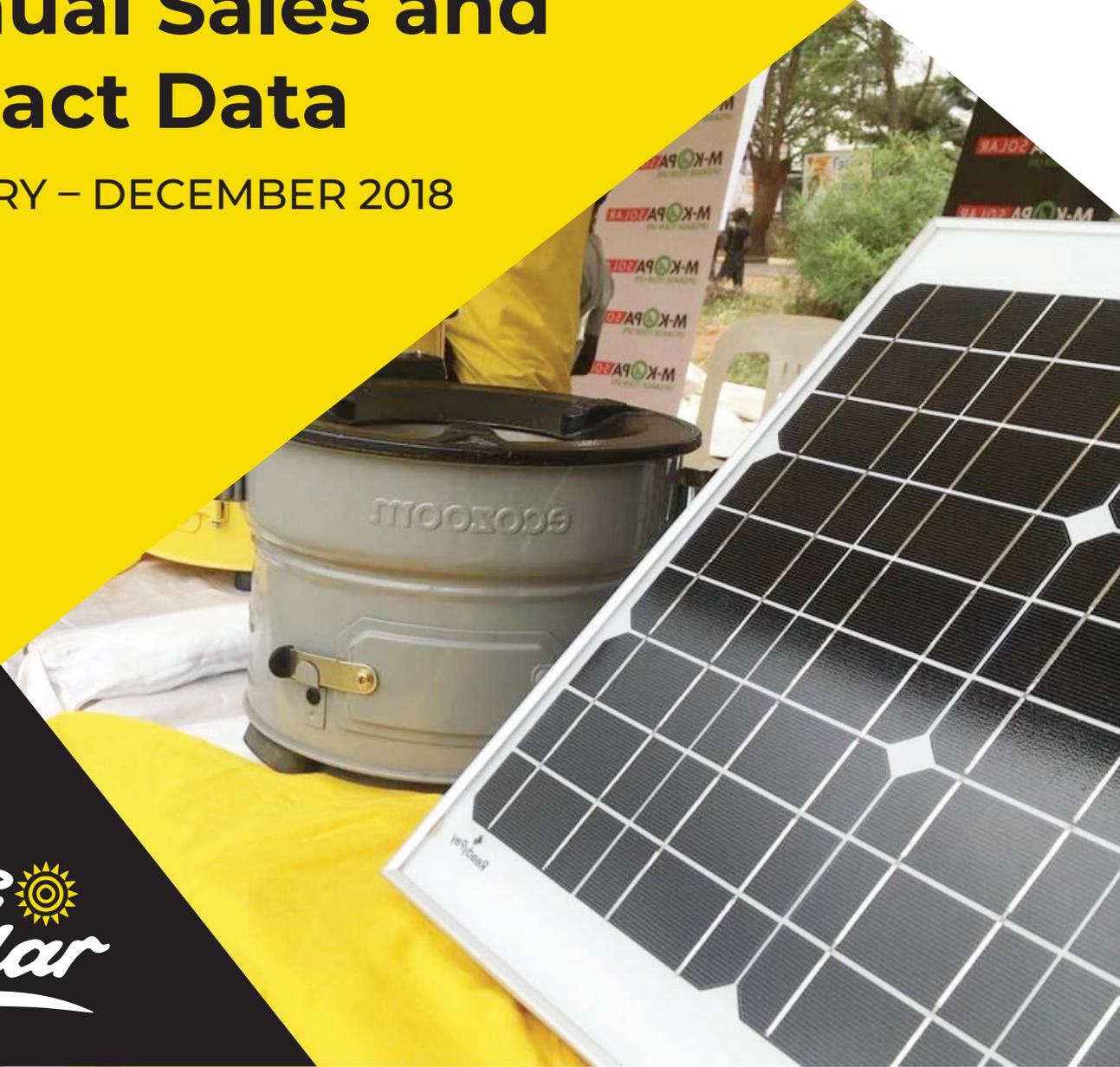


UGANDA SOLAR MARKET REPORT

Annual Sales and Impact Data

JANUARY – DECEMBER 2018



Let's Go Solar



Dalberg Data Insights



This publication was developed by USEA with support from:



Unlocking Public and Private Finance for the Poor

GGLA



Dalberg
Data Insights

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Author's note

The government of Uganda has reached key milestones in its commitment to increasing energy access in all parts of the country. This is being done through several policies such as, increasing power generation, the free grid connection policy, encouraging mini grids and support of off-grid solutions. The private sector plays a vital role in accelerating energy access by complementing government programs. The Uganda Solar Energy Association (USEA) is a non-profit business member organisation facilitating the growth and development of private companies operating in the solar sector in Uganda and the East African region. USEA members' innovations in off-grid products and business models such as Pay-as-you-go (PAYGo)¹ are already accelerating energy access to off-grid communities in Uganda

In order to get a better understanding of the contribution of its members in the off-grid solar industry, USEA has undertaken an off-grid solar market data collection (SMDC) exercise. This pilot market survey and data collection aim to assess the volume of sales of member companies in 2018. The SMDC pilot is intended to provide data on the contribution of the sector towards household electrification in Uganda. Only a complete system comprising of both power generation (the solar panel) and its storage (the battery) were considered in this pilot, as they ensure households of a certain level of access to modern energy that is significant enough to contribute to Uganda's universal electrification goal. On the other hand, sales of components (such as single panels or single batteries), accessories (e.g. mobile chargers etc.) and solar-powered appliances (e.g. TV, fans, irrigation systems etc.) are not included in the scope of this pilot. Nonetheless, the Association recognizes that sales of various component parts, accessories and appliances are also an important indicator of the overall size of the solar sector and will be considered in the subsequent data collection cycles.

The pilot SMDC report presents sales for January to June and July to December 2018, as well as impact data for the entirety of 2018. Twenty-three eligible USEA members participated in the data collection. Sales results show that a total of 313,424 off-grid solar systems were sold in 2018. A total of 115,213 products were sold in the first half of 2018, while in the second half the sales increased by 46.7 percent. PAYGo sales were higher than cash sales in both reporting periods. Among the product category sales, multi light systems account for the highest sales. During the report period, the share of multi light systems sold increased from 39.7 percent in first half of 2018 to 53.0 percent in the second half of 2018. The growing uptake of off-grid solar systems directly translates into more households being able to light their homes or businesses, charge their mobile phones, or use off-grid appliances such as TVs, fans and fridges. Over 75 percent of multi light systems and smaller solar home systems (SHS) are sold through PAYGo. The increasing adoption of PAYGo business models has contributed to improving access to relatively expensive systems, in particular among lower income communities.

The impact generated by these sales is highly significant, both for households and the environment. As a result of the sales described above, this report estimates that 1.3 million people have benefitted from improved energy access in 2018 alone. Many customers are also using their off-grid solar products to extend their working day or to support their business activities. In 2018, an estimated 97,000 people

⁵ A flexible customer finance solution using digital payment in small and frequent instalments.

undertook more economic activity as a result of their purchase of off-grid solar products. Over the lifetime of the products sold, on average of 2-4 year period, this economic activity could help customers generate over \$50 million in additional income. The number of solar sales translates into 265,000 kerosene lanterns being replaced by off-grid solar products. Over the product lifetime, this can save about 295,000 metric tons of carbon dioxide equivalent (CO₂e).

Notwithstanding, the off-grid sector and USEA member's experience a number of challenges which affect their growth and sustainability. They include; unfavourable government policies such as the mobile money tax, inconsistent tax treatment of solar products, unfair competition from low quality and cheaper counterfeit products and limited funding in the sector; thus slow adoption of technological and operational system innovations. USEA continues to take the lead in engaging government and development partners to improve the policy and market environment for the offgrid solar sector. We hope that this publication is enlightening and encouraging to the reader as it was to USEA as we strive to reach SDG 7 by 2040.

USEA has taken the lead in engaging with government and development partners to improve the policy and market environment for the sector.

Sincerely,



Emmy Kimbowa
Chairman, USEA



Joyce Nkuyahaga
Chief Executive Officer, USEA

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Abbreviations and Acronyms

Co2e	Carbon dioxide equivalent	RESP	Rural Electrification Strategy and Plan
DDI	Dalberg Data Insights	SDG(s)	Sustainable Development Goal(s)
DFID	Department for International Development	SHS	Solar home system
GOGLA	Global Off-Grid Lighting Association	SMDC	Solar Market Data Collection
kWp	Kilowatt peak	UNCDF	United Nations Capital Development Fund
MEMD	Ministry of Energy and Mineral Development	UNDP	United Nations Development Programme
MW	Megawatt	USAID	United States Agency for International Development
NDA(s)	Non-Disclosure Agreement(s)	US \$	United States Dollars
PAYGo	Pay-as-you-go	USEA	Uganda Solar Energy Association
PSFU	Private Sector Foundation Uganda	Wp	Watt peak
REA	Rural Electrification Agency		

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About USEA and partners

About USEA

The Uganda Solar Energy Association is an independent non-profit association dedicated to facilitating the growth and development of the solar energy sector in Uganda and the East African region. USEA was formed in 2016 by private sector companies that deal in solar energy with help from the Private Sector Foundation Uganda (PSFU), the Ministry of Energy and Mineral Development (MEMD) and the Rural Electrification Agency (REA). USEA is registered under Section 10 of the Societies Act. The Association aims to strengthen Uganda's solar industry, facilitate business growth and promote self-regulation.

About UNCDF

UNCDF makes public and private finance work for the poor in the world's 47 least developed countries. With its capital mandate and instruments, UNCDF offers "last mile" finance models that unlock public and private resources, especially at the domestic level, to reduce poverty and support local economic development. UNCDF's financing models work through two channels: financial inclusion that expands the opportunities for individuals, households, and small businesses to participate in the local economy, providing them with the tools they need to climb out of poverty and manage their financial lives; and by showing how localized investments — through fiscal decentralization, innovative municipal finance, and structured project finance — can drive public and private funding that underpins local economic expansion and sustainable development. By strengthening how finance works for poor people at the household, small enterprise, and local infrastructure levels, UNCDF contributes to SDG 1 on eradicating poverty and SDG 17 on the means of implementation. By identifying those market segments where innovative financing models can have transformational impact in helping to reach the last mile and address exclusion and inequalities of access, UNCDF contributes to a number of different SDGs.

About GOGLA

GOGLA is the global association for the off-grid solar energy industry. Established in 2012, GOGLA now represents over 150 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.

About DDI

Dalberg Data Insights (DDI) is the Big Data team of the Dalberg Group, focused on building bridges between public and private data and important social problems. DDI creates data products to interpret data and provide actionable insights in international development and humanitarian action. DDI has offices in Brussels, Belgium and Kampala, Uganda.

DDI's core advisory services include: (i) data collection and analytics; (ii) data profile and audit (iii) developing and deploying innovative data solutions (iv) uncovering, accessing and analyzing new technologies and data sources (v) secure sustainable data access mechanisms; (vi) manage complex stakeholders' ecosystem and ensure data privacy (vii) capacity building and end users empowerment to pursue value creation and positive impact as the final goal.

DDI has been active over the last 5 years (formerly as Riaktr) and has developed data products in the areas of energy, financial inclusion, agriculture, urban planning and public health in partnerships with some of the large international donors. While DDI has been active worldwide, the biggest focus of the firm in the past 3 years has been Uganda due to the unique data partnerships with the private organizations and the deep understanding of the data for development ecosystem in the region.

LIST OF USEA MEMBER PARTICIPANTS IN SMDC

Manufacturers	Assemblers	Distributors
Solar Now	Power Trust	Anuel Energy
Fenix International	Trans Africa Supply Services	Kayope Investments
D.light	Village Energy	Luk Solar Ltd
M-KOPA	Fres Uganda	Power con
SoloGrid	All in Trade	Sunny Money
Chloride Exide	Aptech Africa	Ultratec
Greenlight Planet	Victron Solar	
Village Power		
Solantis		
Barefoot Power		

Introduction

OVERVIEW OF THE UGANDAN SOLAR SECTOR

Energy is at the heart of most critical economic, environmental and developmental issues facing the world today. Access to clean, efficient, and affordable energy services is a necessary precondition for achieving development goals that extend far beyond the energy sector. It is fundamentally linked to economic and social development, especially in developing countries. Undoubtedly, access to energy significantly contributes to poverty eradication, better education, improves healthcare, and increases food production and income generation.

In Uganda, lack of access to electricity remains one of the critical hindrances to economic growth and socio-economic transformation. Available statistics show that only 22 percent of households in Uganda use grid electricity for lighting and of this only 8 percent are rural households². Limited access to electricity, especially in rural areas, hampers enterprise development and the ability to improve livelihoods. In a bid to improve access to modern energy services and also align with Sustainable Development Goal (SDG) 7³, the Government of Uganda has identified a number of targets and policies. For example, the Rural Electrification Strategy and Plan (RESP) (2013-2022) aims to increase rural electricity access to 26 percent by 2022 through a mix of grid and off-grid services⁴.

The Government has mainly focused on the provision of grid electricity, which requires large capital investments in order to reach the majority of the widely dispersed rural population. Off-grid solar energy systems represent a major alternative source of cleaner energy. The private sector can play an important role in providing quick access to reliable, affordable and modern lighting and energy services to households.



² Uganda Bureau of Statistics (UBOS), 2018. Uganda National Household Survey 2016/2017. Kampala, Uganda. https://www.ubos.org/wpcontent/uploads/publications/03_20182016_UNHS_FINAL_REPORT.pdf

³ To ensure access to affordable, reliable, sustainable and modern energy for all.

⁴ Ministry of Energy and Mineral Development, (2013). Rural Electrification Strategy and Plan 2013-2022. Kampala: Government of Uganda. <http://www.rea.or.ug/resources/strategy%20and%20plan%202013-2022.pdf>

THE POTENTIAL OF OFF-GRID SOLAR ENERGY IN UGANDA

The off-grid energy sector has been and is still expanding rapidly in Uganda. It plays an important role in improving access to clean and modern energy services. The growth of the off-grid sector has been supported by the Government's commitment to improve electrification through agencies such as the Rural Electrification Agency (REA), as well as by development partners and agencies (such as DFID, European Union, World Bank, USAID/Power Africa, Embassy of Netherlands, United Nations Capital Development Fund (UNCDF) CleanStart, UNDP and Shell Foundation). Development partners have offered technical and financial support to both the government and the private sector to further advance access to clean energy and support the sector.

Many local and international companies in the off-grid solar sector in Uganda are using innovative technologies and business models to foster access to off-grid solar energy. Some of these solar technologies include Pay-As-You-Go (PAYGo) services that enable low income earners to afford solar systems through digital finance with lower instalments than traditional loans or paying the full cost of the system upfront in cash.

The growing significance and potential of off-grid energy in Uganda calls for a supportive and enabling market environment to stimulate investment in the sector. The Uganda Solar Energy Association (USEA) has been formed to provide advocacy and other support to solar companies in advancing the uptake of solar energy solutions in the country. As USEA engages with stakeholders, including the Ministry of Energy and Mineral Development (MEMD) and the broader Government of Uganda, it has become increasingly clear that data plays a significant role to inform policy-level engagements and validate the contribution the off-grid sector towards achieving universal energy access. However, the current market data available to the public is very limited, and only includes rough national market sales estimates with limited product range and company participation in data collection.

To fill this gap, USEA, together with UNCDF, the United Nations Capital Development Fund (UNCDF), Dalberg Data Insights (DDI), and GOGLA, rolled out the first pilot of a Solar Market Data Collection (SMDC). This is the first comprehensive national off-grid solar market intelligence in Uganda. The overall objective of the SMDC is to estimate the number and impact of off-grid solar systems sold across the four regions of Uganda.



Off-grid Solar Market Data Collection Methodology

For the off-grid solar market data collection, USEA adopted and adapted the methodology used by GOGLA, Lighting Global and the Efficiency for Access coalition in their “Global Off-Grid Solar Market Report”. Several changes were made to fit the Ugandan context and scope of USEA’s data collection, specifically regarding product categorization and the application of a three data point rule.

SCOPE

Eligible companies and products

The SDMC targeted USEA members that manufacture, assemble⁵ and/or distribute off-grid solar systems within Uganda. Solar off-grid systems were defined as a complete solar system that includes a panel and battery with a maximum of 5 kWp (kilowatt peak)⁶. Integrated systems with a panel and battery such as solar lanterns were also eligible for the data collection. Since the objective of the data collection is to determine the contribution of off-grid solar to household electrification, component sales such as single panels, single batteries, accessories (e.g. mobile chargers etc.) and solar-powered appliances (e.g. TV, fans, irrigation systems etc.) were not included in the scope of this pilot. Therefore, companies that are involved only in component sales were not eligible to participate in the data collection.

Period of sales

In order to understand how the sector performs within the year and to allow comparison with data that has been collected by other partners such as GOGLA, participants reported sales volumes for each of its product lines for the first half of 2018 (January 1st -June 30th 2018) and second half of 2018 (July 1st-December 31st 2018).

Regional breakdown

Each participating company reported their sales volumes by region (i.e. Central, Eastern, Northern and Western regions) with at least three companies reporting sales in each region to comply with the three data point rule.

DATA COLLECTION

Partners

USEA partnered with UNCDF, DDI and GOGLA to undertake the first pilot of the SMDC. UNCDF offered funding, staffing, coordination and project management. GOGLA acted as knowledge partner and provided technical expertise based on global experience. DDI offered technical experience in setting up the data collection infrastructure, including data governance and security protocols.

⁵ Assembling companies are those that combine different components and sell complete system to the consumer.

⁶ The maximum of 5kWp was established based on a market scoping conducted prior the data collection.

Process

The SMDC was undertaken by USEA with support from its partners. The USEA Secretariat engaged its board throughout the process. A USEA member's workshop was held to identify members willing to participate, involving transparent discussions on the data collection process and its governance. An online questionnaire was developed and shared with reporting companies to assess their data reporting needs and capacity. Technical support on how to fill the online questionnaire was provided to respondents. Finally, all data entries were verified based on the quality control framework.

Accuracy and checks

All the data reported in this publication has been self-reported by the participating companies. The partners double-checked all data entry points submitted for consistency. In case of missing or inconsistent data, participating companies were contacted. It is important to note that USEA and its partners do not guarantee the complete accuracy of the sales data reported.

Data security and privacy

Data confidentiality and trust between the USEA Secretariat and its members was key to the success of this exercise. Company level data was only reviewed during the quality control process and data was also processed by a limited number of specific individuals having signed Non-Disclosure Agreements (NDAs).

Three data point rule

To ensure data confidentiality and privacy, a three data point rule was applied to each region and product category. That is to say, at least three manufacturing and assembling companies must have reported any of the specific data points shown. In cases where less than three manufacturing companies reported on a specific data point, no results are shown to protect the proprietary interests of the respondents. This approach differs from GOGLA's methodology and uses a more conservative approach to estimate sales.

Limitations

While reporting on full solar systems provides insights on the level of electrification in Uganda, excluding component sales presents a conservative estimate of the actual size of the solar market. A majority of USEA members are involved in component sales and thus did not participate in the SMDC.

SALES DATA SEGMENTATION AND AGGREGATION

Manufacturers, Distributors and Assemblers

For this SMDC, companies are categorized as manufacturers, distributors and assemblers. Manufacturers are companies that sell their own branded products while distributors sell other companies' branded products. Assemblers are companies that sell other companies' branded products but also import and or buy component parts and assemble them as complete systems. Only sales from companies classified as manufacturers and assemblers were aggregated to the final results to avoid double-counting⁷.

Pay-As-You-Go (PAYGo) and Cash

Considering the rapid development of the sector and in order to enhance the quality of this sales data reporting, the SMDC differentiates PAYGo and cash sales in all the geographic regions and product categories. PAYGo sales are defined as solar products being purchased in more than one instalment and products are equipped with remote lockout technology in case of payment default. Cash sales are defined as products being paid for in one instalment in cash and not equipped with the technology that enables remote lockout.

⁷During analysis, assemblers of assembled products were considered as manufacturers.

Product Categorization

In order to offer more insights into the off-grid solar market, sales have been grouped into product categories based on the categorization for products below 100Wp (Watt peak) adopted in the Global Off-Grid Solar Market Report⁸. For products between 100Wp and 5kWp, the segmentation has been based on product availability in the market and number of respondents after applying the three data point rule. The different product categories are presented in Table I below.

More specifically, the classification and naming of categories with less than 11Wp has been based on the Global Off-Grid Solar Market Report by GOGLA.

Table I: Product categories (adapted from Global Off-Grid Solar Market Report⁹ and ESMAP¹⁰)

Overall Category	Capacity in watt peak (Wp)	Categorization by services provided	Corresponding level of multi-tier framework energy access by use of product
Portable Lanterns	0-1.499 Wp	Single light only	Enable Tier 1 electricity access to an individual person
	1.5-2.999 Wp	Single light and mobile charging	Enable full Tier 1 electricity access to atleast one person and contributes to a full household
Multi-light systems	3-10.999 Wp	Multiple light and phone charging	Enable full Tier 1 electricity access to atleast one person upto a full household
Lower Solar Home Systems (SHS)	11-20.999 Wp	SHS, Entry level (3-4 lights, phone charging, radio, fan etc.)	Enables full Tier 1 electricity access to the household
	21-49.999 Wp	SHS, Basic capacity (as above in addition to TV, additional lights, appliances and extended capacity)	Enables full Tier 2 electricity access to the household coupled with high energy efficiency appliances
Higher Solar Home Systems	50-99.999 Wp	SHS, medium capacity	Enables full Tier 2 electricity access to a household
	100- 499.99 Wp	SHS, higher capacity	Enables full Tier 2-3 electricity access to a household
	500-999.99 Wp	SHS, higher capacity	Enables full Tier 3 electricity access to a household
	1,000+ Wp	SHS, higher capacity	Enables full Tier 4 electricity access to a household

DATA PROCESSING AND ANALYSIS

Sales volumes and newly installed capacity

Sales volumes and newly installed capacity are segmented by PAYGo and cash on national, regional and product category levels. The newly installed capacity is computed by multiplying sales volumes by wattage. For any single data point to be shown, at least three manufacturers must have reported the data for either PAYGo or cash products.

⁸ GOGLA, Lighting Global and Efficiency for Access Coalition, 2018, "Global Off-Grid Solar Market Report July-December 2018". For full report click here: <https://www.gogla.org/global-off-grid-solar-market-report>

⁹ Ibidem

¹⁰ ESMAP, Energy Sector Management Assistance Program, (2015). Beyond Connections- Energy access redefined. <https://openknowledge.worldbank.org/bitstream/handle/10986/24368/Beyond0connect0d000technical0report.pdf?sequence=1&isAllowed=y>.



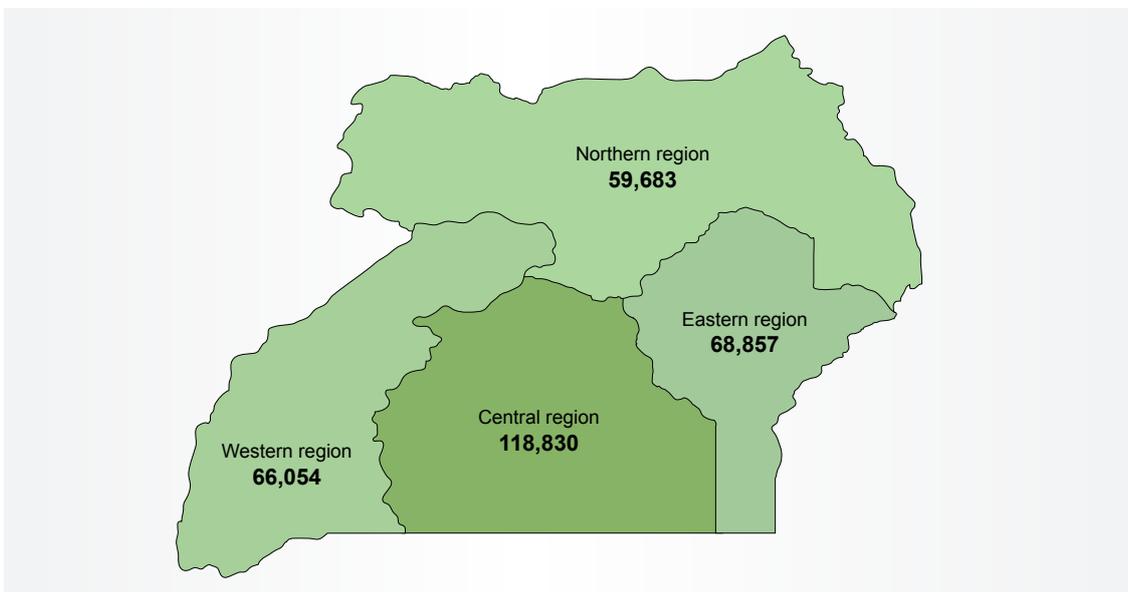
@Village Power

Off- Grid Solar Market Sales Data Results

NATIONAL ANNUAL MARKET SALES INSIGHTS

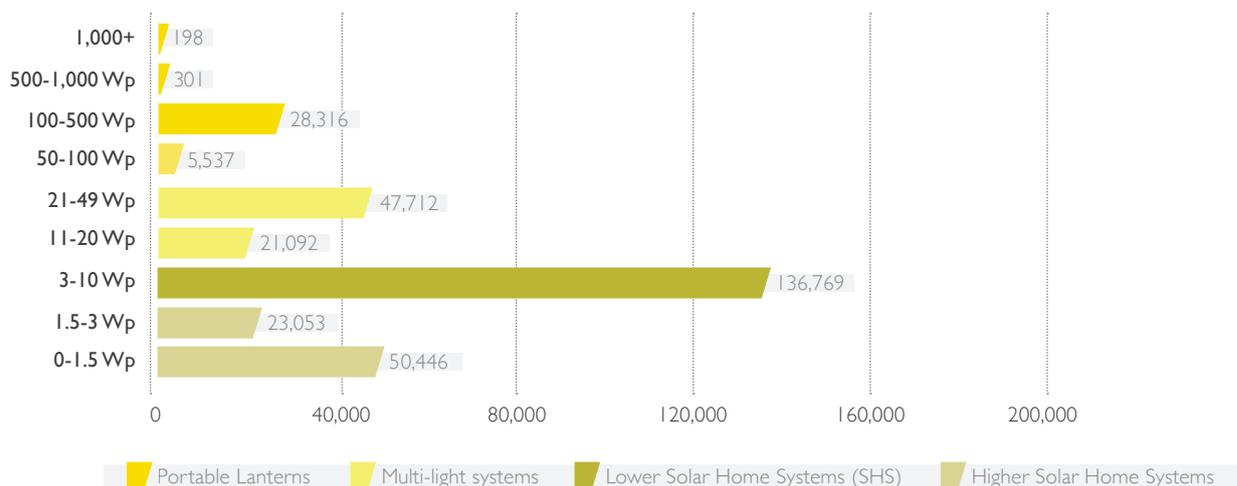
Overall, a total of 313,424 off-grid solar products were sold in 2018 by USEA members. The largest quantities of solar products were sold in the Central region (118,830 products), followed by Eastern region (68,857), Western region (66,054) and Northern region (59,683).

Figure 1: Map showing volume of products sold per region



In 2018, multi-light systems accounted for 43.6 percent of total sales in Uganda, followed by solar lanterns (23.5 percent), lower SHS (22 percent) and higher SHS (11 percent) (Figure 2).

Figure 2: Volume of products sold per product category for 2018



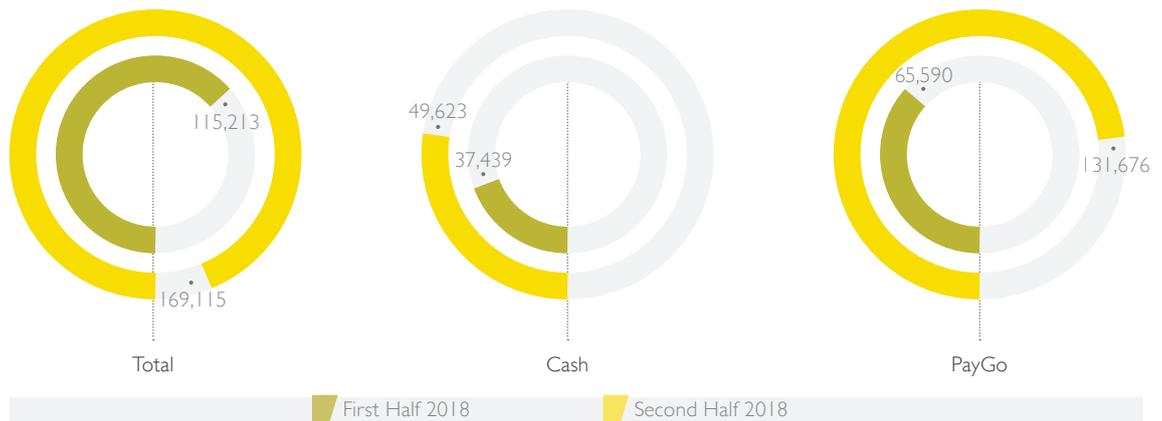
DETAILED BI-ANNUAL VOLUME OF SALES

Figure 3 provides a breakdown of solar products sold in Uganda via cash and PAYGo for the first and second half of the year 2018. More products were sold during the second half of 2018 (169,115 products) than in the first half of the year (115,213 products). PAYGo sales accounted for 77.9 percent (131,676 products) of the solar products sold in the second half of 2018 and 56.9 percent for the first half of the year (65,590 products).

Figure 4 and Figure 5 show sales per product category for the first and second half of 2018 respectively. Multi-light systems are the most sold type of solar products both in the first and second half of 2018. The lowest sales for the first half of 2018 were higher SHS, while the lowest sales for the second half of 2018 were solar lanterns. Multi-light systems were largely sold via PAYGo, both in the first half of 2018 (88.9 percent) and in the second half of 2018 (98.2 percent). In comparison, only 0.4 percent of solar lanterns were sold via PAYGo in the first half of 2018 and 8.8 percent during the second half of 2018. Lower PAYGo sales for lanterns could be attributed to the fact that solar lamps are cheaper and do not need flexible financing.

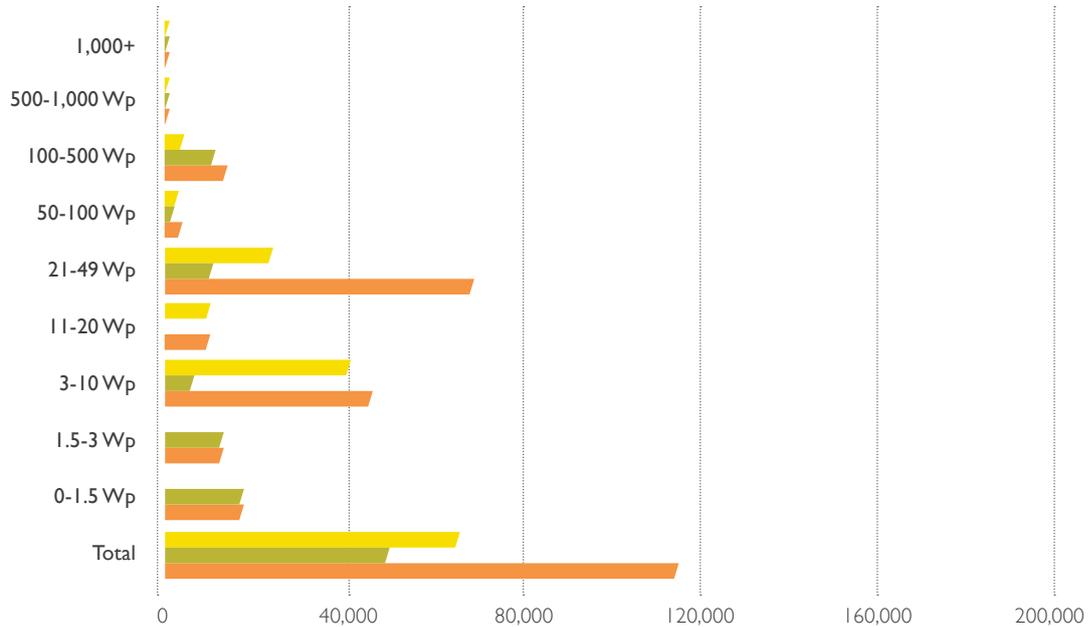
The general increase in terms of volume of sales and of PAYGo as a mode of payment shows a dynamic Ugandan off-grid sector that is moving towards more affordable customer payment solutions. This is particularly the case for multi-light systems.

Figure 3: Total sales for both cash and PAYG products in Uganda for the first and second half of 2018



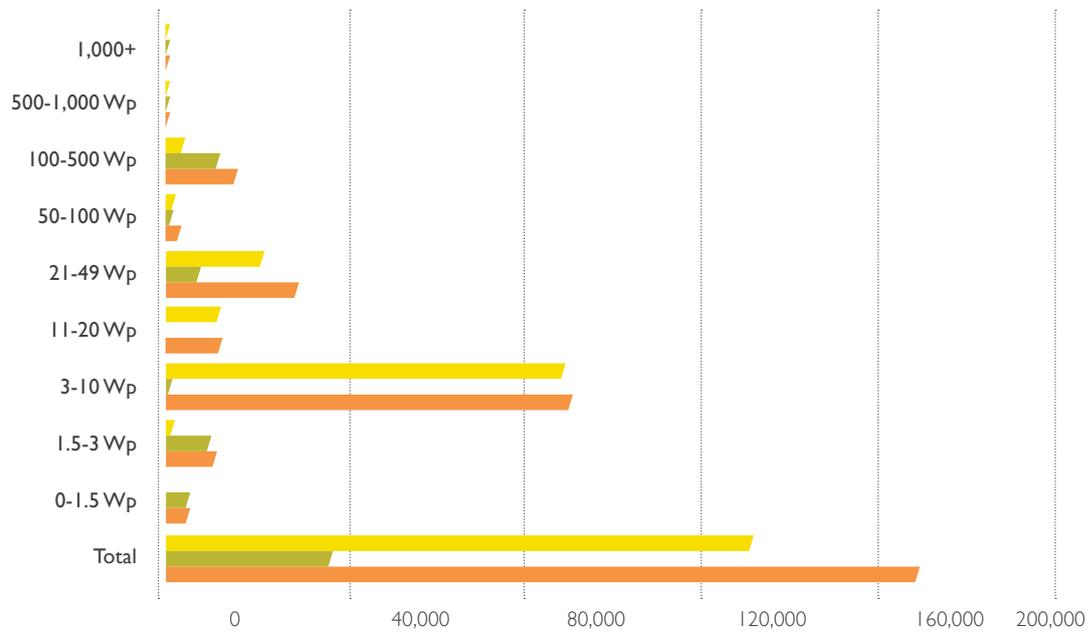
@ SolarNow

Figure 4: Sales volumes by product category for the first half of 2018



	Total	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100-500 Wp	500-1,000 Wp	1,000+
PayGO	65,590		108	40,617	8,632	11,999	1,502	2,658	65	28
Cash	49,623	16,377	11,654	5,091		5,904	520	10,018	29	30
Total	115,213	16,377	11,762	45,708	8,632	17,903	2,022	12,676	75	58

Figure 5: Sales volumes by product category for the second half of 2018



	Total	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100-500 Wp	500-1,000 Wp	1,000+
PayGO	131,676		1,454	89,449	12,460	22,109	2,115	3,979	90	20
Cash	37,439	5,188	9,837	1,612		7,700	1,400	11,661	31	10
Total	169,115	5,188	11,291	91,061	12,460	29,809	3,515	15,640	121	30

DETAILED PRODUCT SALES BY REGION

There was a general increase in volume of sales between the first and second half of 2018 across all the regions. Multi-light systems represent the highest sales in second half of 2018 with over 90 percent of sales made via PAYGo. Though solar lanterns account for the significant sales in both periods, only 0.5 percent and 1.6 percent of the sales were made via PAYGo in the first and second half respectively. This is primarily due to the lower price point of solar lanterns compared to multi-light systems, making payment in instalments less needed by customers. For lower SHS, 7,514 and 12,977 products were sold during the first and second half of 2018, 93.8 percent and 95.4 percent via PAYGo respectively. For higher SHS, 51.2 percent of the 2,098 sales made during the first half of 2018 were made via PAYGo, and 45.2 percent of 3,288 sales that occurred during the second half of 2018.

In both the first and second half of 2018, the Central region accounts for the highest sales (42.1 percent and 30.8 percent) and Northern region for the lowest sales (13.4 percent and 19.8 percent). The Eastern region has the second lowest sales after the Northern region. In the Central region, a total of 48,469 products were sold in the first half of 2018 and 52,011 during the second half of 2018 (See Figure 8 and Figure 9). Solar lanterns represent the highest sales in the first half of 2018, closely followed by multi-light systems.

Sales for the Western region in the first and second half on 2018 are shown in figure 10 and Figure 11. Multi-light systems sales increased from 7,942 sales in first half of 2018 to 15,099 sales in the second half, with PAYGo accounting for over 99 percent of the sales in both sales periods. A total of 12,977 and 12,822 lower SHS were sold during the first and second half of 2018, with PAYGo sales accounting for 50.7 percent and 52.7 percent respectively. While higher SHS sales increased from 3,238 in first half to 11,429, PAYGo only represents a small share of sales, at 13.8 percent and 19.8 percent in the first and second half of 2018. Solar lanterns sales in the Western region are not showcased for both the first and second half of 2018, since less than three companies reported on these sales.

Though the Northern region accounts for the lowest sales across regions, we do observe an increase in sales from the first to the second half of 2018 (see Figure 12 and Figure 13). Solar lantern sales increased from 1,128 in first half of 2018 to 10,545 second half of 2018. All solar lanterns were sold through cash sales. Multi-light systems sales show 9,377 products were sold during the first half of 2018 with 56.2 percent of sales made through PAYGo, while 16,335 sales were made during the second half of 2018 of which 90.2 percent were made through PAYGo. Lower SHS sales also increased from 3,602 during the first half of 2018 to 5,082 in the second half, with PAYGo respectively accounting for 86.9 percent and 91.1 percent of the sales. A total of 1,356 and 1,604 higher SHS were sold during the first and second half of 2018; 61.9 percent and 60.0 percent of these sales were made via PAYGo respectively.

Sales in the Eastern region are detailed in Figure 14 and Figure 15 for the first and second half of 2018. A total of 3,822 solar lanterns were sold in the first half of 2018 through cash sales only. The number of solar lanterns sold decreased to 3,157 in the second half of 2018, but the share of those sales made through PAYGo increased to 44.7 percent. Multi-light systems sales more than doubled from 12,721 to 26,608 between the first and second half of 2018; over 90 percent of these sales were made via PAYGo in both sales periods. Lower SHS sales increased from 6,148 in first half of 2018 to 11,388 in the second half. At the same time, PAYGo sales increased from 83.4 percent to 94.9 percent. Higher SHS sales also increased from 1,936 in first half to 3,035 in the second half with PAYGo accounting for 52.6 percent and 53.2 percent of the sales respectively.

Figure 6: Sales volumes by cash and PAYG products for the first half of 2018

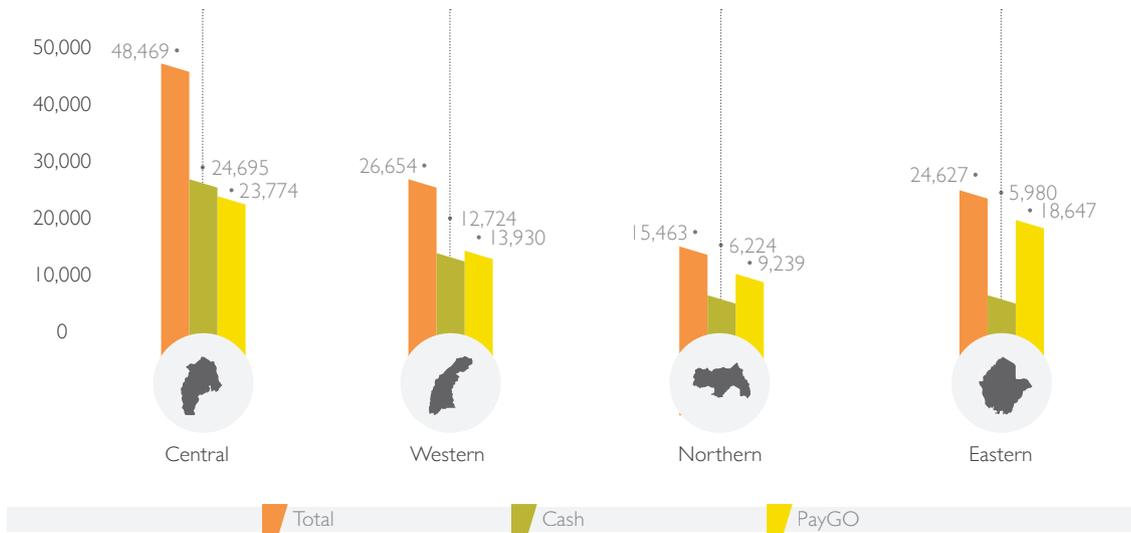


Figure 7: Sales volumes by cash and PAYG products for the second half of 2018

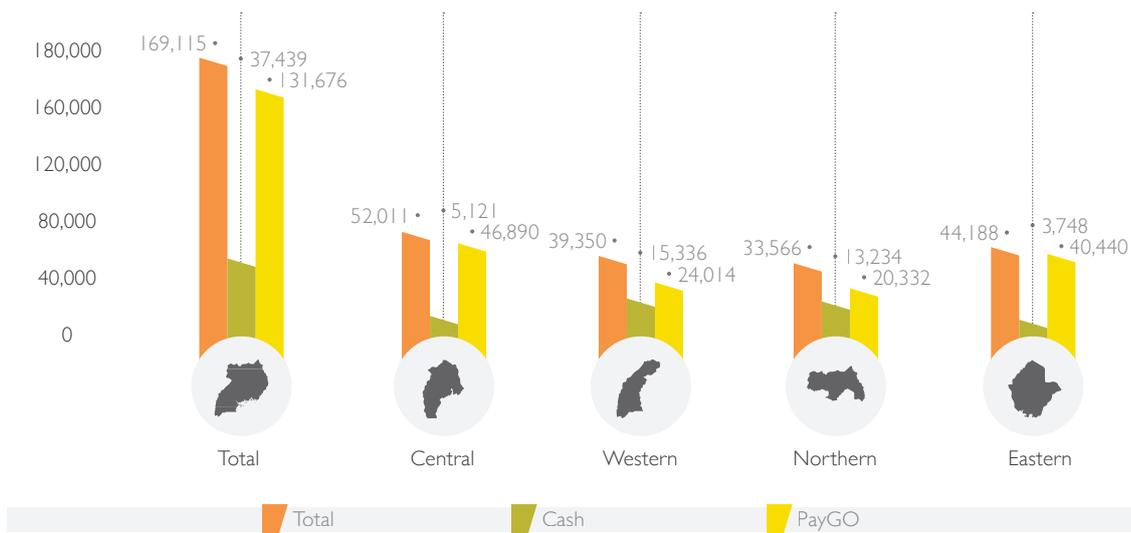


Figure 8: Volumes of products sold in Central region per product category in the first half of 2018

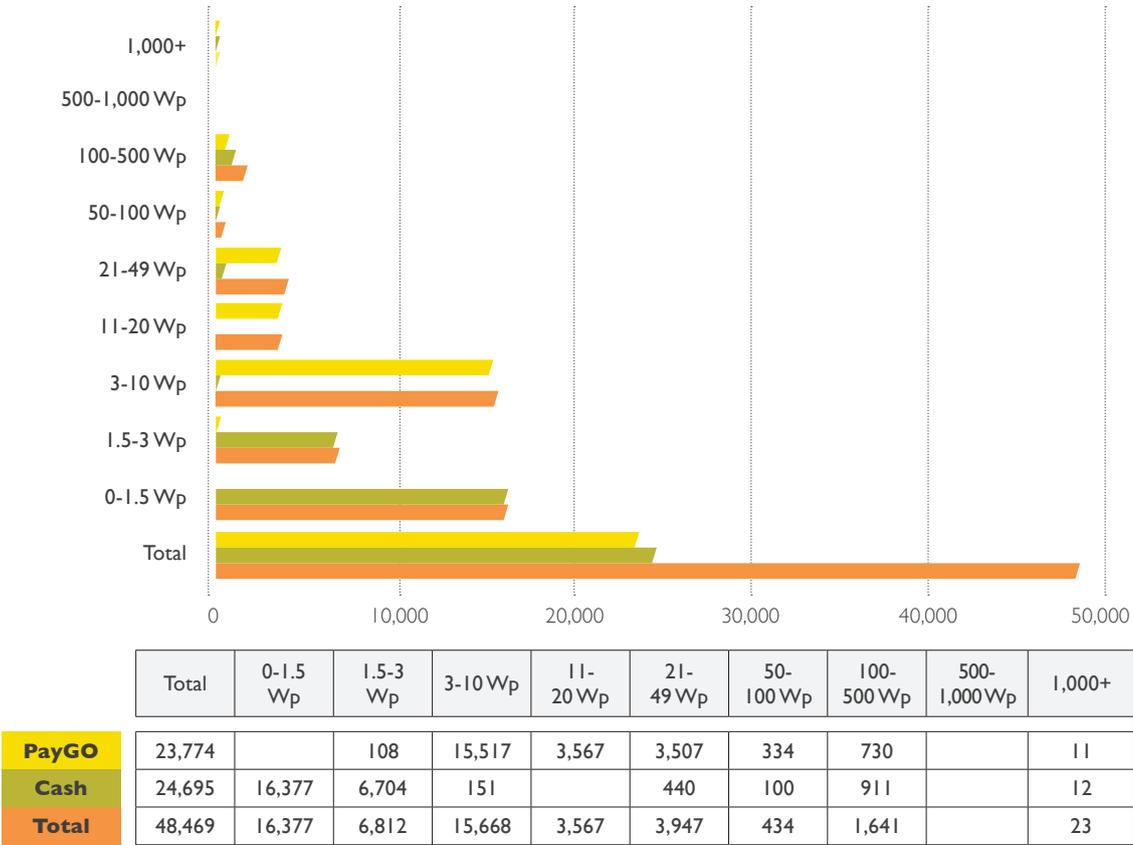


Figure 9: Volumes of products sold in Central region per product category in the second half of 2018

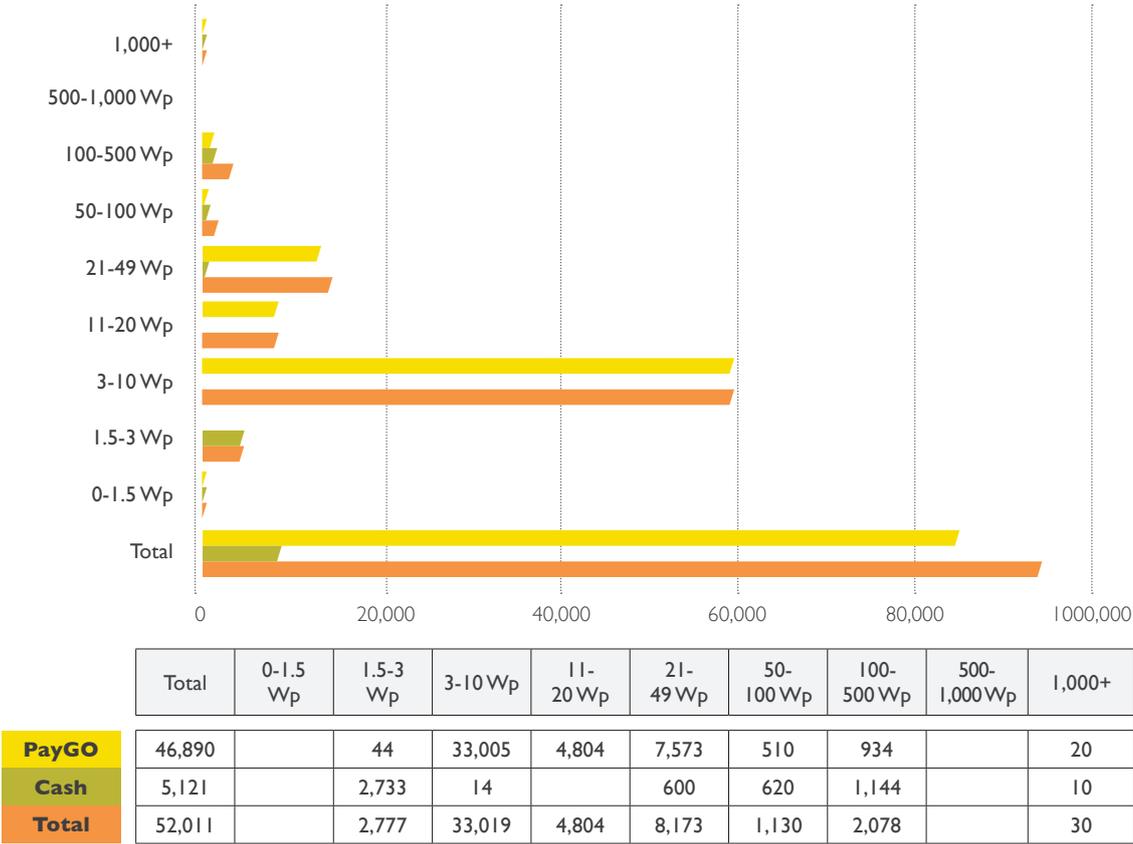


Figure 10: Volumes of products sold in Western region per product category in the first half of 2018

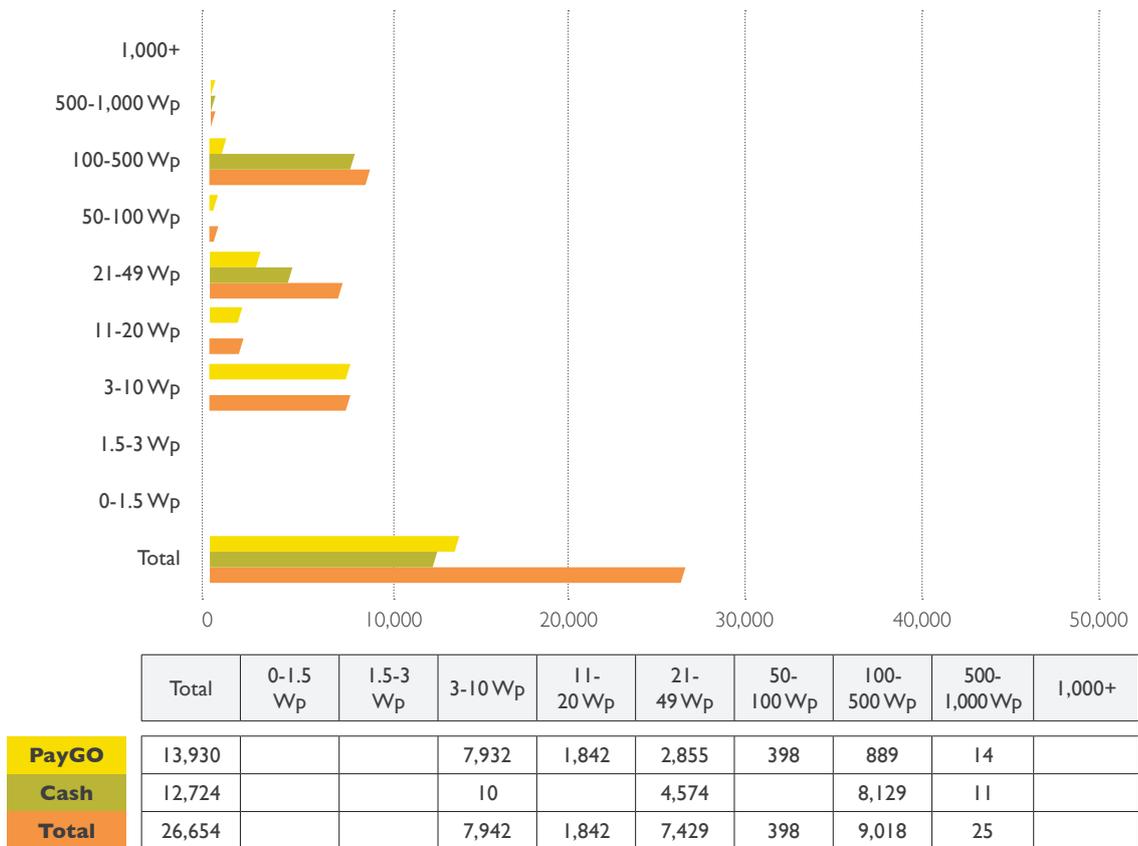


Figure 11: Volumes of products sold in Western region per product category in the second half of 2018

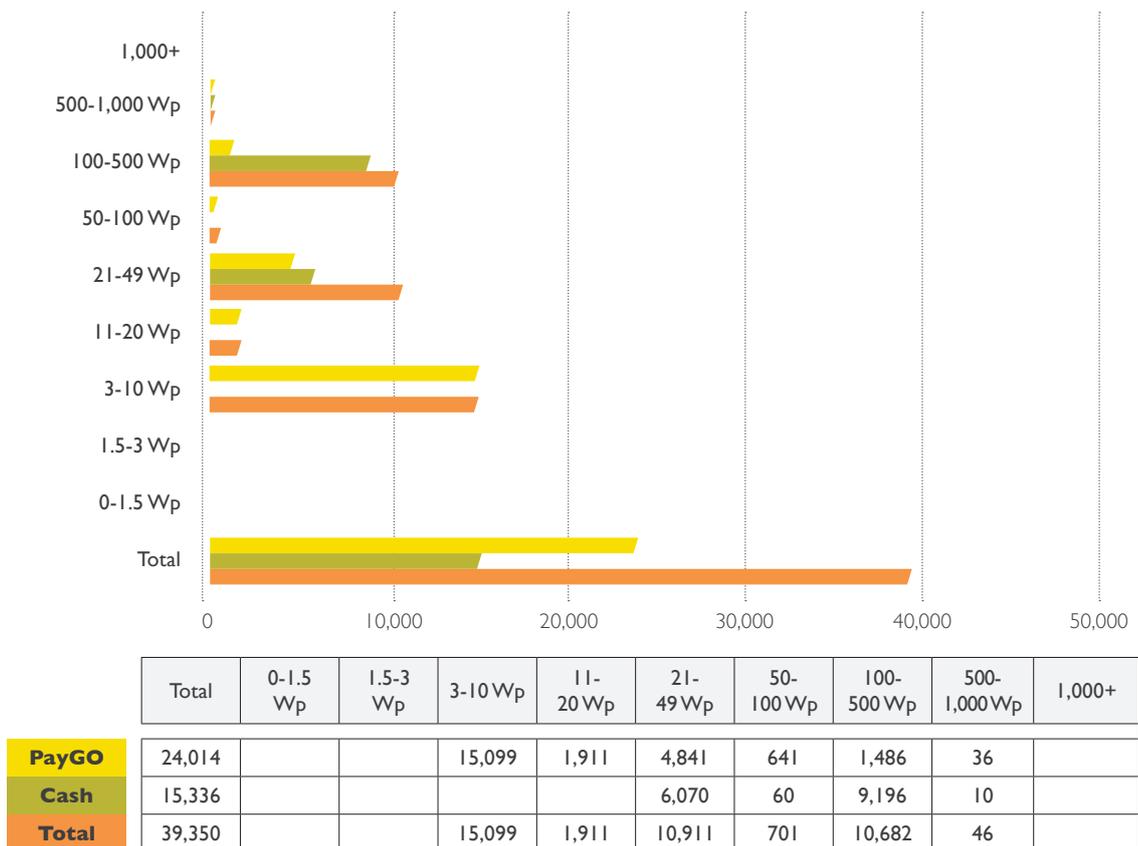


Figure 12: Volumes of products sold in Northern region per product category in the first half of 2018

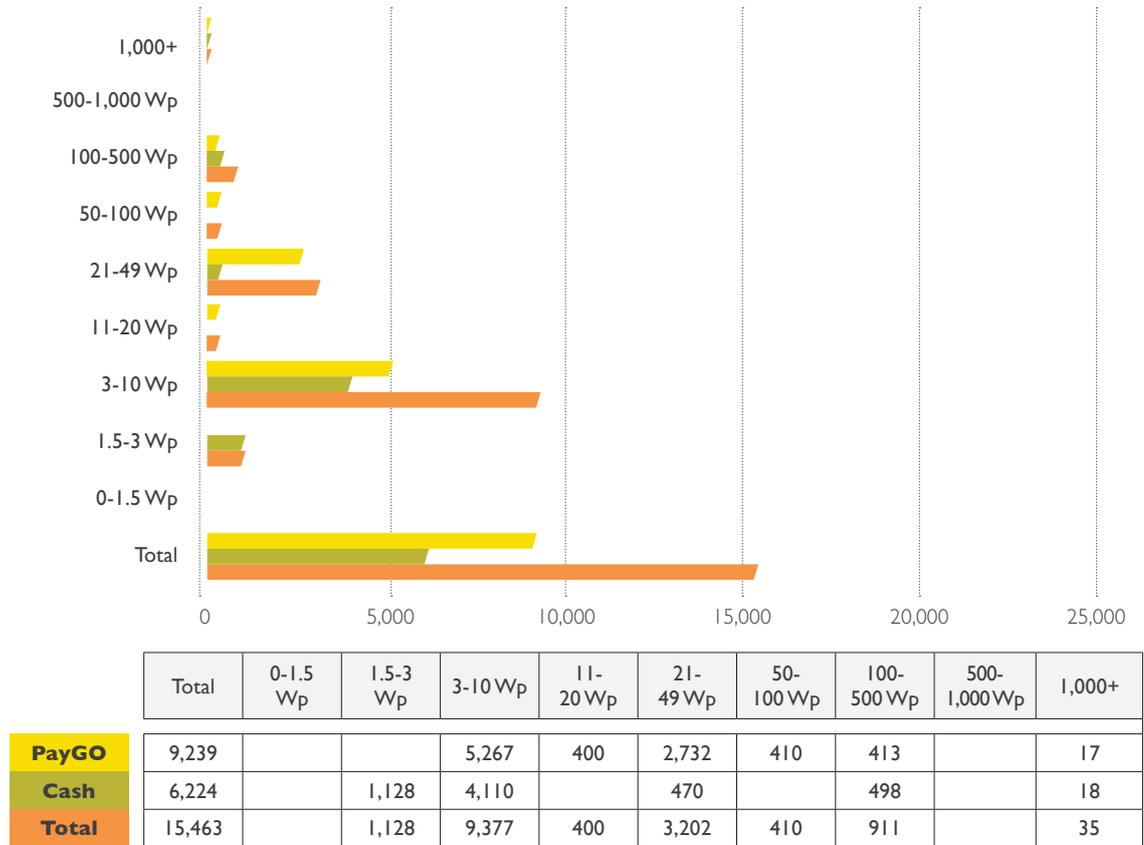


Figure 13: Volumes of products sold in Northern region per product category in the second half of 2018

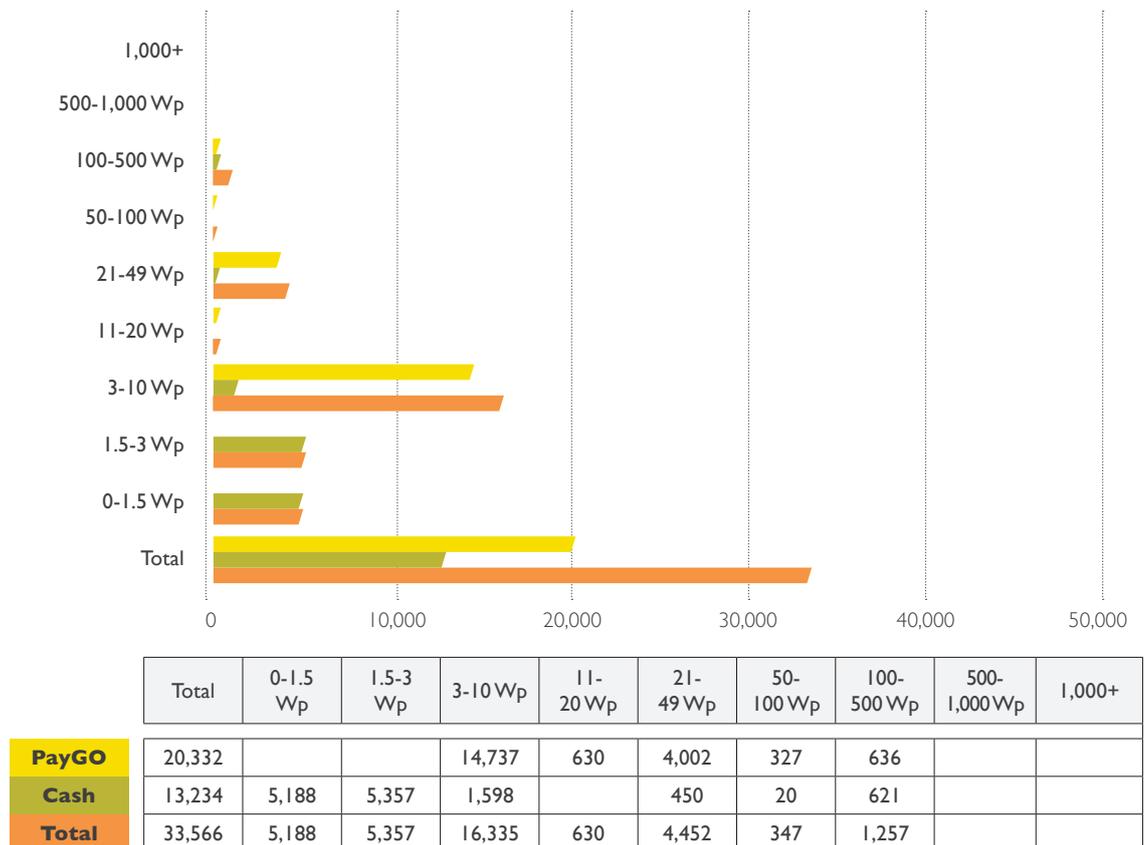
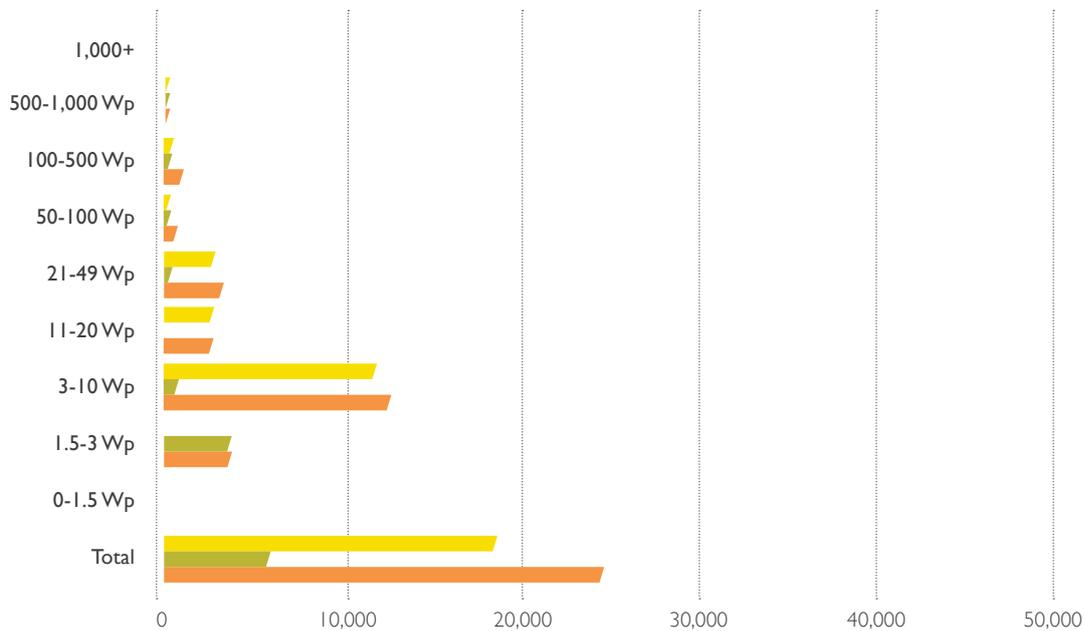
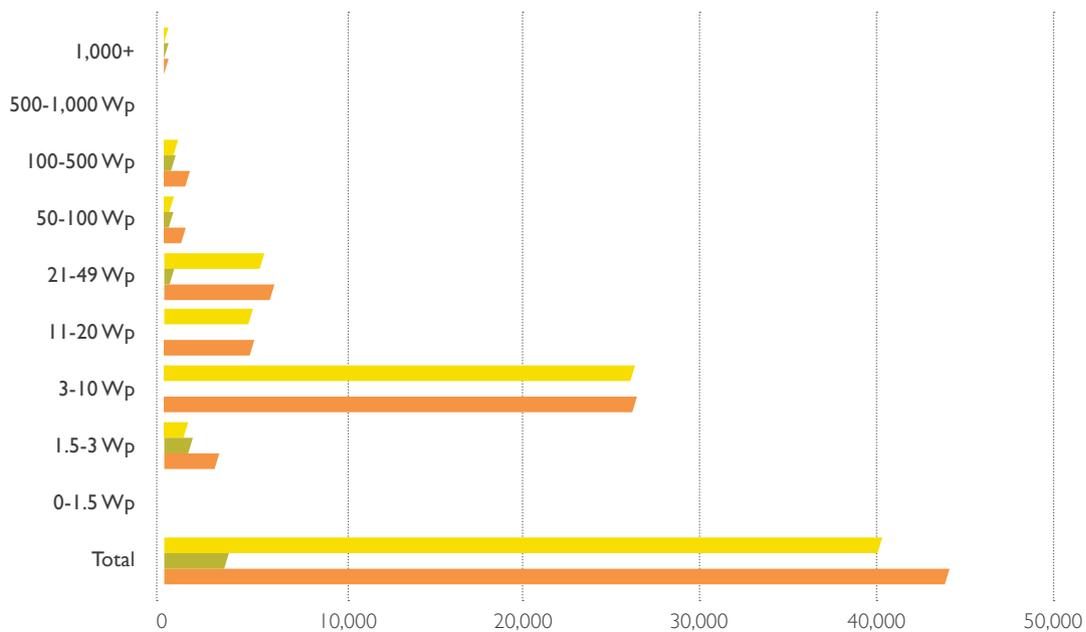


Figure 14: Volumes of products sold in Eastern region per product category in the first half of 2018



	Total	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100-500 Wp	500-1,000 Wp	1,000+
PayGO	18,647			11,901	2,823	2,905	360	626	32	
Cash	5,980		3,822	820		420	420	480	18	
Total	24,627		3,822	12,721	2,823	3,325	780	1,106	50	

Figure 15: Volumes of products sold in Eastern region per product category in the second half of 2018



	Total	0-1.5 Wp	1.5-3 Wp	3-10 Wp	11-20 Wp	21-49 Wp	50-100 Wp	100-500 Wp	500-1,000 Wp	1,000+
PayGO	40,440		1,410	26,608	5,115	5,693	637	923	54	
Cash	3,748		1,747			580	700	700	21	
Total	44,188		3,157	26,608	5,115	6,273	1,337	1,623	75	



INSTALLED CAPACITY

Estimates from overall product sales show that in 2018, USEA members who participated in the SDMC contributed a total of 8.18 Megawatt (MW) of newly installed electricity capacity (See Figure 16). The size of systems sold is an important factor in calculating the installed capacity; for instance, 44.9 percent of the installed capacity is contributed by a small number of higher SHS sales with a capacity ranging from 100 to 500 Wp. The total newly installed capacity increased between the first and second half of 2018, from 3.2MW to 4.6MW.

Across regions, the total installed capacity increases between the first half of 2018 and the second half of 2018 (See Figure 17 and Figure 18). While the Central region has the largest amount of sales in terms of volume, it does not have the highest installed capacity, due to the smaller size of products sold. The Western region has the highest newly installed capacity across regions, reaching 1.6MW during the first half of 2018 and 2.0MW in the second half of 2018. This is attributed to higher sales for much larger systems in the Western region compared to the Central region. The Central region ranks second in terms of installed capacity, reaching 0.6MW and 1.1MW for the first and second half of 2018 respectively. In the Eastern region, the installed capacity increased from 0.5MW in first half of 2018 to 0.9MW in the second half of 2018. The Northern region has the lowest installed capacity of all regions, at 0.4MW and 0.6MW for the first and second half of 2018 respectively.

Figure 16: Total installed capacity for both first and second half of 2018

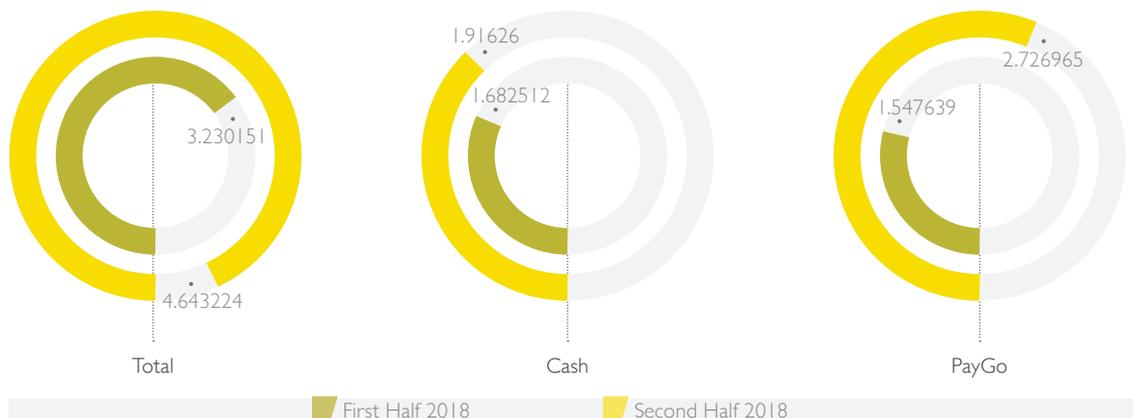
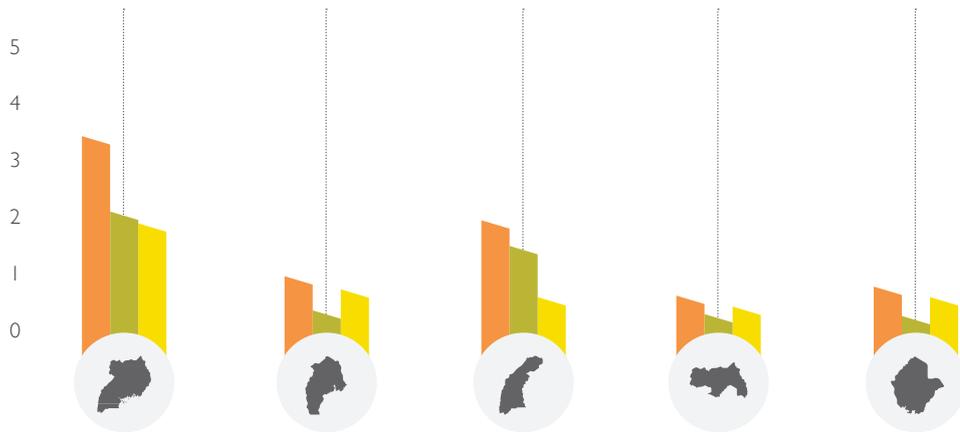
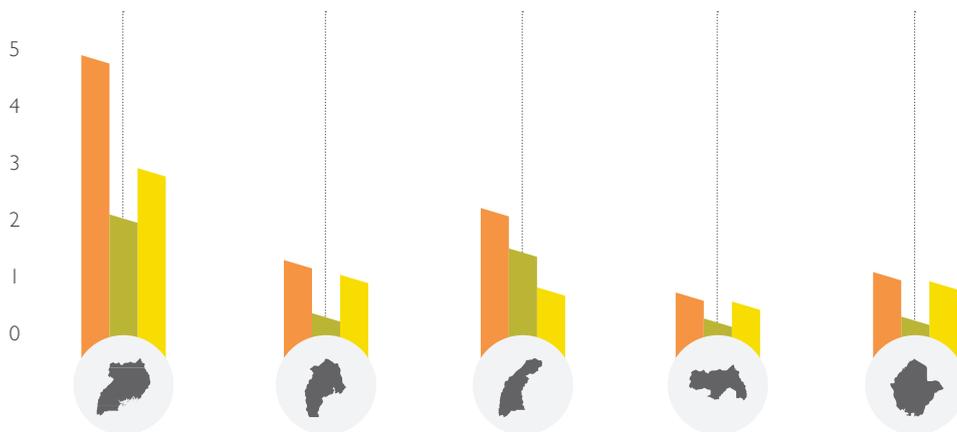


Figure 17: Total installed capacity in the first half of 2018 across regions in Uganda

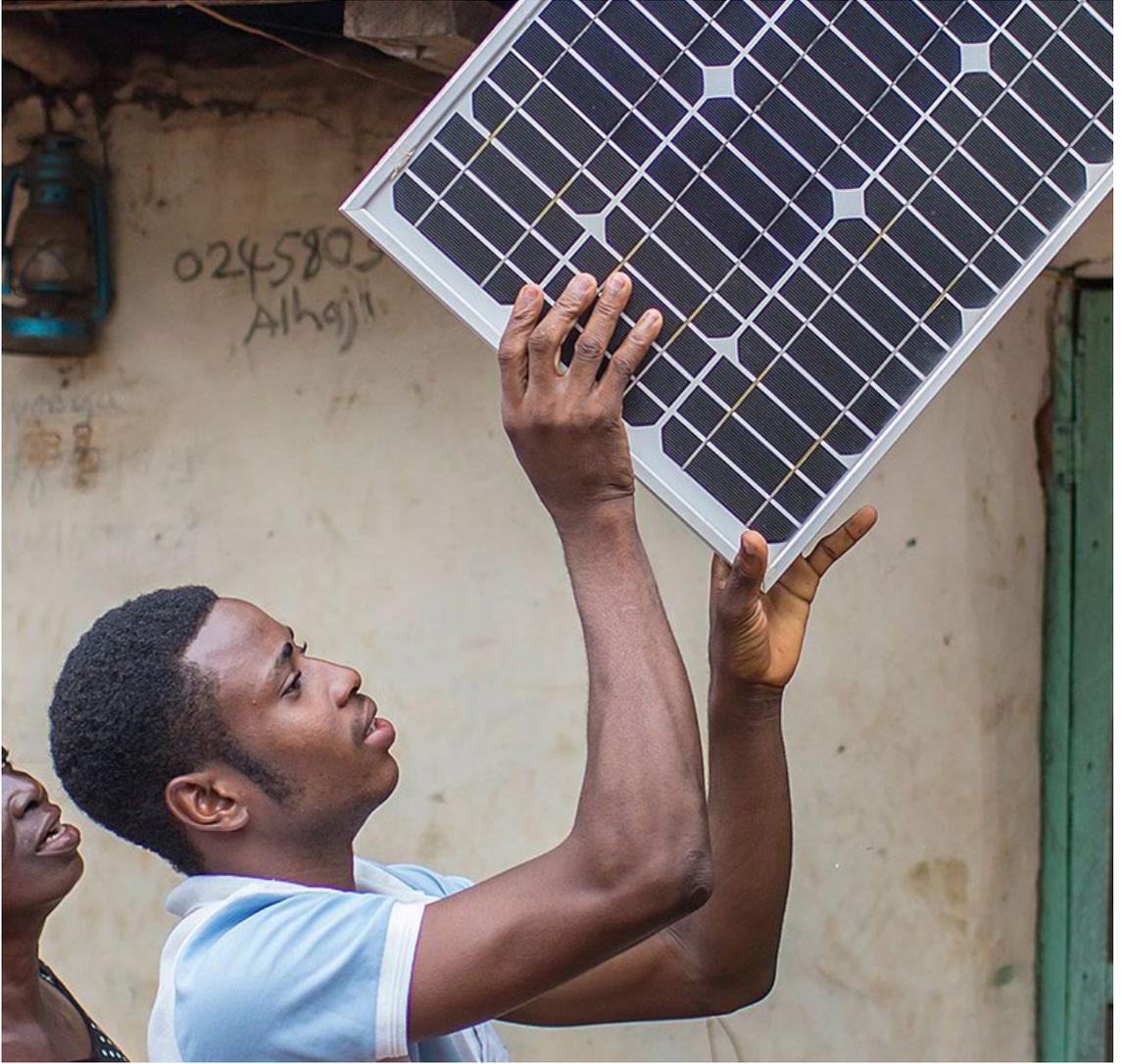


	Uganda	Central	Western	Northern	Eastern
PayGO	1,547,639	486,424	391,046	267,184	402,985
Cash	1,682,512	21,184	1,166,095	16,445	140,127
Total	3,230,151	698,264	1,557,141	431,634	543,112

Figure 18: Total installed capacity in the second half of 2018 across regions in Uganda



	Uganda	Central	Western	Northern	Eastern
PayGO	2,726,965	873,991	666,919	42,433	761,725
Cash	191,626	239,013	135,774	152,125	167,382
Total	4,643,224	1,113,003	2,024,659	576,455	929,107



Impact Estimates

INTRODUCTION

Assessing the impact of off-grid solar products is critical for understanding the extended value of solar and in making informed policy decisions. The growing sales by USEA members are unlocking significant development impact for households across the country. This includes increases in income, savings and economic activity. This section details the estimated impact generated by the 2018 sales of off-grid solar in Uganda.

IMPACT METRICS METHODOLOGY & LIMITATIONS

The impact numbers have been calculated using the Standardized Impact Metrics for the Off-Grid Solar Energy Sector¹¹. The numbers shared represent the estimated impact of the USEA members who have participated in the data collection. These numbers therefore do not include the impact that is being created by other USEA members and non members that did not participate in this exercise, and from sales of component parts. A conservative approach has also been taken in regards to product lifetime, which also means that real impact estimates may be higher than those expressed below.

IMPACT METRICS ESTIMATES AND ANALYSIS

For the full year of 2018, a total of 313,424 off-grid solar products were sold, leading to improved energy access for almost 1.3 million people throughout the country. The Central region saw the highest number of people gaining access to modern solar energy (505,028) followed by the Eastern (292,642), Western (280,730), and Northern (253,653) regions.

Impact calculations estimate that *97,868 people were able to undertake more economic activity* due to their off-grid solar products. This includes over 38,000 people using off-grid products to support enterprise, such as opening shops or restaurants for longer hours or commercial phone charging. The economic activity being unlocked is estimated to generate *an additional income of US \$54.3 million* over the lifetime of the products sold.

The reality of climate change due to rising carbon emissions makes it imperative that Uganda dramatically cut its consumption of traditional fossil fuels. Off-grid solar products sold by USEA members also make a significant contribution to the reduction of emissions. The sales of products in 2018 *will replace a estimated 266,000+ kerosene lanterns*. Over the lifetime of the solar products, this will lead to a *reduction of almost 295,000 metric tons of CO₂e*.

¹¹. GOGLA, Standardized Impact Metrics for the Off-Grid Solar Energy Sector, Version 3.0, 2018. Full report here: www.gogla.org/goglaimpact-metrics

Figure 19: Estimated number of people with improved energy access in 2018, by product category

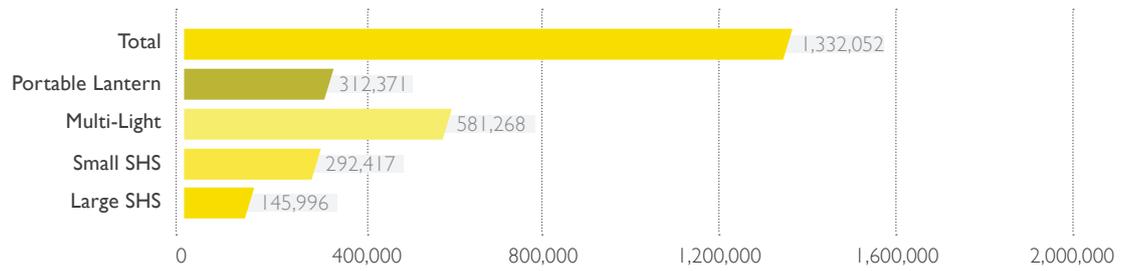


Figure 20: Estimated number of people with improved energy access in 2018, by region



Figure 21: Estimated number of people undertaking more economic activity

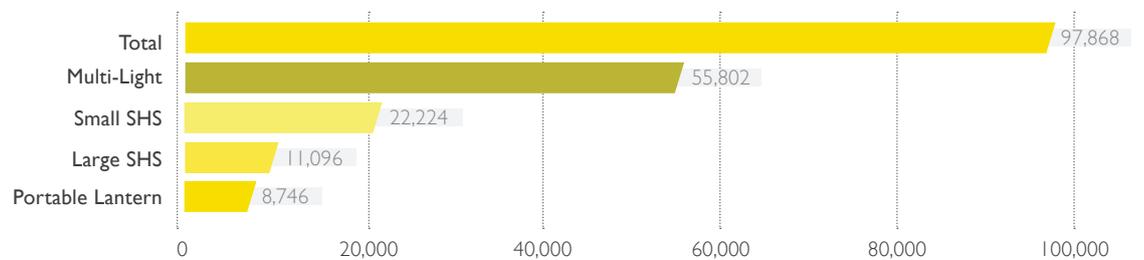


Figure 22: Estimated number of people using their products to support enterprise

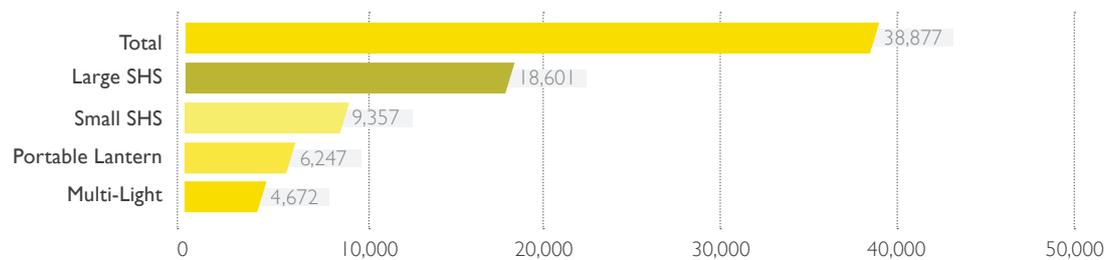


Figure 23: Estimated number of people spending extra time working

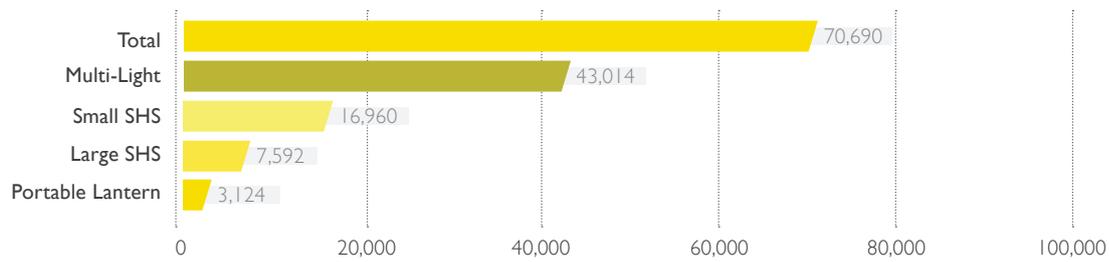


Figure 24 :Estimated additional income generated, over the lifetime of off-grid products (Million \$)

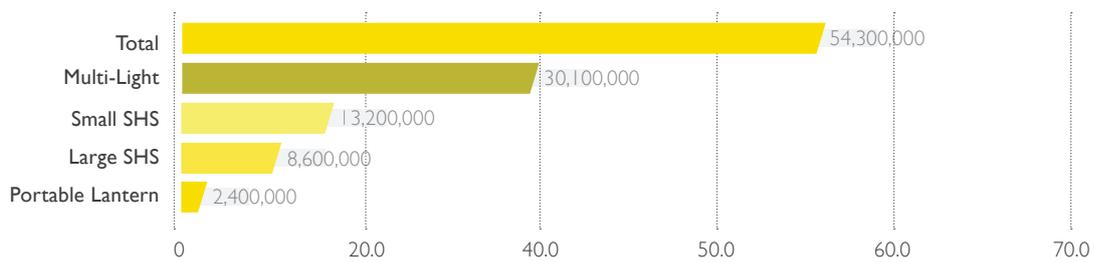


Figure 25: Estimated additional light hours used over the lifetime of off-grid products

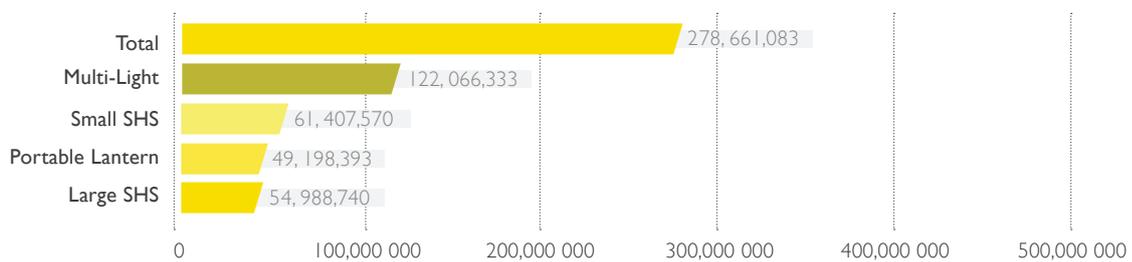


Figure 26: Estimated number of kerosene lanterns replaced

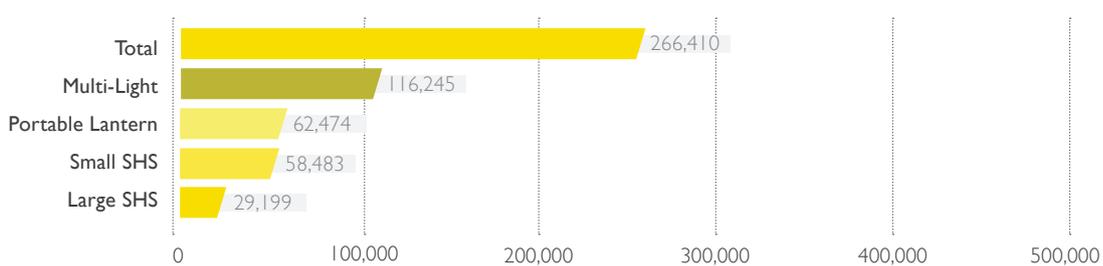
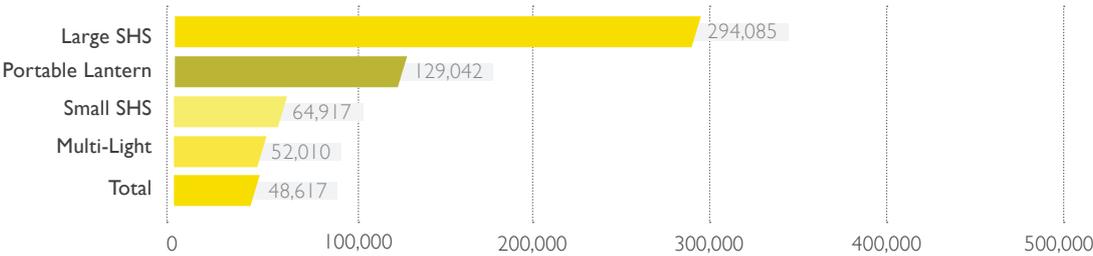


Figure 27: Estimated CO2e emissions avoided (metric tons)







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