



Global Solar Off-Grid Semi-Annual Market Report

July – December 2015
Public Report



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Overview

There are 1.2 billion people without access to the power grid, and they spend about US\$27 billion every year on lighting and mobile phone charging with kerosene, candles, battery torches or other fossil fuel-powered stopgap technologies. Solar-powered portable lights and home kits offer a better, cleaner service at lower cost. Nuanced, quality data is the key to better understanding the maturation and development of this fast-growing market.

In response to demand from investors, manufacturers, distributors and other players in the solar off grid industry, The Global Off-Grid Lighting Association (GOGLA) and the Lighting Global program have combined forces to gather semi-annual product sales data that will allow for systematic identification of key trends, analytical insights and other valuable market intelligence for the sector.

Presented in this report are the aggregated results of the third joint data collection round, covering the period of July 1 to December 31, 2015. In addition, and for the first time ever, this report also includes

data on revenues, providing for a more complete picture of pico-PV products and solar home systems during this period.

This new and ongoing market intelligence not only helps industry members and financiers to make informed decisions. It also strengthens the case for the developmental impact made by the sector—critical for governments, investors and donor agencies.

Acknowledgement

This report is produced by Lighting Global and GOGLA, with the assistance of Berenschot. The Off-Grid Solar Market Report —covering July-December 2015— is the first in a semi-annual series to provide regular snapshots of the off-grid solar market. It relies on the inputs of GOGLA members and IFC clients who share their data in confidence with the research team. Lighting Global and GOGLA would like to thank them for their contribution.

Lighting Global

Lighting Global is the World Bank Group's platform supporting sustainable growth of the international off-grid solar market as a means of increasing energy access to people not connected to grid electricity. Through Lighting Global, IFC and the World Bank work with the Global Off-Grid Lighting Association (GOGLA), manufacturers, distributors, and other development partners to develop the off-grid lighting market.

The Lighting Global program —in partnership with industry— provides market insights, steers development of quality assurance frameworks for modern, off-grid lighting devices and systems, and promotes sustainability. IFC and World Bank jointly manage off-grid lighting programs in more than 10¹ African countries through the Lighting Africa program. The success of the Lighting Africa program has inspired programs in Bangladesh, India, Pakistan and Papua New Guinea, with more programs being developed in Tanzania and

Myanmar. Lighting Global supports Lighting Africa, Lighting Asia and Lighting Pacific, which work along the supply chain of off-grid lighting products and systems to reduce market entry barriers and first-mover risks.

Global Off-Grid Lighting Association

The Global Off-Grid Lighting Association (GOGLA) is a neutral, independent, not-for-profit association created to promote lighting solutions that benefit society and businesses in developing and emerging markets. GOGLA acts as the industry advocate and supports the industry in growing and strengthening the market for clean, quality off-grid lighting and electrical systems. Its main objective is to support industry in scaling the sector based on principles of the triple bottom line, thus contributing to the objectives of Sustainable Energy for All (SE4All) and the Sustainable Development Goals (SDGs).

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 recently been elected by clients as the best management consultancy firm of the Netherlands. As member of the Dutch Council for Management Consultants (ROA) Berenschot is committed to ROA terms and conditions which require them to maintain a high standard of confidentiality.

¹ <http://www.lightingafrica.org/where-we-work/>

Photo credit A children's study group, lit by solar. Nyalenda, Kisumu, Kenya. Photo by Jeffrey M. Walcott



Report Highlights

- This collaborative Off-Grid Solar Market Report for July–December 2015 is the first in a semi-annual series that supplements the wider biennial [Off-Grid Solar Market Trends Report](#)². Together, they provide the most comprehensive source of insight into the real-time dynamics and trends of the off-grid solar market.
- Over 4 million off-grid branded and quality verified solar powered devices have been sold in the second half of 2015. Sales have been highly concentrated in Sub-Saharan Africa and South Asia, which accounted for approximately 2.22 million (54.3%) and 1.6 million (39%) products, respectively.
- Just over half of the total reported unit sales (2,210,017 units / over US\$25 million in revenue) were single light Pico-PV products (1.5 Wp or less). This trend is observable across all regions. Pico-PV single light / mobile phone charging products (1.5–3Wp range) accounted for approximately 39% of all unit sales (1,581,669 units / almost US\$70 million in revenue). As expected, the number of products sold declined as the products got larger and more expensive, with all other product categories together accounting for almost 290,000 units sold (approximately US\$18 million in revenue).
- Over 27 million people have been provided with Tier 1 Electrification Access (or higher), by all the products and systems reported as sold over the last three years. In addition, 48,099 products large enough to provide Tier 2 Electrification Access to a household (21 Wp to 100+ Wp) were sold in the second half of 2015. This is calculated using the [multi-tier energy access framework](#)³ developed for the Sustainable Energy for All initiative's [Global Tracking Framework for measuring progress towards universal energy access](#)⁴.
- Social Impact Measures that have resulted from the reported sales will be reported separately in a forth-coming report, using the [GOGLA standardized impact metrics for the off-grid energy sector](#)⁵.

² <https://www.lightingglobal.org/launch-of-off-grid-solar-market-trends-report-2016/>

³ <https://www.esmap.org/node/55526>

⁴ <http://www.se4all.org/tracking-progress>

⁵ http://gogla.org/sites/www.gogla.org/files/recource_docs/gogla-standardised-impact-metrics-for-the-off-grid-energy-sector1_1.pdf

Research Methodology

The data in this report is limited to that provided by GOGLA member companies and Lighting Global Quality Verified companies using an online questionnaire. Companies are classified either as distributors of other companies' branded products or as manufacturers of their own branded products. Only aggregate data is presented here, and it is only included when it has satisfied our 'three data point rule', meaning that at least three separate product manufacturers have reported data for any single data point. When we have less than three respondents' answers, no results are shown. This protects the proprietary interests of the companies who have supplied data in support of this industry report. All data is self-reported by the companies, and while it is cross-checked for consistency, the companies are responsible for accurate reporting

of product specifications, pricing information, sales volumes and locations of sales.

As in the previous two collection rounds, this data collection and reporting process was overseen by Dutch management consultancy firm Berenschot. Besides adding management capacity and expertise, they provide the safeguard that all company-specific data remains confidential and undisclosed to the industry association GOGLA. Lighting Global provided specialist industry knowledge within the research team and the market research firm Research2Evolve (R2E) collected and processed the data. GOGLA advised the team, but had no access to company specific data.

Photo credit: Lillian runs a small shop in Dunga village, lit by solar. Kisumu, Kenya. Photo by Jeffrey M Walcott



Source of Data - Respondents

The data presented here was provided by a total of 31 companies. Of the respondents, 26 are manufacturers of branded off-grid solar products and 5 are non-manufacturing distributors of others products. The 26 manufacturers reported 110 unique products. To prevent double counting, only the sales of manufacturers are reported in this aggregated report. The data for non-manufacturing distributors helps to validate this data and will inform the companies of their individual market shares.

Along with collection of sales for the period being reported here, companies were also asked to report aggregate global sales per product since 2013. This longitudinal (historical) data was used to calculate the installed base (the number of products globally that are still working) and will in the future be used to calculate trends over time. This, in turn, was used to calculate social impact measures, which will be reported separately in a forth-coming report.

Table 1 - List of Respondents

Respondents	
Azuri	Mobisol
Barefoot Power	Off-Grid: Electric
BBOXX	OmniVoltaic
Bright Products AS	Panasonic
BrighterLite	RAL International
d.light	Solar Kiosk
Fenix International	Solar Sister
Flexiway Solar Solutions	Solar Works!
Fosera	SunnyMoney (SolarAid)
Futura Sun	Videre Global
Greenlight Planet	Village Power
Jua Energy	Waka-Waka (Off-Grid Solutions)
Lagazel	Zhejiang Holley
Little Sun	Zimpertec
Mibawa Suppliers	Zonful Enterprises
Micart (Micro-Mark)	

Data Processing

Quality Verified Versus Non-Quality Verified

In this report the terms 'quality verified' and 'non-quality verified' are used. Quality verified means that the product met has been quality verified by IFC under the [Lighting Global Quality Standards](#)⁶ (Lighting Global / International Electrical Commission Technical Standard 96652) during the reporting period July 1 – December 31, 2015. Non-quality verified means that the quality of the product was not verified by IFC according to these standards. It is important to note that the absence of quality verification does not imply that products are of lower quality. Industry members may have a variety of legitimate reasons for not having sought product certification.

Data Checks

The research team checked the entered data for consistency and logic in relation to previously collected data by Berenschot or IFC. Based on these checks, some small adjustments have been made to the data, mainly concerning panel wattage and the status of products being 'quality verified' or not.

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 was still missing.

⁶ <https://www.lightingglobal.org/qa/>

Product Categories

Data has been grouped into product categories in order 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. Panel wattage (in watt-peak) was used as a proxy for both criteria. In a very limited number of cases, products were manually categorized to fit them in the right functionality category. The definitions of these categories are presented in Table 2.

Table 2 - Definition of Product Categories

Pv Panel Capacity	Categorization By Services	Corresponding Level Of Mif Energy Access
0 – 1.5 Wp	Single Light only	Systems can provide a person with basic lighting access and contribute to meeting Tier 1 Electricity Access needs
1.5 – 3 Wp	Single Light & Mobile Charging	More powerful systems provide Tier 1 Electricity Access to at least one person and contribute to meeting a household needs
3 – 10 Wp	Multiple Lights & Mobile Charging	Systems provide Tier 1 electricity Access to more than one person, up to a household
11 – 20 Wp	SHS, Entry Level (3-4 lights, mobile charging, powering radio, fan, etc.)	Systems provide Tier 1 electricity Access to more than one person, up to a household
21 – 49 Wp	SHS, Basic capacity (above plus power for TV & extended capacity)	More powerful systems can provide Tier 2 Electricity Access to a household when coupled with high-efficiency appliances
50 – 100 Wp	SHS, Medium capacity (above but with extended capacities)	Systems provide Tier 2 Electricity Access to a household
100+ Wp	SHS, Higher capacity (above but with extended capacities)	Systems provide Tier 2 Electricity Access to a household



Photo credit: Igembe, Meru County, Kenya. Lighting Africa/ Peter Nyimbae, 2013

Market Overview: Off-Grid Solar

Sales - World & Regions

At the global level, just over 4 million products have been sold in the second half of 2015. Sub-Saharan Africa and South Asia account for approximately 2.22 million (54.3%) and 1.6 million (39%) respectively. The East Asia & Pacific region was third with a significantly lower reported number of products sold—105,187 (2.6%). The combined sales of all other regions amount to about 165,579 products.

In Sub-Saharan Africa (see Figure 2) most of the sales have been recorded in East African countries with Tanzania, Kenya, Ethiopia and Uganda representing 66% of all sales in the region. In South Asia, it is India where most sales have been recorded with about 1.46 million products sold, or 91% of the sales in the region. Worldwide, India is by far the country with the most recorded sales.

Figure 1 - Volume Of Products Sold, World & Regions, Jul 1-Dec 31, 2015

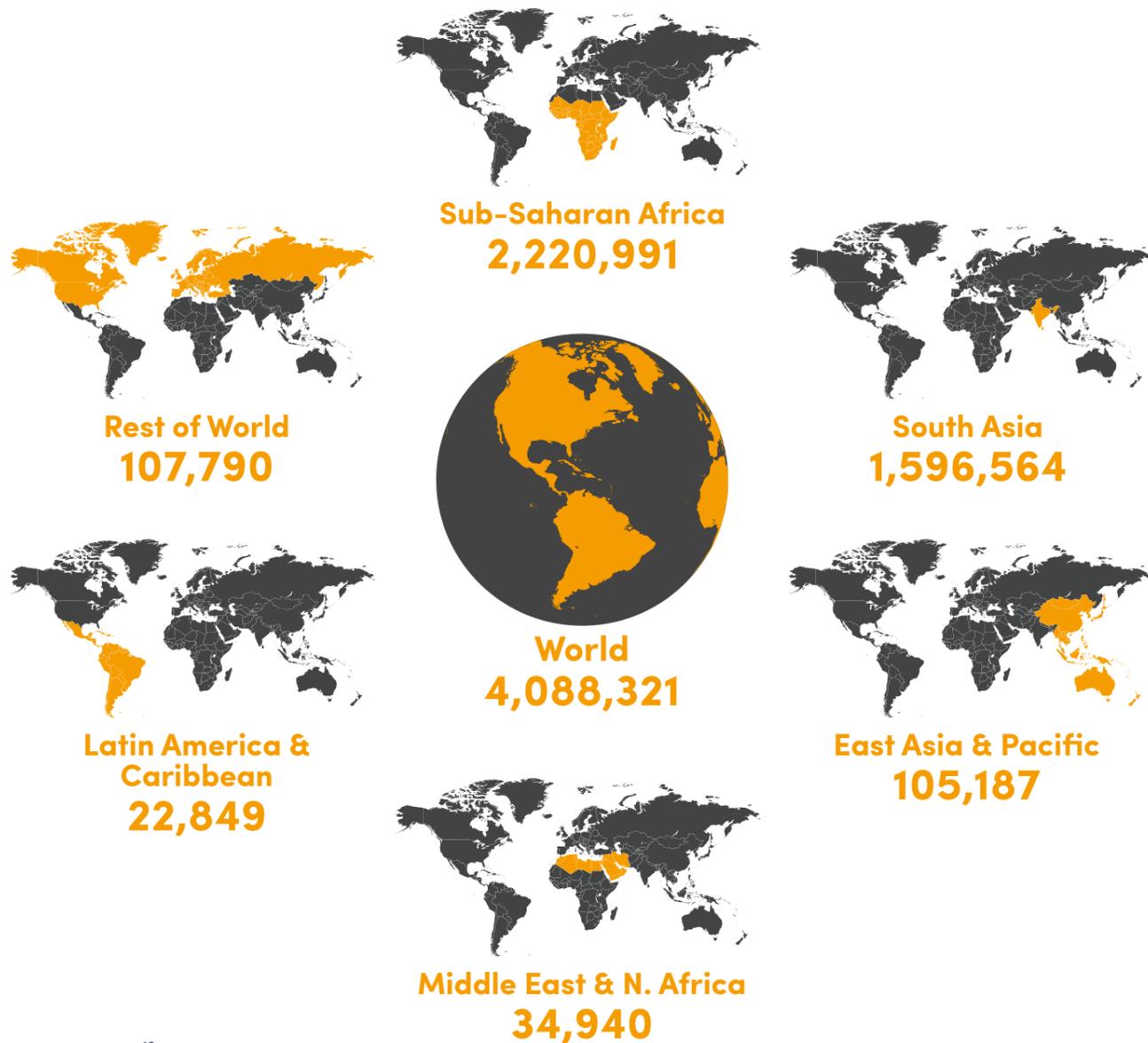
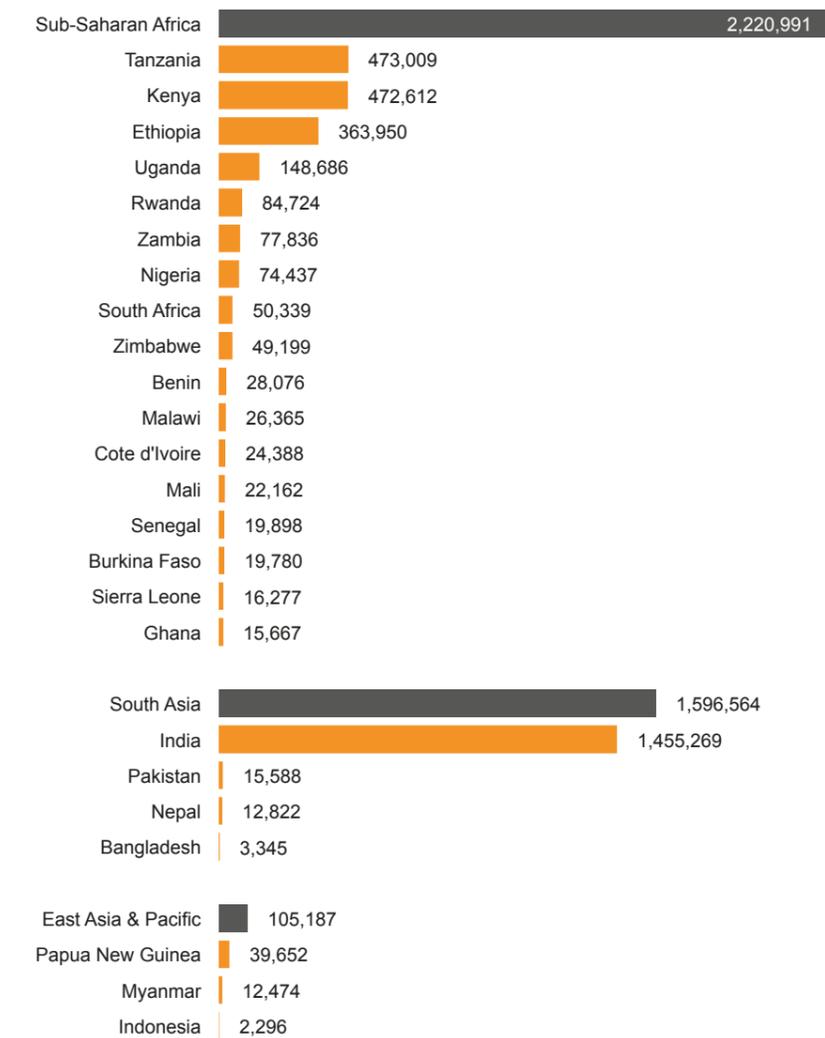


Figure 2 - Volume Of Products Sold, Regions & Countries, Jul 1-Dec 31, 2015

PLEASE NOTE - Data is not reported in the categories for which insufficient data points were provided



Sales – Breakdown: Quality Verified vs. Non-Quality Verified

At the global level, quality verified product sales represent approximately 80% of all captured sales (see Figure 3).

In Sub-Saharan Africa (see Figure 4) quality verified products constitute over 85% of all sales. Non-quality verified products are more prominent in Ghana (35.6%) and South Africa (30.7%), two less developed markets.

In East Asia & Pacific, the sales of non-quality verified products account for 30.75% of all documented sales.

In South Asia (see Figure 5) quality verified product sales represent 77% of all sales. However, in Nepal, the recorded number of non-quality verified products (9,600) sold is about 3 times higher than that of quality verified products (3,222).

Figure 3 - Volume Of Products Sold, World & Regions, Jul 1-Dec 31, 2015 – Breakdown, Quality Verified Vs. Non-Quality Verified

PLEASE NOTE – Data is not reported in the categories for which insufficient data points were provided

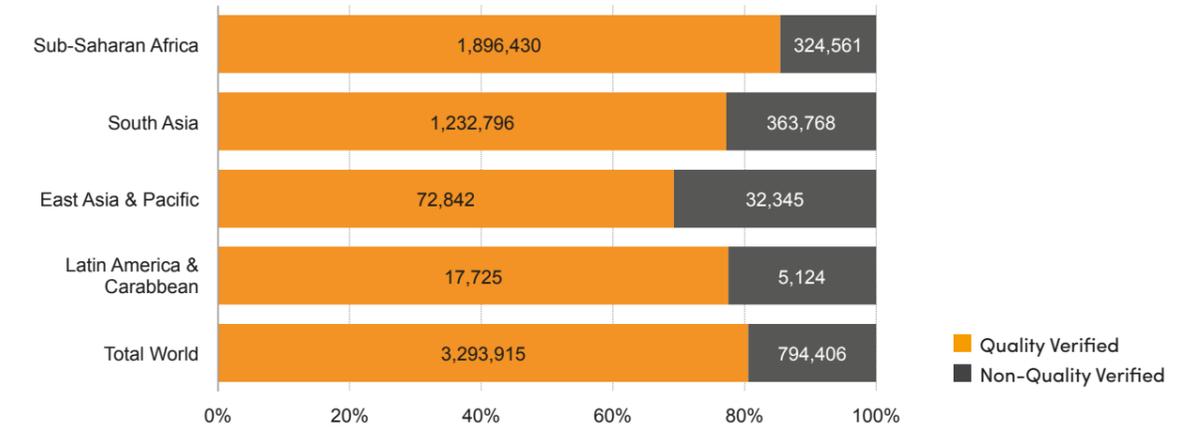


Figure 4 - Volume Of Products Sold, Sub-Saharan Africa, Jul 1-Dec 31, 2015 – Breakdown, Quality Verified Vs. Non-Quality Verified

PLEASE NOTE – Data is not reported in the categories for which insufficient data points were provided

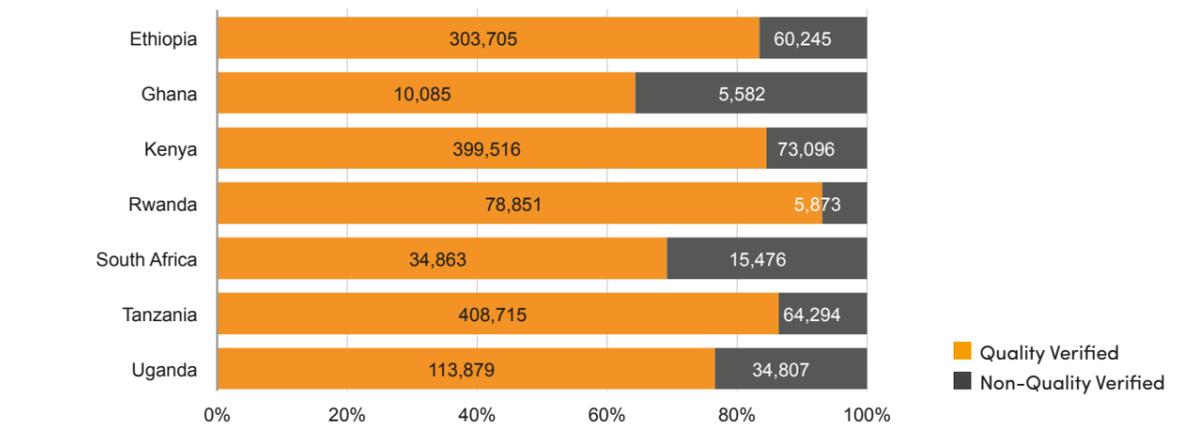


Figure 5 - Volume Of Products Sold, South Asia, Jul 1-Dec 31, 2015 – Breakdown, Quality Verified Vs. Non-Quality Verified

PLEASE NOTE – Data is not reported in the categories for which insufficient data points were provided

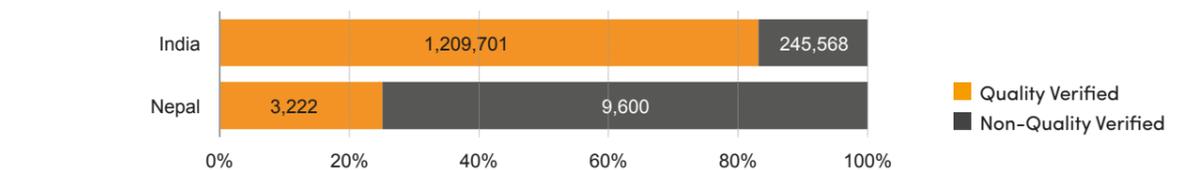


Photo credit Dinner preparation and chemistry study, illuminated by solar light. Kisumu, Kenya. Photo by Jeffrey M Walcott



Sales Broken Down By Product Category

In this section, the sales data is segmented into product categories. From a market perspective, the most meaningful segmentation is based on functionality and capacity. Panel wattage (in Watt-peak) was used as a proxy for both criteria. The definitions of the different product categories are presented in Table 2 above.

As shown in Figure 6 (below left), over half (54%) of the total sales worldwide (2,210,017) were single light products in the range of 0-1.5 Wp. This trend is observable across all regions (see Table 3). The next category, products with a single light and mobile phone charging capability in the 1.5-3 Wp range, accounts for approximately 39% of all sales, or 1,581,669 units.

As expected, the number of products sold declines as the products get larger and more expensive. However, in Sub-Saharan Africa, 148,834 larger products with a capacity ranging from 3 Wp to 20Wp were sold (see Table 3). In addition, 48,099 products large enough to provide Tier 2 Electrification Access to a household (21 Wp to 100+ Wp) were sold in the second half of 2015. This is due to the proliferation of the PAYGO⁷ model in East Africa, which reduces the affordability barrier and enables customers to acquire larger systems.

⁷ PAYGO: "Pay-as-you-go". PAYGO firms sell solar equipment against small instalments instead of a lump-sum payment, with a technology that locks the functionality of the equipment in the event of non-payment by the consumer.

Figure 6 - Volume Of Products Sold Vs. Product Category, World, Jul 1-Dec 31, 2015

PLEASE NOTE - The absence of a bar means that either no data was available or that not enough data points were available to report.

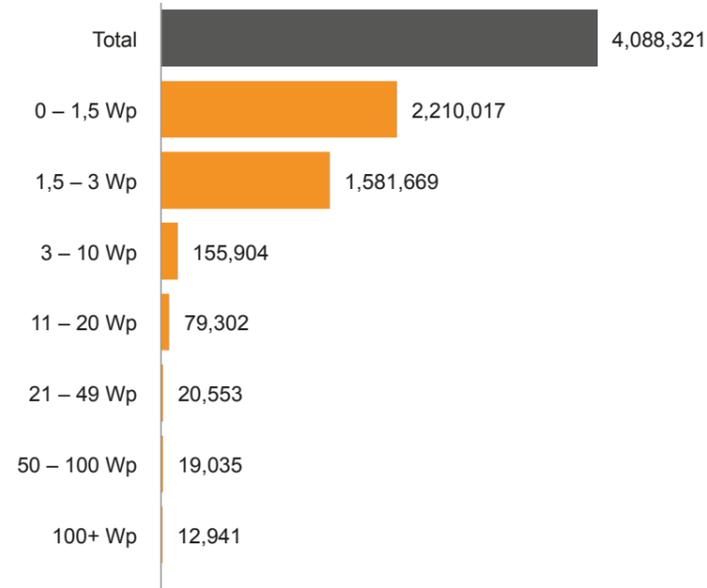


Table 3 - Table 3 - Volume of Products Sold Vs. Product Category, Regions, Jul 1-Dec 31, 2015

NOTE - Empty cells mean that either no data was available or that not enough data points were available to report

	Sub-Saharan Africa	South Asia	East Asia & Pacific	Latin America & Caribbean	Middle East & N. Africa	Rest of the World
Total	2,220,991	1,596,564	105,187	22,849	34,940	107,790
0-1.5 Wp	1,307,111	757,969	40,577	8,645	29,000	66,715
1.5-3 Wp	716,947	784,514	37,669			37,375
3-10 Wp	89,392	35,051	19,205	3,516		3,700
11-20 Wp	59,442					
21-49 Wp	16,653					
50-100 Wp	19,005					
100+ Wp	12,441					
Not Specified						

Photo credit Ivan and Yvonne Wambani, 8 and 11, read by solar light outside their home in Nyalenda, an informal settlement. Kisumu, Kenya. Photo by Jeffrey M Walcott



Comparison With Previous Counts

The following graphs compare the current sales count with previous counts, highlighting the development of the off-grid solar industry.

Product sales grew steadily to the end of 2014 (Figure 7) with periodic growth peaking at 123% in H1 2013. A fall in sales was recorded in H1 2015 but the sector has recovered in H2 2015 as leading companies overcame supply-chain constraints (BNEF/LG 2016).

When examining the historical sales figures per region presented in Figure 8, it is clear that the fall in sales experienced in H1 2015 was due to a drop in sales in Africa. Sales in India, which dominates the Asian market, continued to progress over that period. This drop in sales in Africa can be attributed

to companies facing operational bottlenecks (e.g. inventory finance constraints) that held back their sales and the increased competition from generic products (BNEF/LG 2016).

In H2 2015, sales in Africa picked up again, which, combined with the sales in other regions, resulted in a 40% growth (from H1 2015 sales) at the global level.

When looking at cumulative sales since counting started in July 2010 (see Figure 9), just over 17.1 million quality verified product sales have been reported.

Taking non-verified products into account adds 2 million in product sales to the final result.

Figure 7 - Historical Product Sales (Quality & Non-Quality Verified) In Millions, World

SOURCE - LIGHTING GLOBAL, GOGLA, BERENSCHOT

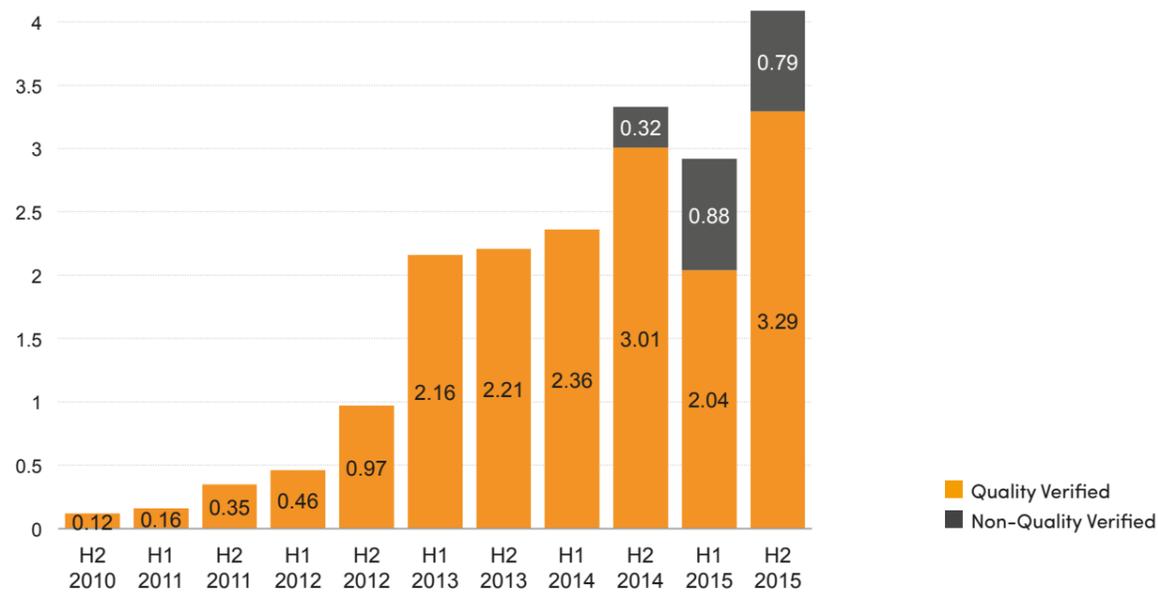


Figure 8 - Comparison of Combined Product sales in millions

SOURCE - LIGHTING GLOBAL, GOGLA, BERENSCHOT

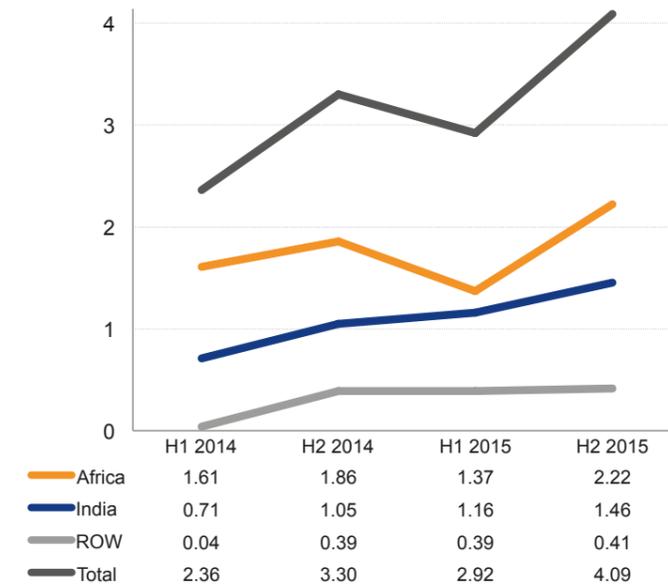
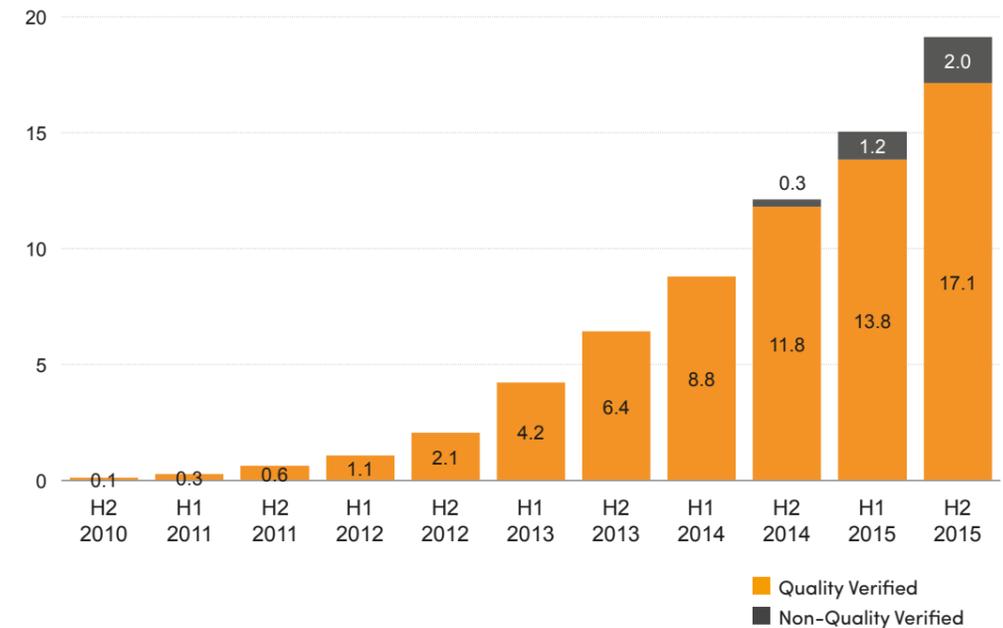


Figure 9 - Cumulative Product Sales (Quality & Non-Quality Verified) In Millions, World

SOURCE - LIGHTING GLOBAL, GOGLA, BERENSCHOT



Revenues – World

As depicted in Figure 10, the combined revenues from PAYGO and cash sales in H2 2015 amount to US\$ 136,514,383 globally.

The PAYGO revenues were provided by respondents and amount to US\$18,437,216. These are likely to be an underestimation of the actual PAYGO revenues since many respondents did not provide this

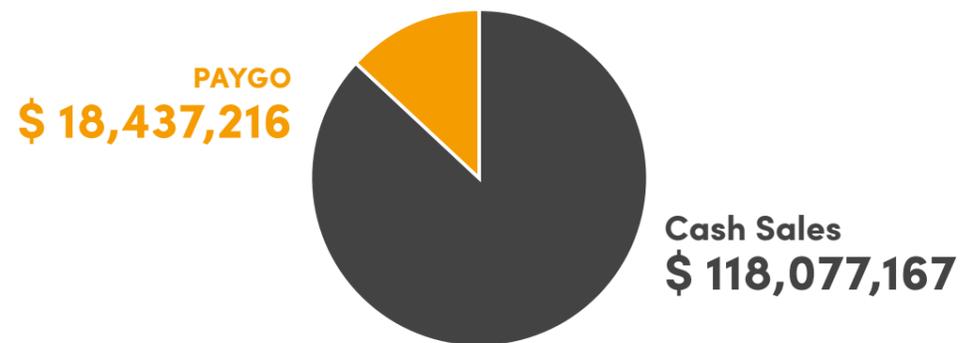
information. There were not enough respondents to provide further breakdowns of PAYGO revenues.

Cash sales revenues were calculated by multiplying the number of sales of each product by 1.8 times its respective FOB price to approximate the retail price. The total cash sales revenues for all products amount to US\$ 118,077,167 globally.

Figure 10 – Revenues in US\$, World, Jul 1-Dec 31, 2015



Figure 11 – Revenues in US\$, World, Jul 1-Dec 31, 2015: Cash Sales Vs. Paygo



Cash Sales Revenues – Regions

As depicted in Figure 12, most of the revenues from cash sales in H2 2015 were generated in Africa (US\$ 59 million) and South Asia (US\$ 47 million). Revenues from cash sales in Africa are only 25% higher than those in South Asia despite the fact that almost 40% more products were sold there (2.22 million in Africa vs. 1.6 million in South Asia). This is due to the fact that most of those additional sales are entry-level products, which are sold at a lower price, or larger PAYGO products, which are not accounted for in this calculation.

Cash sales revenues in India alone amounted to almost US\$40 million in H2 2015. This translates as 84.5% of all cash sales revenues in South Asia or one-third of global cash sales revenues. In Africa, most cash sales revenues came from East Africa, with US\$ 16.7 million in Kenya and US\$10.1 million in Ethiopia. Despite ranking first among African nations in terms of the number of products sold with 473,009, Tanzania sits 3rd in terms of cash sales revenues with US\$ 5.3 million. This is due to the fact that most sales in Tanzania are entry-level products and larger PAYGO products, which are not accounted for in this calculation.

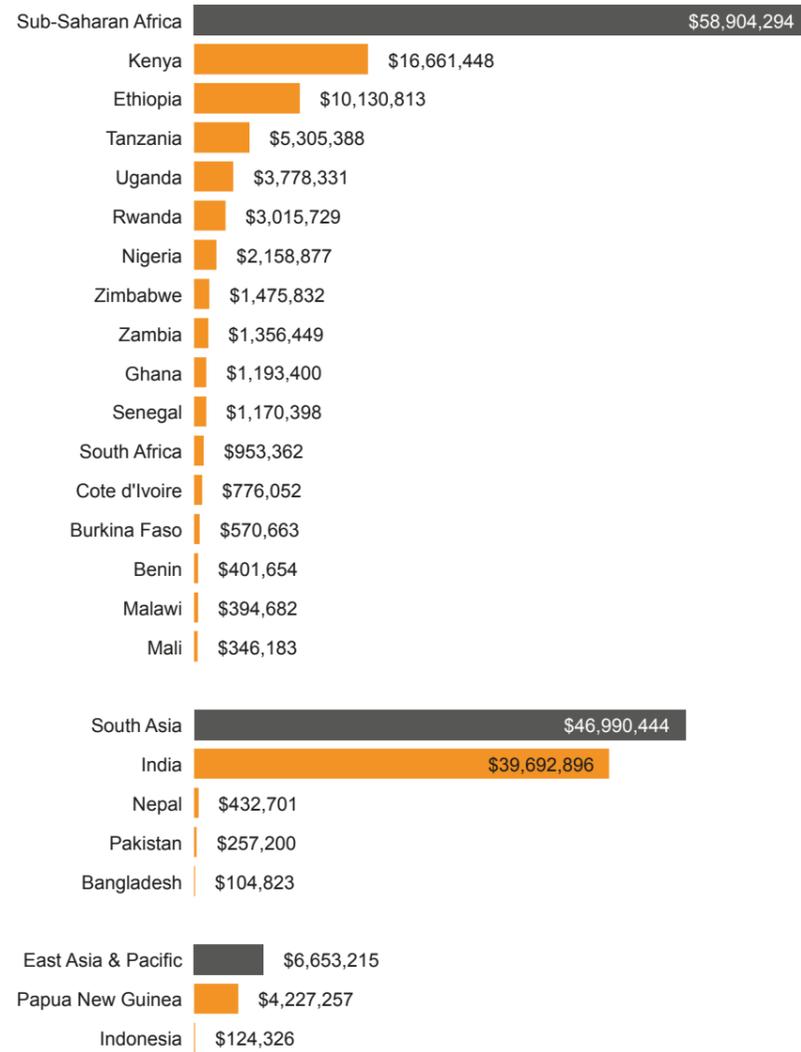
Figure 12 – Cash Sales Revenues in US\$, Regions, Jul 1-Dec 31, 2015

PLEASE NOTE – Data is not reported in the categories for which insufficient data points were provided.



Figure 13 - Cash Sales Revenues in US\$, Regions & Countries, Jul 1-Dec 31, 2015

PLEASE NOTE - Data is not reported in the categories for which insufficient data points were provided.



Cash Sales Revenues – Breakdown Quality Verified vs. Non-Quality Verified

Globally, revenues from the sale of quality verified products represent about 71% of all revenues from cash sales.

Only in the East Asia & Pacific region and in Nepal do revenues from non-quality verified products surpass those of quality verified ones.

Figure 14 - Cash Sales Revenues in US\$, World & Regions, Jul 1-Dec 31, 2015 – Breakdown, Quality Verified Vs. Non-Quality Verified

PLEASE NOTE - Data is not reported in the categories for which insufficient data points were provided

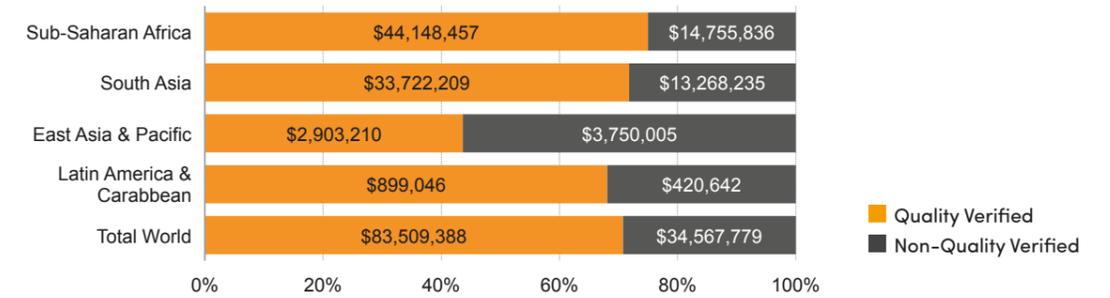


Figure 15 - Cash Sales Revenues in US\$, Sub-Saharan Africa, Jul 1-Dec 31, 2015 – Breakdown, Quality Verified Vs. Non-Quality Verified

PLEASE NOTE - Data is not reported in the categories for which insufficient data points were provided

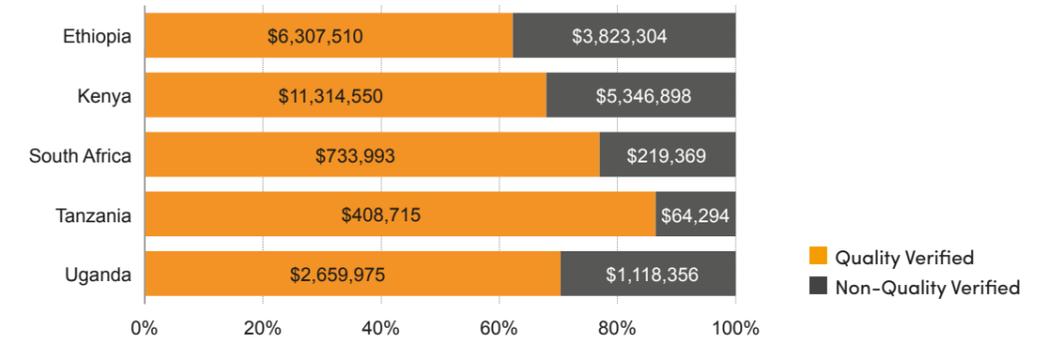
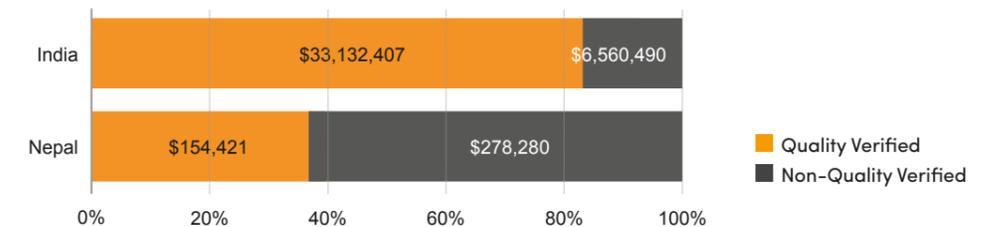


Figure 16 - Cash Sales Revenues in US\$, South Asia, Jul 1-Dec 31, 2015 – Breakdown, Quality Verified Vs. Non-Quality Verified

NOTE - Data is not reported in the categories for which insufficient data points were provided



Cash Sales Revenues vs. Product Category

In this section, the cash sales revenues data is segmented into product categories. From a market perspective, the most meaningful segmentation is based on functionality and capacity. Panel wattage (in Watt-peak) was used as a proxy for both criteria. The definitions of the different product categories are presented in Table 2 above.

As mentioned above (see Figure 6), entry-level products (0-1.5 Wp) account for 54% (2,210,017 units) of the total sales worldwide. However, revenues from cash sales of such products represent only 21.4% of the total cash sales revenues or US\$ 25.3

million (see Figure 17). This is due to the lower retail price of such products.

Products with a single light and mobile phone charging capability in the 1.5-3 Wp range account for approximately 39% of all sales (1,581,669) but they generate 58.7% of the total cash sales revenues or US\$ 69.3 million (see Figure 17).

Cash sales of larger products with a capacity ranging from 3 Wp to 10 Wp generate US\$ 14.1 million in revenues and those with a capacity of 11-20Wp generate US\$ 3.83 million.

Figure 17 - Cash Sales Revenues in US\$ Vs. Product Category, World, Jul 1-Dec 31, 2015

PLEASE NOTE - The absence of a bar means that either no data was available or that not enough data points were available to report.

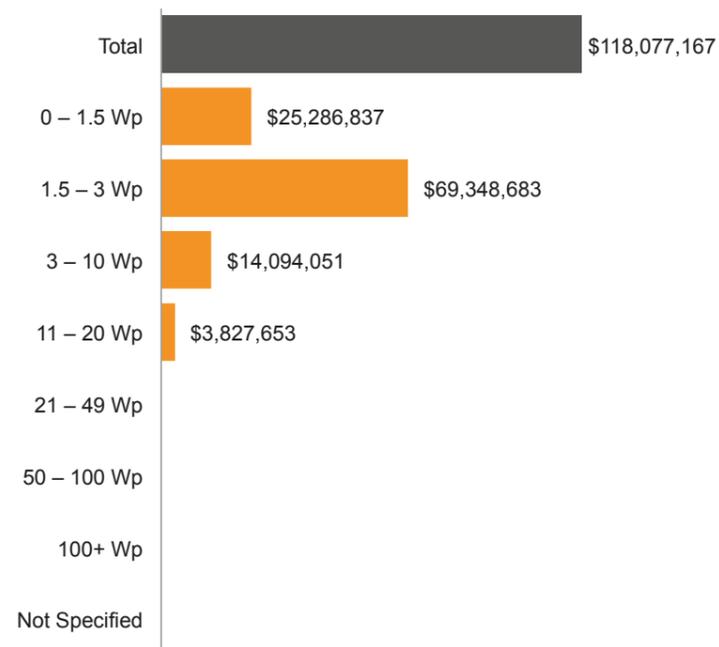


Table 4 - Cash Sales Revenues in US\$ Vs. Product Category, Regions, Jul 1-Dec 31, 2015

NOTE - Empty cells mean that either no data was available or that not enough data points were available to report

	Sub-Saharan Africa	South Asia	East Asia & Pacific	Latin America & Caribbean	Middle East & N. Africa	Rest of the World
Total	\$58,904,294	\$46,990,444	\$6,653,215	\$1,319,688	\$720,306	\$3,489,221
0-1.5 Wp	\$14,404,718	\$8,224,557	\$542,113	\$92,128	\$365,778	\$1,657,544
1.5-3 Wp	\$32,359,580	\$33,342,631	\$1,723,595			\$1,717,298
3-10 Wp	\$8,631,742	\$2,416,033	\$2,120,479	\$456,890		\$114,379
11-20 Wp						
21-49 Wp						
50-100 Wp						
100+ Wp						
Not Specified						

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- [Lighting Global Quality Standards](https://www.lightingglobal.org/qa/) (Lighting Global / International Electrical Commission Technical Standard 96652)



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