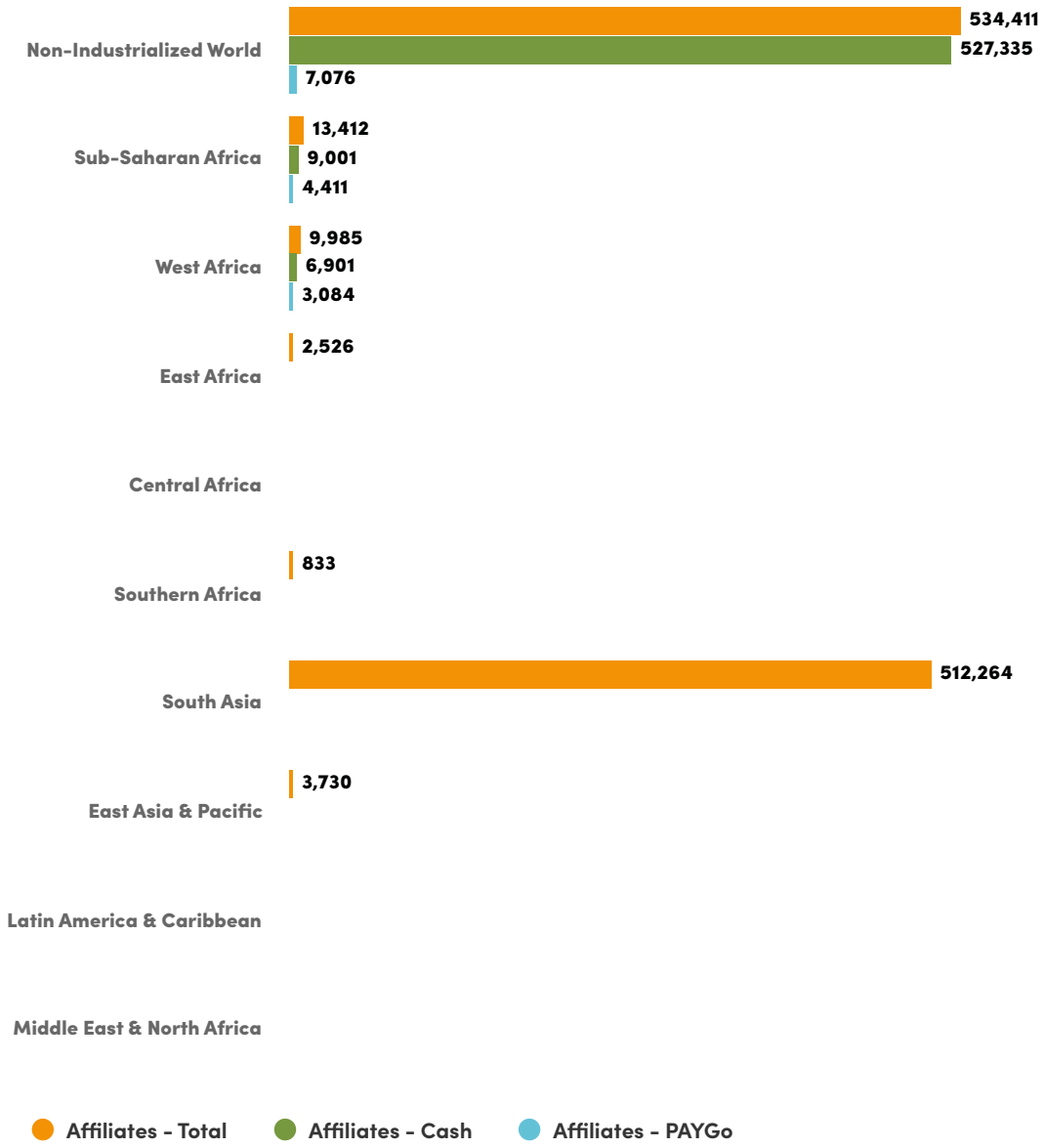
19 Efficiency for Access Coalition, Off-Grid Fan Quality Testing in Pakistan, 2019. Full article here: https://medium.com/efficiency-for-access/off-grid-fan-quality-testing-in-pakistan-fce8364721e0

20 Efficiency for Access Coalition, Appliance Data Trends, 2018. Full report here: https://storage.googleapis.com/e4a-website-assets/Efo-rA-ApplianceDataTrendsReport-Sept7.pdf

21 CNN, At least 36 people dead in one of India's longest heatwaves, 2019. Full article here: https://edition.cnn.com/2019/06/14/india/india-heat-wave-deaths-intl/index.html

Market Insights

Figure 30 - Volume of Products Sold per region – Fans

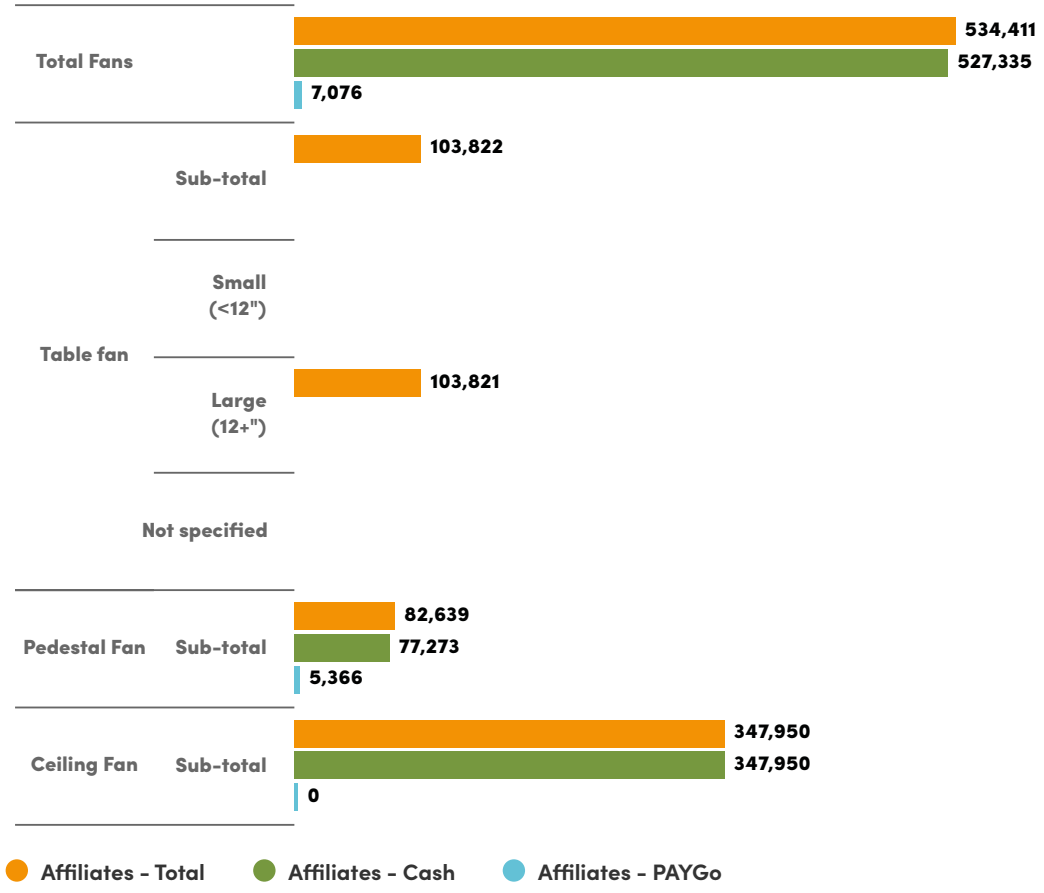


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

Market Insights

Figure 31 - Volume of Products Sold Globally by Product Category – Fans

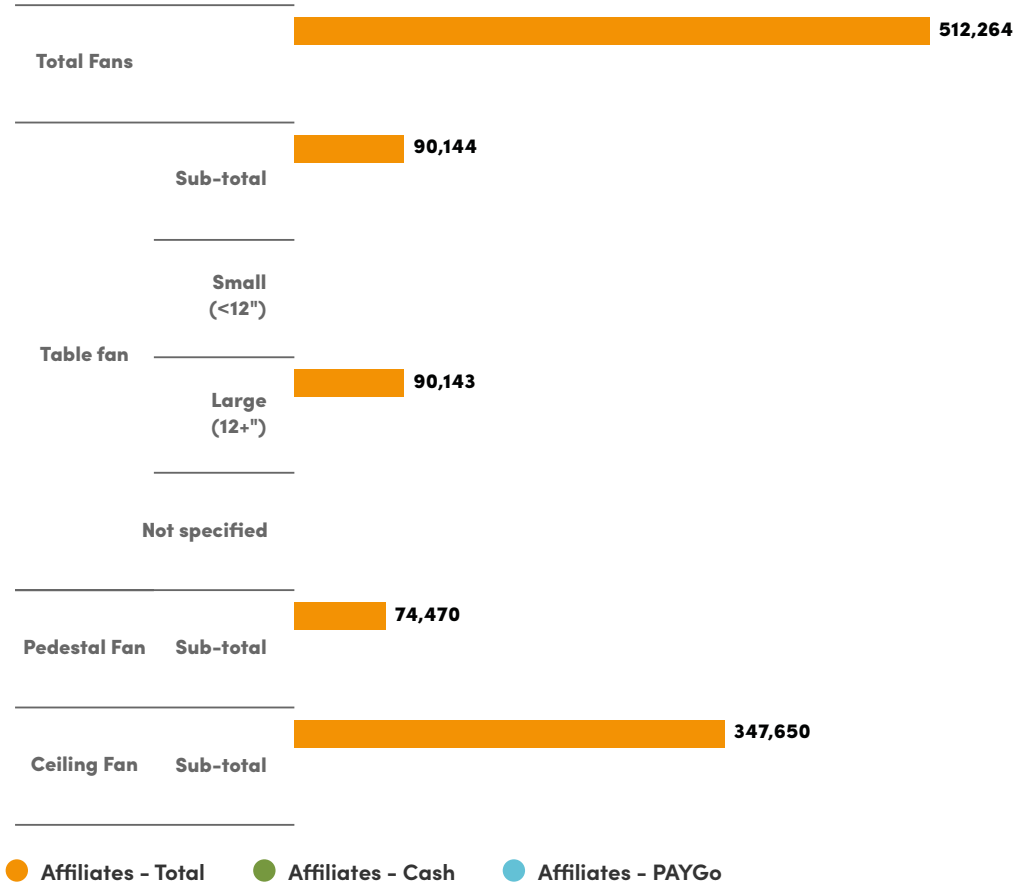


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYGo is shown only if both segments passed the three-data point control.
3. The segmentation of sales is done on the basis of the diameter (in inches).

Market Insights

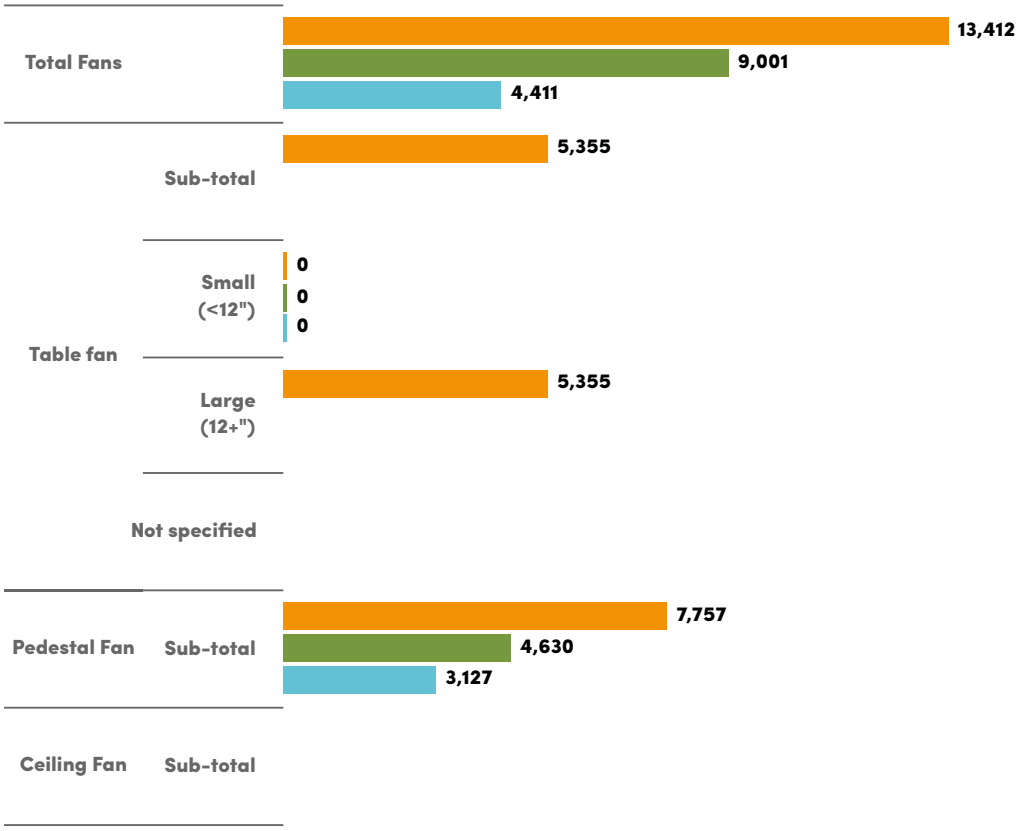
Figure 32 - Sales Volumes by Product Category – South Asia – Fans



NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYGo is shown only if both segments passed the three-data point control.
3. The segmentation of sales is done on the basis of the diameter (in inches).

Figure 33 - Sales Volumes by Product Category – Sub-Saharan Africa – Fans



© GOGLA/Jeffrey M. Walcott

Market Insights

Countries Insights

The total number of countries which pass three-data point control amounts to 7, more than double the 3 reported last round, largely thanks to the increase in participation. It is important to note that some countries such as Bangladesh, India and

Pakistan have well established and highly reputable local fan manufacturing industries which marks the region as different from all other markets covered in this report, which only sell imported fans. Pakistan still holds the record for the highest sales, followed by Bangladesh which was absent in the last reporting round. We expect more countries to gain visibility in the coming reports. However, the lack of company diversity prevents all the other markets shown in Table 13 passing the three-data point control to form further breakdowns. For Pakistan and Bangladesh, it is not yet possible to compare results as they are appearing for the first time in the appliance section of this report.

Sales see a dramatic increase in Nigeria, which achieved a four-fold increase since the 1,000 units sold last round.

India is the only country where sales decrease, dropping by half, from 30,000 units to a few more than 15,000 this round. As aforementioned, it is possible that there is a data gap for India as, although it was identified as a leading market in the market assessments, there are few reported sales in data collection. Both GOGLA and the Efficiency for Access Coalition have planned strategic activity in the country to increase participation and offer increased visibility in future rounds.

Table 13 - Sales Volumes by Country – Fans

Countries	Total	Cash	PAYGo
Pakistan	383,243	-	-
Bangladesh	113,865	113,865	0
India	15,135	-	-
Nigeria	4,193	-	-
Cote d'Ivoire	3,968	-	-
Kenya	1,669	-	-
South Africa	883	-	-

NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

Market Insights

Refrigeration Units

As of yet, off-grid refrigeration units (RUs) still have a very low penetration rate and this report finds small sales volumes. There are various barriers to developing commercial markets for RUs at the household and micro enterprise level, including lack of affordable products and access to customer financing, high cost of energy supply, and difficulty of last-mile transportation.[22] Products reported here are designed to be suitable for off-grid settings, and are therefore more efficient and run on less power than conventional RUs. The largest commercial market for the units reported here is currently for the medicine and vaccine refrigeration cold chain, which is dominated by bulk purchases for institutional use. Existing and new companies are evolving and adapting current designs to meet the needs of the mass market and to leverage both off-grid solar systems themselves and also the distribution, sales, finance and after-sales infrastructure to accelerate access.

Generally, RUs are designed based around having one or both of the following types of compartments:

- Fresh-food compartments, defined as a compartment for the storage and preservation of unfrozen food and beverages, where the storage temperature is between +2°C and +8°C.

- Freezer compartments, defined as a compartment for the storage and preservation of frozen food and beverages where the storage temperature is not warmer than –6°C.

This subsection presents sales of RUs by reporting affiliates, broken down into the following three product categories, and further segmented based on their size in litres where possible:

- Refrigerators: with one or more fresh food or vaccine compartments.

- Refrigerator-Freezer Combination Units: with at least one fresh food compartment and at least one freezer compartment.

- Multi-Temperature Refrigerator: with one or more compartments that can be operated either as a refrigerator or freezer by adjusting the thermostat control

Global, Regional and Countries Insights

RUs are currently rarely included with SHS packages, although this has recently begun to change. As such, most units are sold on a cash basis, and lower numbers are reported in the PAYGo section. However, a large increase of the PAYGo section can be observed, likely due to Results Based Financing (RBF) programmes[23] that have been launched by members of the Efficiency for Access Coalition, incentivising off-grid solar sector companies to increase their adoption of refrigerators into their product and service offerings to accelerate customer's access to high quality energy efficient cooling appliances. Further growth of this segment is expected to be fostered by 2019-20 Global LEAP RBF incentives which will be available for the procurement of best-in-class solar off-grid refrigerators identified as Winners or Finalists of the 2019 Global LEAP Awards in Bangladesh, Kenya, Tanzania, Rwanda, and Uganda.[24]

The cash sales segment for RUs consists largely of institutional sales which typically fluctuate from each half year. In particular, during our last reporting round, large volumes were anecdotally attributed to institutional sales for ensuring vaccine preservation in West Africa, which did not materialise this round, causing the overall sales of RUs to be half of the volumes reported in the second half of 2018.

Sub-Saharan Africa is still the dominant market for the sale of RUs, with 99% of almost 3,000 units sold globally, as shown in Figure 35. In this reporting round, we can see East Africa take the lion's share, with West Africa following. Central Africa and South Asia contribute around 100 units to the total, while other regions do not have enough contributing companies to pass the confidentiality rule.

Compared to the second half of 2018, sales in East Africa increase by 300%. In contrast, West Africa sees a 72% decrease due to the lack of the institutional sales reported last round.

The only two countries that pass the three-data point control are Kenya, registering 446 units and Uganda, totaling 298 units. This is to be expected

22 Efficiency for Access Coalition, Appliance Data Trends, 2018. Full report here: https://storage.googleapis.com/e4a-website-assets/EforA-ApplianceDataTrendsReport-Sept7.pdf

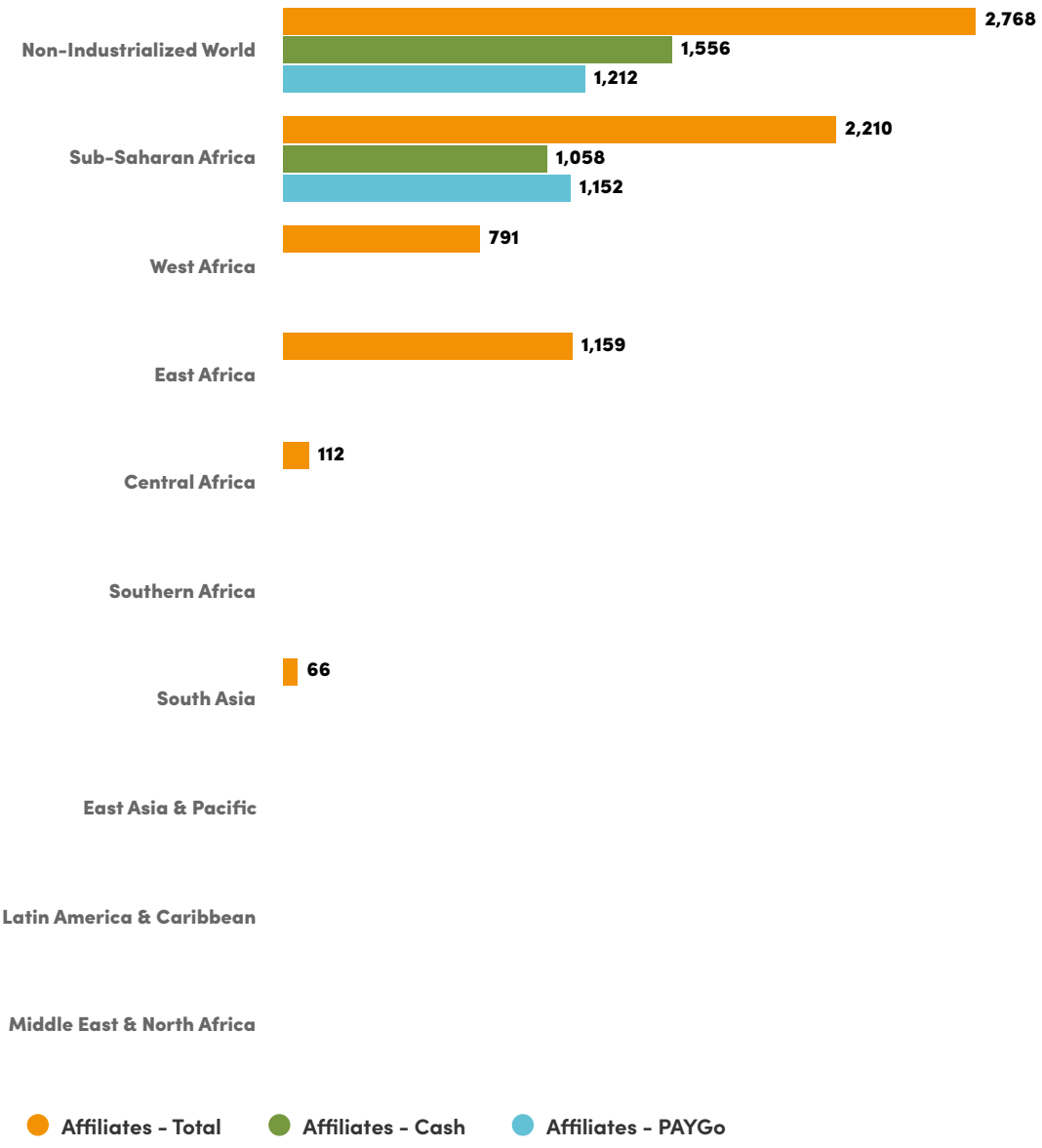
23 Efficiency for Access Coalition, 2017 Global-LEAP-Buyers-Guide-Refrigerators, 2017. Full report here: https://efficiencyforaccess.org/publications/global-leap-buyers-guide-refrigerators

24 Global Leap Awards, Results-based financing. 2019-20 - Refrigerators & Solar Water Pumps, 2019. Full article here: https://globalleapawards.org/results-based-financing

as this is still a very new market. As the market evolves we will see more country markets passing the three-data point control and being reported on in this market data analysis.

The most common RU product category is refrigerators, as in the last round - meaning units with one or more fresh food compartments but no freezer compartments. These appliances account for 66% of all sales (Figure 36). Most of these refrigerators are medium sized (51-100 litres), probably because they are well suited to households, small businesses and institutional use. No split can be offered this round, though, for multi-temperature units and refrigerator-freezer combination units, which offer more flexible usage as they combine the possibility of preserving fresh food with the freezer function.

Figure 34 - Volume of Products Sold per region – Refrigeration Units

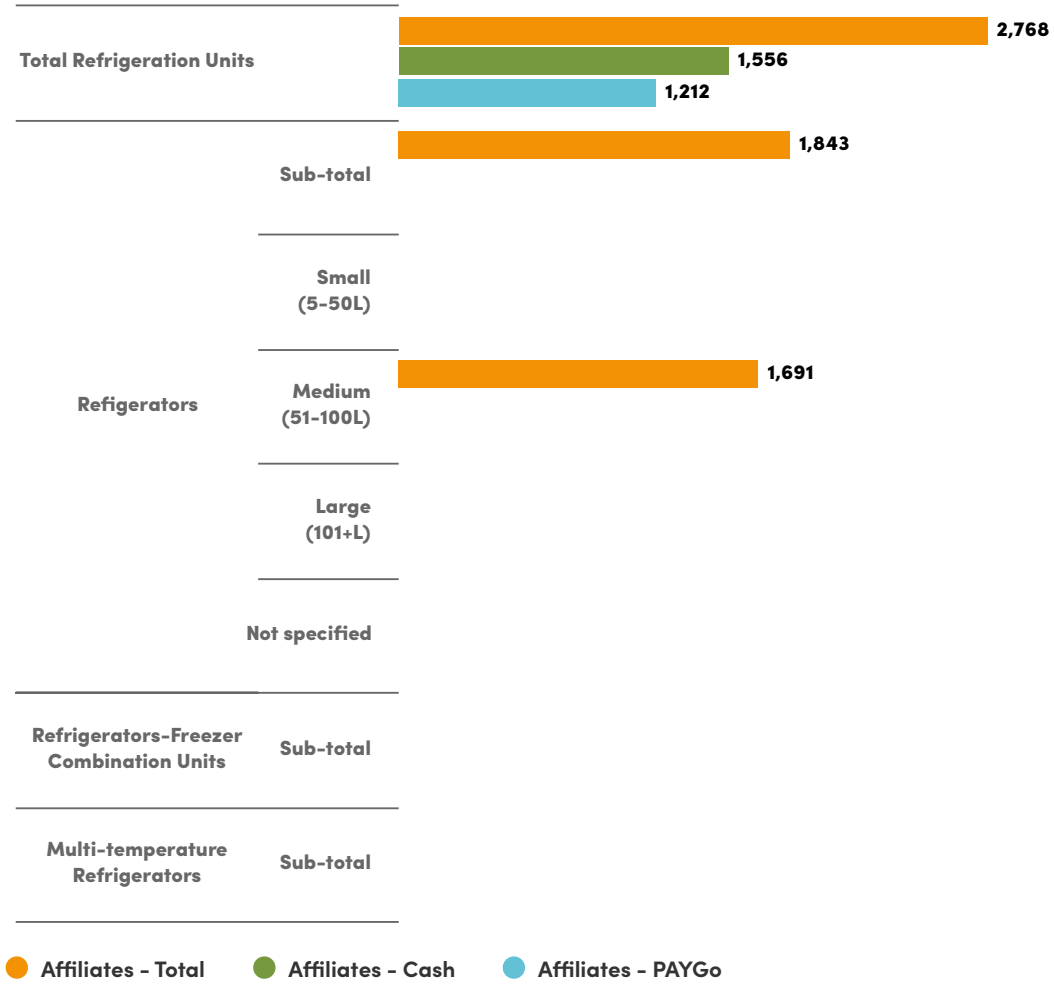


NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

Market Insights

Figure 35 - Volume of Products Sold Globally by Product Category – Refrigeration Units



NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYGo is shown only if both segments passed the three-data point control.
3. The segmentation of sales is done on the basis of the size (in liters).

Market Insights

Solar Water Pumps

The agricultural sector employs 40% of the world's population and many of the world's smallholder farmers, especially those in remote locations, have no access to energy. Approximately 95% of the land in Sub-Saharan Africa and 60% of the land in South Asia relies on unpredictable seasonal rainfall to meet irrigation needs.[25] Solar Water Pumps (SWPs) have the potential to increase agricultural yields by as much as two to three fold, depending on the crop and climate, and they are starting to become commonly available in the off-grid appliance market. A new report from the Efficiency for Access Coalition estimates the total addressable market for small-scale solar water pumps in sub-Saharan Africa and India is USD 15.6 billion, representing 4.9 million units.[26]

However, the sales volumes are still relatively small, due to a number of barriers to the development of commercial markets for the sales of SWPs at the small-holder farmer and micro-enterprise level. These are: lack of affordable products and consumer financing, low awareness and availability of technology local to intended users, water scarcity, and complexity of use of this technology, among others.[27] Growth of this segment is expected to be fostered by 2019-20 Global LEAP Results Based Financing (RBF) incentives which will be available for the procurement of best-in-class SWPs identified as Winners or Finalists of the 2019 Global LEAP Awards in Bangladesh, Kenya, Tanzania, Rwanda, Uganda, Zambia, and Senegal.[28]

This subsection presents the sales of SWPs by affiliates; all products reported here are DC-powered, submersible or surface water pumps, designed to be suitable for off-grid settings. In particular, we are focused on sales of pumps powered by solar panels with less than 3kW capacity, as larger ones are normally used in institutional, community or commercially managed contexts, whereas we are targeting commercial mass markets, such as those for small-holder farmers and micro-enterprises. Currently, key SWPs markets are dominated by products which are outside the parameters of the data presented here. For example, in India most of the sales of water pumps are larger than 3kW capacity and although there are significant volumes of solar water pumps, the majority of these are not solar-powered, while solar water pump markets across Africa and off-grid regions globally are focused on high-cost boreholes, institutional, community or commercial-industrial applications.

Unlike other off-grid solar appliances in this report, these are not broken down with further product categorisation as the types within this report's focus are not currently being sold in sufficient volumes to be reported due to our confidentiality rule.

Global, Regional and Countries Insights

SWPs, due to location-dependent factors such as availability of water, crop and climate that inform their size and usage, are not regularly included within SHS packages.

PAYGo solutions contributed to 70% of the sales, thanks to the innovation brought by companies specialising in agricultural productive assets which have integrated remote monitoring. This a large increase compared to the last round, in which PAYGo accounted for only 35% of the total sales.

As Figure 37 shows, **Sub-Saharan Africa accounts for the majority of the units sold, making up 92% of the total sales. Within this region, East Africa is responsible for the lion's share of the sales**. An increased number of active companies have reported sales in both West Africa and South Asia, which now also pass three-data point control but only reveal small volumes being sold.

Compared to the second half of 2018, overall sales record a decrease of 25%, largely due to a drop in sales in East Africa.

The commercial mass market for SWPs segment is still very nascent and this fact is evidenced by only three countries passing three-data point control; led by Kenya with 1,561 units sold, followed by Uganda with 395 units and Bangladesh with 166 units. As the market evolves, we look forward to seeing more country markets passing the three-data point control.

25 GOGLA, How solar water pumps are pushing sustainable irrigation, 2019. Full article here: https://www.gogla.org/about-us/blogs/how-solar-water-pumps-are-pushing-sustainable-irrigation?platform=hootsuite

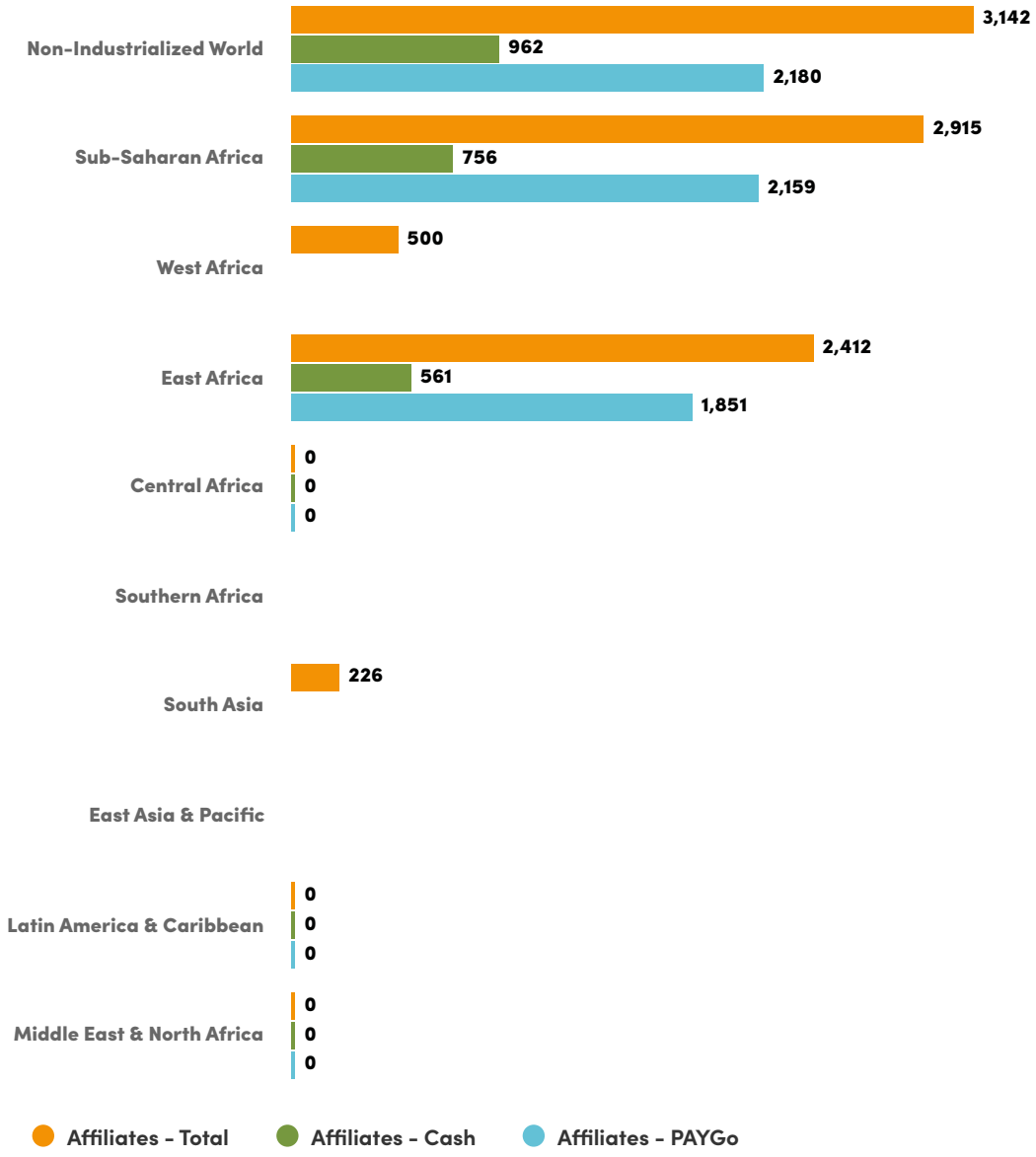
26 Efficiency for Access Coalition, Solar Water Pump Outlook 2019: Global Trends and Market Opportunities, 2019. Full report here: https://efficiencyforaccess.org/publications/solar-water-pump-outlook-2019-global-trends-and-market-opportunities

27 Efficiency for Access Coalition, Tanzania Market Snapshot: Horticulture Value Chains and Potential for Solar Water Pump Technology, 2019. Full report here: https://storage.googleapis.com/e4a-website-assets/SWP_MarketSnapshot_Tanzania.pdf

28 Global Leap Awards, Results-based financing. 2019-20 - Refrigerators & Solar Water Pumps, 2019. Full article here: https://globalleapawards.org/results-based-financing

Market Insights

Figure 36 - Volume of Products Sold per region – Solar Water Pumps



NOTE:

1. Data is not shown for categories for which insufficient or no data points were provided.
2. The split Cash/PAYG is shown only if both segments passed the three-data point control

Impact Metrics

Introduction to Impact Metrics

Impact is calculated using the Standardised Impact Metrics for the Off-Grid Solar Energy Sector[29] first launched in 2015 and revised in September 2018. These metrics provide a framework for the off-grid solar sector to collectively estimate its social, economic and environmental impact in a consistent and comparable way.

The metrics help build the evidence base for the many benefits that off-grid solar lighting 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 a review of publicly available data and 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.[30]

The impact estimates for this reporting round were calculated by applying these standardised impact metrics to the off-grid solar lighting products sales reported by affiliates. The impact of sales between January and June 2019, as well as all sales of off-grid solar lighting products reported by participating companies in previous reports, are included in these calculations.

Please note that impact created by off-grid solar appliances is not included in this section as metrics have not yet been created for this segment; the impacts detailed refer only to the impact of off-grid solar products. Efforts will be put to create such metrics for appliances in the coming years.

The following pages present the aggregated impact of affiliates. This matrix of companies includes 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) programme. 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.** Based on previous analyses by Dalberg Advisors for the Off-Grid Solar Market Trends Report 2018, we estimate that the data reported here represents the impact of about 30% of all global sales of solar lanterns and multi-light systems (<11Wp) and 60-80% of SHS with over 11 Wp solar panels. This representative proportion varies significantly from country to country as one can see in Table 3.

This report takes a conservative approach to data inclusion and may underestimate the total impact of participating companies. To estimate when a product reaches 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. 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. With each reporting round, new information becomes available and GOGLA's impact metrics are continuously improved and revised. Therefore it is important to note that the numbers presented are estimates, and may change as new evidence becomes available.

29 GOGLA, Standardised Impact Metrics for the Off-Grid Solar Energy Sector, Version 3.0, 2018. Full report here: www.gogla.org/gogla-impact-metrics

30 IRIS+, The Global Impact Investing Network Impact Toolkit. For more information, please visit: https://impacttoolkit.thegiin.org/

Introduction to Impact Metrics

List of Impact Metrics

The following table gives an overview of all the metrics for which the estimated results are presented in this report. All metrics, 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.[31]

Please note that all numbers calculated using the metrics should be expressed as estimates.

1ai.	**Number of people with improved energy access[32], 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)
1aii.	**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)
1bii.	**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 CO2 and black carbon averted due to reduction in kerosene use (in CO2e) 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
6aii.	**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[33] , per household; over expected lifetime of solar product
7aii.	**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

31 GOGLA, Standardised Impact Metrics for the Off-Grid Solar Energy Sector, Version 3.0, 2018. Full report here: www.gogla.org/gogla-impact-metrics

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

33 Change in energy expenditure calculated using expenditure on lighting and phone charging only

Impact Metrics Highlights

Key Impact Estimates

Impact estimates relate to all off-grid solar lighting products reported sold to date by participating affiliates[34] (as of June 2019).

279.9 million
people who have ever lived in a household with improved energy access[35] (e.g. high quality solar) thanks to all products sold since July 2010

109.3 million
people with improved energy access currently, considering only the off-grid solar lighting products within their estimated lifetime

65.5 million
people currently accessing Tier 1 energy services, based on the Sustainable Energy for All Global Tracking Framework

6.6 million
people currently accessing Tier 2 energy services, based on the Sustainable Energy for All Global Tracking Framework

2.7 million
people using their SHS to support an enterprise (e.g. charging phones for a fee or operating a bar, restaurant or shop/stall at night), considering only the off-grid solar lighting products within their estimated lifetime

5.1 million
people currently undertaking more economic activity as a result of using off-grid solar lighting products

2.8 million
people spending more time working as a result of using off-grid solar lighting products

$4.9 billion
additional income generated as a result of off-grid system ownership, over the expected lifetime of all off-grid solar lighting products sold since July 2010

$10.5 billion
savings on energy expenditure, over the expected lifetimes of all solar lanterns or multi-light systems sold since July 2010

63 billion
additional light hours used across all households, over the expected lifetime of all off-grid solar lighting products sold since July 2010

24 million
kerosene lanterns no longer in use because users have replaced them with off-grid solar lighting products

66.4 million
metric tons of CO_2 and black carbon averted due to reduction in kerosene use (in CO_2e), cumulatively, over the expected lifetime of all off-grid solar lighting products sold since July 2010

34 Affiliates include GOGLA members, companies selling products that meet Lighting Global Quality Standards, and appliance companies that participated in the Global LEAP Energy Efficient Appliance Awards or are engaging with the Low Energy Inclusive Appliances (LEIA) programme.

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

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Why is there a difference between the cumulative and current energy access figures?

The number of people currently benefiting from off-grid solar lighting products sold by affiliates is almost 40% of those who, cumulatively, have benefitted from improved energy access. The difference between the two estimates arises from the conservative way that GOGLA reports impact data, incorporating a product 'end of life' period into the measurement that is equal to 1.5 times the warranty. This is usually between two and five years. After that point, no further impact is reported for that product. However, it is likely that a significant number of the products are continuing to benefit households beyond this period, or that these households may have continued to use solar products not captured in this exercise.

Global Analysis of Estimated Impact

Right now, the off-grid solar sector is providing over 100 million people around the world with access to energy, and that number is growing. The total number of people that have been reached by off-grid solar lighting and electrification to date stands at 279.4 million. This represents an impressive 14% sector growth compared to the previous report.

Once again there has been a significant growth in the number of sales of larger SHS. Sales of these systems have seen a boost of 40%, resulting in an approximate one third increase in the number of people with access to Tier 2 level energy services. This means that over 6.5 million people now have enough energy each day to power a range of appliances such as TVs and fans. The number of people globally with access to Tier 1 energy services is also growing due to the increased sales in the smaller SHS segment. Compared to our previous reporting round, there are 10% more people with access to Tier 1 energy services, bringing the total to 65.5 million.

At GOGLA we understand the power of off-grid solar economically empower its customers. Owning a solar product provides access to modern energy which in turn unlocks economic opportunity for off-grid solar customers and their households. Since July 2010, an estimated $4.9 billion in additional income has been generated as a direct result of off-grid system ownership. In terms of economic activity, this translates into 2.8 million people spending more time working, 3.4 million people opening a new business and 2.7 million people using their product to support their enterprise. Overall, the number of people undertaking more economic activity increased, reaching 5.1 million.

The reduction in kerosene usage that results from the increased use of solar systems stands currently at 66.6 million metric tons of carbon dioxide and black carbon emissions avoided (measured in CO2e). To put that into perspective: that's equal to over 14 million vehicles taken off the road for a year.

Moreover, the hours of light available and used through their solar systems continues to increase as well. It has now reached a total of 1,088 hours of light per household per year. These lights also shine brighter by providing an improved quality of light. Across all system types the average improvement compared to traditional sources like kerosene in lumen outputs - a measure of brightness - is 88 lumens.

Impact Metrics Highlights

Figure 37 - People with Improved Energy Access – Cumulatively

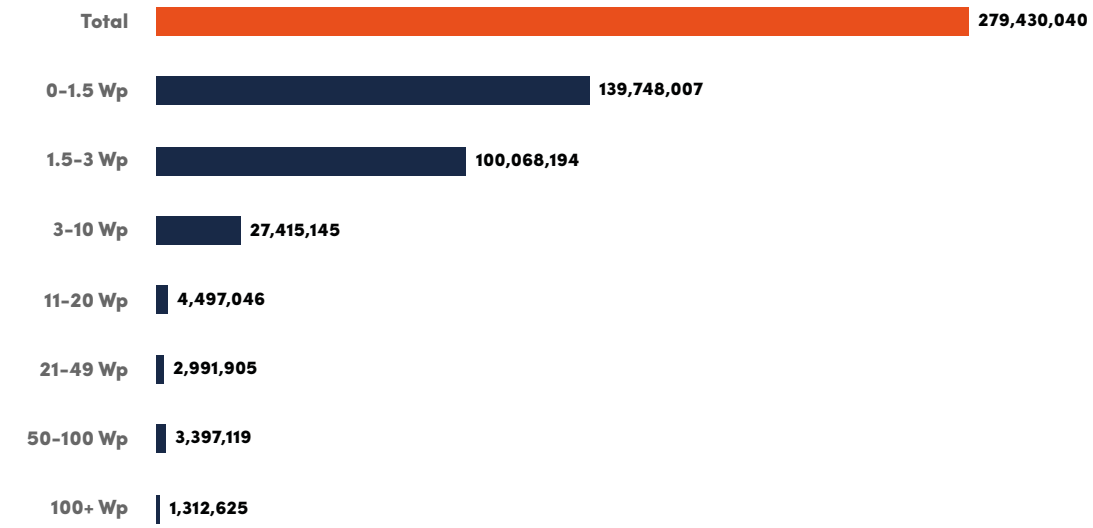
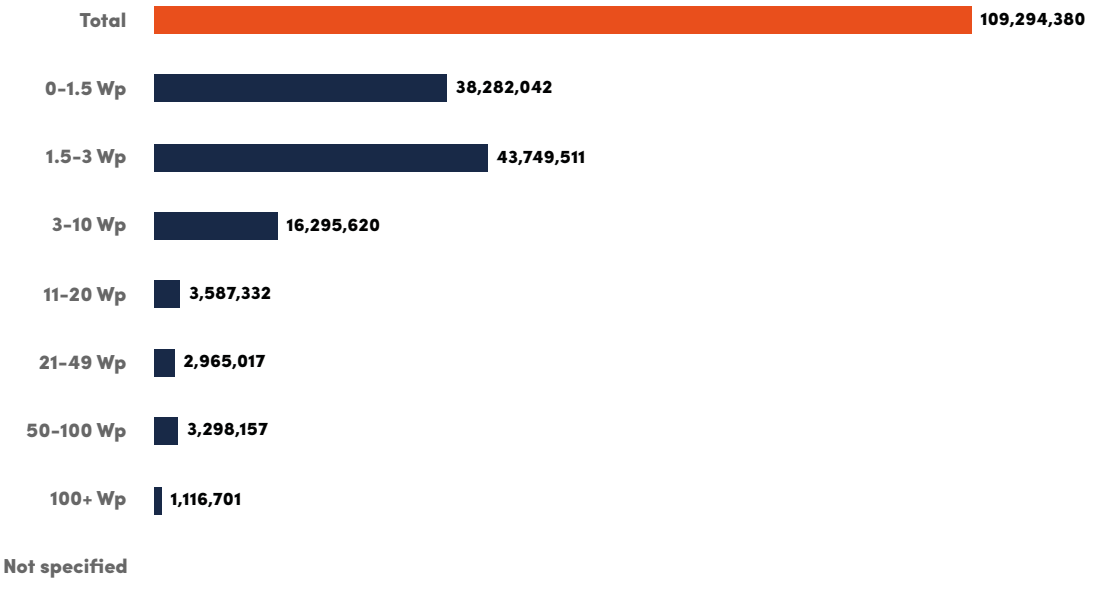
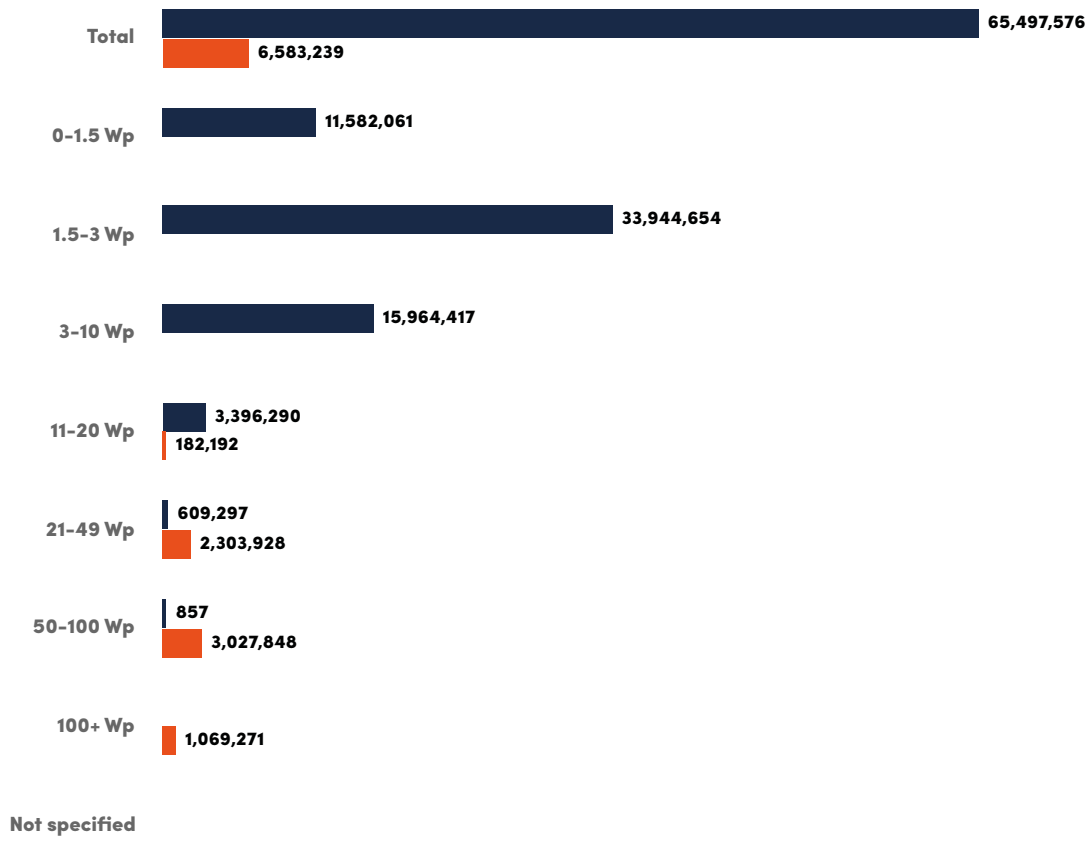


Figure 38 - People with Improved Energy Access - Currently



Impact Metrics Highlights

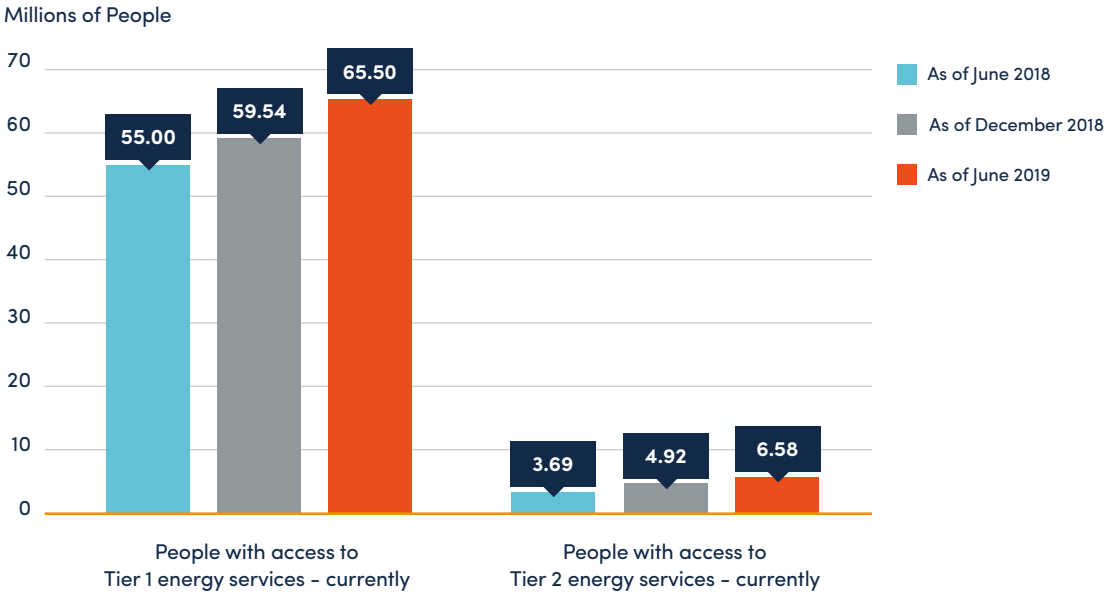
Figure 39 - People with Access to Tier 1 and Tier 2 Energy Services (According to SEforALL Methodology)



NOTE:

1. The Global Tracking Framework was introduced by the UN's SEforALL program and comprises five tiers which address a previous shortfall in energy access categorization. Before the framework was introduced, a household either had a grid connection or it was unconnected i.e. electricity access was seen as binary. The framework includes a more nuanced approach, starting with Tier 1 as the most basic energy access of task lighting and phone charging, progressing up to Tier 5 which describes general home lighting system, television and fan, plus any other high power appliance.

Figure 40 - Semi-annual Evolution of Tiers of Energy Services



Impact Metrics Highlights

Figure 41 - People Undertaking More Economic Activity

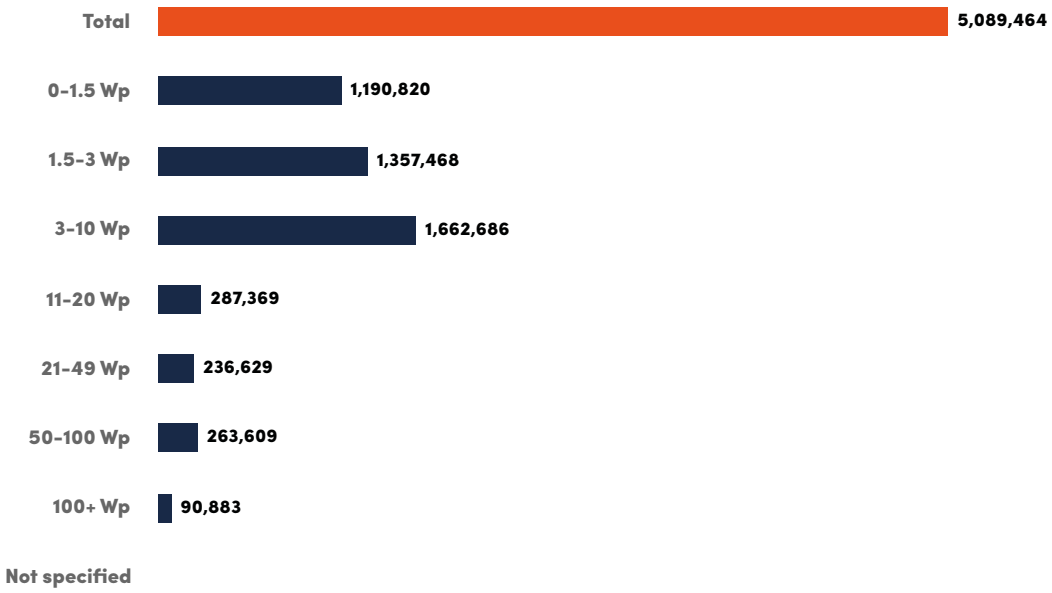
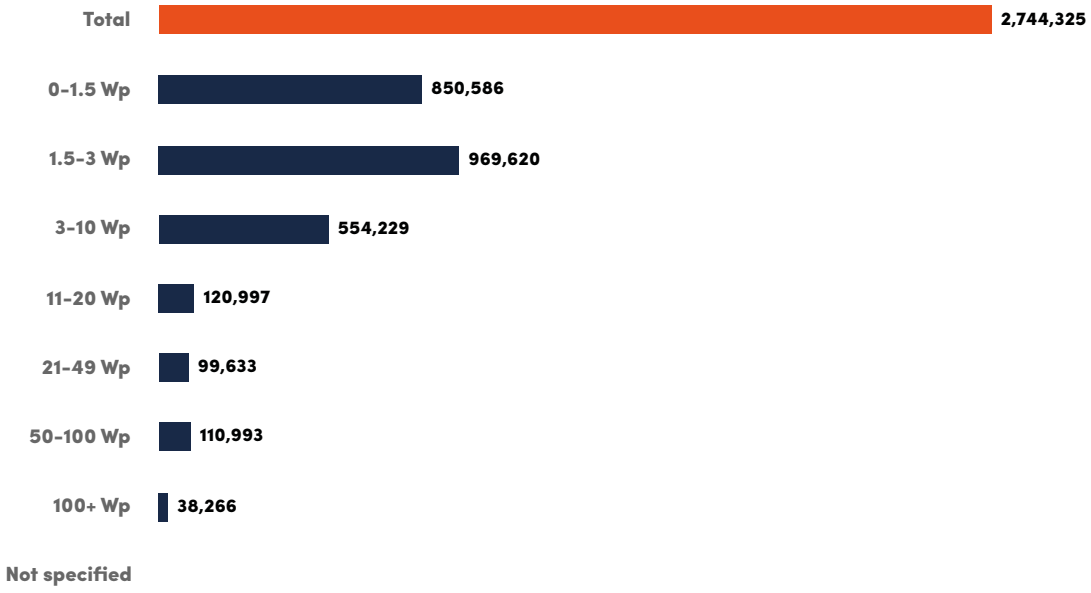


Figure 42 - People Using Products to Support Enterprise



Impact Metrics Highlights

Figure 43 - People that Spend More Time Working

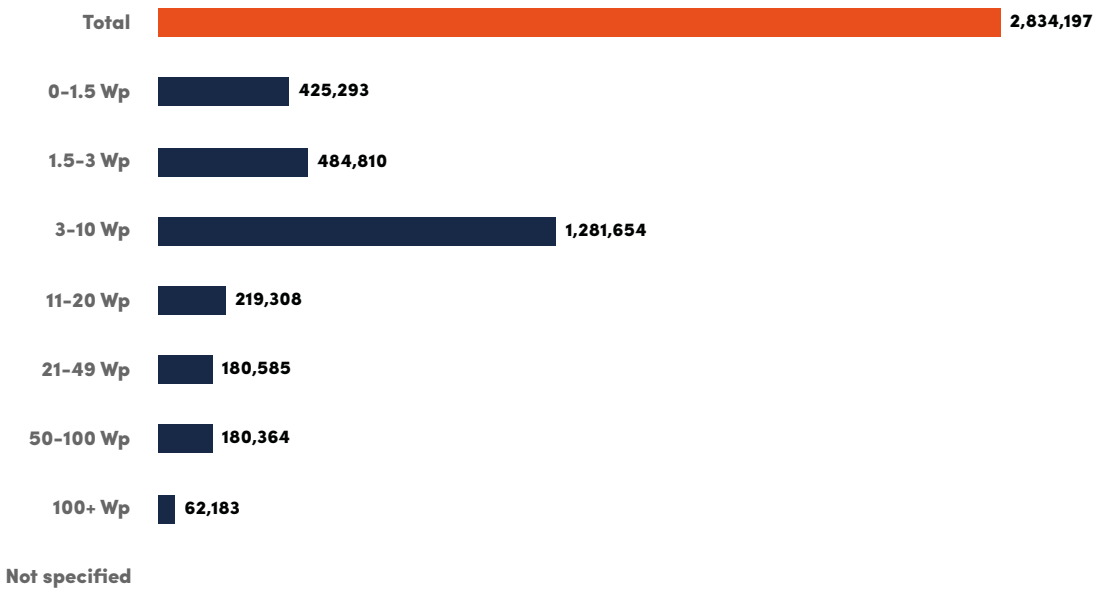
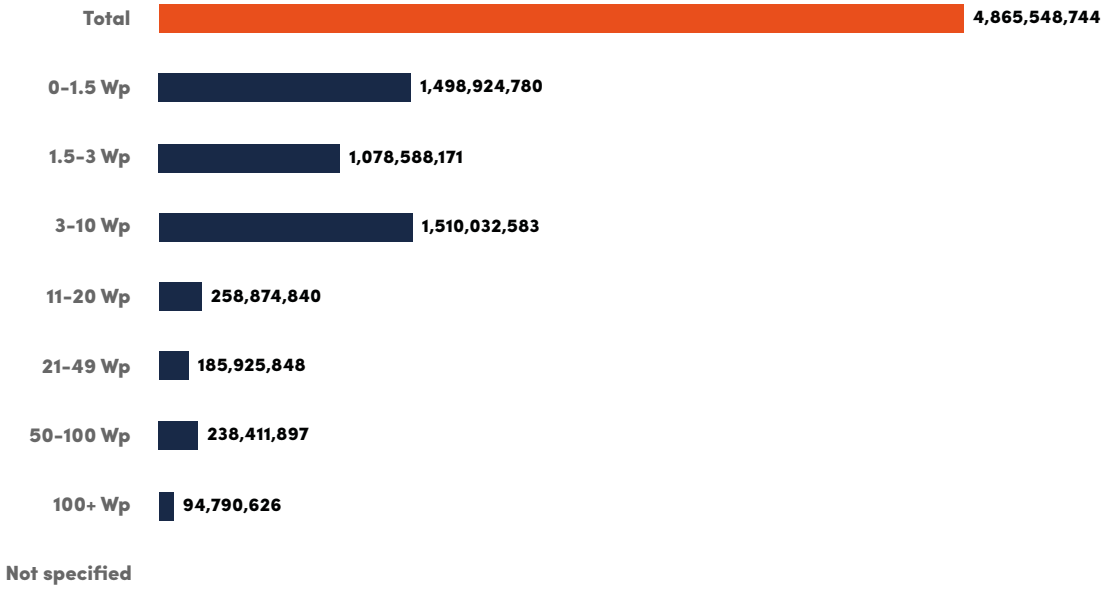


Figure 44 – Additional Income Generated



Impact Metrics Highlights

Figure 45 – Kerosene Lanterns Replaced

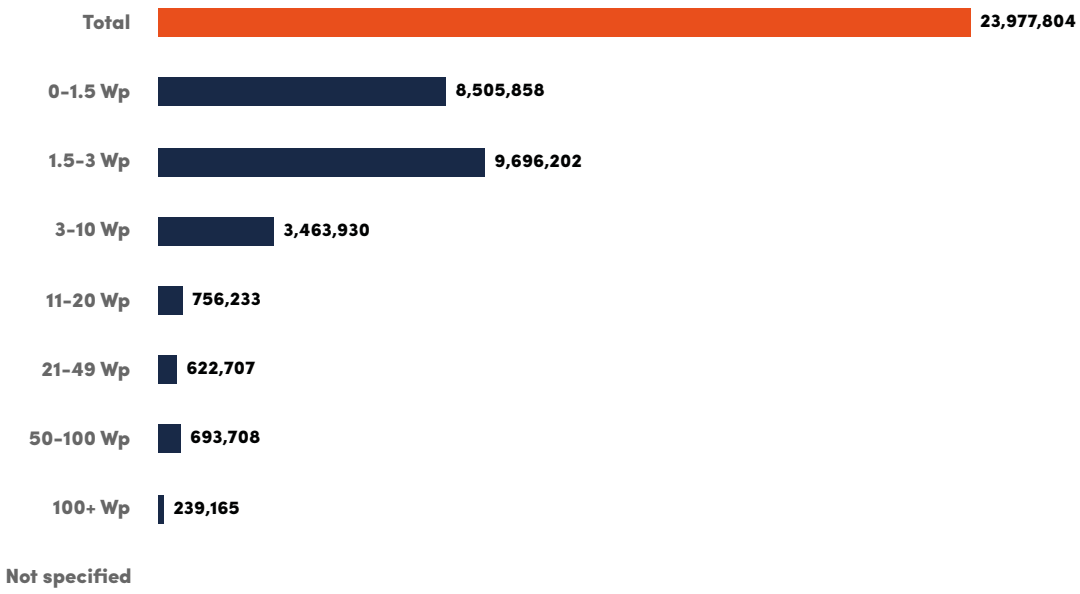
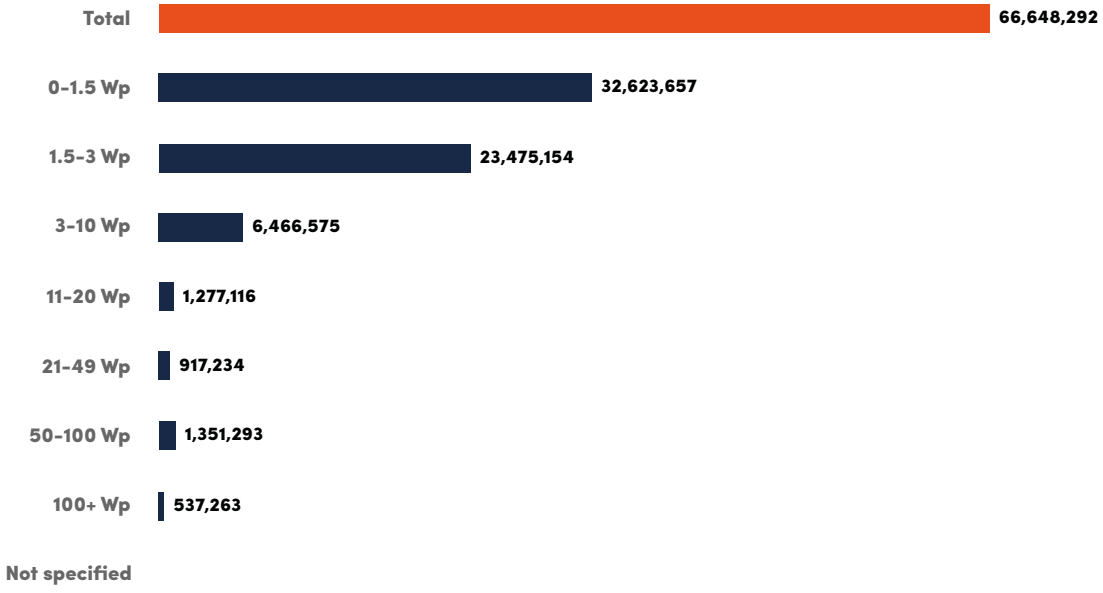


Figure 46 - CO2e Emissions Avoided



Impact Metrics Highlights

Figure 47 - Additional Light Hours Used – Household

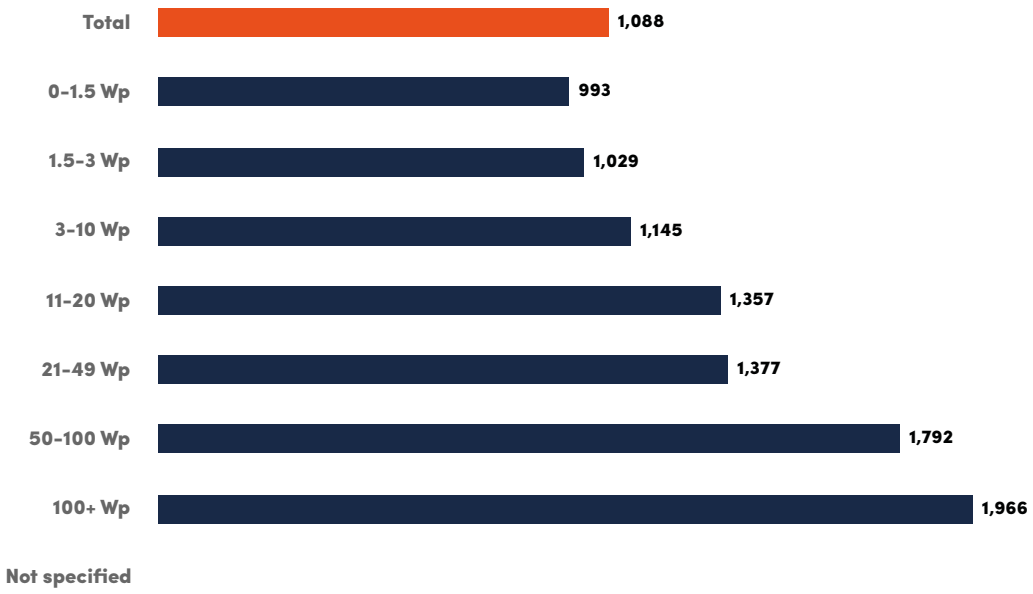
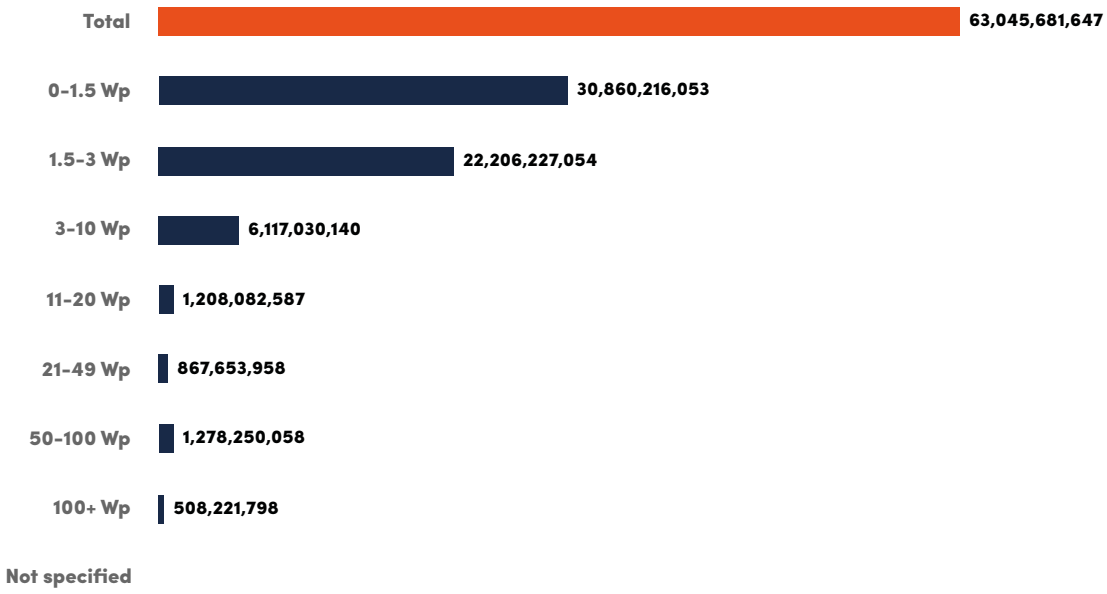


Figure 48 - Additional Light Hours Used - Cumulatively



Impact Metrics Highlights

Figure 49 - Change in Quality of Light – Household

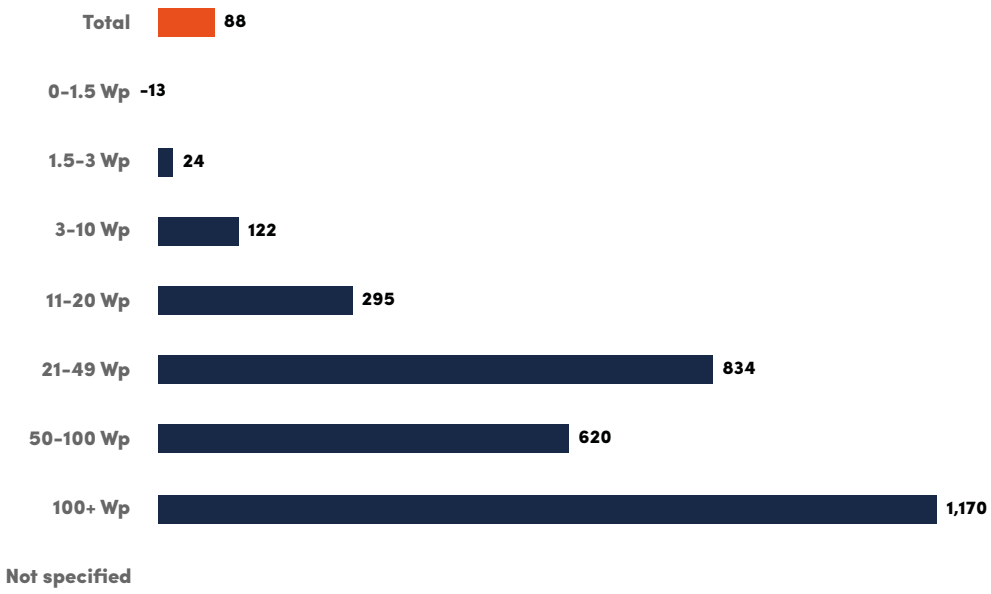
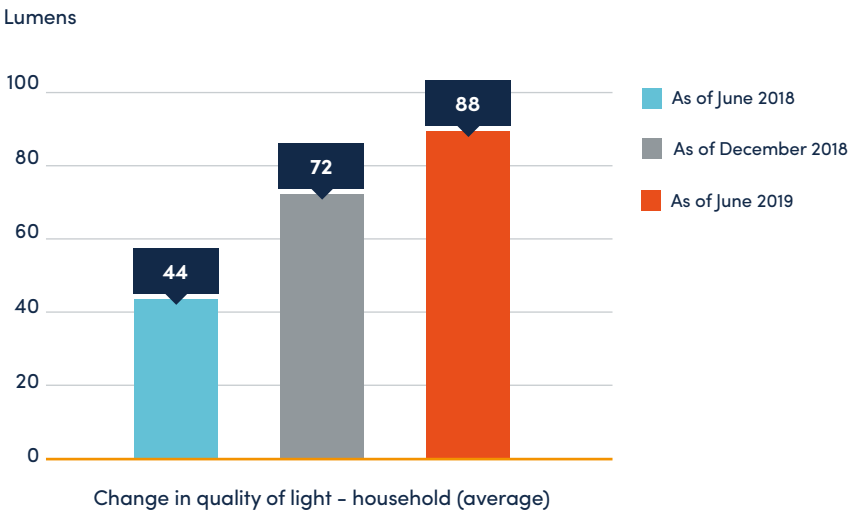


Figure 50 - Semi-annual Evolution of Change in Quality of Light - Household



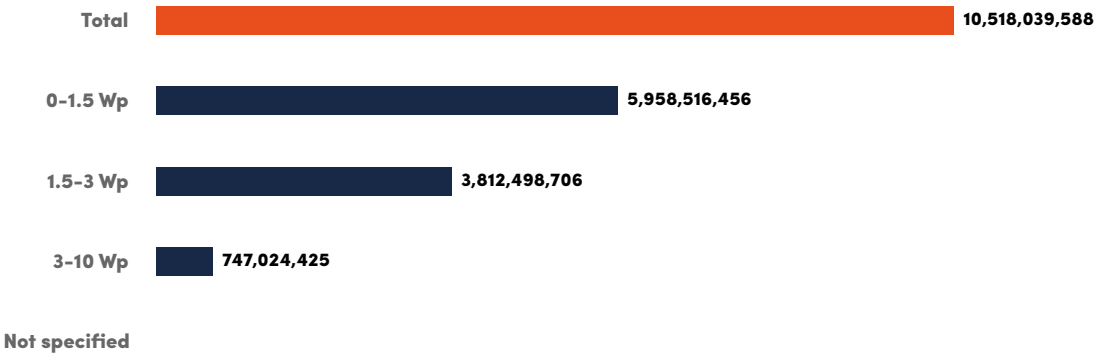
Impact Metrics Highlights

Figure 51 - Savings on Energy Expenditure - Household

NOTE:

1. This metric is computed only for systems with wattage lower than 11 Wp as those are the ones which normally replace the previously used light sources (e.g. kerosene lanterns etc.)

Figure 52 - Savings on Energy Expenditure – Cumulatively



NOTE:

1. This metric is computed only for systems with wattage lower than 11 Wp as those are the ones which normally replace the previously used light sources (e.g. kerosene lanterns etc.)

Impact Metrics Highlights

Table 14 – Global Impact by Product Category

	People with Improved Energy Access – Cumulatively	People with Improved Energy Access - Currently	People with Access to Tier 1 Energy Services (According to SE4All Methodology)	People with Access to Tier 2 Energy Services (According to SE4All Methodology)
World	**279,430,040**	**109,294,380**	**65,497,576**	**6,583,239**
0-1.5 Wp	139,748,007	38,282,042	11,582,061	-
1.5-3 Wp	100,068,194	43,749,511	33,944,654	-
3-10 Wp	27,415,145	16,295,620	15,964,417	-
11-20 Wp	4,497,046	3,587,332	3,396,290	182,192
21-49 Wp	2,991,905	2,965,017	609,297	2,303,928
50-100 Wp	3,397,119	3,298,157	857	3,027,848
100+ Wp	1,312,625	1,116,701	-	1,069,271
Not specified	-	-	-	-

	People Undertaking More Economic Activity	People using products to support enterprise	People that spend More Time Working	Additional Income Generated
World	**5,089,464**	**2,744,325**	**2,834,197**	**$4,865,548,744**
0-1.5 Wp	1,190,820	850,586	425,293	$1,498,924,780
1.5-3 Wp	1,357,468	969,62	484,81	$1,078,588,171
3-10 Wp	1,662,686	554,229	1,281,654	$1,510,032,583
11-20 Wp	287,369	120,997	219,308	$258,874,840
21-49 Wp	236,629	99,633	180,585	$185,925,848
50-100 Wp	263,609	110,993	180,364	$238,411,897
100+ Wp	90,883	38,266	62,183	$94,790,626
Not specified	-	-	-	-

	Additional Light Hours Used - Household	Additional Light Hours Used - Cumulatively	Change in Quality of Light - Household
World	**1,088**	**63,045,681,647**	**88**
0-1.5 Wp	993	30,860,216,053	-13
1.5-3 Wp	1,029	22,206,227,054	24
3-10 Wp	1,145	6,117,030,140	122
11-20 Wp	1,357	1,208,082,587	295
21-49 Wp	1,377	867,653,958	834
50-100 Wp	1,792	1,278,250,058	620
100+ Wp	1,966	508,221,798	1,17
Not specified	-	-	-

	Savings on Energy Expenditure - Household	Savings on Energy Expenditure - Cumulatively	Kerosene Lanterns Replaced	CO2e emissions avoided
World	**$152**	**$10,518,039,588**	**23,977,804**	**66,648,292**
0-1.5 Wp	$180	$5,958,516,456	8,505,858	32,623,657
1.5-3 Wp	$176	$3,812,498,706	9,696,202	23,475,154
3-10 Wp	$129	$747,024,425	3,463,930	6,466,575
11-20 Wp	-	-	756,233	1,277,116
21-49 Wp	-	-	622,707	917,234
50-100 Wp	-	-	693,708	1,351,293
100+ Wp	-	-	239,165	537,263
Not specified	-	-	-	-

References

- GOGLA, Standardised Impact Metrics for the Off-Grid Solar Energy Sector, Version 3.0, 2018. Full report here: www.gogla.org/gogla-impact-metrics
- Global Leap Awards, Results-based financing. 2019-20 - Refrigerators & Solar Water Pumps, 2019. Full article here: https://globalleapawards.org/results-based-financing
- Efficiency for Access Coalition, Tanzania Market Snapshot: Horticulture Value Chains and Potential for Solar Water Pump Technology,2019. Full report here: https://storage.googleapis.com/e4a-website-assets/SWP_MarketSnapshot_Tanzania.pdf
- Efficiency for Access Coalition, Solar Water Pump Outlook 2019: Global Trends and Market Opportunities, 2019. Full report here: https://efficiencyforaccess.org/publications/solar-water-pump-outlook-2019-global-trends-and-market-opportunities
- GOGLA, How solar water pumps are pushing sustainable irrigation, 2019. Full article here: https://www.gogla.org/about-us/blogs/how-solar-water-pumps-are-pushing-sustainable-irrigation?platform=hootsuite
- Efficiency for Access Coalition, 2017 Global-LEAP-Buyers-Guide-Refrigerators, 2017. Full report here: https://efficiencyforaccess.org/publications/global-leap-buyers-guide-refrigerators
- Efficiency for Access Coalition, Appliance Data Trends, 2018. Full report here: https://storage.googleapis.com/e4a-website-assets/EforA-ApplianceDataTrendsReport-Sept7.pdf
- CNN, At least 36 people dead in one of India's longest heatwaves, 2019. Full article here: https://edition.cnn.com/2019/06/14/india/india-heat-wave-deaths-intl/index.html
- Efficiency for Access Coalition, Off-Grid Fan Quality Testing in Pakistan, 2019. Full article here: https://medium.com/efficiency-for-access/off-grid-fan-quality-testing-in-pakistan-fce8364721e0
- GOGLA, Powering Opportunity Report 2018, 2019. Full report here: https://www.gogla.org/powering-opportunity-2018
- Efficiency for Access Coalition, 2017 Global LEAP Awards Buyer's Guide - Fans and Televisions, 2017. Full report here: https://efficiencyforaccess.org/publications/2017-global-leap-awards-buyers-guide-fans-and-televisions
- Efficiency for Access Coalition, 2019 State of the Off-Grid Solar Market Report, 2019. Full report here: https://www.efficiencyforaccess.org/2019-state-of-the-off-grid-appliance-market-report/
- World Bank Group Lighting Global program, Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa, 2019. Full report here: https://www.lightingglobal.org/resource/pulse-market-opportunity/
- Efficiency for Access Coalition, Off-Grid Appliance Market Survey, 2018. Full report here: https://efficiencyforaccess.org/publications/off-grid-appliance-market-survey
- Lighting Global, Energy Access and the Syrian Refugee Crisis: A Situational Report on the Solar Energy Sector in Lebanon, 2019. Full report here: https://www.lightingglobal.org/wp-content/uploads/2019/02/Solar-Energy-in-the-Syrian-Refugee-Crisis-Updated-3.20.19.pdf
- Power for All, Is off-grid solar lighting still relevant in India?, 2019. Full article here: https://www.powerforall.org/insights/dre-technologies/grid-solar-lighting-still-relevant-india
- Energy Sector Management Assistance program of the World Bank group (ESMAP), Beyond Connections: Energy Access Redefined, 2015. Full report here: https://www.esmap.org/node/55526
- Lighting Global/Dalberg, Off-Grid Solar Market Trends Report 2018. Full report here: https://www.gogla.org/sites/default/files/resource_docs/2018_mtr_full_report_low-res_2018.01.15_final.pdf
- Lighting Global Quality Standards (Lighting Global / International Electrical Commission Technical Specification 96652). https://www.lightingglobal.org/quality-assurance-program/

Contact Information & Photo Credits

GOGLA
Arthur van Schendelstraat 500A,
3511 MH Utrecht
The Netherlands

www.gogla.org
info@gogla.org

Lighting Global
2121 Pennsylvania Avenue NW,
Washington, D.C. 20433
United States of America

www.lightingglobal.org
info@lightingglobal.org

Efficiency for Access Coalition
www.efficiencyforaccess.org
info@efficiencyforaccess.org

Energy Saving Trust
30 North Colonnade, 6th Floor,
London, E14 5GP
United Kingdom

www.est.org.uk
info@est.org.uk

CLASP
1401 K Street NW., Suite 1100,
Washington, D.C. 20006
United States of America

www.clasp.ngo
info@clasp.ngo

Photo Credits

Arthur van Schendelstraat 500A
3511 MH Utrecht
The Netherlands

info@gogla.org
+31 304 100 914

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