Global Off-Grid Solar Market Report

Semi-Annual Sales and Impact Data

January - June 2018, PUBLIC REPORT

GOGLA The Voice of the Off-Grid Solar Energy Industry

LIGHTING GLOBAL Catalyzing markets for modern off-grid energy

AN INNOVATION OF WORLD BANK GROUP THE WORLD BANK IBRD · IDA IFC International Finance Corporation

Berenschot

Authors' Note

3.7 million off-grid solar products were sold globally during the first half of 2018, a modest increase of 4%, compared to the same time a year ago. But with over one billion people worldwide still unreached by reliable electricity provision, the market continues to see vast untapped potential. According to the 2018 Off-Grid Solar Market Trends report, off-grid solar devices sold to date are estimated to have penetrated around 17% of the global potential market. However, while the market as a whole might not be growing fast, with unit sales seemingly stagnating, we are observing a noticeable shift into higher bracket product categories, with an increase in newly installed capacity, thanks largely to the steady growth of multi-light and solar home systems. During the first half of 2018, 26 MW of solar capacity was installed globally, a 40% increase compared again to the same period of 2017.

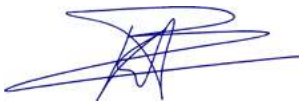
This latest Global Off-Grid Solar Market Report presents sales and impact data for January to June 2018, reflecting the performance of almost 70 companies, which are GOGLA members and companies that sell Lighting Global quality-verified products. A new insight revealed in this report highlights that, as a result of off-grid system ownership, an estimated $3.5 billion in additional income will be generated for households over the lifetime of the products sold to date. And that's just what we know from our members and affiliates. Now, more than ever, we can see the potential impact that the products and services in the off-grid solar sector are bringing to customers.

Emerging markets continue to experience their unique set of challenges that influence the growth rates. New markets are characterized by high volatility in sales volumes between reporting periods, some largely driven by donor or humanitarian programs, while more mature markets are increasingly facing intensified competition from copycat or poor-quality products sold by non-affiliates. Nonetheless, we remain focused on evolving and remaining agile as a sector and continue to engage with governments globally to improve the policy environment for the market.

As with its predecessors, this report is built on a continuously growing set of data to draw upon our observations of trends, insights, and changes underpinning this market's development. We are continually expanding, refining and improving both the accuracy and the level of detail of this dataset, which is estimated to represent around 30% of the market for small systems with wattage less than 11 Wp, and 60-80% of the market for solar kits with capacity larger than 11 Wp. In response to the industry's request for an enhanced segmentation of results, this round we have broken down the sales data between cash sales and products sold via Pay-as-you-Go (or PAYG) business model, seeing 2.93 million of the total 3.66 million being sold for cash, and 730,000 sold via PAYG. We hope that the report continues to provide an invaluable snapshot of the sector to investors, manufacturers, donors and policymakers alike, and we welcome any recommendations to improve it.

In the next reporting round, due in spring 2019, we will start to collect sales data on efficient off-grid appliances that provide services beyond lighting and phone charging, in particular those products that target productive use for increased income generation for the customer. As always, the companies that have contributed their sales data receive their own individualized report, indicating their share of all relevant markets, and have access to a comprehensive online reporting platform that visualizes key market insights. If you would like to participate in our next data collection round, please get in touch with us.

Sincerely,



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About the Authors

This report is produced by GOGLA and Lighting Global with the assistance of Berenschot.

GOGLA is the global association for the off-grid solar energy industry. Established in 2012, GOGLA now represents over 135 members as a neutral, independent, not-for-profit industry association. Its mission is to help its members build sustainable markets, delivering 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, go to www.gogla.org.

Berenschot

Berenschot is a leading Dutch management consultancy firm with an extensive track record in supporting industry associations, including 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.

Lighting Global is the World Bank Group's initiative to rapidly increase access to off-grid solar energy for the one billion people living without grid electricity around the world. Lighting Global works with manufacturers, distributors, governments, and other development partners to build and grow the modern off-grid solar energy market, which is expected to reach 740 million people by 2022. Its programs -- which include Lighting Africa, Lighting Asia, and Lighting Pacific -- provide market intelligence, quality assurance, consumer education, business support services, and support for access to finance, at the global, regional, and country levels. Lighting Global is also poised to address new markets and opportunities that emerge as the off-grid energy sector evolves. Its activities now include support for the productive use of solar (e.g. solar irrigation & milling), community services (e.g. for schools and health centers), super-efficient household appliances (e.g. fans, TVs, household refrigeration), and innovative pay-as-you-go (PAYG) 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.

Participants

Table 1 - List of Participants

Manufacturers			
Anji Dasol	Jua Energy	Orb Energy	Solaris Offgrid
Azuri	Jua Solar	OvSolar	SolarNow
BBOXX	Lagazel	Poly Solar	SolarWay
Biolite	Little Sun	Qingdao LEFF International Trading	Super Star Group Solar
Bright Products AS	Lumos Global	RAL Consumer Products	Videre Global
CAA Communications	M-KOPA	Renewit	Village Boom
d.Light	Mibawa Suppliers	Schneider Electric	Village Power
Devidayal Solar Solutions	Mobisol	Shanghai Easy	Yingli
EcoZoom Limited	Nadji-Bi	Signify	Zimpertec
Enlight	Niwa	Simpa Networks	Zola Electric (foramer Off-Grid Electric)
Fenix International	Nizam Energy	Sinoware	
Fosera	Offgrid Sun	Smarter Grid International	
Greenlight Planet	OmniVoltaic Energy Solutions	Solar Run Energy	

Distributors			
ARESS Sarl	Mwezi Limited	Solar Sister	Sunny Money (Solar Aid)
Azimuth	NewLight Africa (Heya!)	SolarHome	Total
Baobab+	Oolu Solar	Solarkiosk	UpOwa
Bright Life by Finca	Pawame	SolarWorks!	
EcoEnergy	PEG Africa	Sosai Renewables Energy	

Methodology

Data Processing

Companies are classified either as distributors of other companies' branded products or as manufacturers if they are selling their own branded products. **Only aggregate data from companies categorized as manufacturers is presented here to avoid double-counting.** In this reporting round, this amounts to 49 companies out of the 67 that participated in the data collection.

Market Share Represented

This report only includes data on products sold by affiliates, meaning GOGLA members or companies that sell Lighting Global quality verified products. Based on 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 global sales of small systems (<11 Wp) products and 60-80% of solar kits with over 11 Wp solar panels.** This proportion varies substantially from country to country; the market share estimates for non-affiliates devices globally and across nine national markets can be found in the table below.

Table 2 - Market share estimates of affiliate devices against the whole market[1]

	Share represented by affiliates against the whole market	
Country	**Pico <11 Wp**	**Plug-and-Play SHS > 11Wp**
Global	**29%**[2]	**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%

Data Collection Process

As in the previous rounds, this data collection and reporting process was overseen by the Dutch management consultancy firm Berenschot, while Lighting Global and GOGLA provided specialized industry knowledge within the research team. Both the online questionnaire and the results platform were programmed by Getting Social, a Dutch web development company.

Accuracy

All data is self-reported by the companies, and while 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. Companies may also choose to report sales volumes but not revenues.

Data Checks

The research team checked the submitted data for consistency and logic with respect to previously collected data by Berenschot or Lighting Global. Based on these checks, some small adjustments have been made concerning product performance specifications and the 'quality verified' status of products where necessary.

Missing Data

Where meaningful data was missing, we tried to address this by consulting our existing data sets, or by contacting respondents. Unfortunately, even after these actions, some data is still missing.

Confidentiality

Data on a specific region, country or product category is only included when it has satisfied the three-data point rule, meaning that at least three separate product manufacturers have reported data for any single data point. When we have 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.

Country Categorization

Sales data is provided in this report for all countries where at least three companies reported sales; in this reporting round, this amounts to **46 countries**. The regional groupings in this report follow the World Bank country and lending groups[3]. For sub-regional groupings in Sub-Saharan Africa, the United Nations categorization of geographical sub-regions is used[4].

Sales Data Segmentation

When the sales and impact data collection and reporting process started in 2010, the sector was primarily driven by the cash sales market. However, in the last few years, the off-grid solar market has matured and diversified, with Pay-As-You-Go (PAYG) becoming a critical part of the sector. While sales data volumes reported in the Global Off-Grid Solar Market has always included PAYG products, no segmentation between PAYG and cash was presented in this report in the past, and sales revenues reported excluded the PAYG segment of the market. To reflect the growth and development of the sector and to improve accuracy and usefulness of this reporting exercise, GOGLA and Lighting Global have initiated and completed a revision of this data collection and reporting processes so as to enable differentiation between PAYG and cash sales, and to report on the estimated market value of PAYG products deployed. The team worked with Altai Consulting and extensively consulted companies and other key experts in the sector. This has resulted in the following methodology.

Volumes of Products Sold and Newly Installed Capacity

Sales are now segmented based on whether the products are sold to a customer in a single transaction as a cash sale, or whether the customer pays for the product in installments over time or pays for use of the product as a service, both of which are classified as PAYG. Following the confidentiality rule, the split in sales volumes will be shown for any single data point where at least three separate manufacturers have reported data for both cash and PAYG products. Where only one of the two passes this confidentiality rule, only the total is shown.

Values of Products Sold and Currency

For the first time, this report is outlining not only the value of the cash products but also those sold through PAYG business model.

As in the past reporting rounds, the value of cash products is computed by multiplying the sales volumes by an indicative wholesale per unit price reported by the product manufacturer and a multiplier factor to capture the costs incurred in getting the product from the manufacturer to end customers (including transport, duties, taxes, clearance costs, sales channel overhead, markups etc.). The wholesale Free-on-board (FOB) price is defined as the per unit price for a 1,000-unit minimum order quantity in USD.

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

Therefore, the total value of all the products sold in each round cannot be computed by summing the two values reported, given the different time horizons considered for the cash and PAYG segment. The FOB price used to represent cash sales is paid in one instalment by the end-customer, while the Estimated TCO used for the PAYG segment is necessarily projected into the future.

Sales Data: What's Coming Up?

This report provides robust sales data only for off-grid solar lighting products sold by manufacturer affiliates participating in this data collection. While the early off-grid market was dominated by solar lighting service, recent years have seen an expansion of services to the provision of phone charging, radios, televisions, fans, refrigeration and a variety of other services from highly efficient appliances designed for off-grid use. To capture this evolution, GOGLA has initiated an expansion of the current data collection and reporting, in partnership with the Low Energy Inclusive Appliances (LEIA) programme, funded by DFID and managed by the UK's Energy Saving Trust and CLASP. Companies and other key experts in the sector are being consulted, as the team assesses how best to capture and segment the data, since the willingness of companies to share the data differs. The appliances reporting will be incorporated in the next round of data collection for the second half of 2018, and findings included in the next public report, due to be published at the end of April 2019.

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

Product Categorization

This report only covers solar lighting kits. This means that products which are sold as components (e.g. individual panels, batteries or mobile phone chargers) or as top-up products (e.g. TVs, fans or radios that are sold as single appliances) are not included here.
Data has been grouped into product categories to segment sales in a way that provides the most value and information to the market. From a market perspective, the most meaningful segmentation is based on functionality and capacity. **The categories of all products with less than 11 Wp solar module capacity are determined by the services that a product provides** (e.g. the number of light points and the possibility of mobile charging). For ease of reference, each of these categories is represented by an indicative wattage range of PV module that is typical for most products providing the respective services. **Panel wattage (in watt-peak) was used to categorize solar lighting kits with solar modules 11+ Wp.** The definitions of these categories are presented in the table below.

The level of energy access enabled through use of these lighting products is indicated below using the terminology of the multi-tier framework for measuring energy access. This framework was developed by the World Bank's Energy Sector Management Assistance Program (ESMAP)[5] under the Sustainable Energy for All initiative.

Table 3 - Product Categories

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)	

5 For more information, please visit: https://www.esmap.org/node/55526

Report Highlights

What data does this report cover?

This report only covers aggregate data provided by affiliates, which includes GOGLA members and companies that sell Lighting Global quality verified products. Moreover, data is only collected for solar lighting kits. This means that products which are sold as components (e.g. individual panels or batteries) or as top-up products (e.g. TVs, fans or radios that are sold as single appliances) are not included in the numbers reported here.

3.66 million
off-grid solar products sold globally in H1 2018[6] out which **2.93 million** have been sold **on a cash basis** and **730,000 via PAYG** business models.

$107.50 million
value of cash products sold globally in H1 2018

$110.89 million
value of PAYG products sold globally in H1 2018

26.43 MW
newly installed capacity globally in H1 2018

2.70 million
solar lanterns sold globally in H1 2018

560,000
multi-light systems sold globally in H1 2018

395,000
SHS sold globally in H1 2018

Impact estimates relate to all off-grid solar products sold/reported to date (as at June 2018). For more details on the impact created, please refer to the Impact Metrics section at page 44.

103.5 million
number of people with improved energy access, currently[7]

4.5 million
people undertaking more economic activity (e.g. spending more time working, using their system to support enterprise or able to get a new job)

51 million
metric tons of CO_2e emissions avoided, over products' lifetimes

$3.5 billion
additional income unlocked, over the products' lifetimes

$8.4 billion
savings on energy expenditure, by households switching to solar lanterns or multi-light systems over product lifetime

48.2 billion
extra hours of light created for families, over products' lifetimes

Global Market Insights

In the first half of 2018 (January-June 2018), 2.93 million cash products and 726,000 PAYG products were sold worldwide installing over 26 MW of solar capacity. The value of the cash products was around $107.50 million, while the value of PAYG surpassed $110 million, as, despite a smaller sales volume, this business model is predominantly used for higher category products.
As Figure 1 shows, the sales volumes have been stable, with only a slight decrease (-12%) compared to the second half of 2017 and a minimal increase (+4%) if compared with the first half of last year. Notable from Figure 2 is the 20% increase of the newly installed solar capacity over the last two rounds, thanks to the steady growth of multi-light systems and SHS.

Portable Lanterns

In the first half of 2018, 2.70 million solar lanterns have been sold globally, accounting for 74% of the total unit sales volumes. Figure 3 shows us that the clear majority of these products are sold on a cash basis, with only 5% of products sold through PAYG consumer financing. The solar lanterns with mobile charging (indicative wattage 1.5-2.999 Wp) remain the top seller in terms of volume amongst all product categories, with around 40% of all global sales volumes for this reporting period (just above 1.50 million units), 50% of the global cash sales values ($54.8 million) and 13% of the newly installed capacity with 3.5 MW. The second best-performing category in terms of sales volumes globally is the solar lantern without mobile charging (indicative wattage 0-1.4999 Wp) with 1.20 million units sold worldwide, 33% of the total. However, the value of these products accounts only for $18.55 million (17% of the total) and only 2% of the total newly installed capacity (0.53 MW). This is due to the lower retail price and small panel size of such products.

Overall, Figure 4 shows us rather stagnant sales volumes of solar lanterns in the last reporting rounds. This may be explained by the commoditization of the market for these entry-level products causing intensified competition for GOGLA and Lighting Global affiliates from generic, copycat and counterfeit products.

Multi-light Systems

Solar kits with multiple lights accounted for 560,000 units sold (15% of the world total), with around 65% of these systems being sold through PAYG business models. These systems accounted for 3.5 MW of newly installed solar capacity for the first half of 2018; the value of the cash segment was almost $10 million while the value of PAYG products surpassed the $30 million mark.

Figure 4 shows significant growth in this market segment, notwithstanding the spike of the last reporting round due to a bulk purchase.

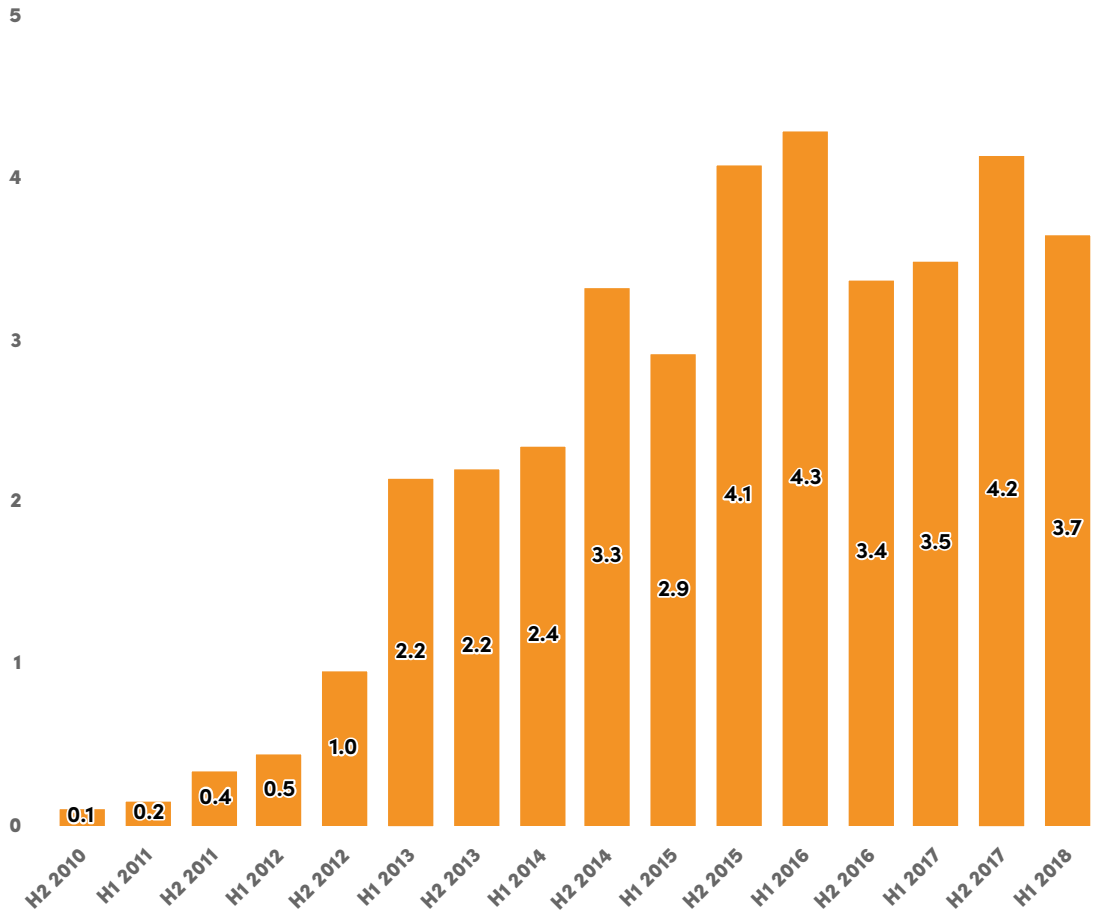
Solar Home Systems (SHS)

The larger, higher-cost product categories with solar panels 11+ Wp constitute about 11% of the overall sales volumes (395,000 units sold globally). Solar Home systems account for 70% of the total PAYG segment - estimated to value about $78 million, and a smaller share of cash sales with a value of almost $25 million. The top seller among the SHS remains the 50-99.999 Wp category with 140,000 units. This category alone installed almost 9 MW of the new off-grid solar capacity worldwide. The next categories in line are the 11-20.999 Wp which has surpassed for the first time the 100,000 units sold, and the systems with wattage 21-49.999 Wp that reached 81,000 units. The systems with wattage 100+ Wp are now catching up with the group with 44,000 units sold; and is the only category in the product family where a considerable share of systems (44%) are sold for cash over the counter.

When comparing these figures with those from previous reporting rounds in Figure 4, one can observe a steady increase in sales volumes of SHS. This is thanks to the penetration of PAYG which allows consumer financing. Sales in all categories are steadily raising with increases of 98% for the 11-20.999 Wp, 15% for the 21-49.999 Wp and 35% for the 50-99.999 Wp; in this round. The greatest increase can be observed in the 100+ Wp which registered a 200% increase compared to the 14,000 sold in the last three rounds.

6 H1 always refers to the period between January 1st-June 30th, while H2 to the one between July 1st-December 31st.
7 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.

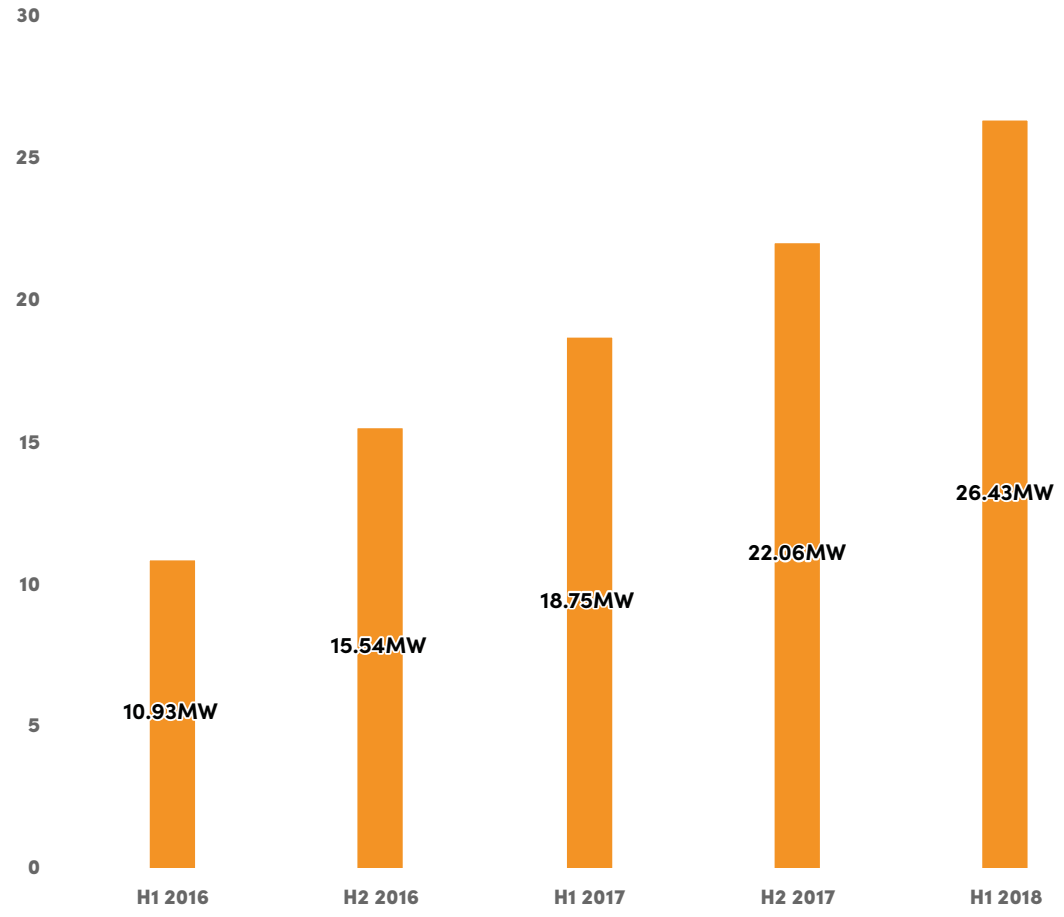
Figure 1 - Volume of Products Sold in Millions (Historical)



NOTE

1. The data presented in this chart has been compiled from various sources: The data from H2 2010 to H1 2014 originates from Lighting Global's own data collection, while the data from H2 2014 onwards comes from the joint Lighting Global / GOGLA / Berenschot data collection process. The methodology and the questions used have evolved over time and the number of respondents has changed with each round of data collection. Therefore, the data presented above does not constitute the basis for an in-depth statistically correct analysis. However, it does indicate general market trends and reflects the evolution of the market as it encompasses data from most of the industry leaders. As the data collection process is improved with every round and with companies submitting their data on a consistent basis, we will be able to paint an ever more accurate picture of the market.
2. This report only includes data on products sold by GOGLA members or Lighting Global associates and does not include non-branded generic products. Based on previous analysis by Dalberg Advisors for the Off-Grid Solar Market Trends Report 2018, we estimate that the data reported here represents about 30% of all sales of stand-alone off-grid solar products. This proportion is likely to vary substantially from country to country.

Figure 2 – Newly Installed Capacity of Products sold in MW (Historical)



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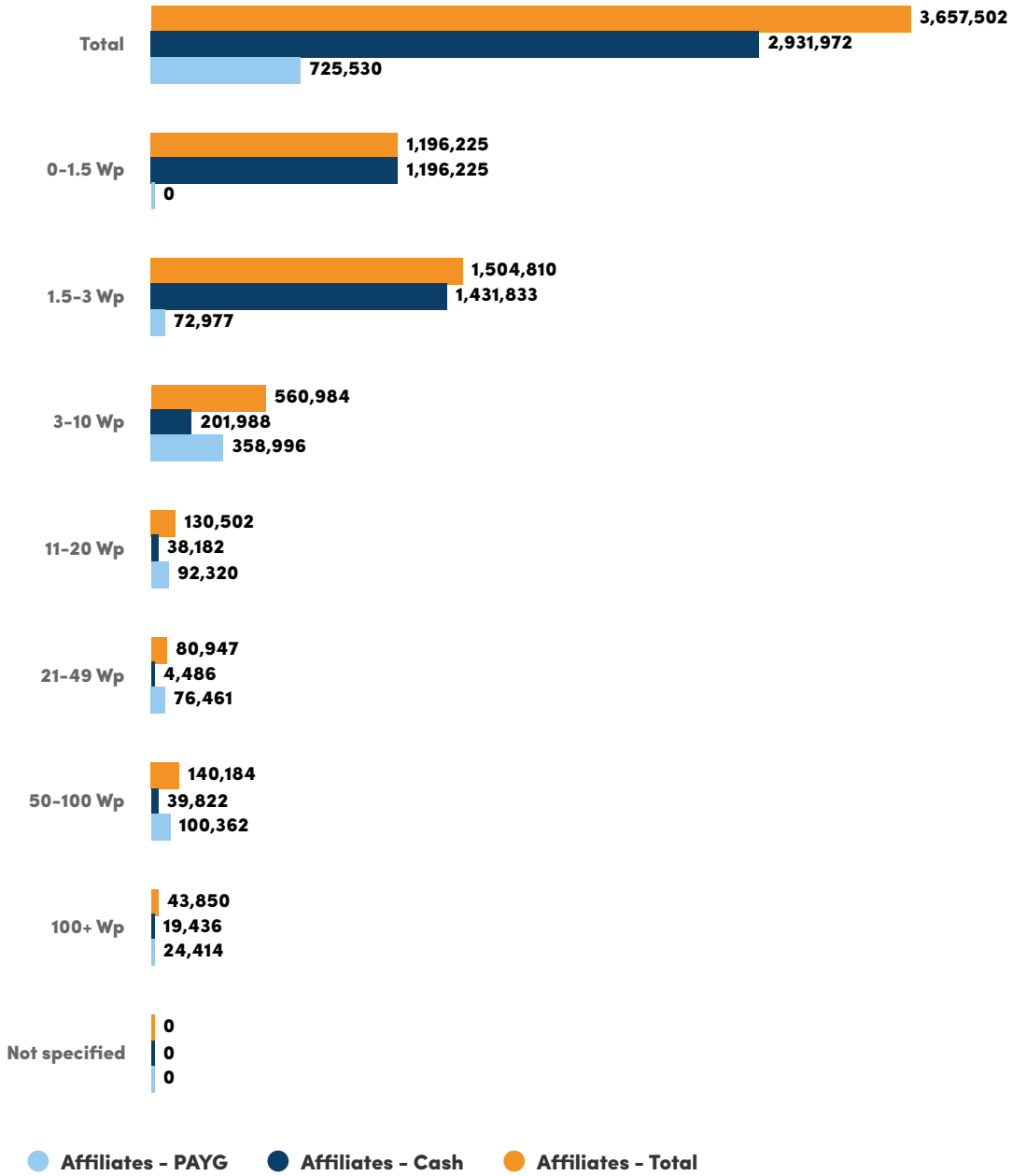
2. The installed capacity should be considered as newly installed capacity during the reporting period, computed using the reported panel size per product.

Newly Installed Capacity

The newly installed capacity of products represents the amount (in MW) of solar panels deployed during this reporting round. This metric helps to provide additional insights into the off-grid solar market and points to the average size of systems sold in a region or country, allowing comparisons to be drawn.

Figure 3 - 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/PAYG is shown only if both segments passed the three-data point control

Figure 4 - Volume of Products Sold Globally by Product Category (Historical)

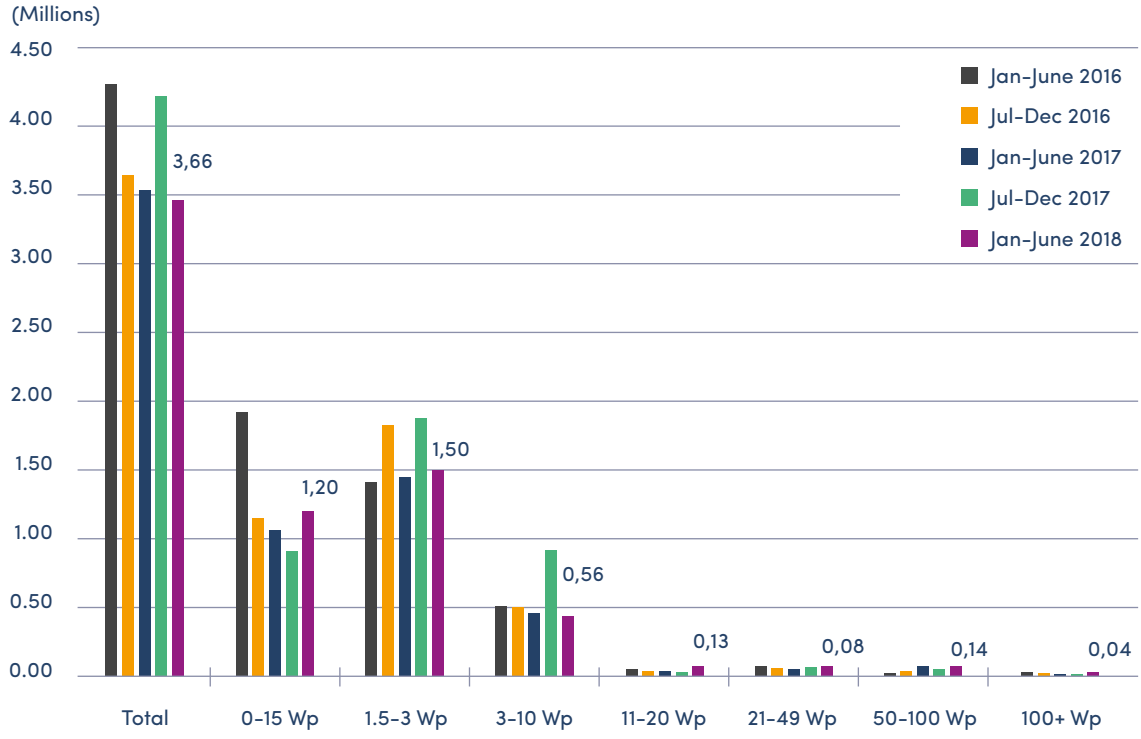
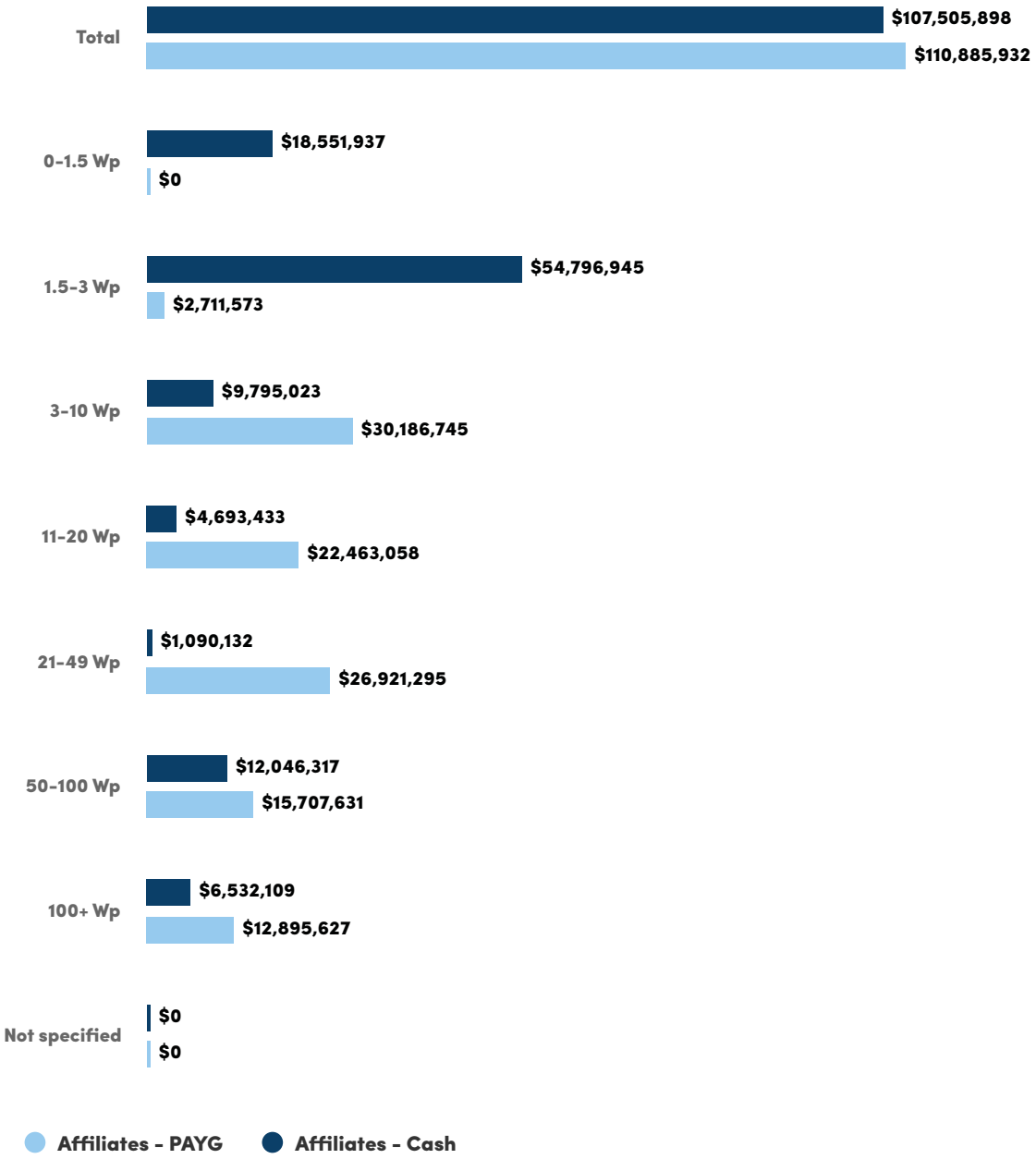
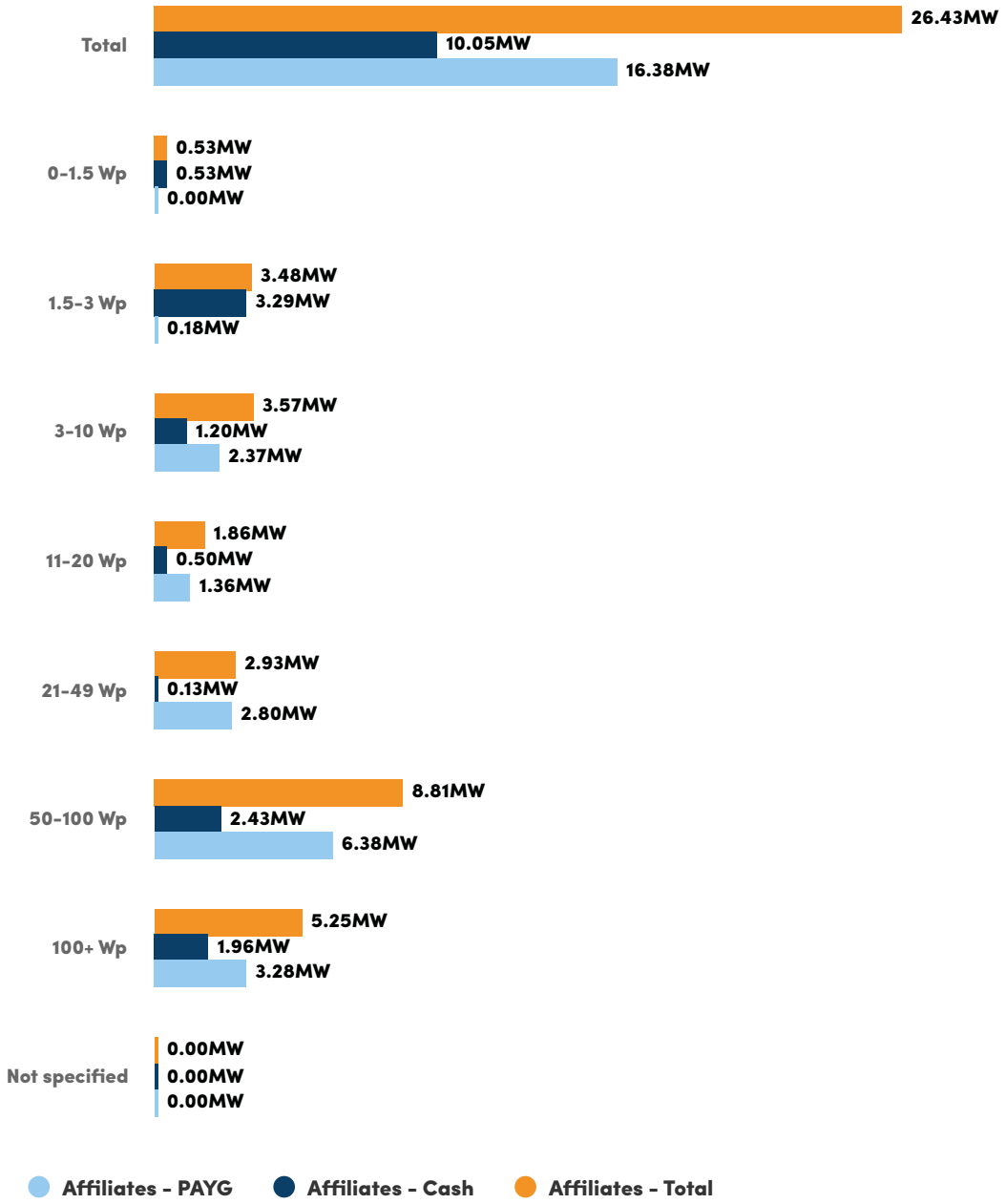


Figure 5 - Global Value of Products Sold by Product Category



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

Figure 6 – Global Newly Installed Capacity by Product Category



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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/PAYG is shown only if both segments passed the three-data point control

Detailed Sales Data

Market Dynamics

As with previous reports in this series, 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;
- Availability of finance, in particular working capital and local currency financing;
- Macro-economic factors, including general economic conditions, currency fluctuations, and other factors affecting the purchasing power of customers;
- Seasonal trends and other environmental factors;
- Competitive dynamics, especially in relation to competition from generic, counterfeit and 'copycat' products.

During this reporting round (January-June 2018), the following identified drivers have likely affected the single country markets shown in Figure 7.

Country-specific drivers of note

Ethiopia: Import regulations imposed by the Ethiopian Ministry of Trade have forced off-grid solar importers to provide samples, testing fees and a deposit of 0.5% of the invoice value. Moreover, the devaluation of the Ethiopian Birr against the USD has increased the selling price; challenges in accessing foreign exchange continues to restrict the growth of the sector. This is reflected in the high demand and exhaustion of the second tranche under the Market Development for Renewable Energy & Energy Efficient Products Credit Line facility, designed to address this barrier. In addition, affiliates reported an interruption of the distribution chain owing to civil unrest.

Uganda: PAYG companies flagged that in May 2018, the government introduced a levy of 1% on the sending, receiving and depositing of funds through mobile money, widely used for purchasing off-grid solar products through consumer financing schemes. The Ugandan Ministry of Finance revised this levy in July 2018, reducing it to 0.5% and restricting it to withdrawals only, but the uncertainty around this may have affected the sales for PAYG players.

Rwanda: As the Government of Rwanda continues to explore mechanism to accelerate the realization of Energy Access for All (Sustainable Development Goal 7) through off-grid products, a number of proposals in the first quarter of 2018 caused uncertainty in the sector. While stakeholder engagement has made important progress in this regard, the resolution of a long-term plan would improve certainty.

Kenya: The 2017 election period was reported to have impacted sales figures; the prolonged political impasse and subsequent repeat polling resulted in a general slow-down of business activities which affected the entire economy. Political stability re-emerged towards the end of 2017, and with it came increased economic stability, resulting in a growth in sales during the first half of 2018. The off-grid sector in Kenya continues to see expansion to new regions across the country with new markets seeing strong growth.

Tanzania: Businesses report that the changes in the political climate is affecting the ease of doing business in Tanzania. With strong competition from non-branded products, government plans to strengthen enforcement and compliance of minimum quality standards are welcomed by many companies.

Nigeria: The macroeconomic situation in Nigeria in the first half of 2018 seems to be more stable than it was in 2017. Inflation has remained high and in double digits, but it is on a slightly downward trend compared to the previous two years. Foreign exchange is more available to enable imports but shortages of it still remain an issue.

Bangladesh: Institutional bulk orders across Bangladesh and orders for donations towards the Rohingya refugee camps have driven sales growth. This follows the latest migration wave which started in August 2017.

India: Following a challenging period in 2017, the market in India has regained momentum, thanks to the renewed engagement with the microfinance segment. The challenges in 2017 were largely due to the effects of demonetization, the introduction of the Goods and Services Tax, and the launch of the Government's Saubhagya Scheme to extend the grid to all households.

Myanmar: The large increase in sales has been driven by bulk government procurements in the cash segment as well as by the growth of PAYG multi-light systems with several companies securing investment to scale up their operations in the country.

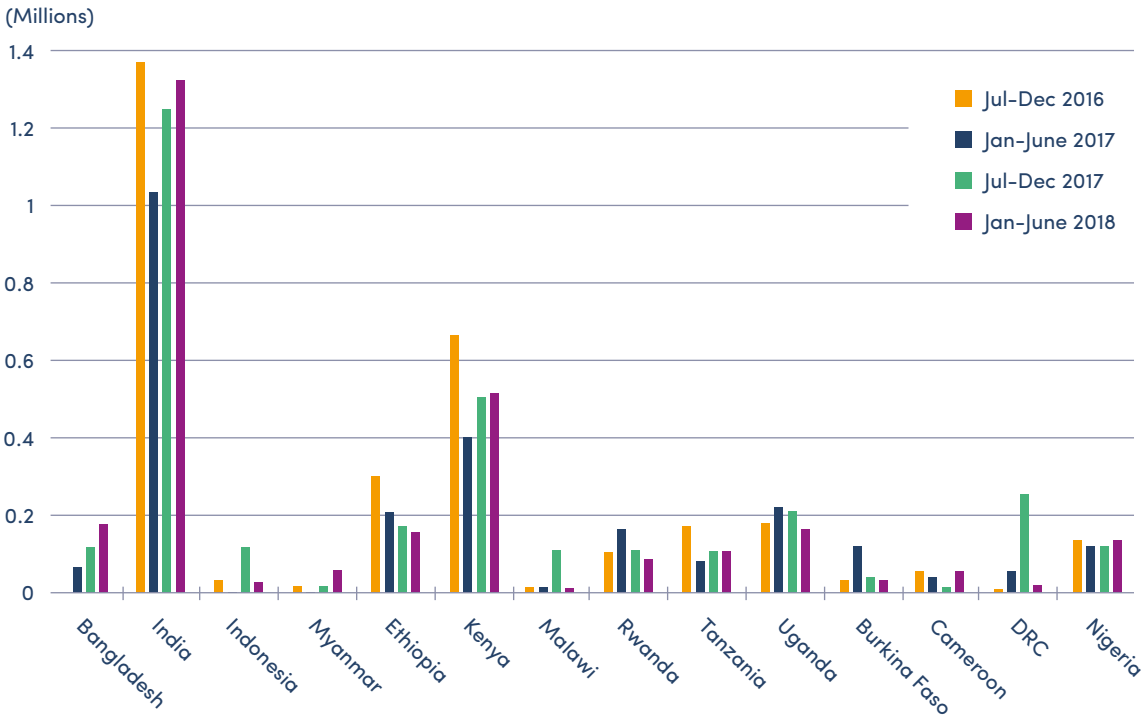
Pakistan: The Pakistani Rupee has significantly lost value against the USD, dropping over 17% in one-year period, eroding margins for distributors. There is great uncertainty on the future of the currency as foreign reserves have reached critical levels. Moreover, high import tariffs on key SHS accessories (LEDs, fans, TVs) are further complicating import procedures while adding significant costs to imported SHSs.

Other non-country specific drivers:

Immature markets: Most national markets in West and Central Africa, as well as in East Asia and Pacific, are still far from maturity, so high volatility in sales volumes between reporting periods is likely to be observed. These fluctuations do not necessarily reflect larger market trends. In addition, swings may be caused by individual companies or by bulk procurements. Examples of these exceptionally large sales volumes are found in Indonesia, Malawi and Democratic Republic of Congo (DRC) in the second half of 2017, or Burkina Faso in the first half of the 2017.

Commoditization of the market for portable lanterns: For several years now - and particularly in relation to single-light portable lanterns - copycat and counterfeit products sold by non-affiliate companies have been causing 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, coming to the fore.

Figure 7 – Volume of Products Sold in Top 10 Countries (Historical)



Regional Market Insights

Which regions does this report cover?

This report only covers aggregate data provided by affiliates, which includes GOGLA members and companies that sell Lighting Global quality verified products. Currently sales numbers are only collected for solar lighting kits and not component-based systems. **Data on a specific region, country or product category is only included in this section when it has satisfied the three-data point rule,** meaning that at least three separate manufacturers have reported data for any single data point.

In the first half of 2018, Sub-Saharan Africa and South Asia accounted for 83% of the global sales with 1.51 million and 1.52 million units sold respectively. However, one crucial difference between those two regional markets can be observed when looking in Figure 8 at the breakdown between PAYG and cash products sold: PAYG products have not yet penetrated South Asia (or in any other region) as they have in Sub-Saharan Africa. Thanks to the newly installed capacity lens shown in Figure 10, it is possible to grasp another key difference in the type of systems sold across the geographical regions: for instance, Sub-Saharan Africa accounts for 16.3 MW, representing over 60% of the global total, while South Asia falls behind with 5.15 MW.

Sub-Saharan Africa

East Africa and West Africa together represent 93% of total sales volumes in Sub-Saharan Africa with 1.11 million and 300,000 units sold respectively. Compared to the second half of 2017, Sub-Saharan Africa has registered a 20% decrease in sales volume, mainly due to the 16% decreases in East Africa and the 70% decrease in Central Africa. This latter drop is due to the high volatility in sales volumes typical of non-mature country markets where the relatively small fluctuations in sales patterns do not necessarily reflect larger market trends. In Figure 11 we can see how the value registered in the second half of 2017 was exceptionally large in Central Africa. West Africa remains stable on the volumes reported in the previous reporting round, though big variations exist at a national level. The decrease in East Africa is driven by an increase in competition from generic, copycat and counterfeit products in the market of entry-level products with wattage less than 11 Wp; the larger categories are all seeing a steady increase where the share of products sold through PAYG is almost the same as products bought in cash.

South Asia

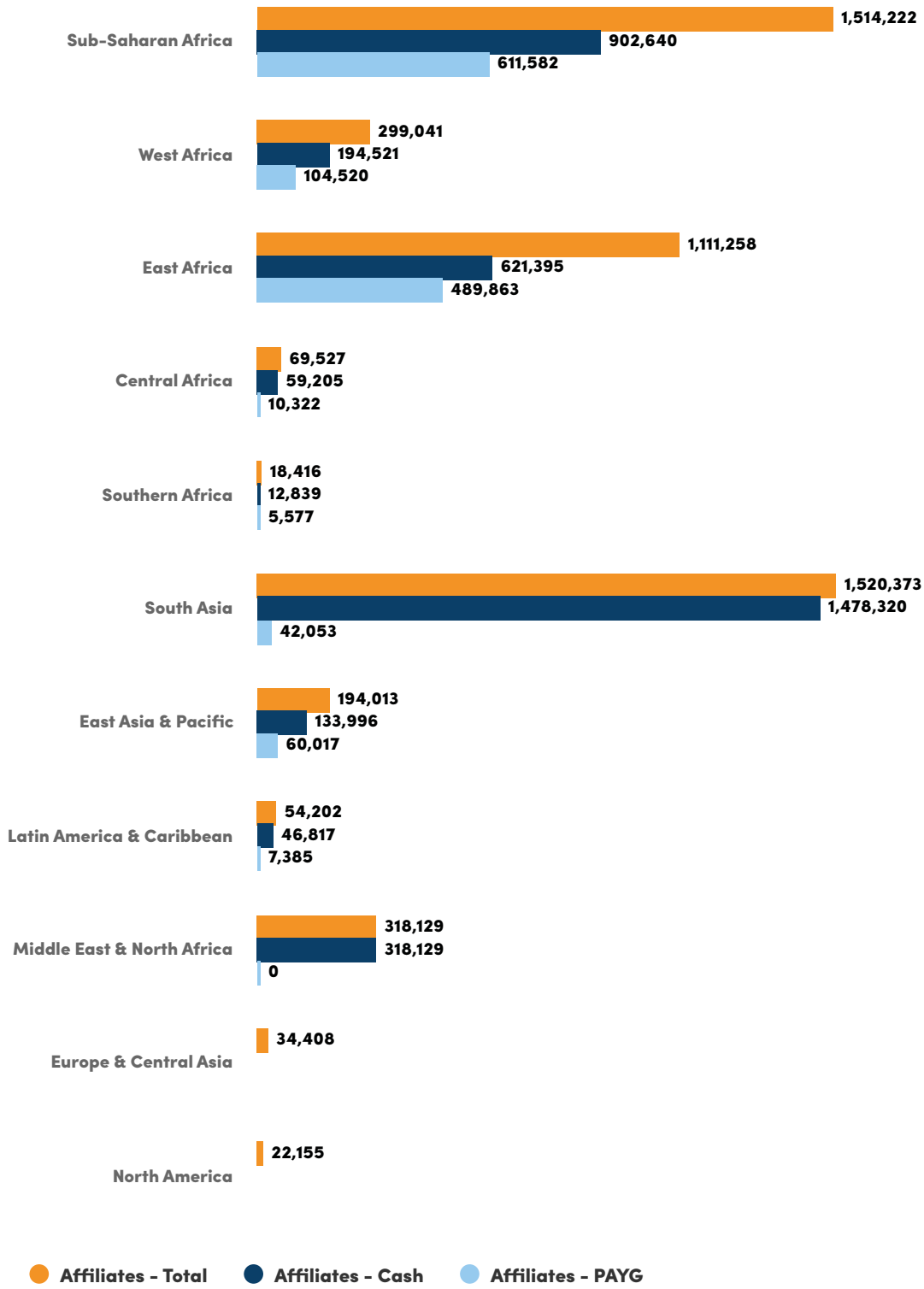
Figure 11 shows how South Asia seems to be regaining some momentum in terms of sales volumes, with a 10% increase, mainly driven by India's recovery from the challenging period in 2017. Very little of the South Asian market is comprised of PAYG sales.

Other Markets

In the first half of 2018, Middle East and North Africa was the third largest regional market with 320,000 sales reported, registering a 30% decrease compared to last round. Much of these sales can be attributed to distribution hubs for humanitarian emergency relief activity in the region, and therefore do not necessarily represent a commercial market for off-grid products in these areas. Meanwhile, the sales volumes increased again by 12% in the East Asia and Pacific market, which seems to continue its rising trend from previous rounds, as seen in Figure 11.

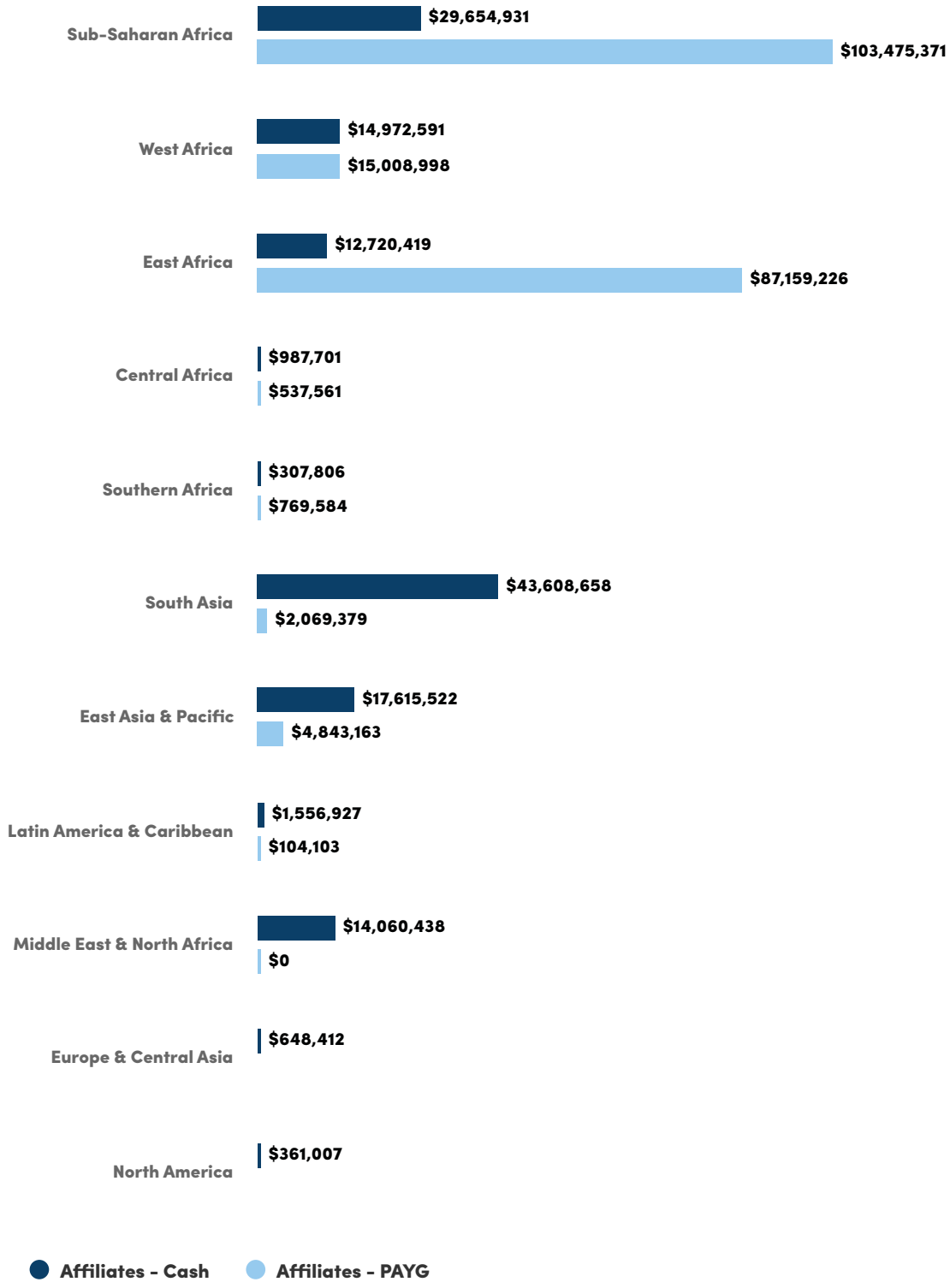
For a more in-depth analysis into the countries causing these regional trends, please refer to the "Market Insights by Country" section on page 36.

Figure 8 - 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/PAYG is shown only if both segments passed the three-data point control

Figure 9 - Value of Products Sold per region



NOTE
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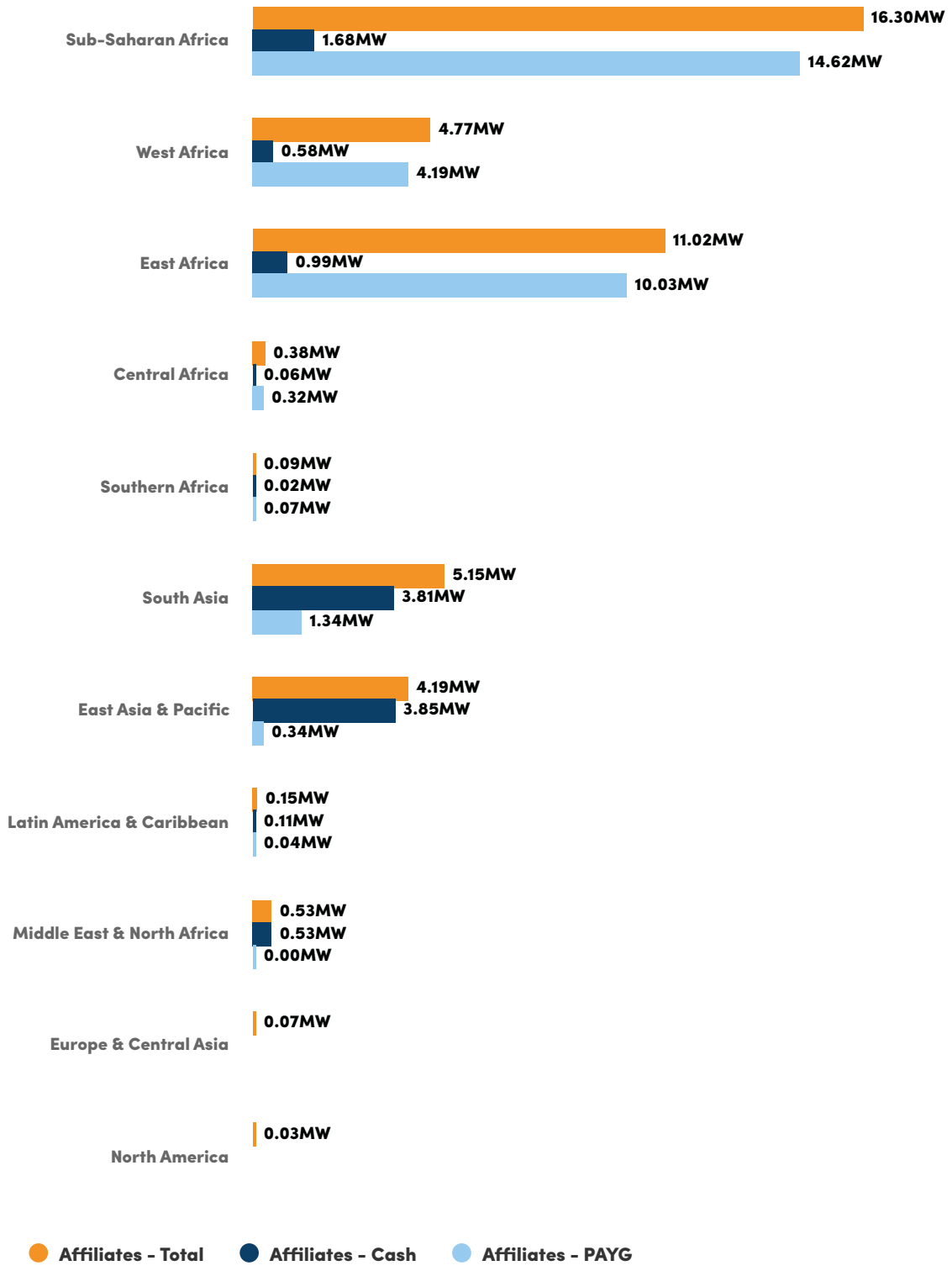
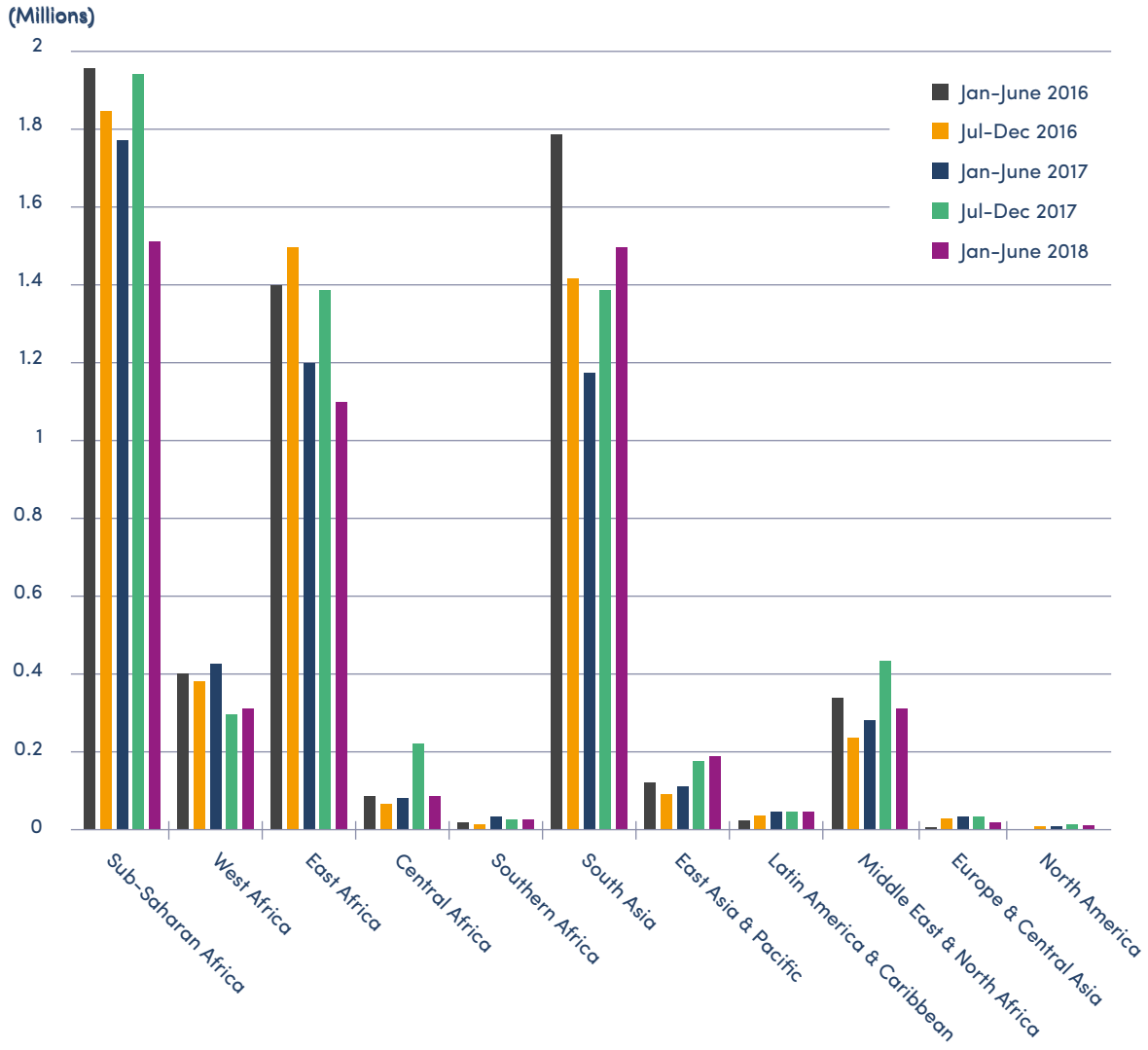
Figure 10 - Newly Installed Capacity per region



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/PAYG is shown only if both segments passed the three-data point control

Figure 11 - Volume of Products Sold Regionally (Historical)



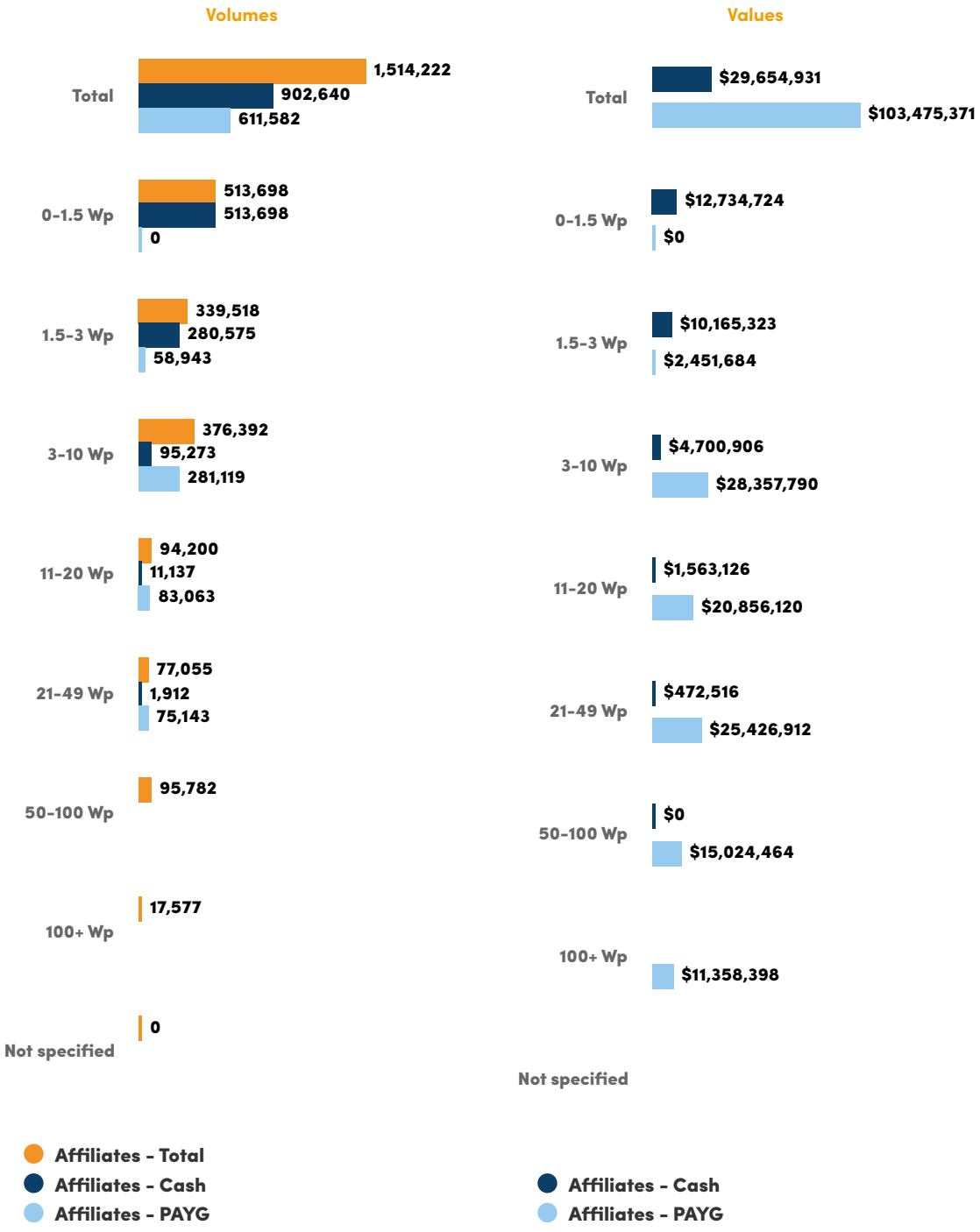
Insights by Product Category

Portable Lanterns
In the first half of 2018, portable lanterns still represented 56% of the total sales volumes in Sub-Saharan Africa and 90% in South Asia, accounting for 850,000 and 1.4 million units sold, respectively. Most of these products are sold on a cash basis, registering a value of $23 million in Sub-Saharan Africa and $34 million in South Asia. These systems represent 28% of sales volumes reported in East Asia and Pacific, highlighting how the customers in this market are probably looking at larger systems.

Multi-light Systems
This family of products is mostly sold via PAYG in Sub-Saharan Africa, continuing its consolidation path over time with 380,000 units sold in total. In South Asia, multi-light systems are leading the way in the small penetration of PAYG products into the region with 20,000 units. However, the clear majority of the total 90,000 units sold is still channeled through cash over the counter sales. East Asia and Pacific has recorded sales of around 80,000 multi-light systems sold, 40% of the total for the region.

Solar Home Systems (SHS)
Only in Sub-Saharan Africa SHS kits from affiliates are starting to reach significant sales volumes with 285,000 products sold, accounting for over 70% of the global market for this category; while the sub-region with the largest share is the more mature East African market with 200,000 SHS sold.

Figure 12 - Sales Volumes & Values by Product Category – Sub-Saharan Africa



NOTE
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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/PAYG is shown only if both segments passed the three-data point control

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Figure 13 Sales Volumes & Values by Product Category – East Africa

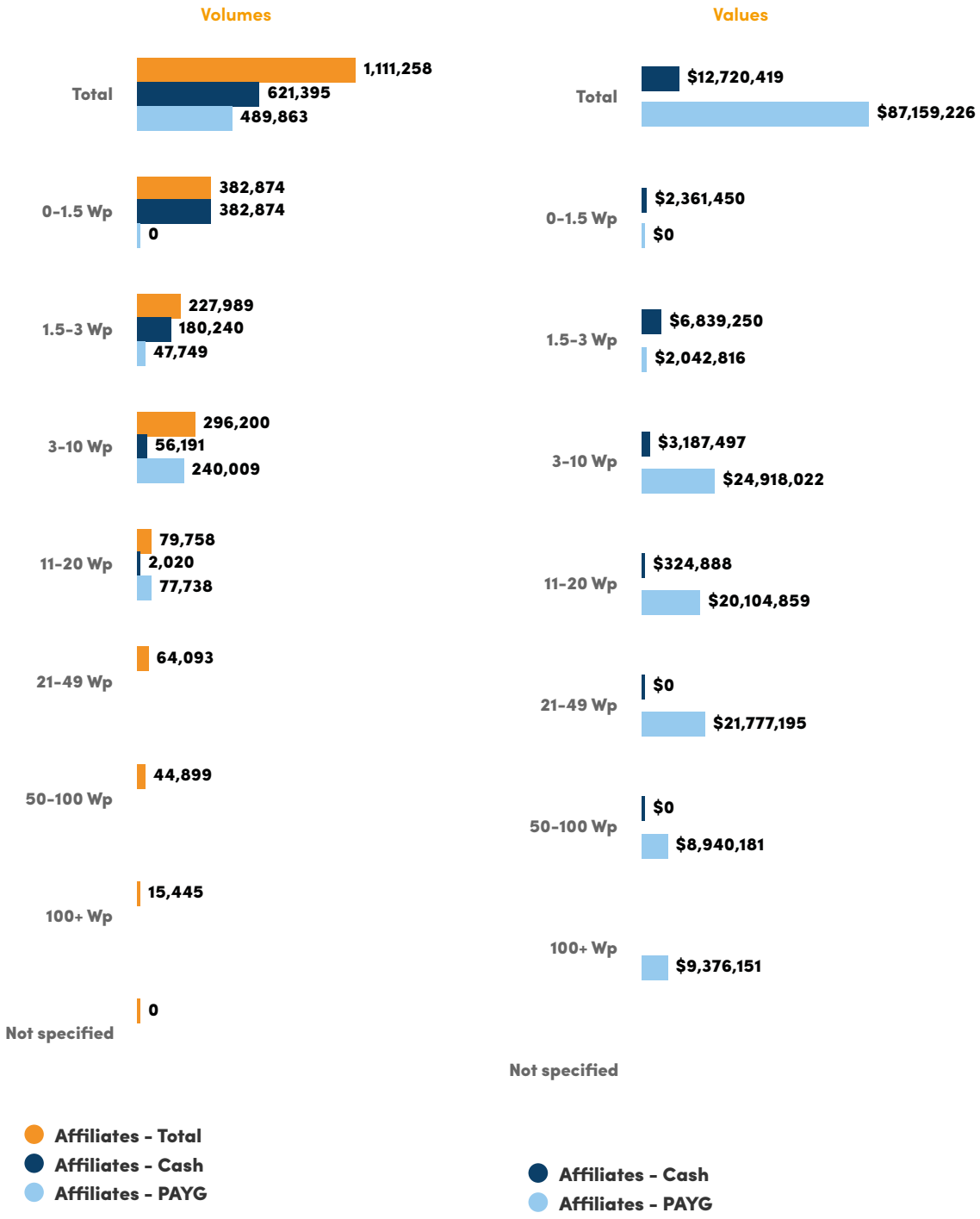

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Figure 14 - Sales Volumes & Values by Product Category – West Africa

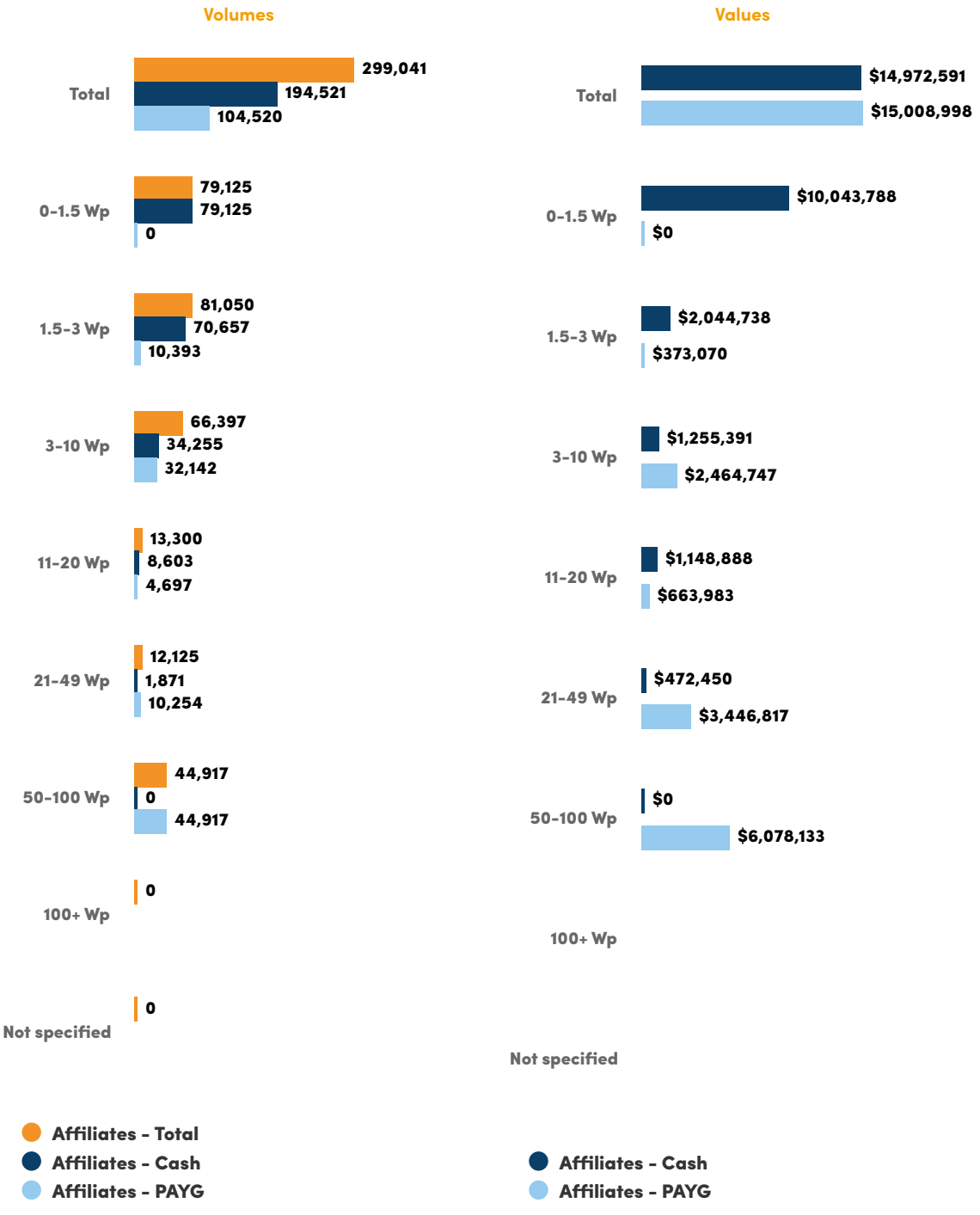

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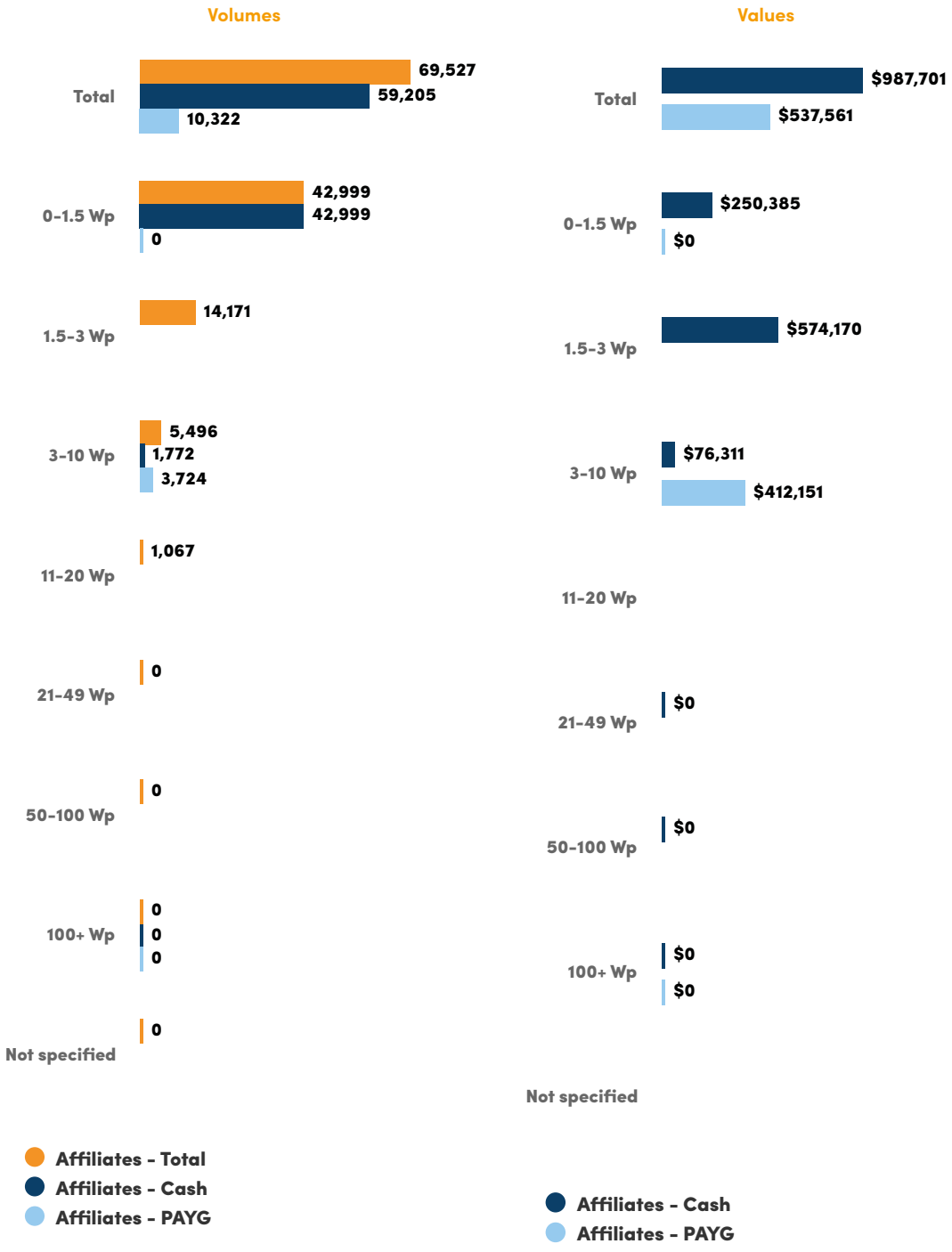
Figure 15 - Sales Volumes & Values by Product Category – Central Africa



NOTE
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Figure 16 - Sales Volumes & Values by Product Category – Southern Africa

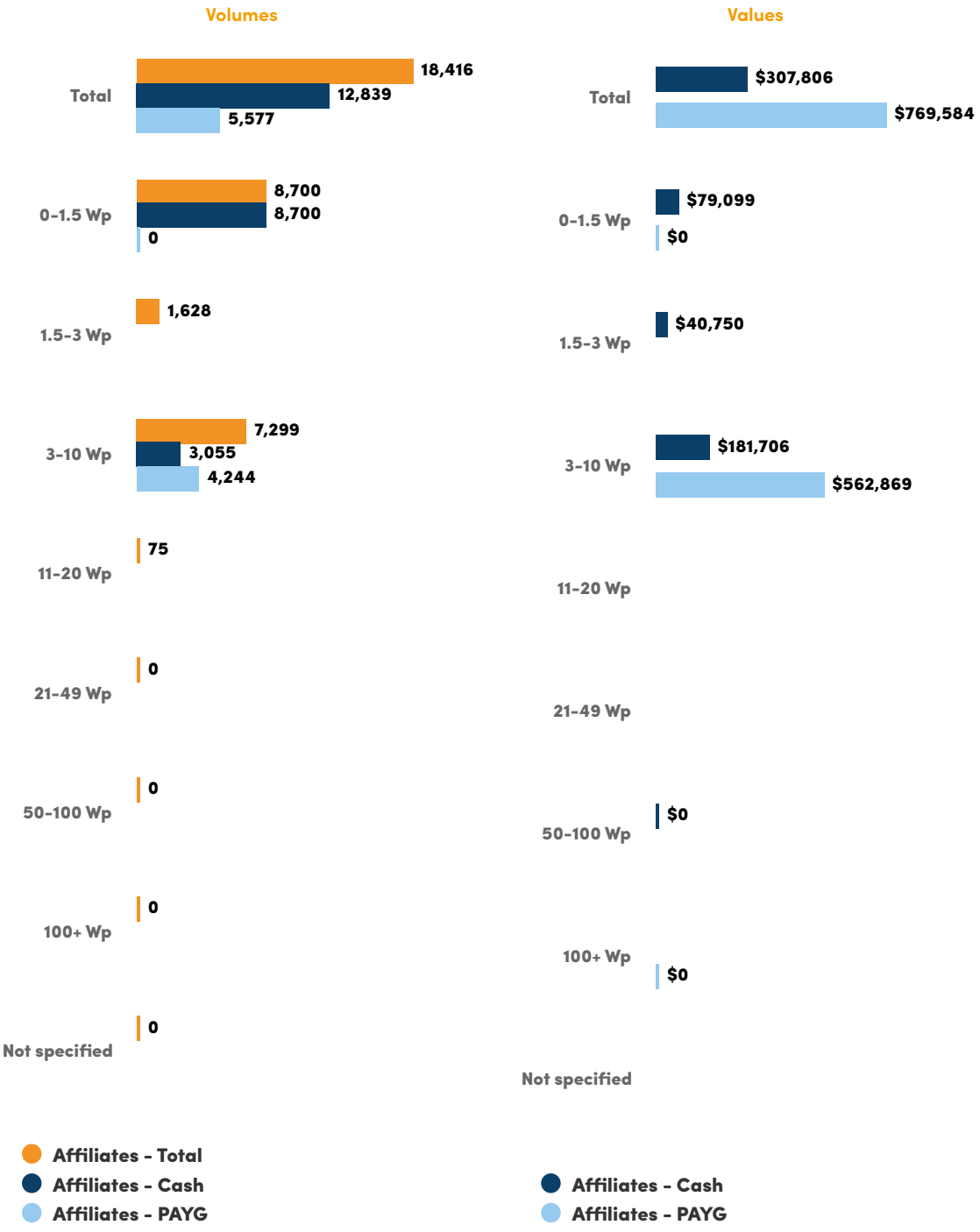

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Figure 17 - Sales Volumes & Values by Product Category – South Asia

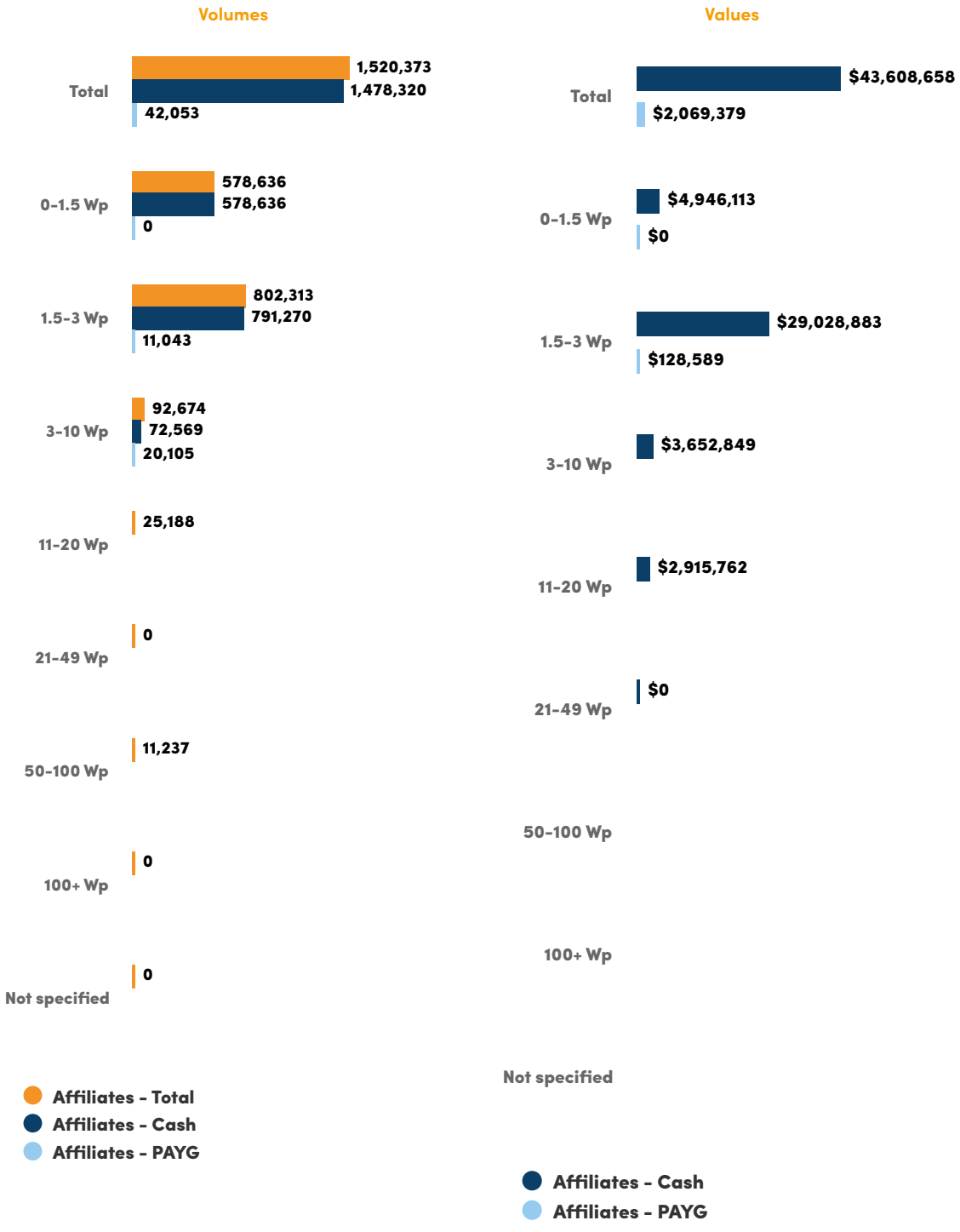

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Figure 18 - Sales Volumes & Values by Product Category – East Asia & Pacific

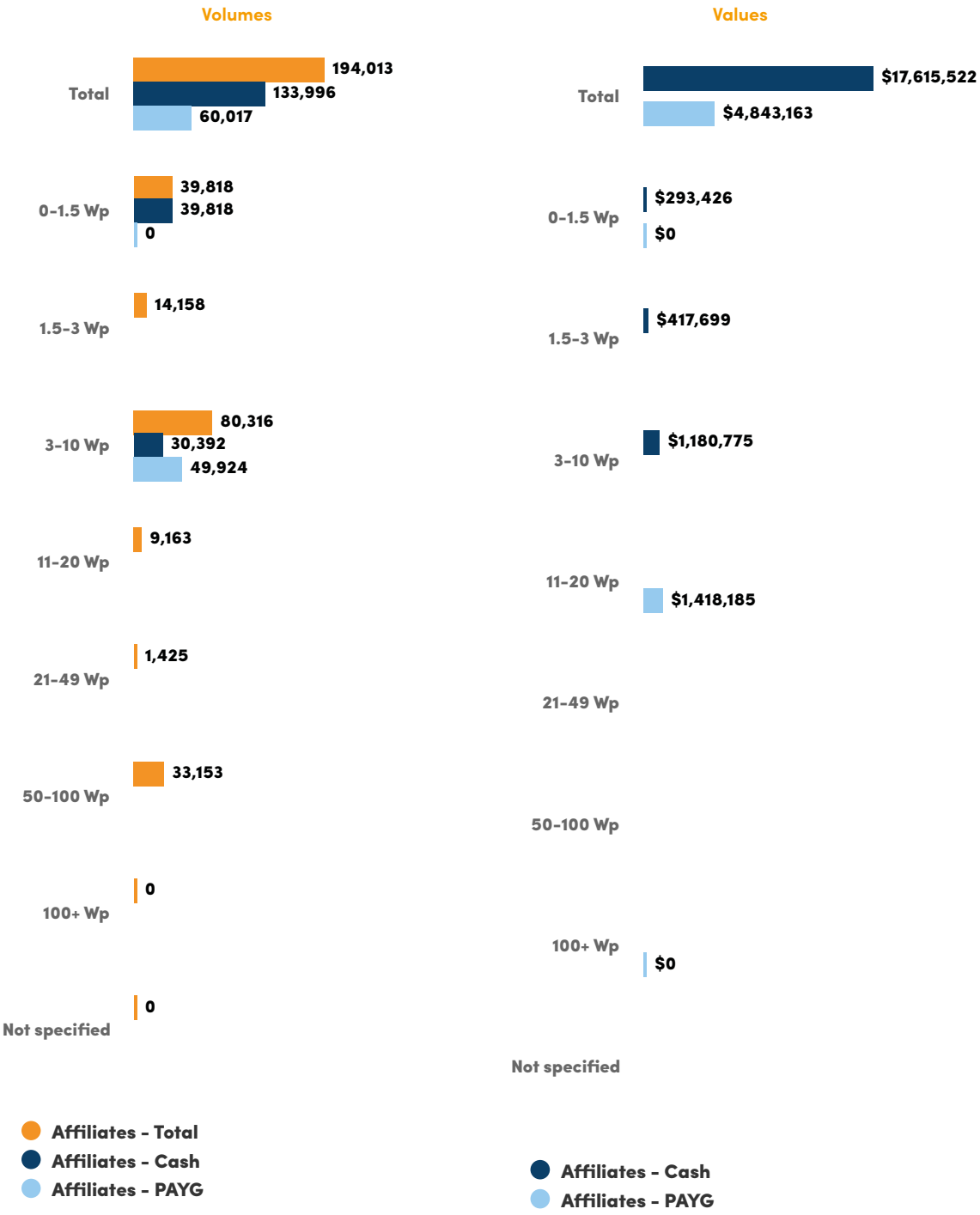

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Figure 19 - Sales Volumes & Values by Product Category – Middle East & North Africa

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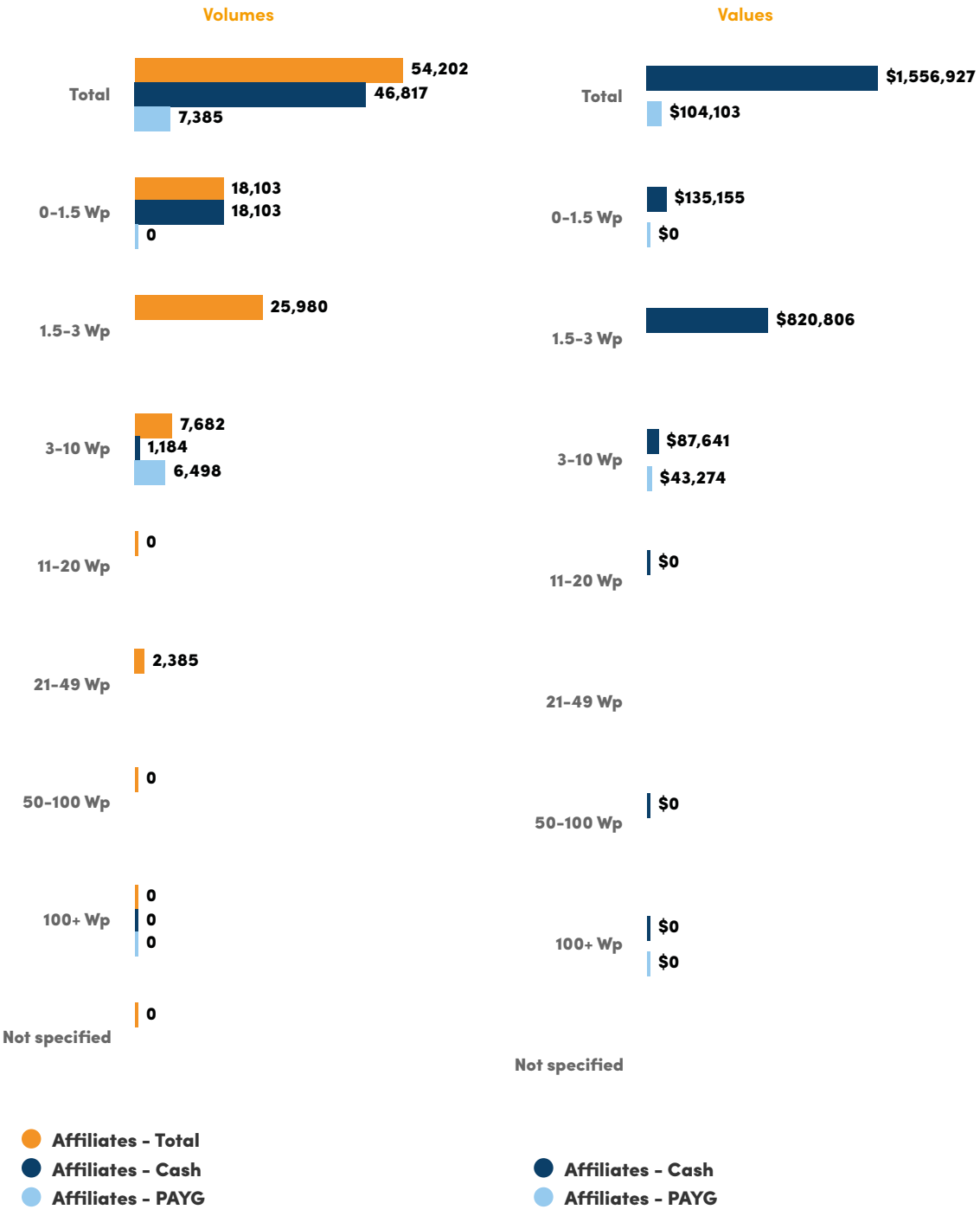
Figure 20 - Sales Volumes & Values by Product Category – Latin America & Caribbean



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Market Insights by Country

This report only includes data for national markets where at least three manufacturers reported sales; in this reporting round (January-June), this amounts to 46 countries. An explanation of drivers affecting the sales volumes in the first half of 2018 can be found in the "Market Dynamics" section on page 18.

When looking at the Top 10 countries by volumes of products sold in cash in Table 4, India remains the largest country market in the cash segment with 1.3 million products sold for a value of $37 million, accounting for 44% of the cash sales globally. Kenya follows with 300,000 units sold for a value of $5 million. Ethiopia, Nigeria and Uganda complete the Top 5 with around 100,000 units each. Moreover, we can observe that these large sales volumes account for little newly installed capacity; this is because portable lanterns with indicative wattage 0-2.999 Wp still represent the clear majority of products sold in the cash segment. The only exception seems to be Myanmar with 50,000 units installing 3.55 MW.

The Top 10 looks different in Table 5 representing the PAYG products segment: here Kenya is leading the pack with 220,000 units sold, alone representing 30% of the PAYG market, while India falls to fifth place with slightly less than 40,000 units and Tanzania replaces Ethiopia in third position.

Table 4 - 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	1,292,067	44.07%	$36,618,911	34.06%	2.98MW	29.70%
Kenya	300,557	10.25%	$5,090,720	4.74%	0.33MW	3.32%
Ethiopia	121,227	4.13%	$4,499,580	4.19%	0.44MW	4.37%
Nigeria	102,793	3.51%	$2,746,581	2.55%	0.3MW	3.03%
Uganda	95,018	3.24%	$2,099,173	1.95%	0.12MW	1.21%
Tanzania	52,691	1.80%	$339,108	0.32%	0.02MW	0.23%
Myanmar	50,451	1.72%	$15,598,113	14.51%	3.55MW	35.37%
Cameroon	45,488	1.55%	$690,329	0.64%	0.03MW	0.34%
United Arab Emirates	32,941	1.12%	$1,278,852	1.19%	0.05MW	0.51%
Philippines	24,536	0.84%	$808,440	0.75%	0.12MW	1.17%

Table 5 - Top 10 Country Markets by Volume of Products Sold – PAYG

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
Kenya	218,597	30.13%	$35,429,662	31.95%	3.6MW	21.96%
Uganda	78,538	10.82%	$16,159,700	14.57%	1.7MW	10.41%
Tanzania	51,004	7.03%	$16,745,601	15.10%	2.47MW	15.10%
Nigeria	50,319	6.94%	$2,605,621	2.35%	2.57MW	15.72%
India	39,253	5.41%	$1,918,701	1.73%	1.2MW	7.31%
Rwanda	38,341	5.28%	$4,480,075	4.04%	1.33MW	8.12%
Zambia	30,081	4.15%	$5,675,206	5.12%	0.4MW	2.45%
Ethiopia	26,42	3.64%	$1,354,220	1.22%	0.18MW	1.12%
Myanmar	21,295	2.94%	$2,310,529	2.08%	0.14MW	0.88%
Cote d'Ivoire	17,106	2.36%	$8,158,133	7.36%	1.02MW	6.23%

Sub-Saharan Africa

As seen in the Top 10 charts, Kenya, Ethiopia, Rwanda, Tanzania and Uganda are still the largest markets in Sub-Saharan Africa, together accounting for 90% of the sales in East Africa in the first half of 2018. However, split trajectories can be observed: Kenya and Tanzania remained stable in terms of the sales volumes registered last round with modest growth rates and respectively 500,000 and 100,000 units sold. On the other end of the spectrum, Ethiopia, Uganda and Rwanda have experienced a decrease in sales by 7%, 23% and 40%, respectively, compared to the second half of 2017. Both Zambia and Zimbabwe seem to be expanding markets with steady growth rates registered in the previous two reporting rounds for 2017, reaching respectively 38,000 and 22,000 units sold in this reporting round. Malawi, after the large volumes reported in the second half of 2017 with 130,000 units sold, has fallen back to 23,000 systems in this first half of 2018, which is still an increase compared to the sales registered in the same period of the previous year. Unfortunately, Mozambique did not pass the three-data point control this round so no conclusion can be drawn on the growing trajectory observed in the second half of 2017.

In West Africa, Nigeria – the largest national market in the region – registered a 42% increase compared to the second half of 2017 reaching again the levels registered in the second half of 2016 with 150,000 units sold. Senegal also registered significant market growth with over 30,000 units sold (a 75% increase compared with the second half of 2017), while Cote d'Ivoire shows more modest but steady growth with a 14% increase that allows it to reach almost 18,000 units sold. Large growth in percentage terms can be observed in Niger and Togo (241% and 135%, respectively). However, they both still account only for small volumes overall, since each market accounts for around 4,000 units. Ghana registered a small decrease compared to the second half of 2017, with sales volumes comparable with the ones reported in the first half of the same year (around 26,000 units). Meanwhile, both Burkina Faso and Mali experienced a 50% decrease falling respectively to 23,000 and 16,000 each (compared to the 40,000 units each in the last reporting round).

Currently only two countries in Central Africa have enough companies reporting to pass the confidentiality rule. After the large volumes registered in 2017 (46,000 units in H1 2017 and 240,000 units in H2 2017), DRC registered only 11,000 units sold in January-June 2018 while sales in Cameroon are the highest registered in the countries with 50,000 units sold, recovering after the large drop observed in the previous reporting round when only 2,000 systems where reported in the country.

South Asia

The picture seems definitely brighter in South Asia with general growth registered. India still represents 87% of the sales reported by affiliates in South Asia with 1.33 million units sold, seeing a small percentage increase compared to the last round. Bangladesh again reported a 50% increase following the trajectory of the last few rounds, reaching 180,000 units sold. Meanwhile, 9,000 units were sold in Pakistan in the first half of 2018, a 33% increase compared to the second half of 2017.

East Asia and Pacific

The largest national market in the first half of 2018 was Myanmar with 70,000 units sold, with a tremendous increase compared to the second half of 2017 (when only 4,000 systems were reported sold by affiliates). Also, Papua New Guinea and the Philippines registered a large increase compared to the previous round reaching respectively 37,000 and 25,000 units sold in January-June 2018. More positive signals have been registered also from the smaller markets of Vanuatu and Thailand. Meanwhile, Indonesia, which hit the bar of 100,000 units last reporting round has fallen to 26,000 systems sold in the first half of 2018. Overall, East Asia and Pacific remains a market in expansion with new companies reporting sales in the region and sales volumes still steadily increasing over time. It will take some rounds to identify if such growth continues, or if the current sales spikes are incidental.

Middle East and North Africa

The Middle East and North Africa region is still the third largest regional market with 320,000 units reported as sold. However, little can be said about the countries contributing to the sales due to the three-data point rule applied in this report, meaning that for most countries in the region less than three manufacturer companies reported sales.

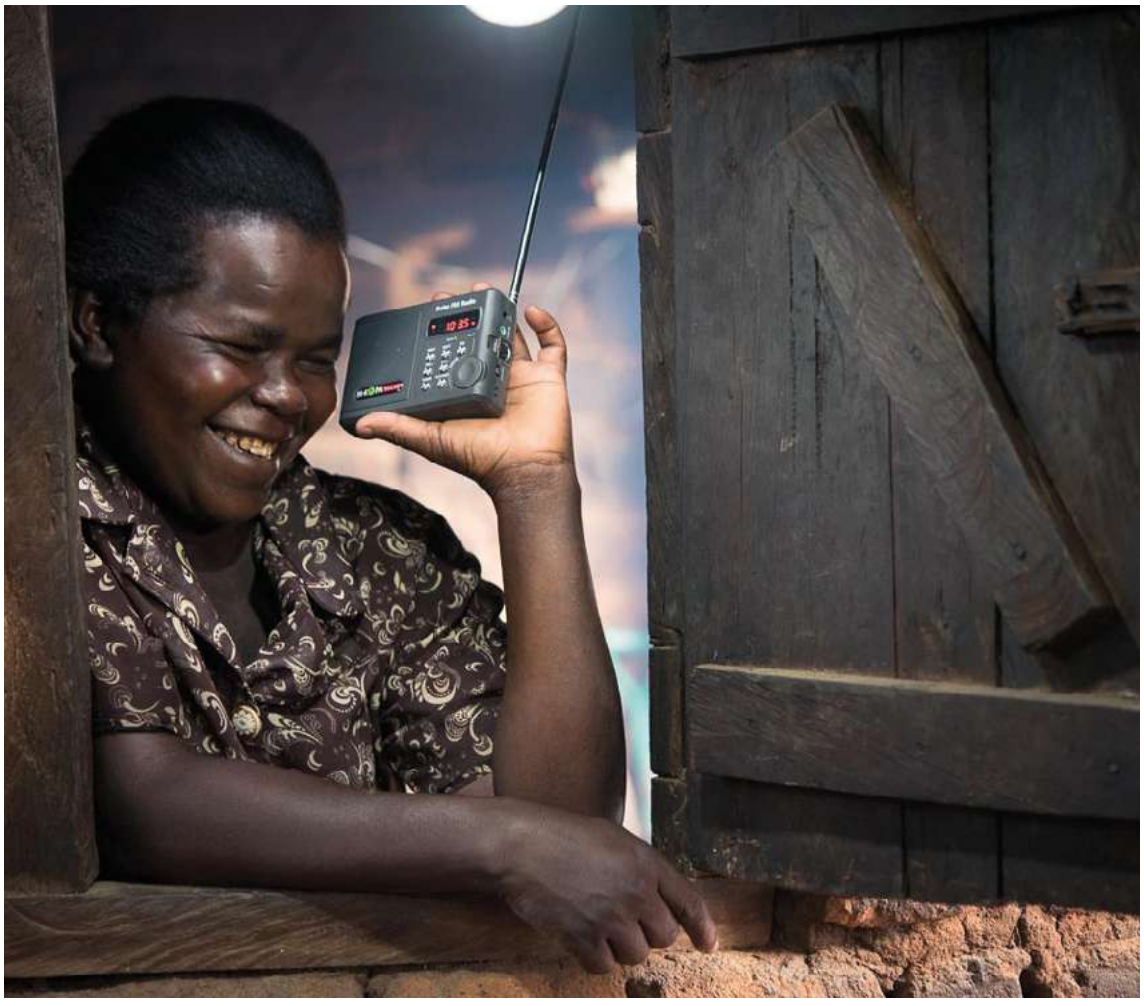

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Table 6 - Sales Volumes & Values by Country – Sub-Saharan Africa

	Volumes			Values	
Countries	**Total**	**PAYGO**	**Cash**	**PAYGO**	**Cash**
Sub-Saharan Africa	**1.514.222**	**611.582**	**902.640**	**$103.475.372**	**$29.654.932**
East Africa	**1.111.258**	**489.863**	**621.395**	**$87.159.227**	**$12.720.420**
Ethiopia	147.647	26.420	121.227	$1.354.221	$4.499.581
Kenya	519.154	218.597	300.557	$35.429.663	$5.090.721
Madagascar	27.355	-	-	-	-
Malawi	22.772	12.083	10.689	$525.286	$86.171
Rwanda	47.741	38.341	9.400	$4.480.075	$279.934
Tanzania	103.695	51.004	52.691	$16.745.601	$339.108
Uganda	173.556	78.538	95.018	$16.159.700	$2.099.174
Zambia	37.978	30.081	7.897	$5.675.206	$157.800
Zimbabwe	21.583	-	-	$1.980.697	-
West Africa	**299.041**	**104.520**	**194.521**	**$15.008.999**	**$14.972.591**
Benin	5.733	-	-	-	$372.935
Burkina Faso	22.809	478	22.331	-	$383.637
Cote d'Ivoire	17.446	17.106	340	$8.158.133	-
Ghana	26.160	12.688	13.472	$2.753.189	$915.725
Mali	16.448	-	-	-	$443.729
Niger	3.955	-	-	-	-
Nigeria	153.112	50.319	102.793	$2.605.621	$2.746.581
Senegal	31.335	9.265	22.070	-	$448.595
Togo	4.505	-	-	-	-
Central Africa	**69.527**	**10.322**	**59.205**	**$537.561**	**$987.701**
Cameroon	49.715	4.227	45.488	$487.747	$690.329
Congo, Dem. Rep.	11.197	-	-	-	-
Southern Africa	**18.416**	**5.577**	**12.839**	**$769.585**	**$307.807**
Namibia	4.218	-	-	-	-
South Africa	13.848	1.431	12.417	-	$303.698

Table 7 - Sales Volumes & Values by Country – South Asia

	Volumes			Values	
Countries	Total	PAYGO	Cash	PAYGO	Cash
South Asia	**1.520.373**	**42.053**	**1.478.320**	**$2.069.380**	**$43.608.659**
Bangladesh	179.708	-	-	-	$6.849.402
India	1.331.320	39.253	1.292.067	$1.918.702	$36.618.911
Pakistan	8.982	2.295	6.687	$138.221	$121.512

Table 8 - Sales Volumes & Values by Country – East Asia & Pacific

	Volumes			Values	
Countries	Total	PAYGO	Cash	PAYGO	Cash
East-Asia & Pacific	**194.013**	**60.017**	**133.996**	**$4.843.164**	**$17.615.522**
China	7.552	-	-	-	$129.595
Hong Kong SAR, China	5.024	-	-	-	$869
Indonesia	26.289	-	-	-	$141.594
Japan	1.667	-	-	-	-
Myanmar	71.746	21.295	50.451	$2.310.530	$15.598.113
Papua New Guinea	36.908	-	-	-	$643.321
Philippines	24.855	319	24.536	-	$808.440
Singapore	645	-	-	-	-
Thailand	2.673	-	2.673	-	-
Vanuatu	9.729	-	-	$2.296.990	-

Table 9 - Sales Volumes & Values by Country – Middle East & North Africa

	Volumes			Values	
Countries	Total	PAYGO	Cash	PAYGO	Cash
Middle East & North Africa	**318.129**	**-**	**318.129**	**-**	**$14.060.438**
United Arab Emirates	32.941	-	32.941	-	$1.278.852

Table 10 - Sales Volumes & Values by Country – Latin America & Caribbean

	Volumes			Values	
Countries	Total	PAYGO	Cash	PAYGO	Cash
Latin America & Caribbean	**54.202**	**7.385**	**46.817**	**$104.103**	**$1.556.927**
Haiti	8.760	-	-	-	-
Peru	3.100	1.580	1.520	-	$43.154
Puerto Rico	4.262	-	-	-	-

Impact Metrics

The following set of impact numbers is estimated using the revised Standardized Impact Metrics for the Off-Grid Solar Energy Sector[8], released in September 2018. These metrics provide a framework for the off-grid solar sector to collectively report on their social and environmental impact in a consistent and comparable way.

First launched in 2015, the metrics were updated and expanded throughout 2017–18 by GOGLA's Impact Working Group and with input from external experts. This revision enables additional impact areas to be included in the H1 2018 report, including estimates of the number of people able to undertake more economic activity as a result of using off-grid solar products and the amount of additional income this activity generates. The metrics have also been enhanced to better estimate the impact of different sizes of off-grid systems and different business models (e.g. PAYG vs cash sales).

Methodology

Each impact metric combines company data (such as sales, product characteristics, and other company information) 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, 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.

The impact estimates for this reporting round are calculated by applying these standardized impact metrics to the off-grid solar sales reported by GOGLA Members and affiliates. The impact of sales between January to June 2018, as well as all sales of off-grid solar products in previous years that have been reported by participating companies, are included in these calculations.

The following pages therefore present the aggregated impact of affiliates, which includes GOGLA members and companies that sell Lighting Global quality verified products, who participated in the data collection for the first half of 2018 and/or who participated in previous rounds of data collection. To avoid double-counting, the results are only drawn from data provided by manufacturers[9].

Limitations

This report only estimates the impact made by participating companies: Therefore, while the numbers shown aggregate the impact of key players in the off-grid sector, this report does not present an estimate of all global impacts of off-grid solar for this reporting period. Based on previous analysis 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 small systems (<11 Wp) and 60–80% of solar home systems kits with over 11 Wp solar panels.** This proportion varies substantially from country to country.

This report takes a conservative approach to data inclusion and may underestimate the total impact of participants: To estimate when a product reaches 'end of life', 1.5x their warranty period is used. This means that no impact is attributed to a product after that period. However, it is possible that a significant number of these products are continuing to benefit households beyond this period. Moreover, if companies have not provided all the product specifications needed for a particular impact metric, such as lumen output or run-time, the product will not be included in the analysis for that metric.

Research on off-grid solar, and the GOGLA metrics, are being continuously improved: GOGLA's impact metrics continue to be refined and improved. It is important to note, therefore, that the numbers presented are estimates and may change as new evidence becomes available.

8 www.gogla.org/gogla-impact-metrics
9 https://iris.thegiin.org/off-grid-energy-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 Standardized Impact Metrics for the Off-Grid Solar Energy Sector: Version 3.0[10]. Please note that all numbers calculated using the metrics should be expressed as estimates.

1ai. Number of people with improved energy access[11], 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 sales 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), per off-grid solar product; over expected lifetime of the product

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 (products <11 Wp only)
Amount of US$ savings on energy-related expenditure*, per household; over expected lifetime of solar product

7aii. Savings on energy expenditure, cumulatively (products <11 Wp only)
Amount of US$ savings on energy-related expenditure, in aggregate of all sales ever; over the expected lifetime of products

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

10 www.gogla.org/gogla-impact-metrics
11 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.

Key Global Impact Figures

Impact estimates relate to all off-grid solar products sold/reported to date by participating GOGLA Members and affiliates (as at June 2018)

214.8 million
People who have ever lived in a household with improved energy access (e.g. high quality solar)

103.5 million
People currently living in a household with improved energy access (e.g. high quality solar)

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

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

4.5 million
People currently undertaking more economic activity as a result of using off-grid solar

2.5 million
People using their system to support an enterprise or income generating activities e.g. charging phones for a fee or operating a sales stall at night

$3.5 billion
Additional income generated as a result of off-grid system ownership; generated over the expected lifetime of the solar products

22.8 million
Kerosene lanterns no longer in use because users have replaced them with solar lighting

51 million
Metric tons of CO2 and black carbon averted due to reduction in kerosene use (in CO2e), cumulatively, over the expected lifetime of the products

$8.4 billion
Amount of savings on energy-related expenditure, in aggregate of all sales ever; over the expected lifetime of products (<11 Wp products only)

48.2 billion
Additional light hours used across all households; over the expected lifetime of their solar products

2.4 million
People spending more time working as a result of using off-grid solar products

Global Analysis: Impact

Why are there no comparative impact figures between 2017 and H1 2018?

Between the last report in the series and this one, a significant revision was made to the sales and impact database. This has allowed for a more accurate assessment of the cumulative impact of off-grid solar products reported to GOGLA in previous years. However, it means that it is not possible to make direct comparisons with impact estimates shared in previous reports. A revision to the impact metrics was also made during this time, again reducing comparability. Please note that efforts will be made to include comparative figures in future reporting rounds.

Currently, over 100 million people are actively benefitting from off-grid solar products sold or distributed by GOGLA Members and companies that sell Lighting Global quality verified products. Since data collection began, an estimated 215 million people have been reached with improved energy services. When viewing energy access through the lens of the SEforALL Tiers[12], these products have helped 55 million people to access Tier 1 energy services and 3.7 million to reach Tier 2. The increasing number of people reaching Tier 1 and 2 levels of energy service is linked to the increasing sales of larger sizes of off-grid solar system. Tier 2 energy service is achieved where the off-grid system used by a household provides a minimum of four hours of service for multiple lights, phone charging and television, or when the system is 50 Wp or larger and can power a range of appliances.

While SHS are enabling more customers to reach higher tiers of energy access, the smaller entry-level devices are responsible for the significant customer savings on energy expenditure created by the sector: over their lifetimes, solar lanterns and multi-light systems sold to date are estimated to save customers over $8 billion by reducing or eliminating the need to buy kerosene, candles, or torch batteries for lighting, as well as the amount spent on phone charging outside the home[13].

Meanwhile, the reduction in kerosene usage unlocked by households previously using kerosene switching to off-grid solar continues to bring huge benefits for CO2e reduction. Cumulative sales of off-grid solar kits to date are estimated to avoid over 50 million tons of CO2 and black carbon emissions over the product lifetime. This is equivalent to taking 12 coal-fired power plants offline for a year[14]. Improvements in light quality created by the switch to solar have also seen the average light output received (44 lumens) increase by 76% when compared to households with kerosene lamps (25 lumens) and 158% when compared to candlelight (12 lumens) – making homes brighter and safer. In addition, the number of extra hours of light created for off-grid families from the products sold to date is close to 50 billion in total, and over 1000 hours on average for a household, creating more time for work, study and to spend with family.

While the impacts highlighted above are linked to impact numbers shared in previous sales and impact reports, this latest version includes estimates on three new impact areas for the first time: economic activity (overall), people spending more time working, and income generation. These impact estimates have been made possible by new research, supported by the UK Department for International Development, which was used to inform the revision to the impact metrics[15]. These updates also included new data on the number of people using off-grid solar to support enterprise, such as phone charging for a fee or opening shops and restaurants later at night. This indicates that more than 2.5 million people are now using off-grid solar to support their businesses or income generating activities. In addition, the number of people who now can work longer hours due to time-savings, either to

12 The five tiers of energy access are categories within the SEforALL Global Tracking Framework, created to address the previous, binary, approach to energy access measurement (in which a grid-powered household had electricity access, and households powered in any other way were not recognised).
13 Please note that this metric has been amended so that it only relates to pico-solar PV, where there is a closer like-for-like comparison with baseline expenditure estimates on phone charging and lighting. Larger off-grid systems often come with additional appliances such as radios, televisions and fans. This makes like-for-like comparison challenging and can lead to increased, rather than decreased, costs. As such, solar home systems are no longer included in the calculation for this metric.
14 www.epa.gov/energy/greenhouse-gas-equivalencies-calculator
15 www.gogla.org/gogla-impact-metrics

create income or in productive activities, is estimated at 2.4 million. While the overall number of people undertaking more economic activity (whether using their system to support enterprise, the additional time available to undertake more work or have been able to take on a new job) is almost 4.5 million[16]. This increased economic activity, will unlock an estimated $3.5 billion in additional income for off-grid households over the lifetime of all the products sold to date.

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

This number of people currently benefitting from off-grid solar products sold by GOGLA Members and affiliates is just under half of those who, cumulatively, have benefitted from improved energy access. The difference in the two estimates is a result of the conservative way that GOGLA reports impact data, incorporating an "end of life" period into measurement that is equal to 1.5x the warranty (usually between 2-5 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.

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16 The economic activity metric includes a calculation of the number of people within households with off-grid solar who use their system to support an enterprise, are able to spend more time working or have been able to get a new job. The figure used to calculate this number also takes into account the number of customers who do more than one of these activities. For this reason, the number of people undertaking more economic activity does not simply equate to the number of people using their system to support enterprise plus the number of people who spend more time working e.g. as some households might use the system to support enterprise and spend time working / take on a new job (or all three).

Figure 21 - People with Improved Energy Access – Cumulatively

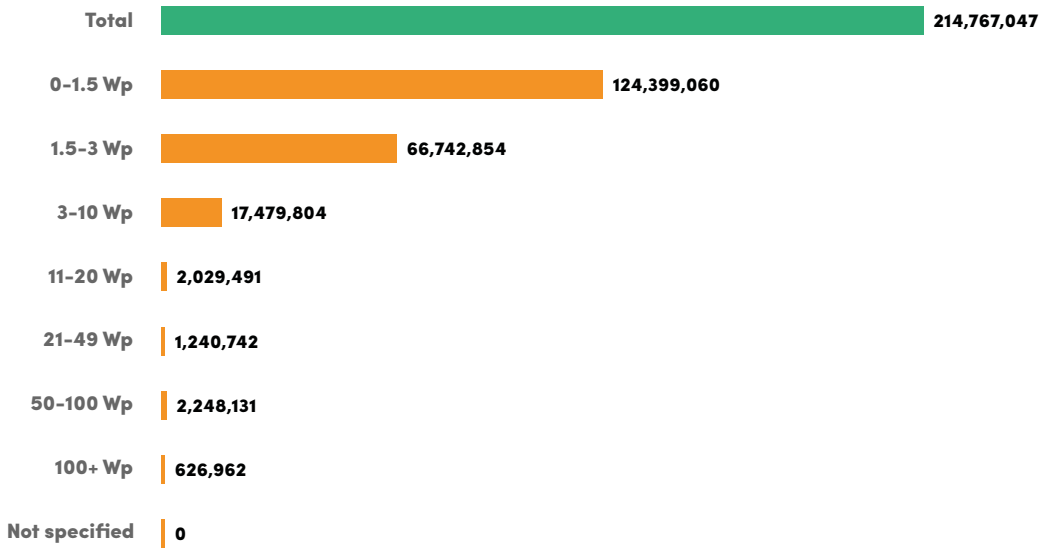


Figure 22 - People with Improved Energy Access - Currently

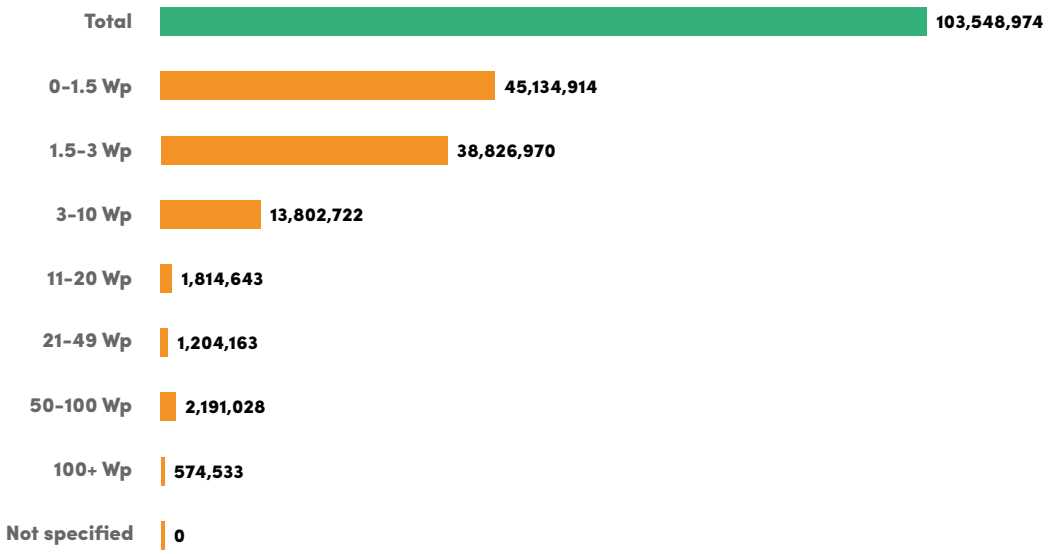
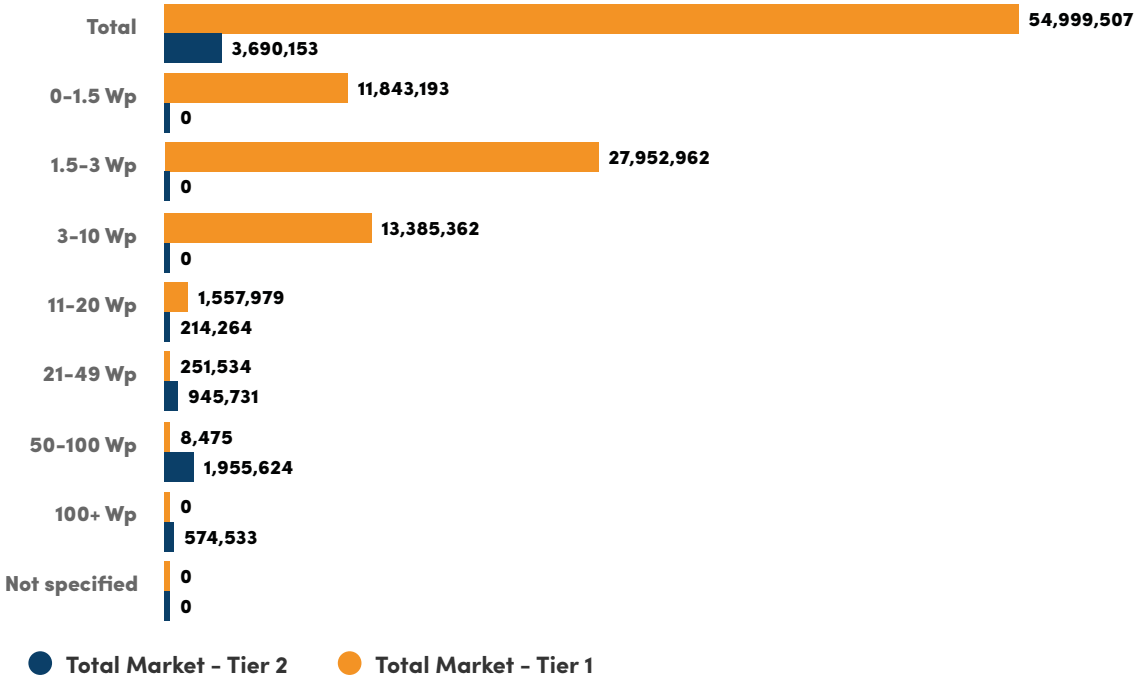


Figure 23 - People with Access to Tier 1 and Tier 2 Energy Services (According to SEforALL Methodology)



© Mobisol

Figure 24 - People Undertaking More Economic Activity

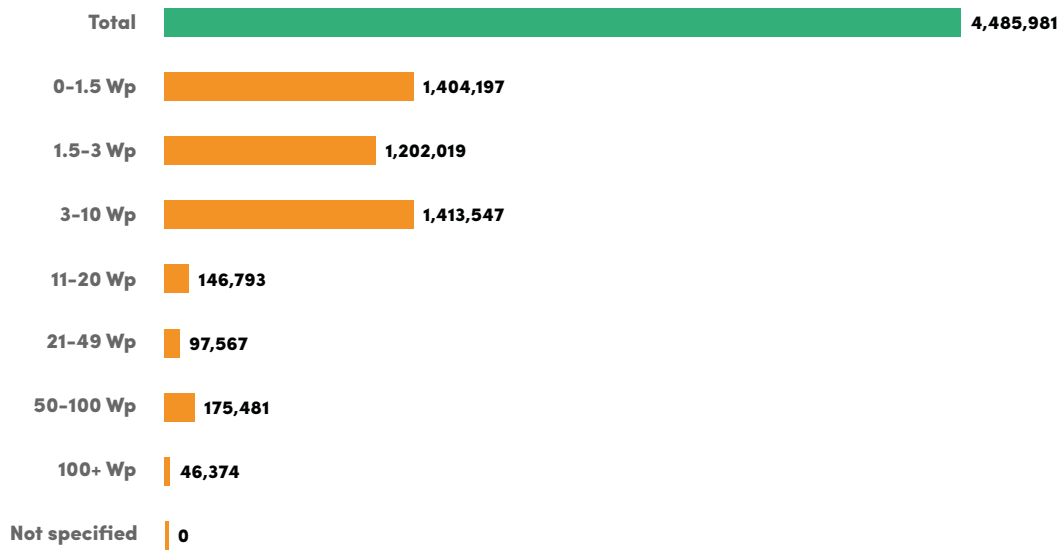


Figure 25 - People Using Products to Support Enterprise

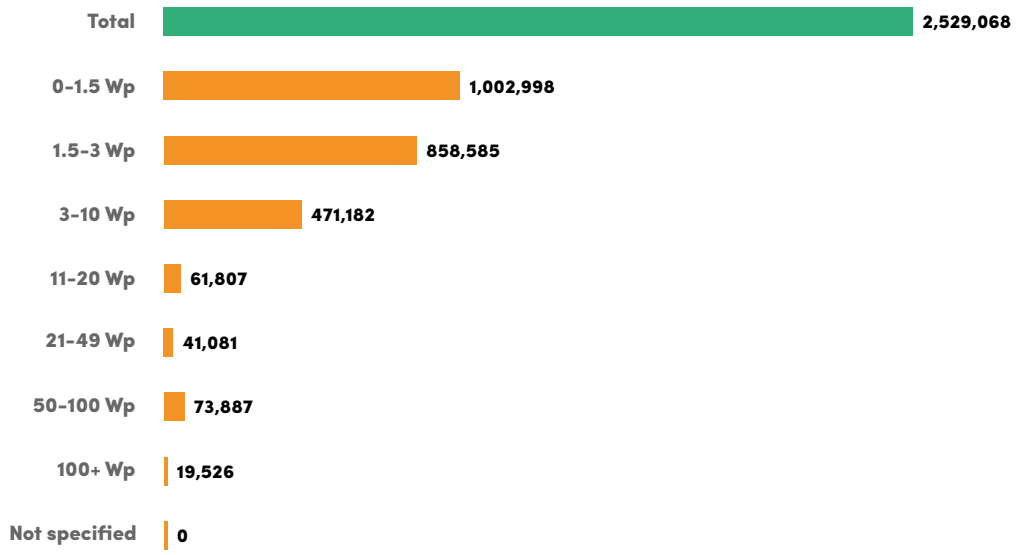


Figure 26 - People that Spend More Time Working

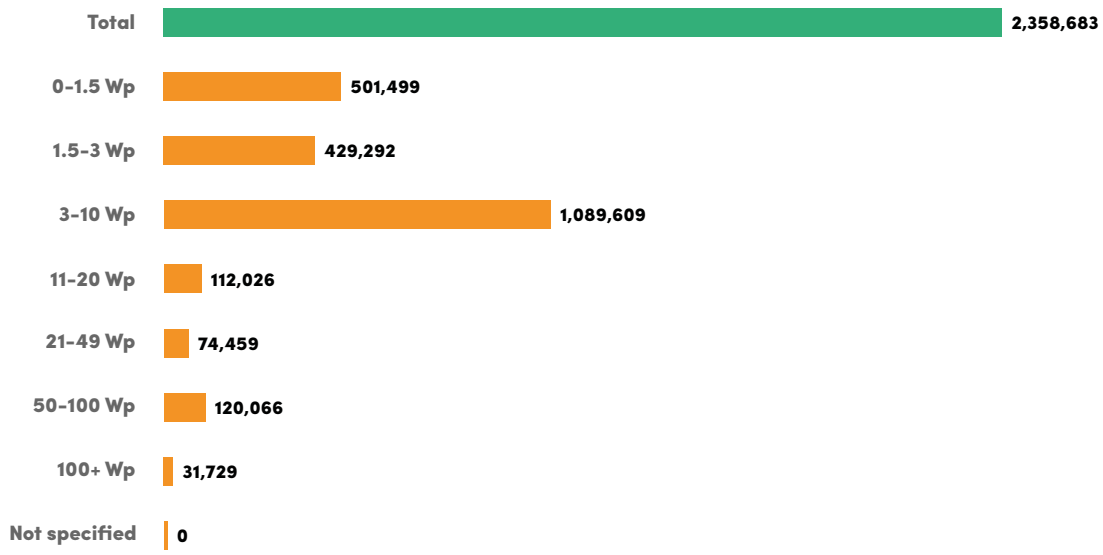


Figure 27 – Additional Income Generated

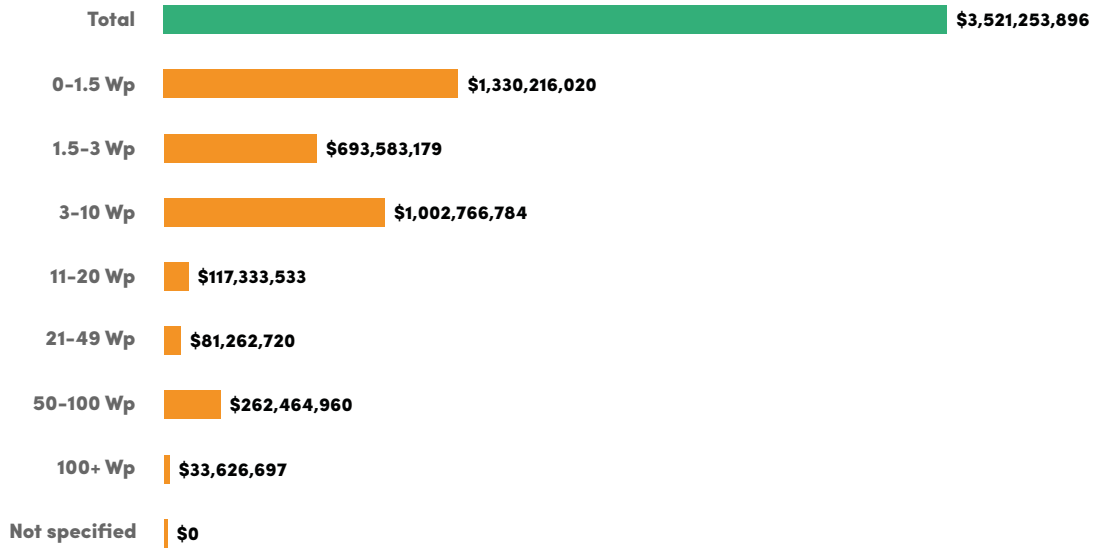


Figure 28 – Kerosene Lanterns Replaced

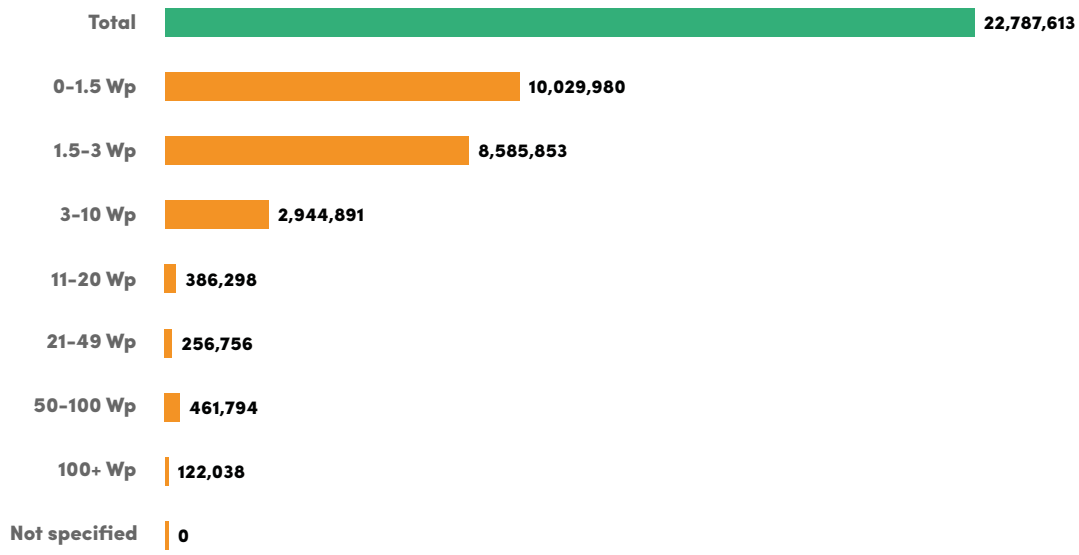


Figure 29 - CO2e emissions avoided

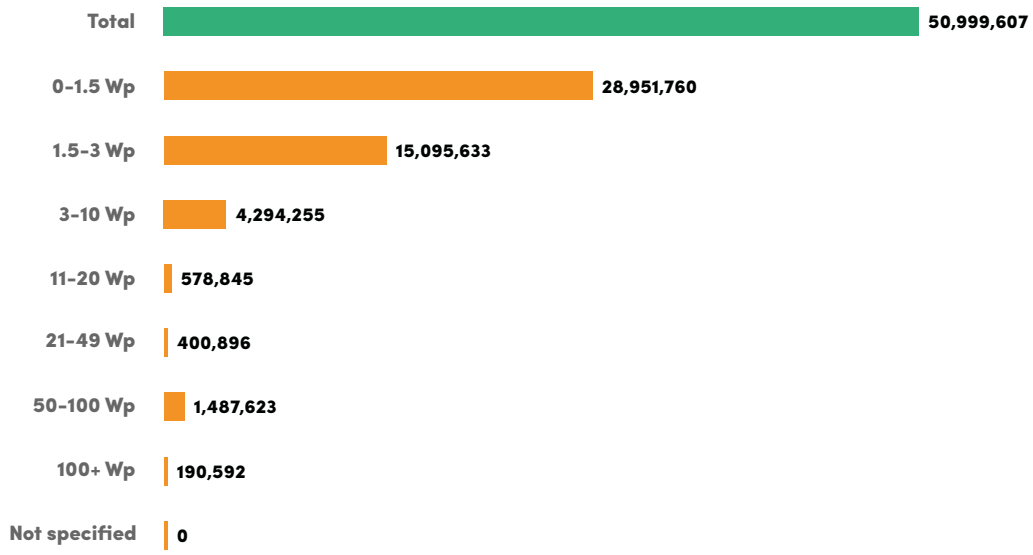


Figure 30 - Additional Light Hours Used – Household

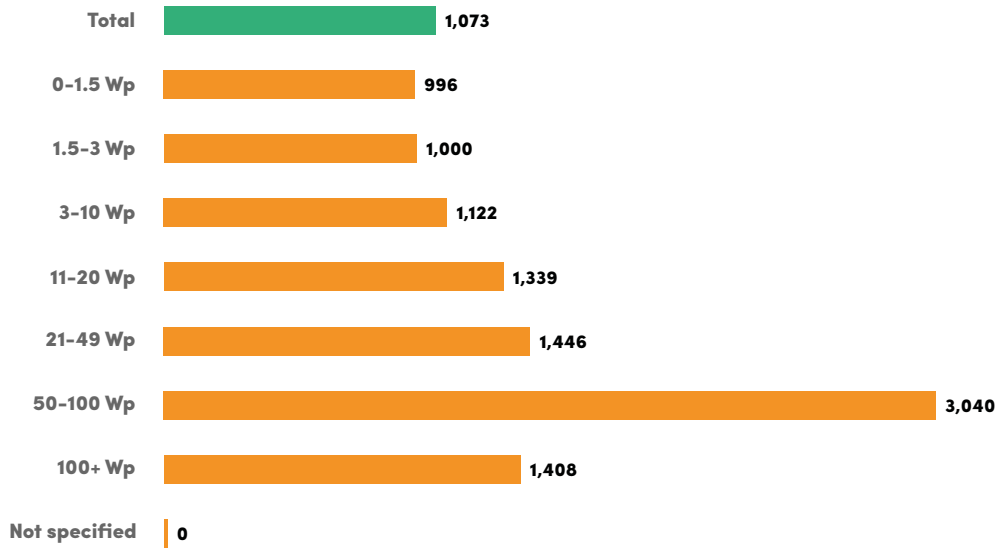


Figure 31 - Additional Light Hours Used - Cumulatively

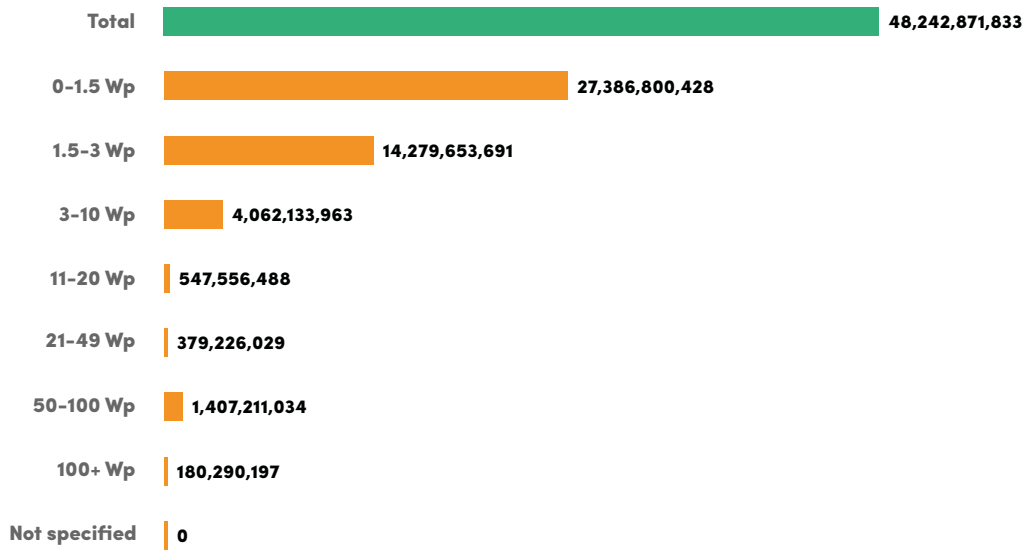


Figure 32 - Change in Quality of Light – Household

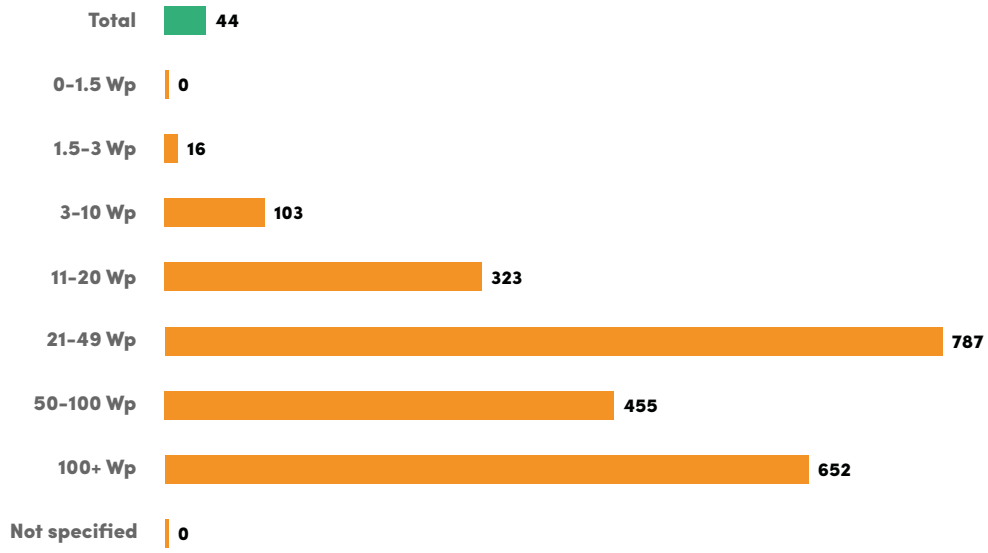
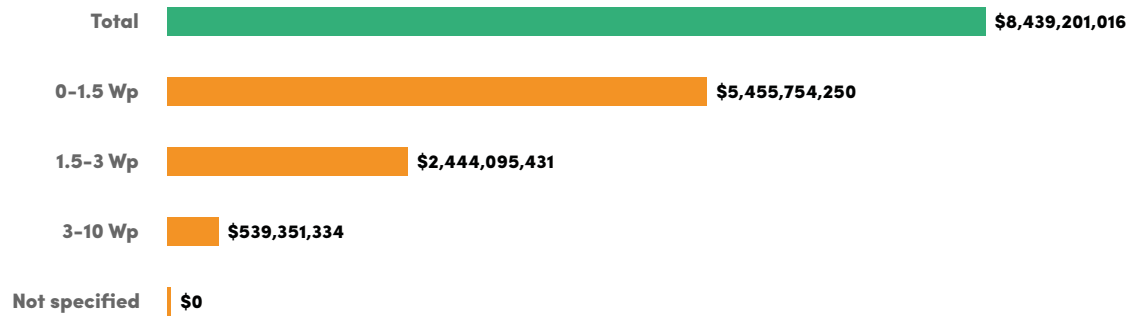


Figure 33 - Savings on Energy Expenditure - Household

Figure 34 - 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.)"

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Table 11 – 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	214,767,047	103,548,974	54,999,507	3,690,153
0-1.5 Wp	124,399,060	45,134,914	11,843,193	0
1.5-3 Wp	66,742,854	38,826,970	27,952,962	0
3-10 Wp	17,479,804	13,802,722	13,385,362	0
11-20 Wp	2,029,491	1,814,643	1,557,979	214,264
21-49 Wp	1,240,742	1,204,163	251,534	945,731
50-100 Wp	2,248,131	2,191,028	8,475	1,955,624
100+ Wp	626,962	574,533	0	574,533
Not specified	-	-	-	-
	People Undertaking More Economic Activity	**People using products to support enterprise**	**People that spend More Time Working**	
World	4,485,981	2,529,068	2,358,683	
0-1.5 Wp	1,404,197	1,002,998	501,499	
1.5-3 Wp	1,202,019	858,585	429,292	
3-10 Wp	1,413,547	471,182	1,089,609	
11-20 Wp	146,793	61,807	112,026	
21-49 Wp	97,567	41,081	74,459	
50-100 Wp	175,481	73,887	120,066	
100+ Wp	46,374	19,526	31,729	
Not specified	-	-	-	
	Additional Income Generated	**Additional Light Hours Used - Cumulatively**	**Additional Light Hours Used - Household**	**Change in Quality of Light - Household**
World	$3,521,253,896	48,242,871,833	1,073	44
0-1.5 Wp	$1,330,216,020	27,386,800,428	996	-11
1.5-3 Wp	$693,583,179	14,279,653,691	1,000	16
3-10 Wp	$1,002,766,784	4,062,133,963	1,122	103
11-20 Wp	$117,333,533	547,556,488	1,339	323
21-49 Wp	$81,262,720	379,226,029	1,446	787
50-100 Wp	$262,464,960	1,407,211,034	3,04	455
100+ Wp	$33,626,697	180,290,197	1,408	652
Not specified	-	-	-	-
	Savings on Energy Expenditure - Cumulatively	**Savings on Energy Expenditure - Household**	**Kerosene Lanterns Replaced**	**CO2e emissions avoided**
World	$8,439,201,016	$168	22,787,613	50,999,607
0-1.5 Wp	$5,455,754,250	$197	10,029,980	28,951,760
1.5-3 Wp	$2,444,095,431	$172	8,585,853	15,095,633
3-10 Wp	$539,351,334	$136	2,944,891	4,294,255
11-20 Wp	n/a	n/a	386,298	578,845
21-49 Wp	n/a	n/a	256,756	400,896
50-100 Wp	n/a	n/a	461,794	1,487,623
100+ Wp	n/a	n/a	122,038	190,592
Not specified	-	-	-	-

References and Credits

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Berenschot

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October 2018