GOGLA

The Voice of the Off-Grid Solar Energy Industry

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

January - June 2021, Public Report

LIGHTING GLOBAL
Catalyzing markets for modern off-grid energy

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Executive Summary

The off-grid solar industry has shown tremendous resilience throughout the COVID-19 pandemic. However, the path to recovery is uneven and there are varying trends among regions and markets. Following consumers' reduced spending capacity and severe disruptions in global supply chains the industry is not yet back on a solid growth trajectory.

While industrialized nations are seeing clear signs of economic recovery, increased vaccine rates and fewer restrictions needed to combat the pandemic, the situation in developing and emerging markets remains more fragile and uncertain. Market maturity, regulations, access to finance, donor programs, climate-linked disasters, political instability, conflict, the pandemic and countries' responses are all influencing factors and require analysis of market trends beyond global headline figures. **The sales data for January-June 2021 in this report highlights the contrasting trends behind this recovery:**

- **Global PAYGo sales volumes of lighting products for the first half of 2021 are the highest ever reported with 1.21 million units sold.** Cash sales, at 2.25 million units are 30% lower than during the second half of 2019, before the COVID-19 pandemic.

- **East Africa, West Africa and South Asia, the three largest regional markets are experiencing different trends.** In South Asia, sales of off-grid solar products such as solar lanterns and solar home systems have been on a declining trend since 2018, accelerated by COVID-19. Sales in East Africa, although affected by the crisis, have been relatively stable, in particular in Kenya. After a moderate slowdown in 2020, sales in West Africa have returned to growth and are now 30% higher than the second half of 2019.

- **Companies have fared very differently during these past months depending on the markets they were exposed to, their supply chains, their maturity and their business model.** 57% of companies reported decreased sales compared to the second half of 2019, with 28% reporting decreases of more than 50%. In contrast, 43% of companies reported stable or growing sales with 28% reporting increased sales of over 75% compared to the second half of 2019.

Globally, close to 3.5 million units of off-grid solar lighting products were sold between January and June 2021, a moderate 4% decrease in sales compared to the second half of 2020. This is relatively stable development, especially considering the effects of seasonality, as the second half of the year tends to see higher sales. **Aggregated sales of key off-grid appropriate appliances** (TVs, fans, refrigeration units and solar water pumps) **shrank by 10% compared to the previous reporting round with 421,000 units sold.** While seasonal factors which typically impact the sector's annual sales may be an influencing factor, total volumes remain below pre-pandemic levels recorded in 2019. Global sales of lighting products and appliances are respectively 22% and 9% lower than in the second half of 2019. The industry as a whole has shown resilience and adaptability, but has not yet returned to the growth required to reach 2030 goals.

Among lighting products, solar lanterns (0-3 Wp) have experienced a declining trend for the last three years. 2.18 million units were sold in the first half of 2021, 7% lower than during the previous reporting round. Multi-light systems (3-10Wp) sales reached 672,000 units this reporting round, a 3% decrease from July-December 2020 and still significantly lower than sales reported in the second half of 2019. Solar home system (SHS) sales reached 605,000 units, 2% lower than the second half of 2020 and 27% lower than the second half of 2019.

Among key appliances, 194,000 TV sales were reported for the first half of 2021. This is an 18% decrease compared to the second half of 2020 and 31% decrease compared to the second half of 2019. 216,000 fans were sold this round, a stable figure compared to the previous reporting round[1]. 4,100 refrigeration units were sold in January- June 2021, a 2% decrease on the previous reporting round and 24% lower than the second half of 2019. Finally, 6,400 solar water pumps were sold during the first half of 2021. This is 20% lower than in the second half of 2020 and 77% lower than in the second half of 2019.

1 Strong variations in sales volumes for fans in 2019 make comparisons between 2019 and 2021 hard to interpret.

Executive Summary

In Sub-Saharan Africa, sales of lighting products decreased by 6% compared to the second half of 2020, but total volumes are 19% higher than during the comparable January-June 2019 period preceding the pandemic. However, these figures obscure significant differences between regions and countries. **For East Africa as a whole, sales are 9% lower than during the previous reporting period and 18% lower than during the second half of 2019 before the pandemic.** Kenya, the largest market in the region, saw a moderate 4% decrease in sales. Crises in Ethiopia and COVID-19 restrictions in Uganda saw these two key regional markets contract significantly, while Rwanda, Zambia and Tanzania saw a second consecutive round of growth in sales volumes. **Key appliance sales in the region were particularly affected with a 28% decrease in volumes overall compared to the previous reporting round, and are now 31% lower than in July-December 2019.**

In West Africa, regional sales volumes of lighting products grew 10% compared to the second half of 2020 and are now 30% higher than in the second half of 2019. Nigeria, a powerhouse in the region, saw a 20% growth in sales volumes and Senegal, Sierra Leone and Togo all saw significant increases. **Key appliance sales in West Africa as a whole also grew by 10% and are back on par with pre-COVID volumes.**

Sales of lighting products in South Asia remain on a declining trend. Volumes decreased by 16% compared to the previous reporting round. In India, sales have been on a downward trajectory since before the pandemic, but still account for the majority of volumes in the region. The country was acutely affected by the pandemic in spring 2021. Sales shrank by 19% and are now 52% below volumes reported in the second half of 2019. Key appliance sales in South Asia decreased by just 4% compared to the previous reporting round.

Beyond commercial performance, the sales data in this report also translates into stories of impact. **Since 2010, 360 million people have benefited from improved access to energy through off-grid solar lighting products and 86 million metric tons of CO_2e have been avoided - the equivalent of taking 22 coal plants offline for a year.** Additionally, emissions avoided by high-performing fans and TVs since July 2018 are already close to 18,000 metric tons. This is equivalent to the carbon sequestered over 10 years by planting 298,000 trees[2]. **Despite off-grid solar solutions providing the fastest and most affordable way to electrify hundreds of millions of people, across the last 18 months, the reversal in the growth of the off-grid solar market led to an estimated 12-23 million people missing out on improved energy access[3].**

The crisis has dealt a blow to companies in the sector, but it has also shown their capacity to adapt and endure a protracted and complex crisis in a relatively young industry. To a large extent this resilience has been powered by the ingenuity of entrepreneurs and their teams. Companies have adapted their product offering to cope with supply issues, absorbed price increases to maintain affordability and awarded flexibility to reliable customers. Resilience was bolstered for companies that received crucial support from partners, including the continued backing of their investors and recognition from some governments that they perform an essential service in times of crisis. Additionally, initiatives by development partners will help safeguard the progress made toward Sustainable Development Goal 7, such as the Energy Access Relief Fund which closed a first round of $68 million to protect energy access for 20 million households and micro-businesses in Sub-Saharan Africa and Asia[4] or the African Development Bank COVID-19 Off-grid Recovery Platform ($20 million closed this summer)[5].

While this support is vital in weathering the crisis, more is required to put the industry firmly back on the growth trajectory required to reach universal access to energy by 2030. **Off-grid solar lighting and appliances are essential in meeting emerging market households and businesses' energy needs while avoiding CO_2e emissions and exposure to harmful toxins from fossil fuel-based alternatives. They can also generate savings on energy expenses, provide economic opportunities or improve productivity[6] for MSMEs and across farming, livestock and fisheries (e.g. through harnessing cold storage, solar water pumping, agro-processing, etc.)[7,8].**

2 United States Environmental Protection Agency (2021), Greenhouse Gas Equivalencies Calculator.
3 High level estimates based on access rates if sales numbers had risen by the same 13% increase as they did between 2018 and 2019, using the Standardised Impact Metrics.
4 More information available here.
5 More information available here.
6 GOGLA (2018-2020), Powering Opportunity series.
7 Lighting Global (2019), The Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa.
8 Efficiency for Access Coalition (2019), The State of the Off-Grid Appliance Market.

Executive Summary

As recognized at the United Nations' High-Level Dialogue on Energy, there is increased awareness of how the sector can not only drive access to energy, but also improve economic and climate resilience for vulnerable households and businesses in developing countries[9]. **Governments have a key role to play in providing an enabling environment which will support citizens' access to clean energy, and efficient appliances. Continuing support from development partners and investors will be crucial to not only safeguard, but expand development gains linked to access to energy.** The impact of the COVID-19 pandemic on the sector is going to be felt for the duration of 2021. **We therefore call on all partners to recognize the tremendous gains in energy access the sector has already enabled and to join us in protecting and further enhancing social and environmental impacts.**

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9 United Nations (2021), Theme Report on Energy Access.

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About the Report

Authors

GOGLA

GOGLA is the global association for the off-grid solar energy industry. Established in 2012, GOGLA now represents over 200 members as an 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

Lighting Global

Lighting Global is the World Bank's initiative to rapidly increase access to off-grid solar energy for the 789 million people living without electricity world-wide. Lighting Global - managed by the Energy Sector Management Assistance Program (ESMAP) - works with manufacturers, distributors, governments, and other development partners to build and grow the modern off-grid solar market. Our programs are funded with support from Austria, Canada, the Climate Works Foundation, Denmark, the European Commission, Finland, France, Germany, Iceland, Italy, Japan, Luxemburg, the Netherlands, Norway, the Rockefeller Foundation, Spain, Sweden, Switzerland, the United Kingdom, and the World Bank. For more information, please visit www.lightingglobal.org

Efficiency for Access Coalition

Efficiency for Access is a global coalition working to promote high performing appliances that enable access to clean energy for the world's poorest people. It is a catalyst for change, accelerating the growth of off-grid appliance markets to boost incomes, reduce carbon emissions, improve quality of life, and support sustainable development. Efficiency for Access consists of 17 Donor Roundtable Members, 17 Program Partners, and more than 30 Investor Network members. Current Efficiency for Access Coalition members have programs and initiatives spanning 44 countries and 22 key technologies. The Efficiency for Access Coalition is coordinated jointly by CLASP, an international appliance energy efficiency and market development specialist not-for-profit organisation, and UK's Energy Saving Trust, which specialises in energy efficiency product verification, data and insight, advice, and research. For more information, please visit www.efficiencyforaccess.org

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

Berenschot

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

Global Insights

Global Insights

Background

Over the last 18 months, the COVID-19 pandemic has caused unprecedented disruption to healthcare systems and global supply chains, and placed huge financial strain on households worldwide. As vaccination rates pick-up and restrictions are lifted, optimism for the global economy is gaining traction and growth is projected at 6% for this year[10]. **However, the fight against the pandemic has also highlighted global inequalities with industrialized countries boasting high vaccination rates while developing countries struggle to access vaccines**. With vaccination increasingly likely to become the key driver of recovery, it is alarming that Africa's per capita vaccine doses administered are almost fifty times lower than in Europe[11]. In this context, projected growth for 2021 will heavily rely on countries such as the United States and China. **Recovery in emerging and developing markets, where the off-grid solar industry is most active, remains uncertain and fragile[12].**

Low-income countries[13] (LICs) and Sub-Saharan Africa are particularly vulnerable. They will likely see no gains in GDP per capita in 2021 and will see poverty further increase[14] placing further constraints on household expenditure in key markets for the sector. Measures taken to fight the spread of the virus such as lockdowns and market closures have led to shrinking sales figures locally. India and Uganda present two clear examples of measures such as market closures, curfews and travel restrictions, disrupting company operations and ability to reach customers in the first half of 2021.

The first half of the year has illustrated how the pandemic is still affecting the supply of the off-grid solar lighting and efficient appliances sector. **Disruptions to global supply chains have led to component shortages, increased prices and delays in shipment affecting the sector[15].**

While COVID-19 has been the global headline story since early 2020, off-grid markets have also been affected by other destabilizing factors resulting in variable performance from one country or company to another. Emerging markets, where off-grid solar companies primarily operate, are increasingly affected by extreme weather and changes in rainfall patterns[16] which impact the livelihoods of rural communities and in some cases lead to food insecurity as is currently the case in Madagascar. The locust infestation that affected East Africa, the Arab Peninsula and India only came to an end in early 2021 in the Horn of Africa. Political instability has increased with the conflict in Tigray and with recent coups in Mali, Guinea and Myanmar.

Yet, the sector has shown resilience during this time of protracted and complex crisis. While global sales have not recovered, new product innovations have reached the market and interest in the sector remains high[17]. The sector's importance in developing countries was highlighted by several governments during the pandemic which recognized off-grid solar as an essential service and enabled companies to continue operating during lockdowns. This period has also seen growing support for the productive use of renewable energy (PURE) which harnesses super-efficient appliances and equipment; key examples being the Togolese government's CIZO program extending its support of distributed renewable energy (DRE) to include solar water pumps, or support to the supply and distribution of quality solar powered systems for productive use in the third phase of the EnDev Program. There have also been many recent announcements, which did not affect this reporting round, but will likely benefit the sector going forward. These include the return of off-grid solar tax exemptions in Kenya; the launch of the Energy Access Relief Fund which closed a first round of $68 million to protect energy access for 20 million households and micro-businesses in Sub-Saharan Africa and Asia[18], the launch of the African Development Bank COVID-19 Off-grid Recovery Platform ($20 million closed this summer) and the Ikea Foundation and Rockefeller Foundation commitment of $1 billion towards DRE in low-income countries.

10 IMF (2021), World Economic Outlook Update, July 2021: Fault Lines Widen in the Global Recovery.
11 Congressional Research Service, Coronavirus Disease 2019 (COVID-19): Impact in Africa.
12 World Bank (2021), The Global Economy: on Track for Strong but Uneven Growth as COVID-19 Still Weighs.
13 World Bank Country and Lending Groups: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
14 World Bank (2021), Updated estimates of the impact of COVID-19 on global poverty: Turning the corner on the pandemic in 2021?
15 GOGLA (2021), Off-grid solar supply chain disruption: 87% of manufacturers expect increased prices for consumers.
16 US Global Leadership Coalition (2021), Climate Change And The Developing World: A Disproportionate Impact March 2021.
17 60 Decibels (2021), Listening During COVID-19: A Year in Review.
18 Acumen, Global Coalition Launched $80 Million Relief Fund to Protect Energy Access in Vulnerable Communities from COVID-19 Fallout. https://acumen.org/blog/coalition-launches-energy-access-relief-fund/.

Global Insights

Although the industry has continued to feel the effects of the crisis in the first half of 2021, the sector remains bullish overall, while specific situations vary considerably from country to country and even from company to company.

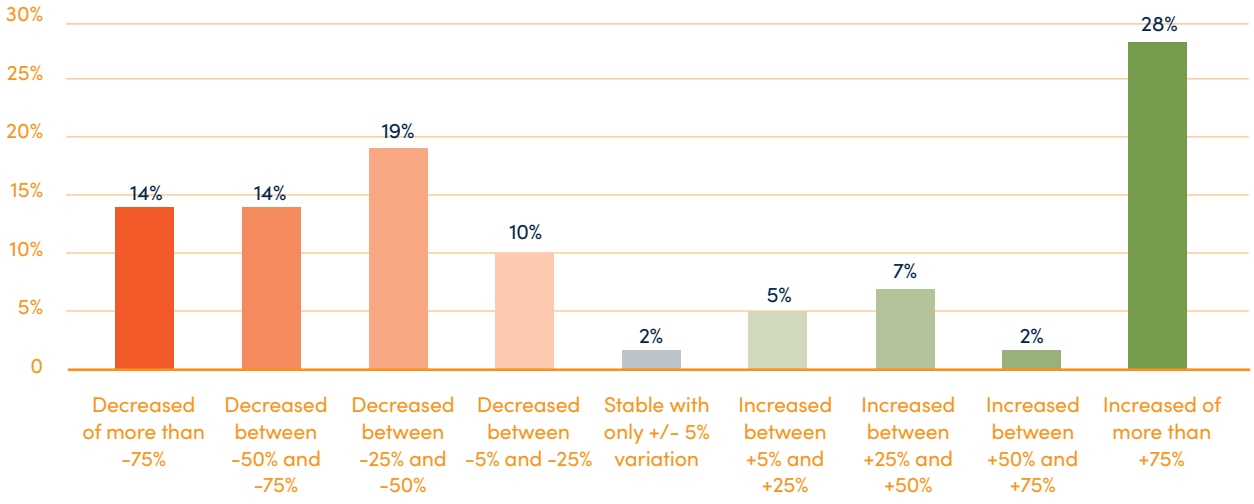
Several companies have reported 0 units sold this round due to shortages or shipping disruptions leading to unmet demand. Smaller companies, local distributors in particular, seem to have been most affected. **57% of companies reported lower sales in the first half of 2021 than in the second half of 2019; the last reporting round before the pandemic affected the industry.** This remains a significant concern, but is an improvement on the second half of 2020 when two-thirds of companies were reporting lower sales, including 54% reporting decreases of more than 25%. **Additionally, 41% of companies reported increased sales compared to pre-COVID reporting (July-December 2019).** Among these companies, 28% reported sales increases of more than 75%. In the second half of 2020, only 23% of companies had reported higher sales than in the second half of 2019.

These results are indicative of the complexity and uncertainty of the recovery for the off-grid solar and efficient appliances sector. It also reflects companies' unequal access to investment and support from governments and development partners. **More than ever, understanding the state of the global market for off-grid solar and efficient appliances requires analysis of trends and developments at a much more granular level.** This report strives to provide this, while respecting the confidentiality of participating companies' data.

Data collection methodology

GOGLA, Lighting Global and the Efficiency for Access coalition, with support from Berenschot, collect data from affiliate companies via an online survey every six months. Participating companies share data on their product specifications and sales volumes on a per product, per country basis. For the period January-June 2021, 101 companies took part in the July data collection. Data goes through a thorough quality control and aggregation process to ensure robustness of the insights and to protect the confidentiality of companies' data. While this report does not claim to be representative of the entire sector, it provides the broadest and most reliable dataset on the off-grid solar and energy-efficient appliances sector. Additionally, impact data in this report is based on the standardised impact metrics for the sector developed by GOGLA, Lighting Global and the Efficiency for Access coalition. Data collected by GOGLA is widely used by organizations in the access to energy sector. In particular, they are a key source in tracking progress made in reaching Sustainable Development Goal 7[20].

Figure 1 - Variation in Off-Grid Solar Lighting Sales Volumes in January-June 2021 Compared to July-December 2019 for Energy Access Companies[19] - World



19 Bespoke analysis of the sales volumes of off-grid solar manufacturers and distributors reporting in H2, 2019, and H1, 2021.
20 More information available here.

Global Insights

Sales and Impact Trends

Global Key Highlights

Sales figures presented here refer to the total of all off-grid solar lighting and off-grid appliance product sales reported by participating affiliates[21] in the period between January 1st and June 30th, 2021

Lighting

3.5 million
off-grid solar lighting products

2.3 million
have been sold as cash products

1.2 million
sold via Pay-As-You-Go (PAYGo)

2.184 million
portable lanterns

672,000
multi-light systems

605,000
solar home systems (SHS)

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

Appliances

149,000
TVs sold

216,000
fans sold

4,100
refrigeration units sold

6,400
solar water pumps sold

168,000
radios sold

21 Affiliates include GOGLA members, companies selling products that meet Lighting Global Quality Standards, and appliance companies of the Global LEAP Awards or the Low Energy Inclusive Appliances (LEIA) program.

Global Insights

Off-Grid Solar Lighting Products

Global sales of lighting products by affiliates between January and June 2021 stand at 3.5 million units. This is a 4% decrease compared to the second half of 2020. Before COVID-19, global sales reached 4.4 million units in the second half of 2019. However, due to seasonal effects that lead to stronger sales in the second half of the year, a more accurate pre-pandemic comparison is the period from January to June 2019. Sales in the first half of 2021 are 16% lower than during that comparative period.

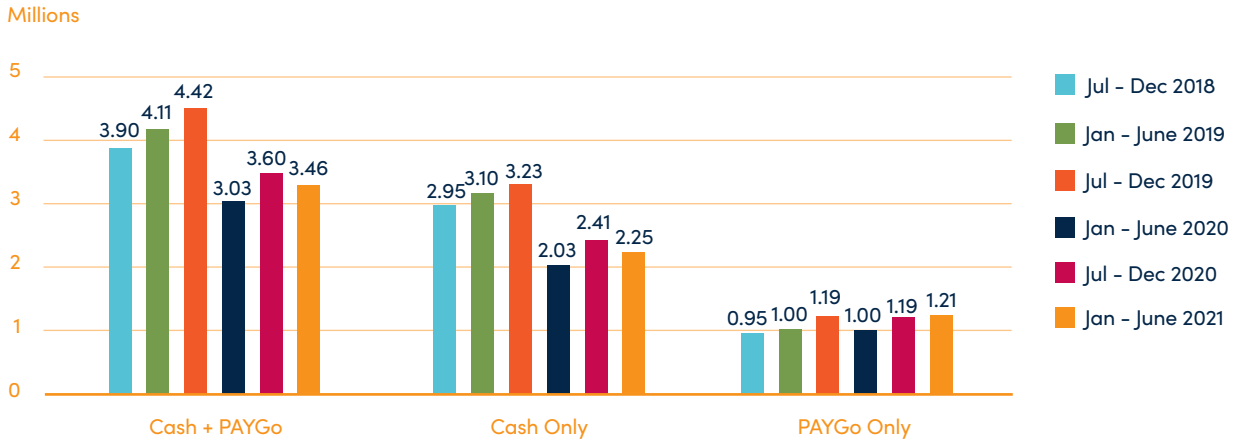
Of the 3.5 million units sold, 2.3 million were sold cash and 1.2 millions products were sold PAYGo.

Cash sales have decreased 7% compared to the second half of 2020. Sales remain about 250,000 units higher than in the first half of 2020 when the pandemic hit, but are still 30% lower than the 3.1 million units sold in the second half of 2019. The global value of cash sales for the first half of 2021 is around $75 million[22].

PAYGo continues to show more resilience during the pandemic. After a dip in sales in early 2020, the second half of the year was on par with the second half of 2019 for total volumes sold. January-June 2021 sales are 1% higher and record the largest absolute volume of PAYGo sales since reporting began. The global value of products sold via PAYGo between January and June 2021 is just over $211 million[23]. However, the pandemic has accelerated the trend of recent years of the growing proportion of lanterns among PAYGo sales. PAYGo lantern sales have grown 176% over the last two years while PAYGo multi-light and SHS sales shrank by 5% compared to the first half of 2019.

Detailed insights by region and country can be found in the following chapters.

Figure 2 - Semi-annual Evolution of Volumes of Lighting Products Sold - World



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

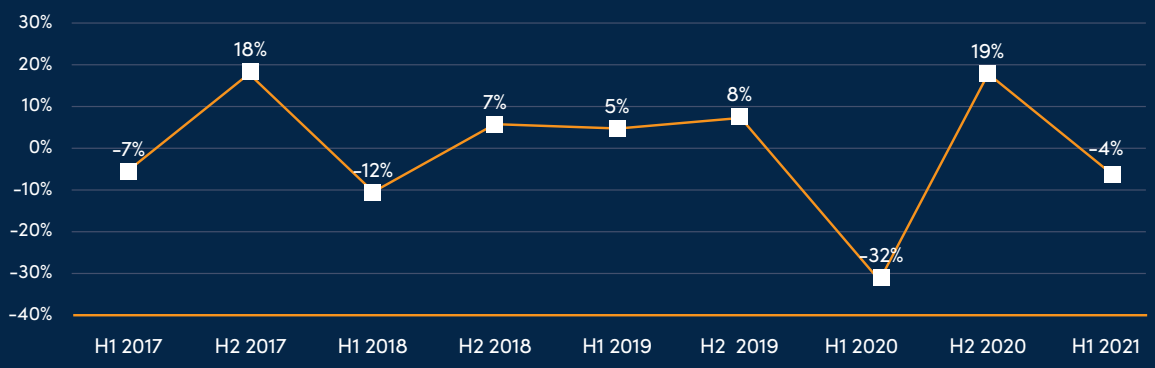
22 Market values are estimates. See Methodology Annex for details.
23 Market values are estimates. See Methodology Annex for details.

Global Insights

Benchmarking against 2019

Due to the effects of COVID-19 on the global economy and the sector in particular, this report series will attempt to keep track of the sector's recovery by benchmarking the most recent data to the sales reported in 2019 in addition to comparing to the previous round of reporting. Sales in the industry can also follow seasonal patterns with sales in the second half of the year tending to be higher or see stronger growth than during the first half of the year. Therefore, the most appropriate benchmark for the first half of 2021 can at times be the first half of 2019. Throughout the report, we will therefore compare current sales to volumes sold between January and June 2019 and to volumes sold between July and December 2019.

Figure 3 - Semi-annual Growth Rates of Global Lighting Sales Volume



Portable Lanterns

Portable lanterns are still the backbone of the sector, with total sales of 2.18 million. This represents a market share of 63% of all off-grid solar products sold. As a percentage of the total sales, portable lanterns have been on a slowly decreasing trajectory from 70+% since 2018. In absolute terms, lantern sales have decreased 7% compared to the second half of 2020. Volumes remain higher than in the first half of 2020 where sales fell below 2 million units, yet 23% lower than in the first half of 2019. Among solar lanterns:

- **Sales of the smaller 0-1.5 Wp lanterns are relatively stable compared to the previous half year - decreasing 1% from 1.16 million to 1.15 million units sold, but remain lower than the 1.31 million units sold in the first half of 2019.**
- **Meanwhile, larger 1.5-3 Wp lanterns have seen sales continually decline since before the beginning of the COVID-19 pandemic.** Over 1.5 million units were sold in the first half of 2019 while just over 1 million units were sold in the first half of 2021 (an 8% decrease compared to July-December 2020). Within the category, cash sales have decreased 20% compared to the previous half year while PAYGo sales have grown 20%. **Volumes of PAYGo sales of 1.5-3 Wp lanterns are now 176% higher than in the first half of 2019 and represent 38% of all sales in the category.**

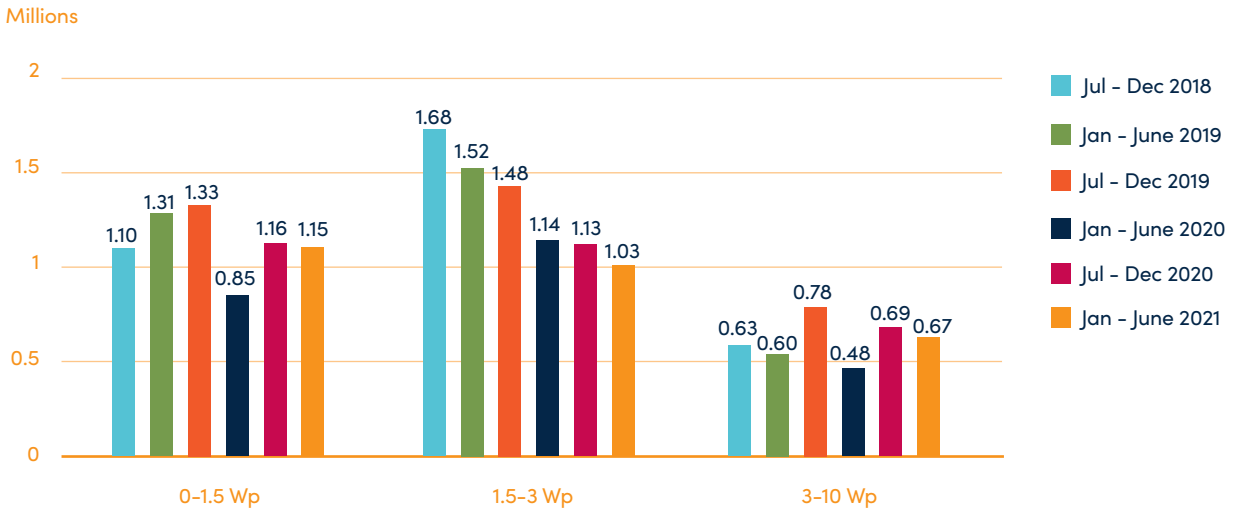
Global Insights

Multi-light Systems

Sales of multi-light systems reached 672,000 units between January and June 2021. This represents 19% of total global sales and a 3% decrease compared to the second half of 2020.

Multi-light system sales have been relatively stable over the last 12 months after falling to below 500,000 units sold in the first half of 2020. While sales reported in the first half of 2021 remain lower than in the second half of 2019 when sales were at their peak, they are 11% higher than the more appropriate pre-COVID benchmark of January-June 2019. 55% of volumes sold during this round were PAYGo sales.

Figure 4 - Semi-annual Evolution of Global Sales Volumes by Lighting Product Category (0-10Wp) - World



NOTE:
Lanterns 0-1.499 Wp include one light and no mobile charging, lanterns 1.5-2.999 Wp one light and mobile charging, and multi-light systems 3-10.999 Wp at least two lights and mobile charging. Solar home systems >11 Wp are classified based on panel wattage.

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Global Insights

Solar Home Systems (SHS)

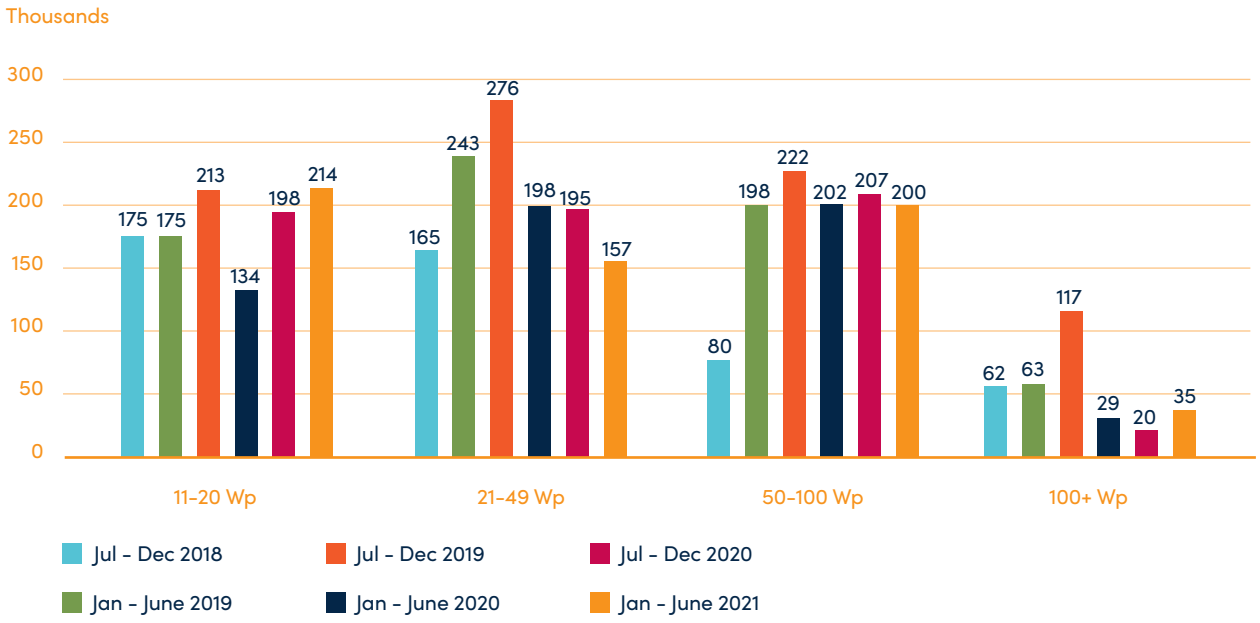
The very broad category of SHS, consisting of larger, higher price point products of wattage 11 Wp and higher, recorded sales of 605,000 units in the first half of 2021. Sales have remained relatively stable compared to the previous six months period (-2%), but are still 11% lower than total volumes sold in the first half of 2019, before the COVID-19 pandemic. However, as shown below, diverse sales patterns are observed for the various sizes of systems.

Approximately three quarters of all SHS sold between January and June 2021 are sold on a PAYGo basis, a dip compared to the 89% in the second half of 2020 and 84% in the first half of 2020. The dip is mostly due to large orders of cash sales in Asia this year-half. It is generally accepted that the large share of PAYGo among SHS sales reflects the importance of the product financing business model for customers accessing larger, more expensive off-grid products that they would be unable to afford in a single upfront payment.

Within the SHS category, there are significant differences in performances by system size:

- 11-20 Wp sales for the first half of 2020 have grown 8% compared to July-December 2020 and are now exceeding pre-COVID sales with 210,000 units sold.
- 21-49 Wp sales have shrunk 20% from 200,000 to 157,000 and are now 33% lower than in the first half of 2019.
- 50-100 Wp sales volumes have remained comparatively stable during the COVID-19 crisis. Sales have oscillated between 200,000 and 220,000 since the first half of 2019.
- 100+ Wp sales had fallen to their lowest level since 2017 in the second half of 2020. Sales are 79% higher during the first half of 2021 with 35,000 units sold. However, this is still far below the peak of 117,000 products sold during the second half of 2019 or even the 63,000 units sold in the first half of 2019

Figure 5 - Semi-annual Evolution of Global Sales Volumes by Lighting Product Category (11-100+Wp) - World



Global Insights

Off-Grid Solar Appliances[24]

In the context of this series of sales reports, the appliance section focuses on reporting sales of appliances which have reached mainstream levels of production. These are currently regarded as: TVs, fans, refrigeration units and solar water pumps. These are collectively referred to as "key appliances" when reported in aggregate, and these separate appliances are reported individually where sufficient sales warrant it.

Between January and June 2021, affiliate companies reported total global sales of 421,000 units of the key appliances represented in this report. Fans represented 51% of these sales, with 216,000 units. This was followed by TVs with 194,000 units (46% of the global total). Solar water pumps (SWPs) and refrigeration units (RUs) represented 2% and 1% of these off-grid appliance global sales, with 6,400 and 4,100 units, respectively.

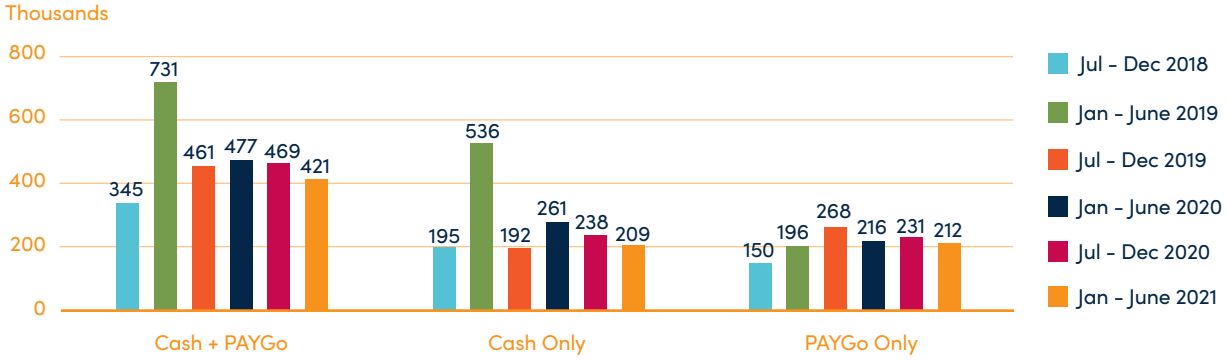
The total volume of key appliances sold between January and June 2021 is the lowest reported since the second half of 2018, the first time appliances data was published. Though anecdotal, industry insiders have indicated that this is at least partially a reflection of the declining sales of SHS which are often sold bundled with TVs, fans and even refrigerators. Information shared by the industry also highlights that TVs have been particularly affected by supply issues leading to shortages and increased prices[25] which are likely to have affected sales. Anecdotal data collected for fans in Nigeria by the Efficiency for Access Coalition also points to significant price increases in between 2018 and 2020[26]. While the general economic downturn in consumer spending is likely associated with suppressed purchases of the larger stand-alone appliances not typically sold with SHS kits.

The appliance segment was at a nascent stage prior to the pandemic, and significant growth was hoped for in 2020 and 2021. While the growth that was anticipated before the COVID-19 crisis has understandably not materialized, this segment in the off-grid solar market has also shown clear signs of resilience and increasing maturity in terms of business model diversification and development. Detailed insights by appliance type, region and country can be found in the following chapters.

Fans

Fan sales in the first half of 2021 recorded 216,000 units sold. Volumes sold are stable compared to the second half of 2020 (-1%). However, fan sales follow a particularly seasonal pattern of higher and more humid temperatures driving sales, and thus a more appropriate comparison would be January-June 2020: sales for the first half of 2021 are 13% lower than for the same period a year ago.

Figure 6 - Semi-annual Evolution for Key Appliances Sales Volumes - World



NOTE:

- The category 'Key Appliances' refers to the sum of all TVs, fans, solar water pumps and refrigeration units.
- Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

24 The sales data collection for off-grid appliances is at an early stage. Please note that, as the number of companies reporting their sales and product information is still growing, there may be limitations on how representative the data is of total sales in certain country markets. We therefore advise users to complement it with other sources where possible.

25 GOGLA (2021), Off-grid Solar Supply Chain Disruption: 87% of manufacturers expect increased prices.

26 Efficiency for Access Coalition (2021), Off- and Weak-Grid Appliance Market: Nigeria.

Global Insights

Comparing sales data with 2019 does not provide accurate insights due to a particularly high sales peak in the first half of 2019.

The bulk of sales are in Asia, where fans are mostly sold on a cash basis and as a stand-alone appliance. This reflects the prevalence of component-based sales in the Asian solar market, as opposed to kits and associated DESCO business models widely adopted in Africa. Sub-Saharan Africa represents 18% of volumes sold during the first half of the year. In contrast, across SSA, 63% of fans are sold bundled with a power system – usually a SHS – and are also more likely to be sold via PAYGo. The growing proportion of fan sales being reported in Africa is the leading factor in driving the increasing share of fans sold bundled with power systems globally.

Within the fan market, pedestal fans are the highest selling category for the third consecutive reporting round. However, pedestal fan sales (79,000 units) have decreased by 11% compared to the second half of 2020 while table fan sales have grown by 35% during the same period and now reach 73,000 units sold. All table fans sold have a diameter larger than 12". Table fans are generally the smallest and lowest power consuming fans and are the category most predominantly sold bundled with a SHS.

Unfortunately, although the number of ceiling fan sales can be extrapolated as significant, it is not possible to report on the sales of this category in this round due to an insufficient number of companies reporting sales to satisfy our three-data point rule.

Figure 7 – Semi-annual Evolution for Fan Sales Volumes – World

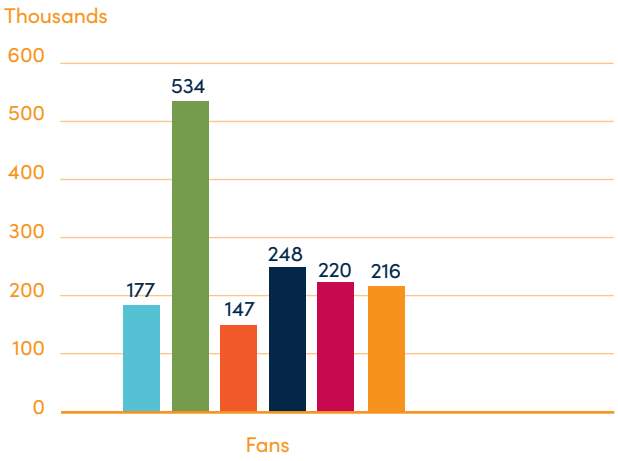
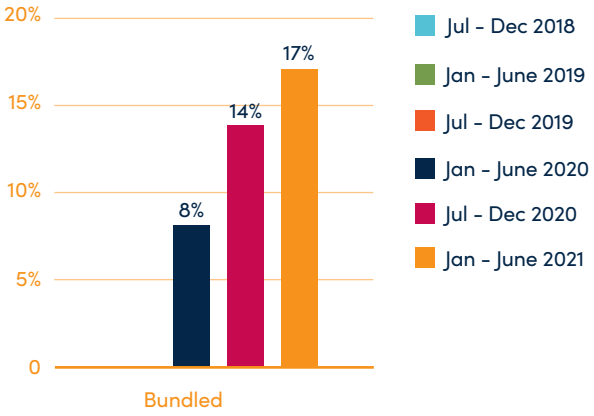
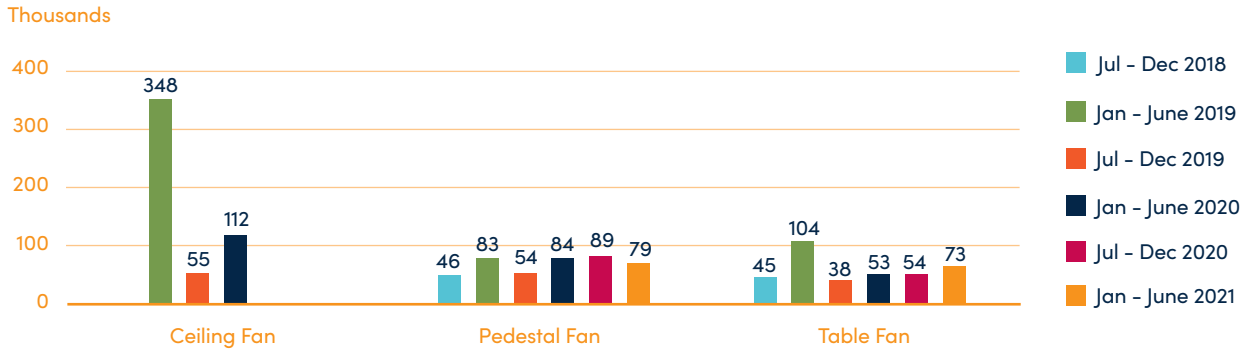


Figure 8 – Evolution of Share of Fan Sales Bundled – World



NOTE:
- High sales in Jan-June 2019 can be attributed to a high volume of sales triggered by significant subsidies.
- Bundled refers to appliances that are sold bundled with a power system.

Figure 9 – Semi-annual Evolution of Fans by Product Category – World



Global Insights

TVs

TVs recorded 194,000 units sold in the first half of 2021. This represents an 18% fall in sales compared to the second half of 2020, but is 2% higher than during the first half of 2019 before the pandemic. Current TV sales are far below the benchmark of the second half of 2019 peak of 281,000 units sold.

During the immediate impact of the COVID-19 crisis in 2020, anecdotal industry reports credited the resilience and sometimes growth in TV sales partly to their purchase to ensure access to timely information and entertainment during lockdowns by SHS owners who could afford it. However, this is the main appliance that has reported being particularly affected by supply chain disruption caused by the COVID-19 pandemic. Effects including stockouts and price increases for key components are likely to continue during the second half of 2021[27].

In sharp contrast with fans, the off-grid TV market is dominated by sales in Sub-Saharan Africa. Almost all TVs sold are also reported to be sold as PAYGo, with 81% being sold bundled with a power system.

In terms of the diversity of product categories, the majority of TVs sold fall in the large category (24-29") with 101,000 units. This is followed by the medium TVs (18-23") with 48,000 units and the extra-large (30+") TVs with 44,000 units. All categories saw their sales decrease with large TVs experiencing the largest absolute decrease (-17,000 units) and extra-large units experiencing the most significant relative decrease (-27%). High sales of large TVs are a reflection of efficiency gains on larger TVs electricity consumption, which is now similar to that of smaller TVs, and of the off-grid sector benefiting from economies of scale on components shared with grid-connected TV manufacturing. These factors combined with customer appreciation for larger TVs has been found to be a major driver of their purchase.

Figure 10 - Semi-annual Evolution for TV Sales Volumes - World

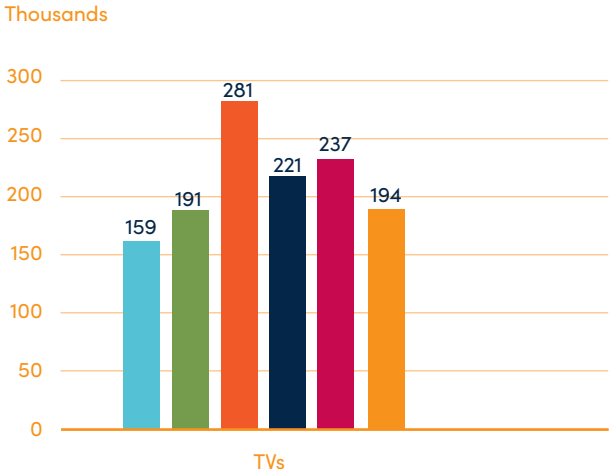
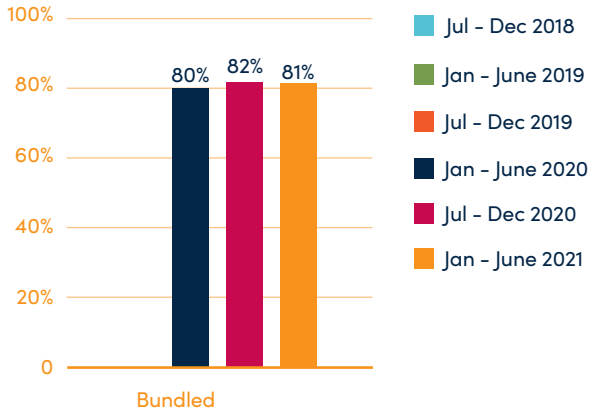


Figure 11 - Evolution of Share of TVs Sales Bundled - World

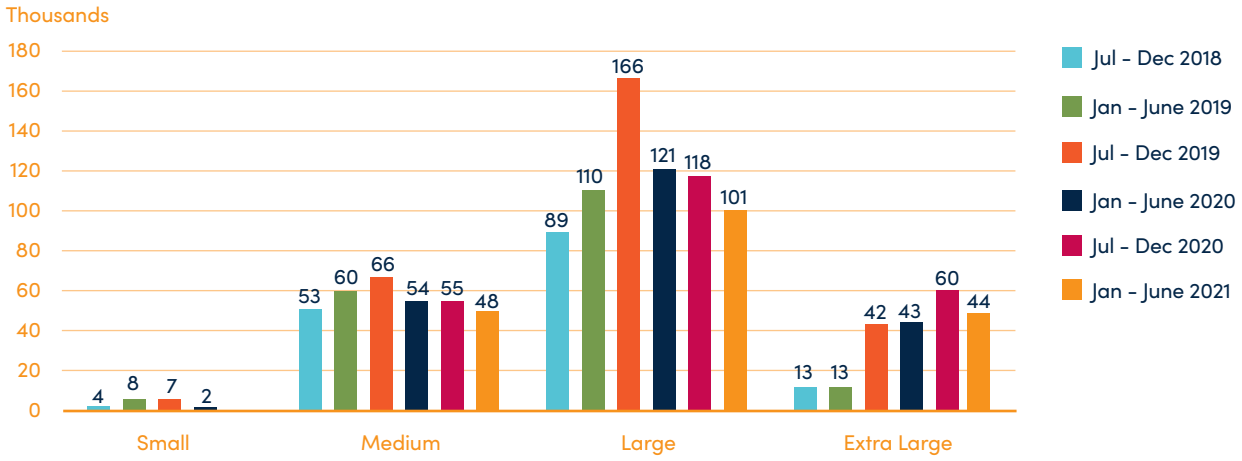


NOTE:
Bundled refers to appliances that are sold bundled with a power system.

27 GOGLA (2021), Off-grid Solar Supply Chain Disruption: 87% of manufacturers expect increased prices.

Global Insights

Figure 12 - Semi-annual Evolution of TVs Sales Volumes by Product Category - World

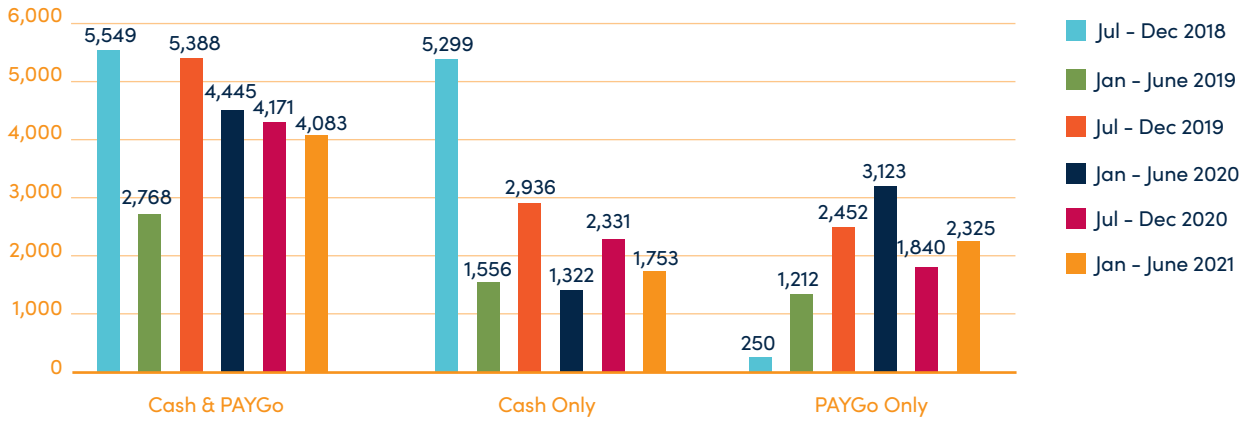


Refrigeration Units (RUs)

Between January and June 2021, 4,083 units were sold globally. Refrigeration unit sales have remained relatively stable compared to the second half of 2020 with only a 2% fall in sales (equivalent to about 90 units fewer). Sales remain 24% lower than for the second half of 2019 before the effects of the COVID-19 pandemic were felt by the industry[28].

65% of refrigeration units were sold with a power system this round. This may not reflect a market trend, and is more reflective of the companies reporting data to us, as many of them sell products directly to end user customers (b2c). While off-grid refrigerators have traditionally been developed by specialist manufacturers who sell them under a business-to-business (b2b) business model to a local distributor which then sells on to customers bundled together with a panel and a battery. These percentages will be monitored over time to observe whether RUs are increasingly sold bundled with large SHS. Observation of the sales patterns over previous years show varied sales on both cash and PAYGo basis, without clear trends becoming apparent. This may also be an indication of the overall small market size and the large influence of any relatively 'large' order during any given period.

Figure 13 - Semi-annual Evolution for RUs - World



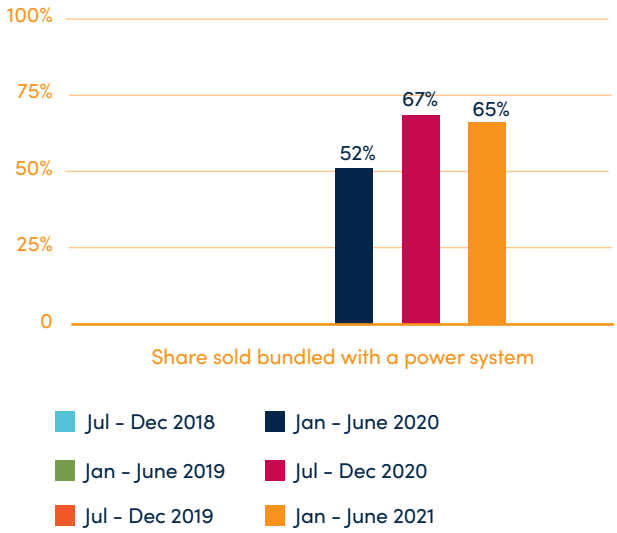
NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

28 Particularly low sales in H1 2019 led the authors to benchmark sales of RUs to H2 2019.

Global Insights

In terms of product category diversity, refrigerators remain dominant, representing 60% of the global sales for all RUs categories with 2,452 units. The second most popular products were multi-temperature refrigeration units, followed by refrigerator-freezer combos and finally freezers. Unfortunately, not enough companies report sales of these products to include data in this report.

Figure 14 - Evolution of Share of RUs Sales Bundled - World



NOTE:
Bundled refers to appliances that are sold bundled with a power system.

Technology transfers from the market for off-grid vaccine cold chain equipment

This report does not reflect the significant institutional market for off-grid vaccine cold chain equipment. Although sources indicate that - due to the COVID-19 pandemic - this period has seen an increase in the amount of high specification pharmaceutical grade vaccine cold storage equipment in use, some of which is off-grid, this largely follows a centrally procured model managed by the World Health Organization and partners under GAVI, the global vaccine alliance. This equipment and the institutional markets for their use differ significantly from the commercial mass consumer market and lower-cost specialist off-grid refrigerators designed to meet our segment's needs. While there is some crossover reflected in this report, sales are very marginal compared to the use of refrigeration for off-grid domestic and productive uses.

However, we are seeing that the development of these off-grid PV powered refrigerators for domestic or productive use applications are utilizing a significant amount of technology transfer and borrowing techniques developed to produce reliable and highly effective equipment for the vaccine market. A notable example is the development of multiple 'solar direct-drive' or SDD PV refrigerators for these mainstream markets which are utilizing what have been called 'ice batteries' (phase change materials/PCM) that are frozen by the generation of photovoltaic generated electricity and remain cold for use overnight or during cloudy days without the need for the electric batteries used in typical PV systems.

Global Insights

Solar Water Pumps (SWPs)

With 6,418 units sold in the first half of 2021, SWPs experienced a 20% fall in sales volumes compared to the second half of 2020. However, when compared to the volumes recorded in the first half of 2019, sales of SWPs have more than doubled. This reporting round, three quarters of SWP sales were recorded in East Africa. It is particularly noticeable that in this appliance segment we have very limited visibility on sales volumes of what are anecdotally known to be large markets particularly in India, other Asian and some Sub-Saharan African countries, due to the lack of affiliation of the sales data partners with the manufacturer/ distributor companies which dominate in these areas.

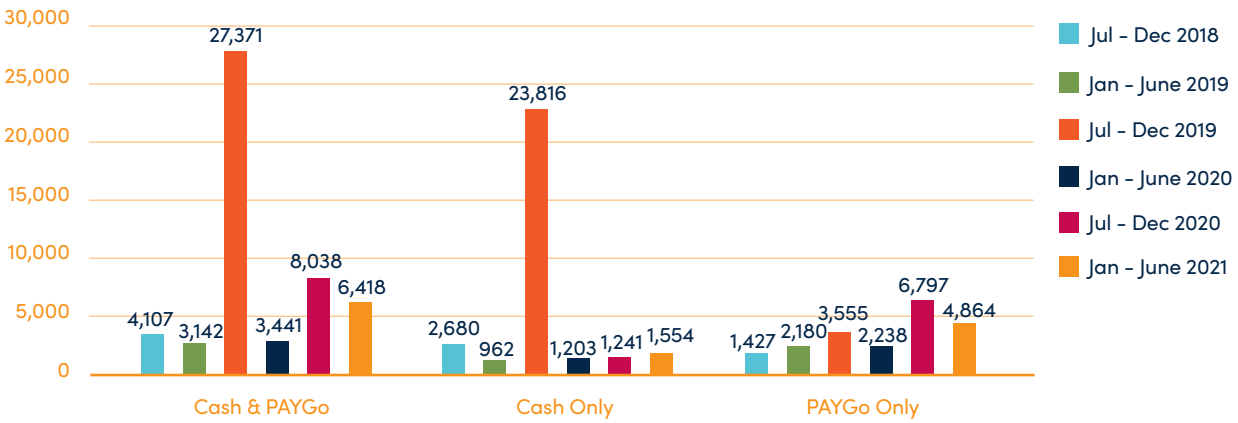
The high upfront costs of this technology remains a barrier to mass adoption. **The price of SWPs varies widely depending on type and use case, but with an average retail price of $ 900 for surface pumps and $ 1,600 for submersible pumps (including bundled PV power generation), this product usually requires consumer financing**[29]**.** The challenge of financing is also reflected in the sales data, as PAYGo sales represent 85% of total SWP sales.

Other Appliances

Sales are also recorded for a wide variety of other off-grid appropriate appliances. These are not reported in sufficient volume by participating companies to enable their inclusion, but provide an insight into the type of appliances that are sold. These products are not included under the 'key appliances' category as these appliances are what we can call at best 'near to market' or 'niche market' and include products such as agro-processing machines, irons, hair clippers, stereos, sewing machines, egg incubators and other equipment. The variety of products reported grows each round and so has the number of companies who have reported productive use appliances, whether for agriculture or for MSMEs (e.g. hair clippers). This is seen to reflect the combination of several reinforcing factors; clear demand for an ever increasing range of services from people living in off-grid areas, an interest from private sector companies in developing efficient high performance appliances that satisfy these domestic and productive use demands and an ability to source funds to pay for this product and business model innovation.

Radios stand out among appliances this report does not focus on as **over 165,000 radios were reported among sales between January and June 2021, many of which are sold bundled with solar lighting and home kits.**

Figure 15 - Semi-annual Evolution for SWPs Sales Volumes - World[30]



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

29 Efficiency for Access Coalition (2021), 2021 Appliance Data Trends.
30 In the second half of 2019, sales of SWPs were boosted due to bulk procurements connected with government programs in South Asia.

East
Africa
Insights

East Africa Insights

Regional Sales Trends

Off-Grid Solar Lighting Products

Sales of off-grid solar lighting products in East Africa between January - June 2021 totalled 2 million units. This is a 9% decrease compared to the second half of 2020 and a 18% decrease compared to the second half of 2019. However sales in East Africa are highly seasonal and the first half of 2019 may offer a more appropriate comparison. Sales in the first half of 2021 are 15% higher than during the same period in 2019. This is also the third highest sales volume on record for a half year in East Africa.

Both cash and PAYGo sales decreased, although PAYGo sales showed clear signs of resilience. Around 1.1 million units were sold on a cash basis. This is a 14% decrease in volumes compared to the second half of 2020. 851,000 units were reported sold via PAYGo in the first half of 2021. This is 3% fewer sales compared to the last reporting round.

Product Trends

The East African market remains under pressure from the COVID-19 crisis. Although trends vary significantly from one country to another (see Table 2). The relative stability of PAYGo sales compared to cash sales and the growth in lantern and multi-light system sales while larger SHS sales shrink could be interpreted as indicators of increased cash constraints on the consumer end.

Figure 16 - Semi-annual Evolution of Volume of Lighting Products Sold - East Africa

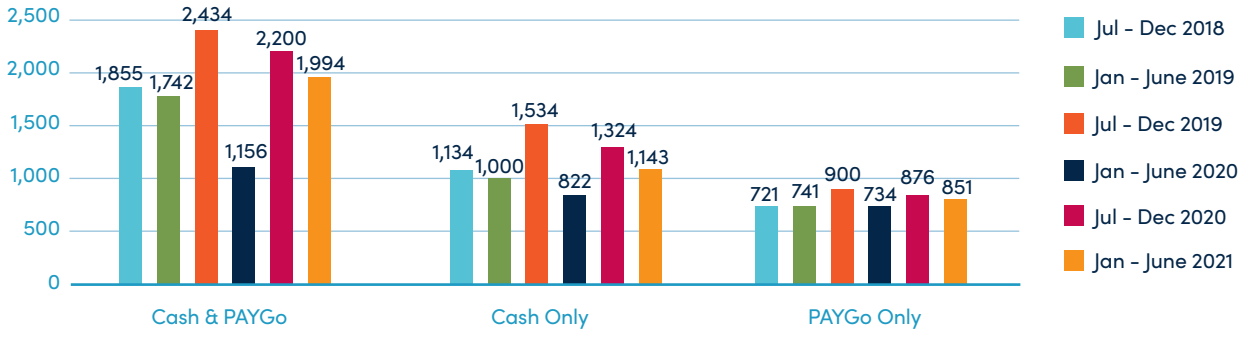


Table 1 - Semi-annual Evolution of Volumes of Lighting Products Sold by Lighting Product Category - East Africa

Categories		Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo Jan-Jun 2021
Lanterns	0-1.5Wp	**738,000**	12%	-7%	15%	0%
	1.5-3Wp	**555,000**	-28%	-19%	48%	60%
Multi-light systems	3-10Wp	**429,000**	11%	-23%	10%	60%
Solar Home Systems	11-20Wp	**94,000**	-32%	-36%	-6%	90%
	21-49Wp	**108,000**	-29%	-40%	-28%	98%
	50-100Wp	**62,000**	-27%	8%	-13%	100%
	100+Wp	**8,000**	68%	-42%	-42%	-

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

East Africa Insights

Countries Overview

Kenya represents close to half of all sales in East Africa. Although the Kenyan market has been affected by COVID-19 and policy changes (see Kenya section), it has remained relatively stable compared to harder hit countries like Ethiopia and Uganda. Ethiopia remains the second largest market in volumes, representing 12% of total sales in East Africa, but has seen sales shrink significantly since 2019 with the market affected by COVID-19 and the conflict in Tigray (see Other East African countries section)

Off-Grid Solar Appliances

Between January and June 2021, the total recorded number of appliances sold in East Africa reached 130,000 units. This is a 28% decrease compared to the second half of 2020, and a 31% decrease compared to the second half of 2019. Both cash and PAYGo segments saw sales drop by over 20,000 units, leading to negligible cash sales and an 18% drop in PAYGo volumes.

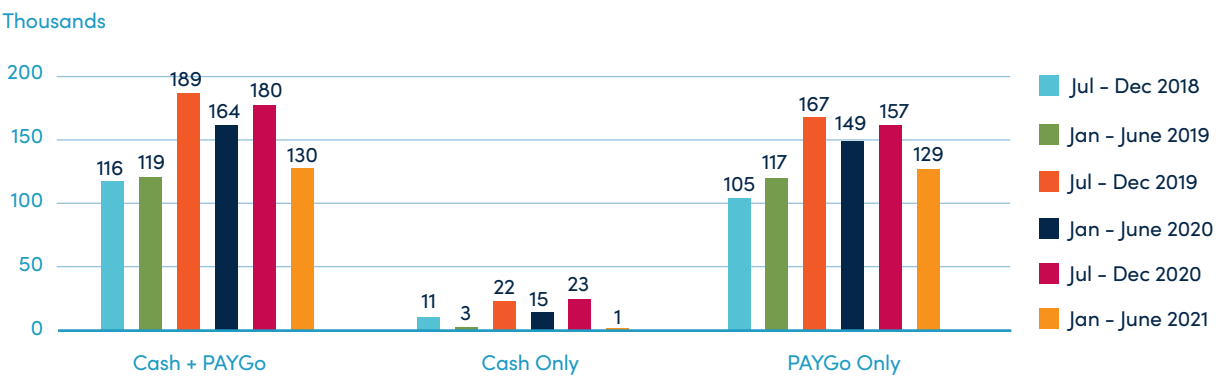
Appliance sales in East Africa represent 54% of total appliance sales in Sub-Saharan Africa (SSA), down from 64% in the last reporting round.

Table 2 - Semi-annual Evolution of Volume of Lighting Products Sold by Country - East Africa

Region / Countries	Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019
East Africa	**1,994.286**	**-9%**	**-18%**	**15%**
Kenya	988,505	-4%	-1%	1%
Ethiopia	234,565	-37%	-67%	-20%
Tanzania	174,263	9%	-1%	99%
Somalia	138,056	-18%	1088%	261%
Uganda	110,769	-27%	-50%	-38%
Rwanda	97,374	30%	103%	50%
Zambia	86,252	77%	-27%	23%
Malawi	45,424	-52%	-12%	410%
Madagascar	32,956	-44%	7%	199%
Mozambique	31,375	8%	377%	

NOTE:
Countries not featured in this table did not see enough companies reporting to pass the three-data point rule

Figure 17 - Semi-annual Evolution for Key Appliances Sales Volumes - East Africa



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

East Africa Insights

Product Trends

TVs sold in East Africa account for 64% of total TV sales in Sub-Saharan Africa with 124,000 units. This is a 27% decrease compared to the second half of 2020. Anecdotal evidence suggests this may be due to supply chain issues created by the COVID-19 pandemic which have led to stock-outs in key markets in late 2020 and the first half of 2021. Such effects are likely to continue affecting the market during the second half of 2021 and price increases for TVs seem likely[31]. Among TVs, large TVs (24-29") represent almost 50% of volumes, followed by extra-large TVs (30+", 27%) and medium TVs (18-23", 24%).

Refrigeration units (RUs) sold in East Africa represent 44% of total Sub-Saharan African sales, with 1,490 units. Sales have steadily decreased from 2,500 units in the second half of 2019 and 1,900 units in the previous reporting round. 97% of units sold are refrigerators.

Solar water pumps (SWPs) sold in East Africa represent 74% of total Sub-Saharan African sales, with 4,738 units. This is the highest volume recorded in the region and 12% more than both the second half of 2019 and of 2020. This comes at the end of the 2019-20 Global LEAP RBF started in October 2019, subsidizing the costs of SWPs in Kenya, Tanzania, Rwanda, Uganda, and Senegal[32]. It may be hoped that sales will continue to grow, but it is recognized that this is still a very nascent sector with significant costs even when spread out using PAYGo mechanisms. There is a growing body of research into the respective roles of policy and financial incentives in building commercial markets for Solar Water Pumps, as recently explored in the IFC Lighting Global program's PULSE "Solar Irrigation System end-user subsidy reference guidelines."[33]

Sales of fans in the region fell to just 287 units sold this reporting round. This is likely in part due to unusually cold weather during the period covered by this report in key markets. Fans have generally been a more marginal appliance in the region.

We do not have visibility on the volume of TV or fan sales outside of this report, but anecdotal reports on SWPs indicate significant volumes are being sold through traditional component-based solar and agricultural equipment retail channels. The opposite is observable for RUs, with very few being sold in commercial markets for off-grid use.

Table 3 - Semi-annual Evolution of Volumes of Key Appliances Sold by Type - East Africa

Appliance	Jan-June 2021 volumes Key Appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo	Share sold bundled with a power system
TVs	**130.130**	-27%	-31%	9%	-	80%
Fans	**123.615**	-91%	-86%	-89%	-	82%
RUs	**287**	-20%	-40%	29%	78%	79%
SWPs	**1.490**	12%	12%	96%	86%	93%

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

31 GOGLA (2021), Off-grid solar supply chain disruption: 87% of manufacturers expect increased prices for consumers.
32 Global Leap Awards (2019), Results-based financing. 2019-20 - Refrigerators & Solar Water Pumps.
33 Lighting Global (2021), Solar Irrigation System End-User Subsidy Reference Guidelines.

East Africa Insights

Countries Overview

Appliance sales in East Africa have experienced a significant fall in sales volumes in the first half of 2021. Kenya remains the largest market with 71% of key appliance volumes for the region.

Table 4 - Semi-annual Evolution of Volumes of Key Appliances Sold by Country - East Africa

Region / Countries	Jan-June 2021 volumes Key appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-June 2019
East Africa	**130,130**	**-28%**	**-31%**	**9%**
Kenya	92,521	-33%	-31%	19%
Tanzania	17,620	-3%	-5%	13%
Zambia	7,569	101%	7%	93%
Rwanda	2,624	-67%	-30%	-56%
Mozambique	1,246	29%	-9%	
Uganda	578	-30%	-70%	-61%
Ethiopia	333	-61%	-69%	-54%

NOTE:

- The category 'Key Appliances' refers to the sum of all TVs, fans, solar water pumps and refrigeration units.
- Countries not featured in this table did not see enough companies reporting to pass the three-data point rule

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East Africa Insights

Kenya Insights

Background

While the overall total market sales volumes held, the market did show some signs of the impact of the significant pressure:

- Kenya experienced another COVID-19 outbreak in March-April 2021. The government imposed a nationwide curfew and travel restrictions within the country.
- The government reintroduced the 14% VAT on off-grid solar products in 2020 and subsequently increased it to 16% in January 2021.

The Kenyan government reinstated the VAT exemption this summer, recognizing the key role of decentralized renewable energy solutions, such as solar home systems, in providing 100% of Kenyans with access to electricity. However, this happened after the cut-off date for reporting for this round.

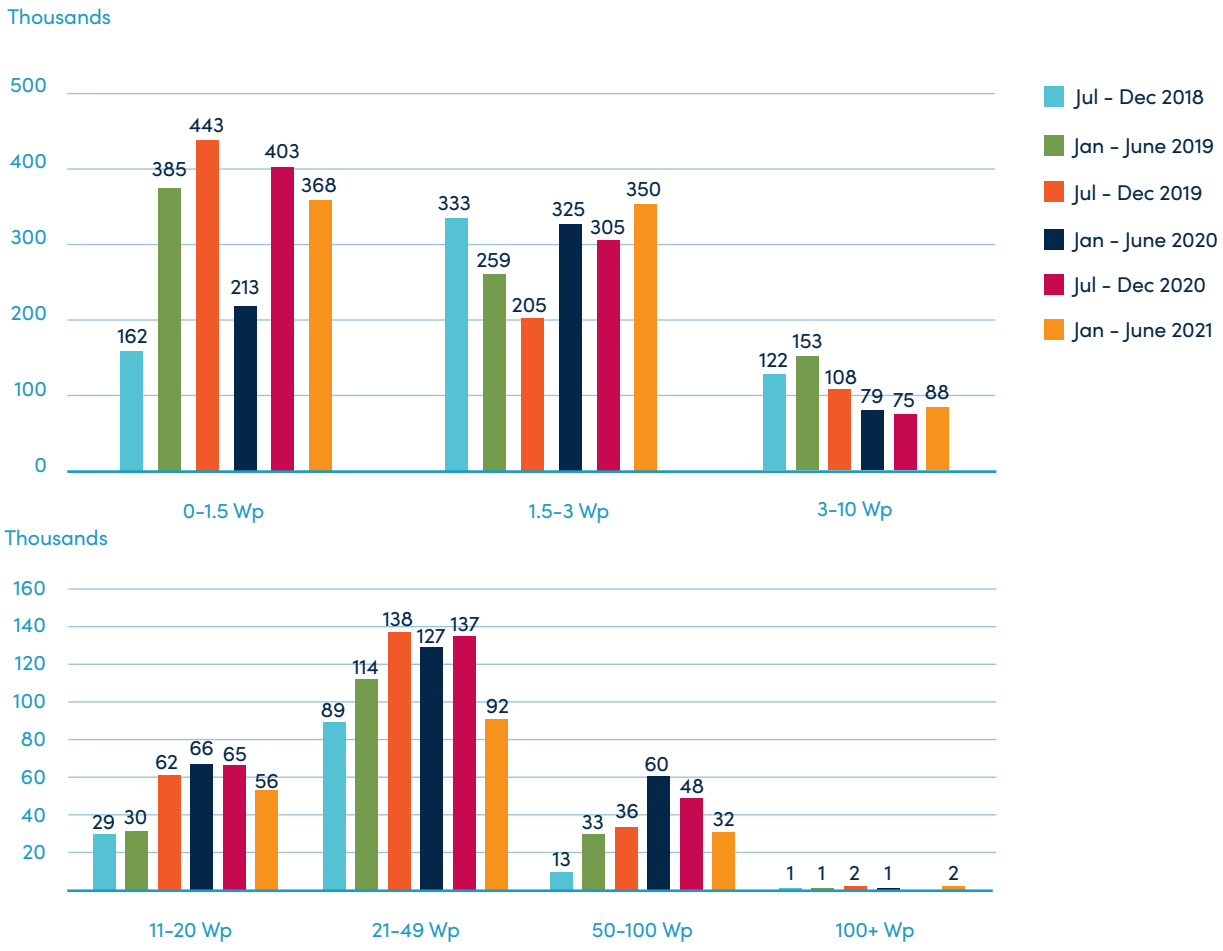
Sales Trends

Off-Grid Solar Lighting

Kenya is the most mature market in the sector which may explain the less sharp decline in overall sales volumes during the pandemic. Sales are currently on par with 2019 volumes at 989,000 units sold. This represents a modest 4% decrease compared to Jul-Dec 2020. Feedback from companies anecdotally highlights the impact of both COVID-19 and the VAT reinstatement as key pressures on sales.

Sales decreased compared to 2020 in all SHS categories. The largest relative decreases in volumes sold were in the 21-49 Wp and 50-100 Wp categories (-32% and -33% respectively). This fall in sales was partially compensated by increased sales of lanterns with phone charging (1.5-3 Wp) and multi-light systems (3-10 Wp) implying that the decrease in sales value has been more significant than the fall in volumes.

Figure 18 - Semi-annual Evolution of Volume of Lighting Products Sold - Kenya



East Africa Insights

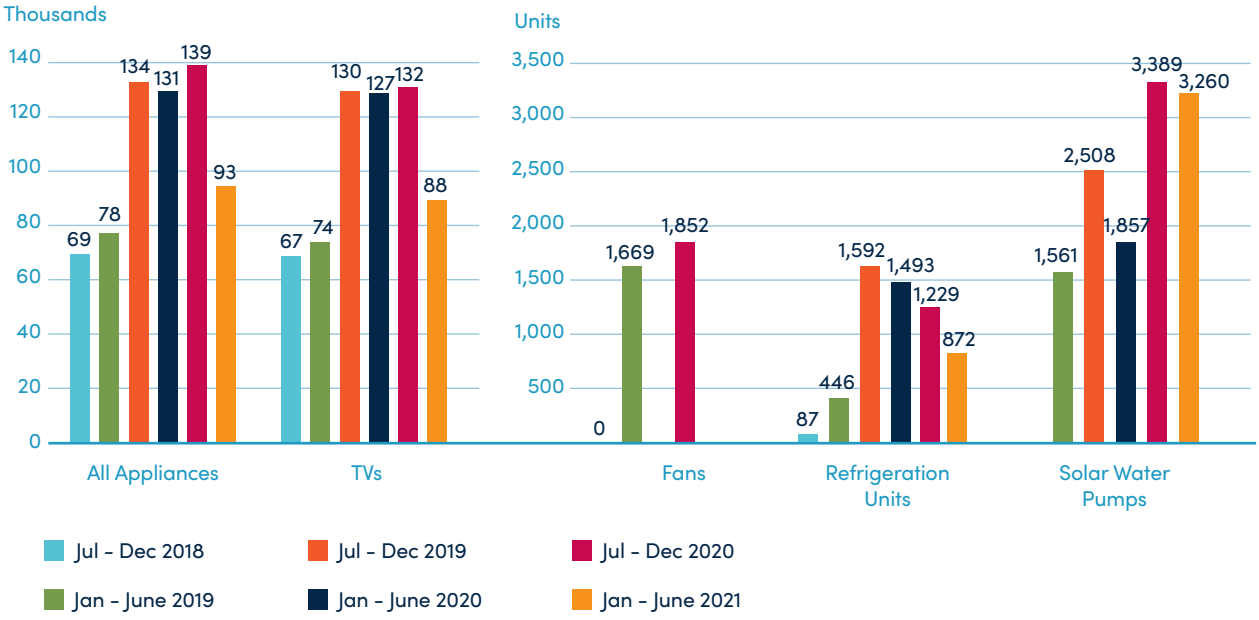
Kenya Insights

Appliances

The appliance market in Kenya is primarily dominated by TVs (95% of key appliance sales). Most TVs are sold bundled with SHS which explains that the volumes sold have followed the same trend as the relevant SHS categories (-33% compared to the previous reporting round).

Refrigeration unit sales are down 29% compared to the second half of 2020 while SWP sales have remained relatively stable (-4%). Not enough companies reported fan sales for the data to be shared publicly.

Figure 19 - Semi-annual Evolution of Volume of Appliance Products Sold - Kenya



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East Africa Insights

Madagascar Insights

Background

Less than 30% of the population of Madagascar has access to electricity despite growing coverage from both grid and off-grid solutions. The country experienced four consecutive years of economic growth with strong support from development partners in areas ranging from nutrition and education to energy and private sector development[34]. However, the COVID-19 pandemic sent the economy into recession in 2020 and while agriculture remained a stable sector last year, low rainfall induced by climate change has led to high food insecurity in the south of the island. As the crisis worsens, it has been labelled the first famine caused by climate change and not conflict by the World Food Program[35]. The deteriorating situation will likely destabilize development gains in the country.

Madagascar has long been a challenging market for off-grid solar. VAT and duties exemptions were announced in 2019 and more and more companies have been able to benefit from this over the last two years. Another key recent driver of growth has been the $ 40 million Off-Grid Market Development Fund (OMDF), offering RBF and debt funding, by the Government of Madagascar, funded by the World Bank and implemented by Bamboo Capital Partners. The fund has attracted new players into the market and led more distributors to focus on Verasol-certified products. Notably, Mobile Network Operators (MNOs) and Micro-Finance Institutions (MFIs) have entered, or partnered with, the sector.

Sales Trends

Off-Grid Solar Lighting

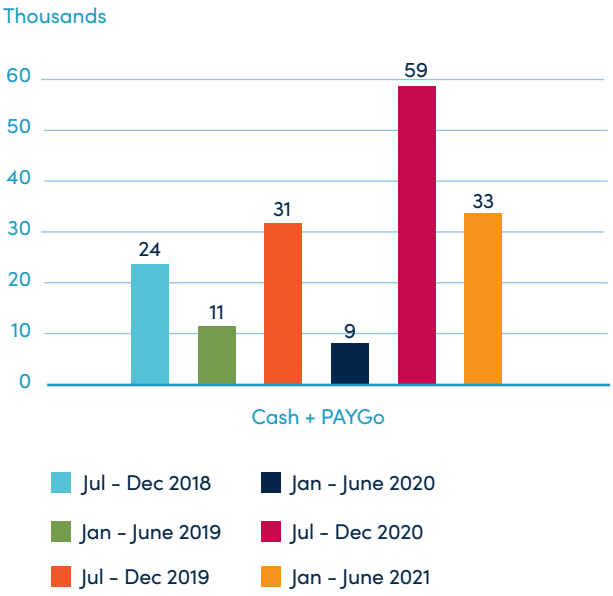
The second half of 2020 saw Madagascar register particularly high sales of off-grid lighting products which can, at least in part, be attributed to the OMDF with stocks being built up for distribution in 2020 and 2021. Feedback from the market suggests that the apparent peak in the second half of 2020 and subsequent 44% decrease in sales volumes reported from manufacturers have translated into a much smoother and continuous growth at the distributor level.

51% of products sold in the first half of 2021 are solar lanterns with solar lanterns with phone charging (1.5-3 Wp) proving particularly popular. Multi-light systems represent 44% of sales and SHS about 6%. 66% of products were sold cash.

Appliances

Appliance sales reported in Madagascar remain limited and almost no data can be published at this stage due to too few companies participating. However, over 1,300 key appliances were reported to have been sold on the island during the first half of 2021, most of them bundled with a power system. Products sold include TVs, RUs and SWPs.

Figure 20 - Semi-annual Evolution of Volume of Lighting Products Sold - Madagascar



34 African Development Bank, African Economic Outlook 2021.
35 BBC, Madagascar on the brink of climate change-induced famine.

East Africa Insights

Malawi Insights

Background

As in most other countries in the region, the pandemic and the measures sought to fight it led to a contraction of the country's economy in 2020. Return to growth is expected for 2021 and could exceed 2019 growth rates in 2022. However, this recovery remains highly conditioned to a contained pandemic and favourable weather for the agricultural sector. Additionally, the sector reports continuing difficulties with the enforcement of the VAT and import duty exemptions and new policies and regulations at the border causing slowdowns in product availability which add-on to the global supply-chain issues.

USAID's Solar Home System Kick-Starter Program for Malawi, which was launched in 2019 and which due to end in March 2021 has been extended until the end of the year.

Sales Trends

Off-Grid Solar Lighting

Sales of off-grid lighting products reached an all-time high of almost 94,000 products sold in the second half of 2020. In that regard, sales have been halved in the first half of 2021 with 45,000 units sold.

However, over the last two years, Malawi has established itself as a market for off-grid lighting products with growth in overall volumes and a trend showing an increase in the proportion of multi-light systems and SHS which will require further data to be confirmed. In recent rounds, multi-light systems have come to be a key segment in the market representing 47% of volumes in the second half of 2020 and 76% of volume this reporting round. With few companies reporting, ittle data can be shared publicly on SHS, but their market share, though still below 10%, has shown signs of growth.

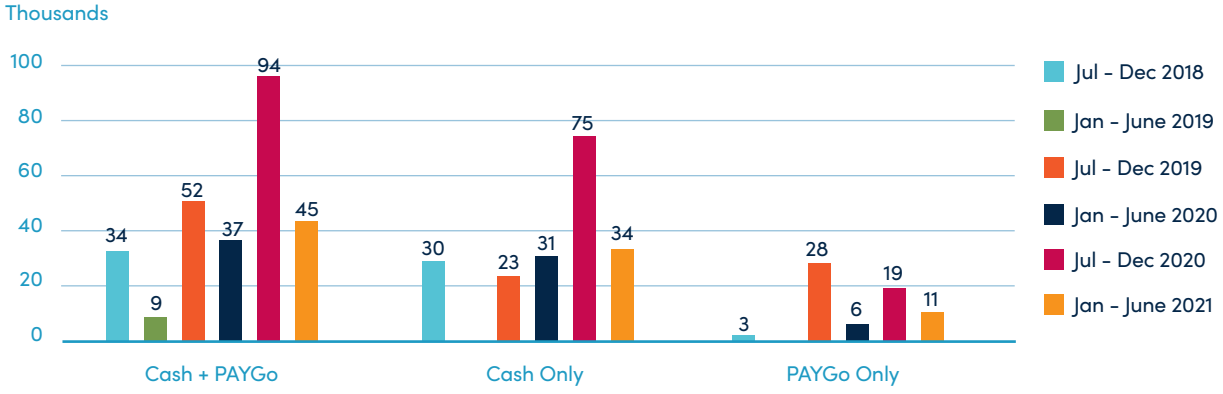
Appliances

For the first time, we are able to share some details on appliance sales in Malawi. Sales volumes for the aggregate of all key appliances exceeded 1,000 units sold. The vast majority of these were TVs and were sold bundled with a SHS. Historical data on TV sales in the country is unavailable, but the fact that more companies are reporting TV sales could be a sign of growth in the segment to be monitored in future reporting rounds. Sales were also recorded for fans, RUs and SWPs.

Table 5 - Volumes of Appliances Sold by Type - Malawi

Type	All	Share sold bundled with a power system
Key appliances	1,071	88%
TVs	860	91%

Figure 21 - Semi-annual Evolution of Volume of Lighting Products Sold - Malawi



East Africa Insights

Tanzania Insights

Background

Tanzania saw a rise in COVID-19 cases in February-March 2021 which led to a slowdown in economic activity, but the second quarter saw sales bounce back. The Tanzanian leadership's approach to the COVID-19 pandemic has changed during the first part of 2021, with the passing of President Magalufi. Following the change of approach, President Samia Suhulu Hassan is striking a positive tone with investors and businesses[36].

Additionally, the Green Economy Recovery Fund (GERF), a $1.4 million RBF program coordinated by SNV and hosted by the Tanzania Investment Development Bank to support the recovery of pico-PV solar and small SHS consumer markets throughout Tanzania, was launched in November 2020.

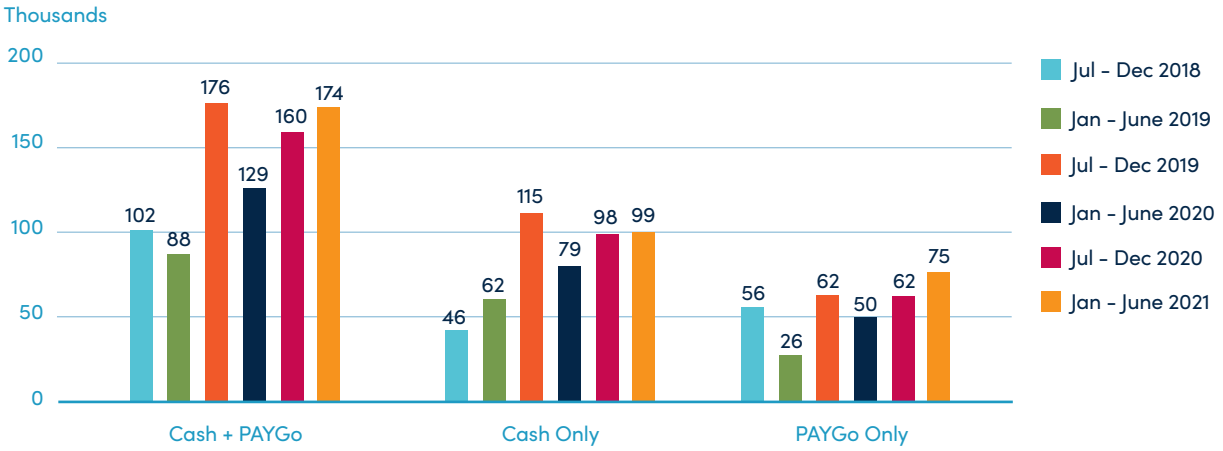
Sales Trends

Off-Grid Solar Lighting

Sales volumes reached 174,000 units sold, with a 9% increase compared to the second half of 2020, and are almost back to the record 176,000 units sold during the first half of 2019. Cash sales remained stable compared to the previous round while PAYGo sales drove the growth with a 22% increase.

As in other East African markets, there has been a shift in volumes towards lanterns, in particular in the last two rounds in Tanzania. Lantern sales represented 30-45% of sales in 2018-2019, while they accounted for 51% and 59% of volumes in the last two reporting rounds. Sales of the smaller 0-1.5 Wp alone account for 55% of units sold during the first half of 2021. This can also be in part linked to a high proportion of lantern sales among the Q1 disbursements of the GERF.

Figure 22 - Semi-annual Evolution of Volume of Lighting Products Sold - Tanzania



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

36 Bloomberg, Tanzania's New Leader Signals U-Turn on Coronavirus Policy.

East Africa Insights

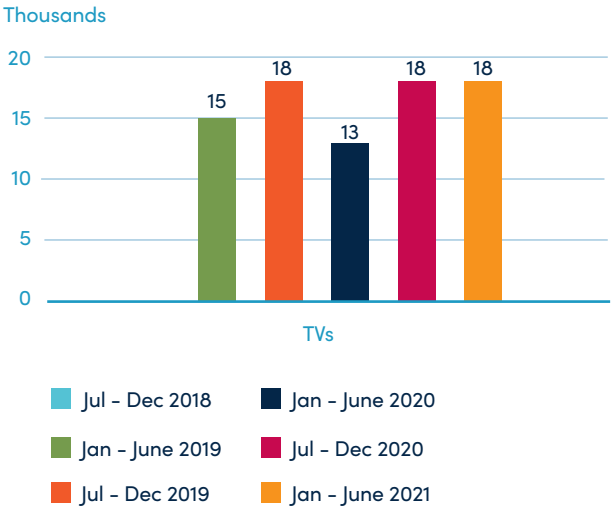
Tanzania Insights

Appliances

17,620 key appliances were sold between January and June 2021 in Tanzania. This is a 3% decrease compared to the second half of 2020, but is 13% higher than during the comparable first half of 2019.

As in past rounds, TVs account for the vast majority of appliance sales. Tanzania stands out compared to other key East African markets, due to reporting a higher share of TVs sold unbundled (without a power system). This is more apparent this round with 55% of TVs sold unbundled. No other appliance type passed the three-data point control. Sales were also recorded for fans, RUs and SWPs, but by an insufficient number of companies for the data to be shared publicly.

Figure 23 - Semi-annual Evolution of Volume TVs Sold - Tanzania



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East Africa Insights

Zambia Insights

Background

Zambia's economy was sharply impacted by COVID-19 and fell into recession in 2020. While forecasts show signs of growth for 2021 and 2022, recovery remains fragile as a new wave of the pandemic could once again lead to decline in demand for copper and tourism, two of the largest drivers of the Zambian economy. The depreciation of the Kwacha poses a further challenge for local recovery.

In March, UNCDF called for applications for access to debt funding with a repayment period of up to three years for locally registered companies involved in the clean off-grid energy sector. The entities are specifically be focused on serving rural communities, households and/or businesses led by women and youth segments in Zambia[37]. To date, $950,000 worth of funding has been approved. The sector may also have benefited from the EU-funded Increased Access to Electricity and Renewable Energy Production (IAEREP) program which includes a grant component.

Figure 24 - Semi-annual Evolution of Volume of Lighting Products Sold - Zambia

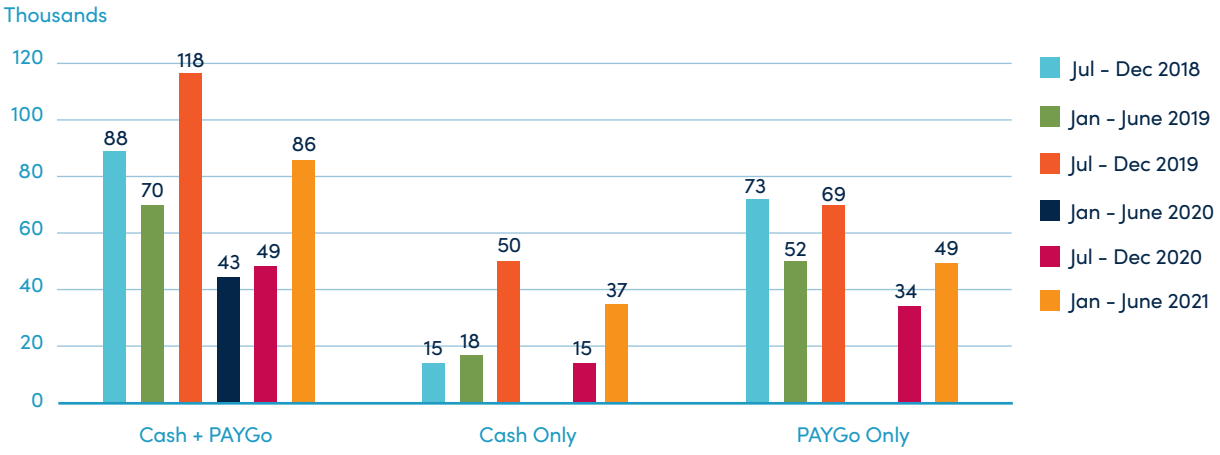
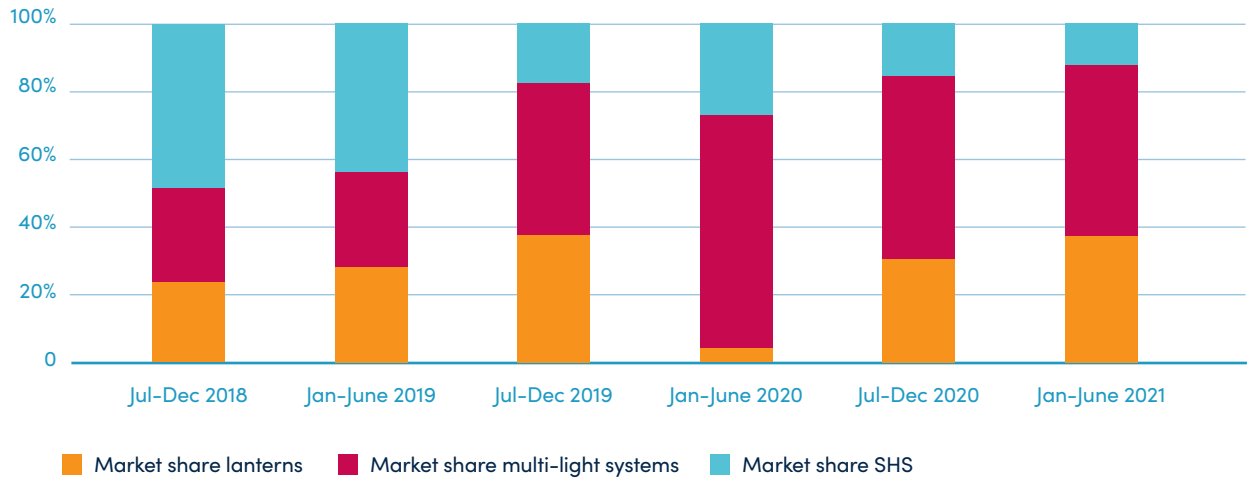


Figure 25 - Evolution of Lighting Product Volumes Distribution among Product Categories - Zambia



37 UNCDF & RFA (2021), Debt Funding to strengthen the clean off-grid energy sector in Zambia.

East Africa Insights

Zambia Insights

Sales Trends

Off-Grid Solar Lighting

Zambia's lighting sales have grown 77% compared to the second half of 2020 and now stand at 86,000 units. Sales are also 23% higher than during the first half of 2019, but remain lower than the peak 118,000 units sold in the second half of 2019.

The increase in sales compared to the previous reporting round is driven by cash sales (+152%), with PAYGo sales also growing by a significant 44%. In terms of product categories, increased volumes are mostly driven by small lanterns (0-1.5 Wp) and multi-light systems (3-10 Wp). SHS sales, in particular in the 11-20 Wp category. Figure 33 clearly shows how the volumes have been redistributed in recent reporting rounds between SHS, multi-light systems and lanterns.

Appliances

TV sales represent almost all key appliances sales reported in Zambia in the first half of 2021. While overall volumes remain low, they have more than doubled compared to the second half of 2020 and have exceeded sales in the second half of 2019 before the market was affected by COVID-19. No solar water pumps were recorded in sales for this reporting round. Although the data cannot be shared, again due to the low number of reporting companies, sales volumes of key appliances include both fans and RUs.

Table 6 - Volumes of TVs Sold - Zambia

Appliance	Jan-June 2021 volumes Key Appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo	Share sold bundled with a power system
TVs	**7,525**	124%	15%	111%	100%	97%

© Futurepump

East Africa Insights

Other East African Countries

Ethiopia

The Ethiopian off-grid solar sector has been destabilized by a combination of factors since 2019:

- Ethiopia has been one of the countries in the region most affected by the COVID-19 pandemic.
- The conflict in Tigray, a key market for off-grid solar companies, and general insecurity in the country has limited companies' ability to operate since the end of 2020.
- Importing products became more challenging with the depletion of the Ethiopian Government's FX facility at the Development Bank of Ethiopia (DBE), funded by the World Bank, combined with the devaluation of the Ethiopian Birr.

Total lighting product sales decreased by 37% compared to the second half of 2020 to 235,000 units sold. Ethiopia is predominantly a cash sales market, with PAYGo representing only 3% of sales this round. It is also predominantly a solar lantern market -they represent 77% of volumes in the first half of 2021. A noticeable evolution in 2021 compared to the second half of 2020 is the shift in volumes from solar lanterns in the 1.5-3 Wp category to the smaller 0-1.5 Wp category.

Only 333 appliances sold were reported for the first half of 2021. Due to the low number of companies reporting, it can only be shared publicly that no fans or refrigeration units were sold this round.

Mozambique

Lighting product sales reached 31,000 units this round, representing an 8% increase from the second half of 2020. Almost 75% of volumes are from sales of 3-10 Wp multi-light systems. The second largest category is SHS, followed by lanterns. **Sales of key appliances also increased from 968 to 1,246 products sold.** With very few companies reporting sales in Mozambique, no specific sales volumes can be shared by appliance type. Companies reported sales of TVs, RUs and SWPs. This is the second half-year of strong performance from the sector in Mozambique, where support has been available from the BRILHO program and EnDev COVID-PAY[38]. In September 2021, the Government of Mozambique approved the Regulation of Off-Grid Energy Access recognizing the importance of the sector in catalyzing rural development which should also foster sales in the country going forward.

© BBOXX

38 For more information, please see BRILHO and EnDev COVID-PAY.

East Africa Insights

Other East African Countries

Rwanda

With 97,000 units sold, Rwanda recorded its highest sales of off-grid lighting products since the second half of 2018. The growth was primarily driven by PAYGo sales, which had been steadily growing since the second half of 2019.

The vast majority of sales were multi-light systems and SHSs. In particular, 72% of units sold this round were in the 3-10 Wp category.

2,624 units of key appliances were reported to be sold in the first half of 2021, which is a 67% decrease on the previous reporting round. The vast majority of appliances (92% this round) reported in Rwanda are TVs. In the second half of 2020, TV sales had spiked to 6,800 units sold from approximately 3,500 units in the two previous rounds. By contrast, the first half of 2021 has seen sales fall back down to 2,400 units sold

Uganda

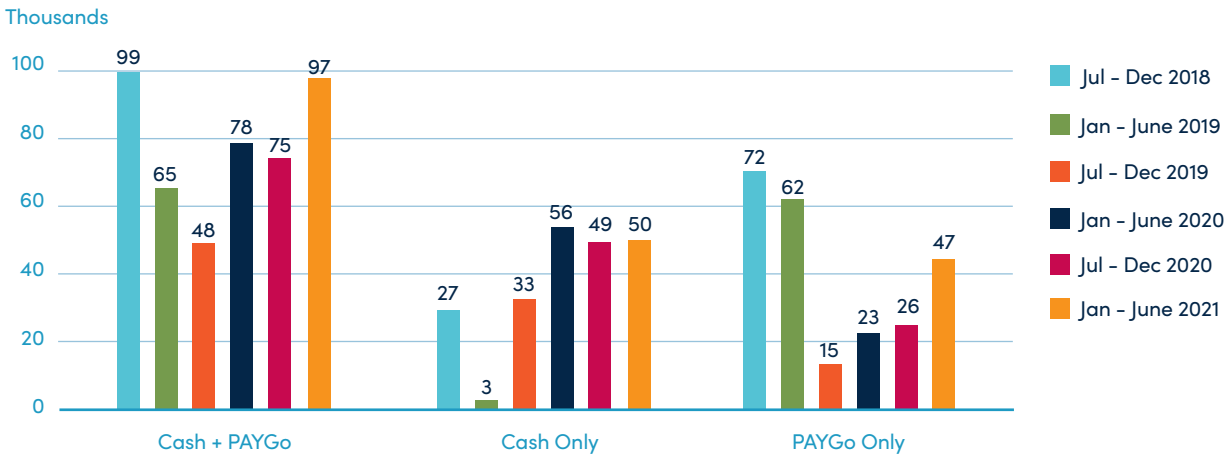
Uganda's economy was significantly affected by the COVID-19 pandemic and the stringent measures taken by the government to contain the spread of the disease. In this context, decreasing sales of off-grid solar products throughout the period are expected.

Sales of lighting products have decreased across all system sizes and business models. Total sales have fallen to just below 111,000 in the first half of 2021. This represents a 27% fall compared to the second half of 2020 and a 38% decrease compared to the first half of 2019. The split of sales between lanterns, multi-light systems and SHS has also progressively shifted towards solar lanterns.

As in most East African countries, TVs represent the bulk of off-grid appliance volumes in Uganda (85% in the first half of 2021). TVs in Uganda are generally sold bundled with SHS and have therefore followed a similar trend, with sales down 35% compared to the second half of 2020 and 61% lower than volumes sold during the period January-June 2019 before the pandemic.

Refrigeration units and SWPs both saw sales increase compared to the previous reporting round (411 and 398 units sold respectively). Both appliance types' sales are still below their pre-pandemic levels.

Figure 26 - Semi-annual Evolution of Volume of Lighting Products Sold - Rwanda



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

West Africa Insights

West Africa Insights

Regional Sales Trends

Off-Grid Solar Lighting Products

Sales of off-grid solar lighting products in West Africa between January and June 2021 totalled 477,000 units. This is a 10% increase compared to the second half of 2020 and a 34% increase compared to the first half of 2019 and confirms the dynamism of the off-grid lighting industry in the region.

Both cash and PAYGo sales grew compared to the previous reporting round. Around 218,000 units were sold on a cash basis. This is a 13% increase in volumes compared to the second half of 2020 and 16% more than the first half of 2019. 258,000 units were reported sold via PAYGo in the first half of 2021. This is a 7% increase compared to the last reporting round, and 54% higher than in the first half of 2019.

Product Trends

West Africa regional data shows an overall positive trend in sales volumes across a majority of lighting product categories. Growth has primarily been driven by the smaller system sizes up to 20 Wp. This could be the sign of a shift in consumer spending towards smaller system sizes due to financial constraints on households amid the COVID-19 pandemic. SHS sales represent 30% of all lighting product sales to, in line with past reporting rounds and much higher than in East or Central Africa, where the share of SHS is closer to 15% of total volumes.

Figure 27 - Semi-annual Evolution of Volume of Lighting Products Sold - West Africa

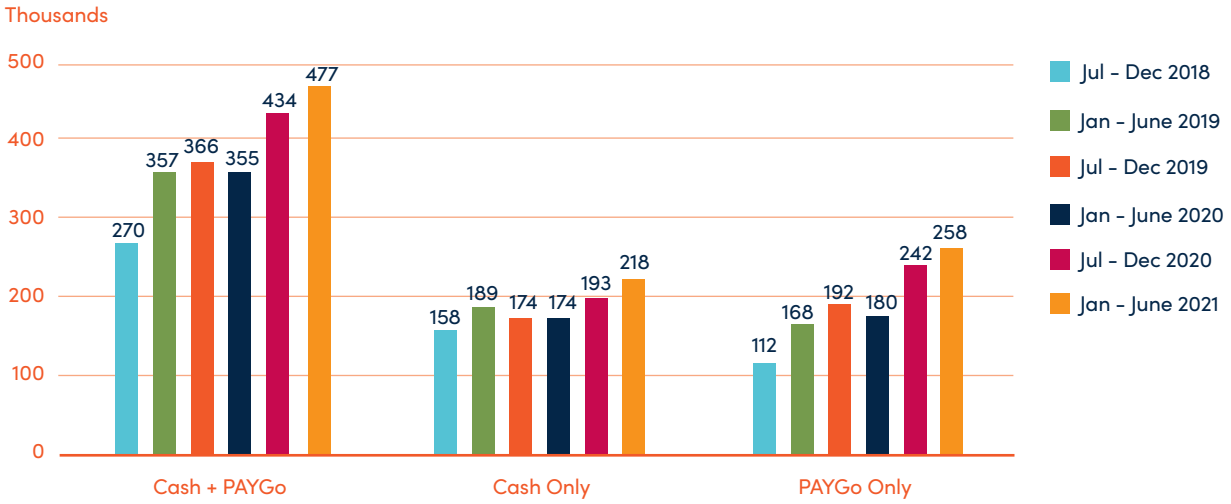


Table 7 - Semi-annual Evolution of Volume of Lighting Products Sold by Lighting Product Category - West Africa

Categories		Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo
Lanterns	0-1.5Wp	**134,000**	29%	55%	28%	0%
	1.5-3Wp	**82,000**	5%	-17%	3%	33%
Multi-light systems	3-10Wp	**118,000**	14%	64%	127%	80%
Solar Home Systems	11-20Wp	**48,000**	86%	148%	271%	98%
	21-49Wp	**27,000**	0%	-8%	-9%	80%
	50-100Wp	**56,000**	-34%	1%	-23%	-
	100+Wp	**11,000**	7%	134%	100%	-

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

West Africa Insights

Countries Overview

The growth registered in West Africa this round hides country disparities, but most countries have seen sales grow compared to the pre-COVID reporting round July to December 2019. With almost 240,000 sales in the first half of 2021, Nigeria represents more than half of the total volumes for the region. Over the last 18 months, and despite the COVID-19 pandemic, several countries including Burkina Faso, Sierra Leone and Senegal have experienced significant growth in volumes of off-grid solar lighting units sold.

Off-Grid Solar Appliances

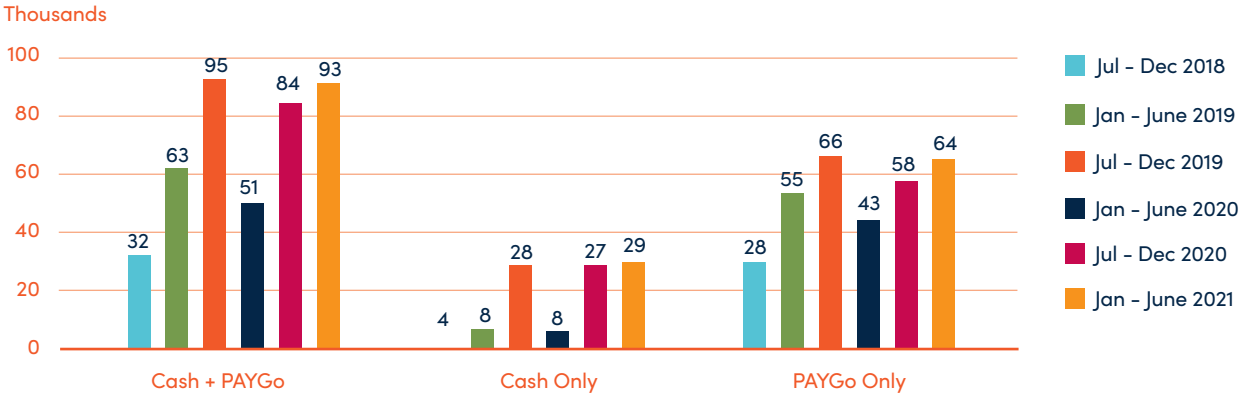
Sales of key appliances in West Africa in the first half of 2021 reached 93,000 units. Mirroring the Solar Lighting Product market, appliance sales volumes have grown 10% compared to July-December 2020 and are almost on par with the second half of 2019. With appliance sales almost at their peak in the region and decreasing in East Africa, West Africa registered almost 40% of sales of key appliances in Sub-Saharan Africa for the first time compared to approximately 25-30% on average in 2019 and 2020.

Table 8 - Semi-annual Evolution of Volume of Lighting Products Sold by Country - West Africa

Region / Countries	Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jul-Dec 2019
West Africa	**476,506**	**10%**	**30%**	**34%**
Nigeria	239,910	20%	44%	77%
Burkina Faso	43,655	8%	229%	14%
Sierra Leone	38,650	55%	71%	144%
Senegal	37,334	116%	45%	26%
Benin	32,735	-32%	13%	35%
Togo	29,323	15%	23%	9%
Mali	21,364	12%	111%	-40%
Cote d'Ivoire	19,146	-27%	-46%	-31%
Liberia	6,796	-26%		455%
Ghana	4,918	-54%	-72%	-64%

NOTE:
Countries not featured in this table did not see enough companies reporting to pass the three-data point rule.

Figure 28 - Semi-annual Evolution for Key Appliances Sales Volumes - West Africa



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

West Africa Insights

Product Trends

West Africa is the second largest regional market worldwide for TVs behind East Africa and also for fans, behind South Asia. Sales of TVs, fans and refrigeration units (RU) have grown compared to the second half of 2020. Not enough companies reported SWP sales in West Africa to be able to include data in this reporting round.

TV sales in the region remain below the highest volumes reported in the second half of 2019, but have been growing rather steadily after dropping by almost 40% in the first half of 2020 as the COVID-19 pandemic hit the region. The vast majority of TVs were sold bundled with a SHS. Large TVs (24"-29") remain the most popular, accounting for more than half of total units sold and growing by more than 30% compared to the second half of 2020. Medium TVs (18"-23") record the second highest volumes, accounting for 30% of all products sold, but recording a 10% decrease in sales compared to the previous reporting round. Extra-large TVs (30"+) record the highest relative increase (42%) in sales. In the past, the region had reported significant sales of smaller TVs and now appears to be following the same declining trend in sales of this category as seen elsewhere, although too few companies reported sales of small TVs for us to be able to share insights on the category.

Fan sales in West Africa are typically highest in the second half of the year as the climate is hot and humid from June to October. **Yet, fans recorded their highest sales in the region in the first half of 2021. This is likely, in part due to strong SHS sales (as fan sales are typically sold as part of SHS bundles in the region).** Due to fewer companies reporting fan sales this reporting round, no data can be shared regarding the specific fan categories sold within the region.

With over 1,500 units sold, refrigeration units record their highest sales since 2018[39]. Refrigerators represent only 60% of the total volumes, as opposed to their near total dominance across all markets. Anecdotally this could be linked to the growth in the utilization of solar freezers and multi-temperature units for productive use in the fisheries sectors across the region. Unfortunately too few companies report on freezers or freezer-refrigerator combos or multi-temperature refrigerators for the data to be included in this report.

Unfortunately, not enough companies reported SWP sales between January and June 2021 to include any data in this report.

Table 9 - Semi-annual Evolution of Volume of Key Appliances Sold by Type - West Africa

Appliance	Jan-June 2021 volumes Key Appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo	Share sold bundled with a power system
TVs	**56,352**	12%	-16%	9%	-	85%
Fans	**34,556**	16%	32%	246%	19%	61%
RUs	**1,517**	52%	140%	92%	-	51%
SWPs						

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

39 RU sales in West Africa had exceeded 3,200 units sold in the second half of 2018. Anecdotal evidence then suggested it was in part linked to sales for the off-grid vaccine cold chain.

West Africa Insights

Countries Overview

While country-level trends highlight certain disparities, four of the five largest markets have recorded growth in sales volumes of key appliances. The hierarchy of market sizes has also changed during the last 18 months. Prior to the COVID-19 pandemic, Côte d'Ivoire generally saw the most sales reported of all countries, but has seen decreasing volumes reported. Nigeria has seen sales grow during this period and has become a leader, an understandable trajectory given its size and level of market development, with close to 25,000 units sold. This also makes Nigeria the third market by volumes of key appliances reported behind Kenya and Bangladesh..

Table - 10 - Semi-annual Evolution of Volume of Appliances Sold by Country - West Africa

Region / Countries	Jan-June 2021 volumes Key appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019
West Africa	**93,040**	**10%**	**-2%**	**48%**
Nigeria	24,854	38%	33%	360%
Senegal	14,469	12%	15%	43%
Benin	12,034	3%	40%	3290%
Sierra Leone	11,973	25%	497%	
Cote d'Ivoire	11,831	-8%	-56%	-48%
Ghana	5,102	-8%	17%	-42%
Mali	3,579	306%	-1%	-22%
Guinea	1,861	-13%		
Burkina Faso	1,494	19%	-81%	149%
Liberia	59	-96%		

NOTE:

- The category 'Key Appliances' refers to the sum of all TVs, fans, solar water pumps and refrigeration units.
- Countries not featured in this table did not see enough companies reporting to pass the three-data point rule.

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West Africa Insights

Nigeria Insights

Background

Lack of global demand leading to falling oil prices and containment measure affecting transport and services industries led the Nigerian economy into a recession in 2020. Inflation reached 12.8% in 2020, driven by increased food prices and increased electricity tariffs following the removal of fuel subsidies. As with most Sub-Saharan African markets, return to growth is expected in 2021, but remains contingent on the evolution of the pandemic and of oil prices.

Several programs were launched in 2020 to support the Nigerian economy including the Solar Naija program in December 2020, which aims to electricity 5 million households, serving about 25 million Nigerians, through SHS and mini-grids, under the Economic Sustainability Plan[40] and a $500,000 relief fund from All On for renewable energy companies. The government also supported the use of off-grid solar in electrifying healthcare centres.

The implementation of the Nigeria Electrification Program has also ramped up leading to more opportunities for companies, especially through the RBF which registered over 100,000 claims in the first half of 2021. This is a 310% increase over the same period of the previous year. The program, which is carried out by the Rural Electrification Agency with funding from the World Bank ($350 million) and the African Development Bank ($200 million), aims to provide electricity access, through mini grids and stand-alone off-grid solutions and to accelerate the proliferation of productive appliances and equipment for off-grid communities[41]. In particular, it includes a $75 million RBF facility to encourage private sector led market growth for faster uptake of standalone solar systems[42]. Additionally, USADF and the Rockefeller Foundation via All-On held the 2021 Nigeria Off-Grid Energy Challenge which awarded $900,000 split between nine companies.

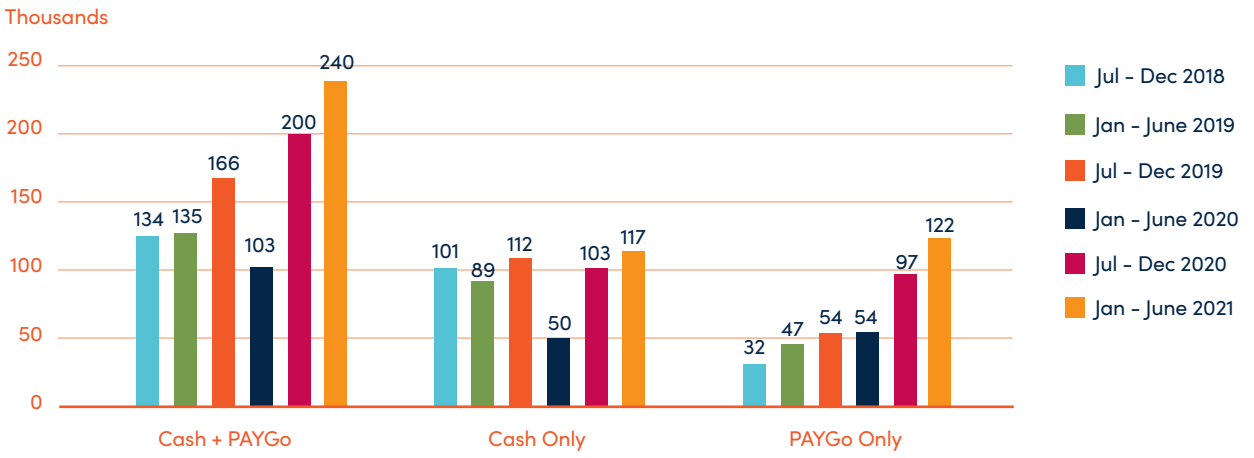
Sales Trends

Off-Grid Solar Lighting

As mentioned previously, Nigeria represents over half of West African sales and therefore the trends at the regional level are in large part reflective of the situation in Nigeria. **Indeed, Nigeria has recorded particularly high sales volumes this reporting round reaching 240,000 units.** This is a 20% increase on the second half of 2020 and a 77% increase from the first half of 2019. While both cash and PAYGo sales are growing, PAYGo plays an increasingly important role in the recovery with sales volume now more than double what they were in 2019 and exceeding cash sales.

Growth in volumes compared to the second half of 2020 are driven by small lanterns (0-1.5 Wp), multi-light systems (3-10 Wp) and entry-level SHS (11-20 Wp). However, the overall distribution of the market between lanterns, multi-light systems and SHS has remained relatively stable over the last three reporting rounds and there has even been a shift from lanterns towards larger systems compared to 2019.

Figure 29 - Semi-annual Evolution of Volume of Lighting Products Sold - Nigeria



40 REA (2020), Fg Launches 'Solar Power Naija' A 5 Million Solar Connection Programme To Off Grid Communities.
41 More information on the NEP here.
42 Efficiency for Access Coalition (2021), Off- and Weak-Grid Appliance Market: Nigeria.

West Africa Insights

Nigeria Insights

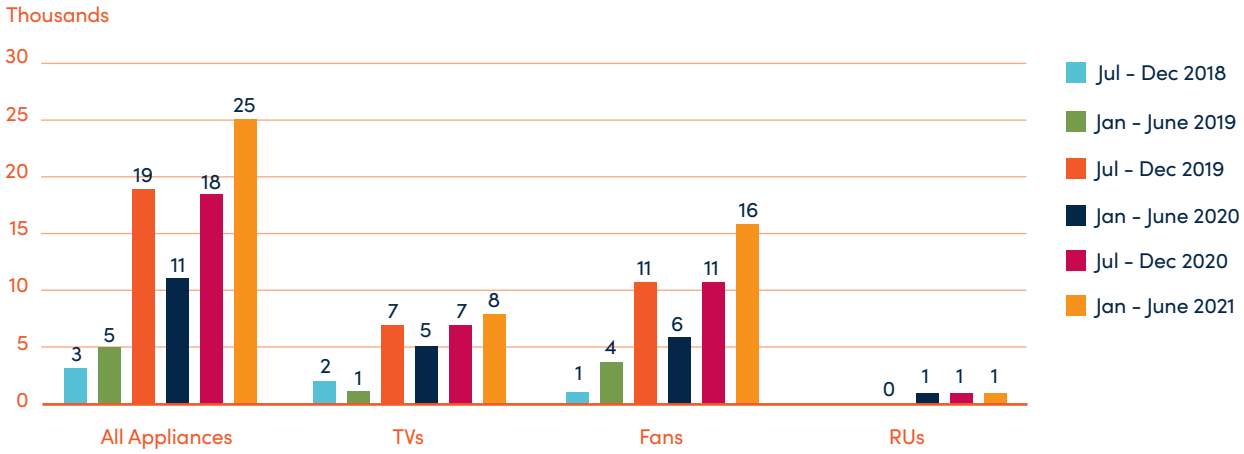
Appliances

Nigeria recorded its highest yet half-year sales for key appliances. Sales volume grew 38% compared to the second half of 2020. While sales grew for TVs and RUs, increased sales were primarily driven by a 50% increase in fan sales. Not enough companies reported sales of SWPs to include them in this report.

Among reported TV sales, 3,400 were large TVs, 2,500 were medium TVs and 1,800 extra-large TVs.

Data confidentiality rules do not allow for data on the types of fans sold to feature in this report, but recent research from the Efficiency for Access Coalition showed pedestal fans were the most common type in the market ahead of ceiling fans and table fans[43].

Figure 30 - Semi-annual Evolution of Volume of Appliance Products Sold - Nigeria



© UpOwa

43 Efficiency for Access Coalition (2021), Off- and Weak-Grid Appliance Market: Nigeria.

West Africa Insights

Senegal Insights

Background

Senegal's economy was heavily impacted by the COVID-19 pandemic, falling from 5.3% growth in 2019 to a 0.7% recession in 2020 with tourism and export taking a severe toll. However the country could return to similar levels of growth in 2021 if the pandemic remains under control[44].

The VAT exemption for solar products came into effect in December 2020. The measure aimed to reduce the acquisition cost of renewable production equipment by 18%. Although it is too early to draw any lasting conclusions, sales for the first half of 2021 seem to indicate the exemption may already have had positive effects.

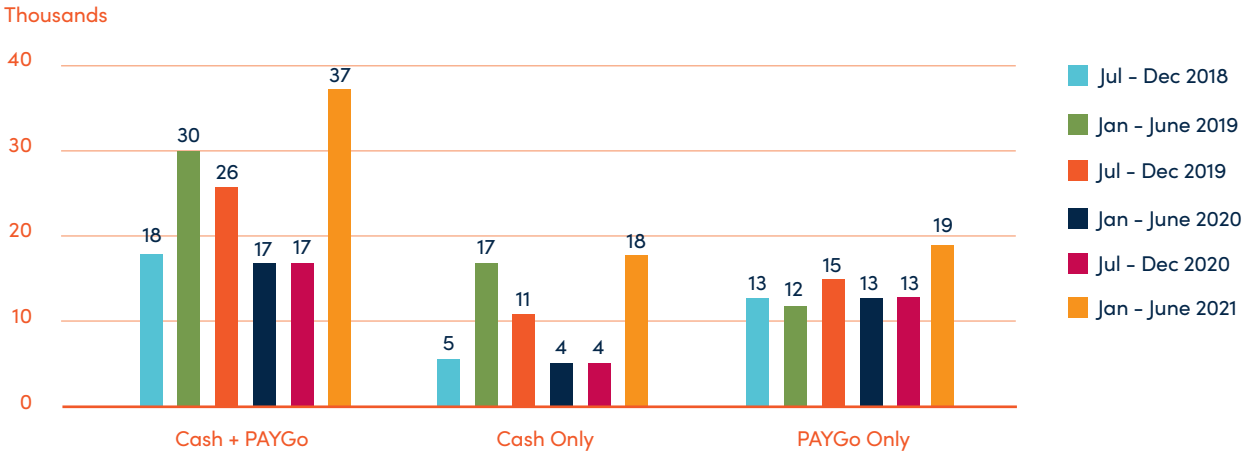
The Global LEAP RBF incentives that had been positively influencing the SWP segment in Senegal came to an end.

Sales Trends

Off-Grid Solar Lighting

Sales of lighting products reached 37,000 units between January and June 2021. This is the highest volume reported so far and a 116% increase on the second half of 2020 and 26% increase on the first half of 2019. Cash sales in particular have shown a strong recovery with sales quadrupling compared to the second half of 2020 and back on par with the first half of 2019. PAYGo sales had remained fairly stable during the COVID-19 crisis and now experienced a 50% increase to reach 19,000 units sold. Due to a low number of companies reporting sales in some product categories, little meaningful analysis can be provided. However, it can be reported that sales include 2,100 1.5-3 Wp lanterns, 5,500 multi-light systems, 1,700 21-49 Wp SHS and 9,600 50-100 Wp SHS. No larger 100+ Wp SHS were reported to have been sold during the first half of 2021.

Figure 31 - Semi-annual Evolution of Volume of Lighting Products Sold - Senegal



44 African Development Bank, African Economic Outlook 2021.

West Africa Insights

Senegal Insights

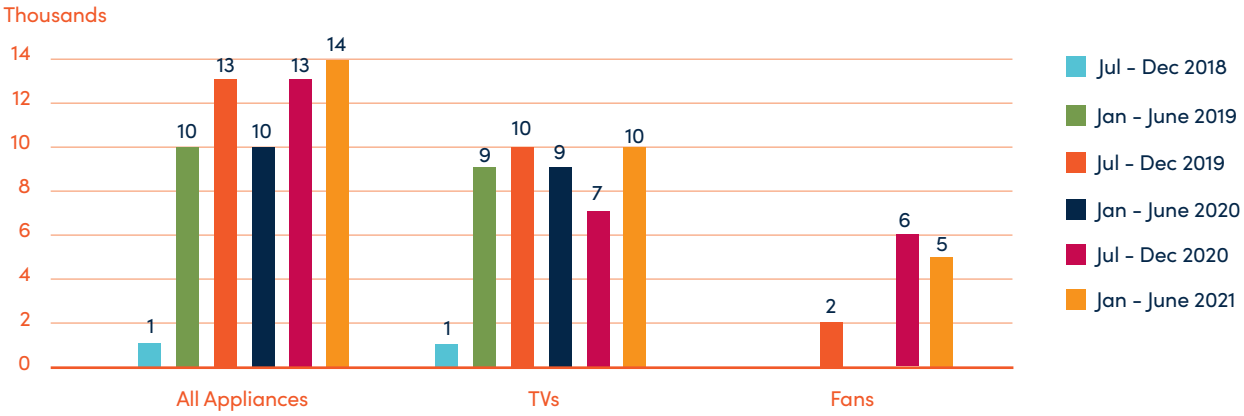
Appliances

Close to 14,500 key appliances were sold in the first half of 2021. This is a 12% increase on the previous reporting round and a 43% increase on the first half of 2019.

The majority of appliances sold are TVs, but fans have become increasingly important in the past two reporting rounds. TVs represent 66% of sales while fans represent 33%. Unfortunately, not enough companies reported SWP or RU sales to publish their data in this report.

All TVs were reported as PAYGo sales and 83% were sold bundled with a power system. Overall sales of this category increased by 36% compared to the previous reporting round and are now on par with TV sales across 2019. 97% of fans were sold unbundled and, while their sales volumes decreased by 16% compared to the second half of 2020, they remain significantly higher than fan sales reported during both rounds of 2019.

Figure 32 - Semi-annual Evolution of Volume of Appliance Products Sold - Senegal



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West Africa Insights

Sierra Leone Insights

Background

Sierra Leone's economy was severely affected by the drop in global demand for key exports and the disruption of global supply chains caused by the COVID-19 pandemic. While restrictions have been lifted, agricultural exports have not fully resumed leading to sustained pressure on rural households.

While economists estimate Sierra Leone could experience a fairly strong recovery in 2021, returning to 3.1% growth, this scenario remains uncertain as the pandemic looms, the leone depreciates and the elections are taking place in 2022.

The off-grid solar sector in Sierra Leone has benefited from import tax and Goods and Services Tax (GST) exemptions on Verosol-certified products since 2014. A recent impact assessment by Africa Clean Energy highlighted that the number of importers of stand-alone solar products had grown from just five in 2015 to 27 in 2021[45]. Beyond taxation, most support for electrification has prioritised mini-grids. Feedback from companies indicate unmet demand for solar lighting products and energy efficient appliances. A potential for growth which could be unleashed with additional support from development partners and investors.

Sales Trends

Off-Grid Solar Lighting

39,000 off-grid solar lighting products were reported sold between January and June 2021 in Sierra Leone. These are the largest volumes reported in Sierra Leone for a given half-year, including years for which the data cannot be shared due to an insufficient number of companies reporting sales.

Appliances

Key appliances sales have gained momentum over the last two reporting rounds. Sales increased 25% to reach close to 12,000 units. This is almost six times the volumes sold in the first half of 2019.

Products include TVs, fans, RUs and SWPs, but no specific data can be shared for each appliance type due to the low number of participating companies. It can be shared that in the second half of 2020, the majority of appliance sales reported were fans.

Figure 33 - Semi-annual Evolution of Volume of Lighting Products Sold - Sierra Leone

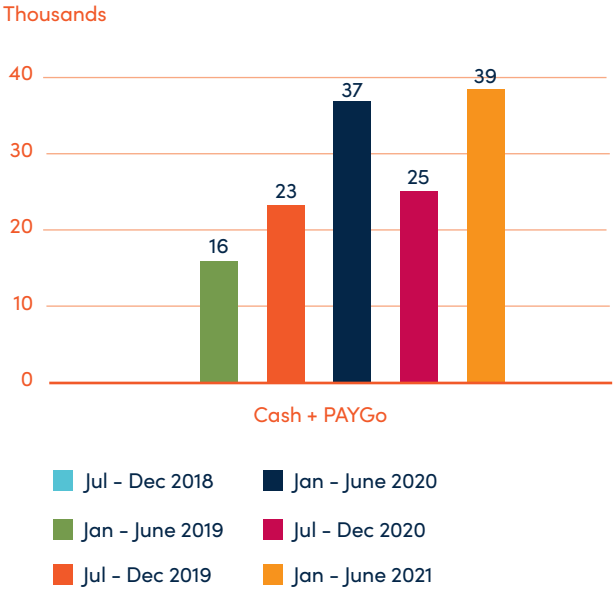
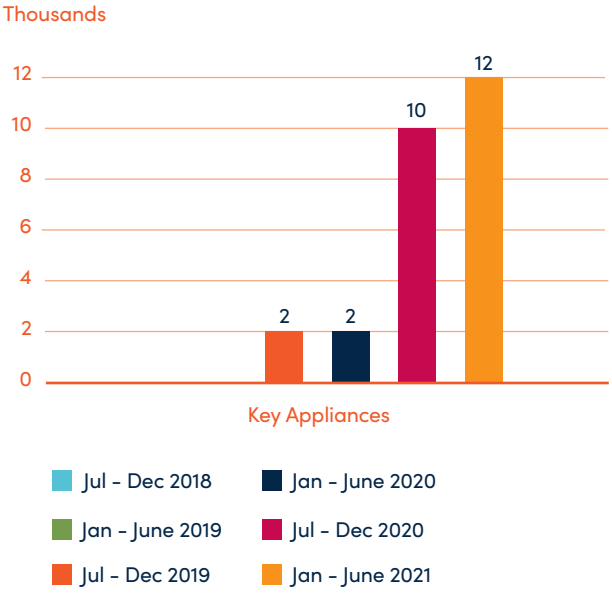


Figure 34 - Semi-annual Evolution of Volume of Appliance Products Sold - Sierra Leone



45 Africa Clean Energy (2021), Sierra Leone: Impact of Goods and Services Tax and Import Duty Exemptions on Stand-Alone Solar Products - Policy Brief.

West Africa Insights

Togo Insights

Background

Since 2017 the CIZO rural electrification program has worked to create an enabling environment for the access to energy sector and especially PAYGo SHS providers. In particular, the customer subsidy program often referred to as "CIZO cheque" introduced in 2019[46], in which the customer only pays the unsubsidised portion of their monthly PAYGo fee out-of-pocket has been hailed as a success. Furthermore, the CIZO program's subsidy scheme was recently extended to solar water pumps[47].

Sales Trends

Off-Grid Solar Lighting

Off-grid lighting product sales reached their highest volumes yet with 29,000 units sold in the first half of 2021, a 15% increase on the previous reporting round and 9% higher than in the first half of 2019 before the pandemic. Sales in Togo remained relatively stable throughout the pandemic despite a significant slowdown in GDP growth during the same period. 65% of sales reported are PAYGo sales. Due to an insufficient number of companies reporting products for certain product categories, limited data can be shared, but SHS represent the majority of sales.

Appliances

5,189 key appliances were reported sold in Togo between January and June 2021. These are almost exclusively TVs. While this is a 31% decrease in sales compared to the second half of 2020, the graph below illustrates how this could form part of a seasonal pattern which further data collection rounds may confirm. The recent extension of the CIZO program to solar water pumps will likely translate into increased key appliance sales in upcoming rounds.

Figure 35 - Semi-annual Evolution of Volume of Lighting Products Sold - Togo

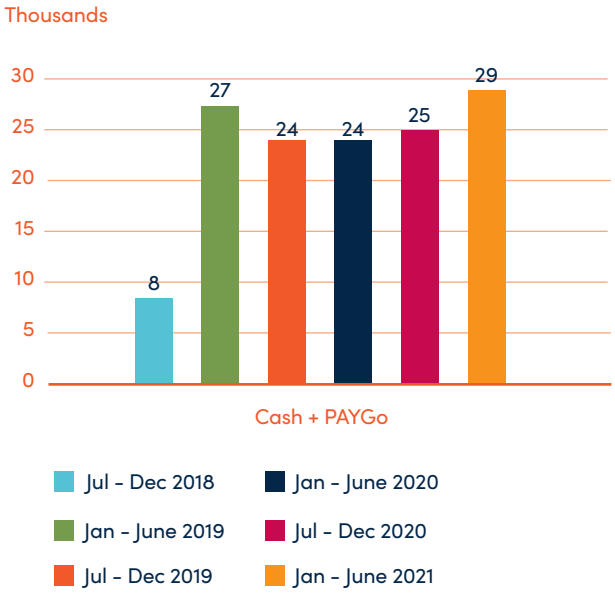
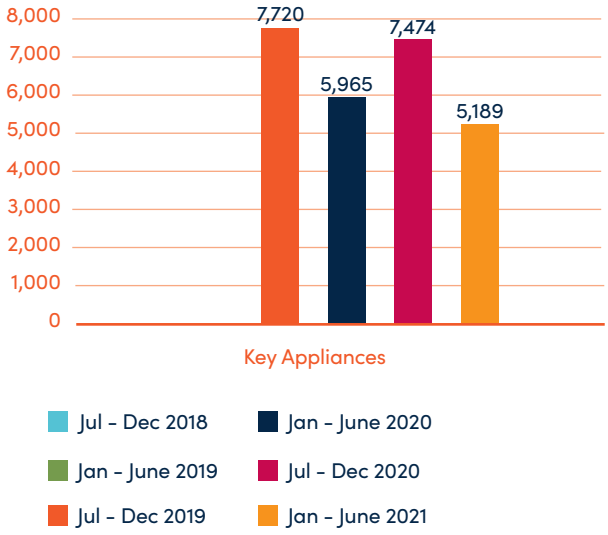


Figure 36 - Semi-annual Evolution of Volume of Appliance Products Sold - Togo



46 République Togolaise, The government launches the "CIZO solar check" to support households in the energy transition.
47 PV Magazine, EDF s'investit au Togo dans l'irrigation solaire pour les agriculteurs.

West Africa Insights

Other West African Countries

Benin

The Off-Grid Clean Energy Facility of the MCA Benin II Off-Grid Electricity Access Project aims at accelerating its effort in 2021 after progress was slowed by the pandemic. Their ambition is to distribute more than 30,000 solar home systems in 2021 compared to just 1,338 in 2020. 2021 should also see the beginning of local assembling of solar kits.

Solar lighting products sales reached close to 33,000 units in the first half of 2021. This is a 32% decrease in volumes compared to sales recorded between July and December 2020, which was the highest on record so far. Sales this round remain 35% higher than in the first half of 2019. Almost all units sold were sold via PAYGo. With few companies reporting sales, no data can be shared on volumes sold per product category. However, it can be reported that multi-light systems are the most popular category, followed by SHS. Lantern sales reported in the first half of 2021 are limited.

Growth in appliance sales in Benin has continued with over 12,000 units sold between January and June 2021. This is a moderate 3% increase on the previous reporting round, but part of the confirmation that the sector is growing. In 2019, around 9,000 units were reported for the entire year. Appliances sold in the first half of 2021 include TVs, fans and SWPs with TVs representing the vast majority of volumes ahead of fans and solar water pumps.

Burkina Faso

Close to 44,000 units of lighting products were sold between January and June 2021, an 8% increase on the second half of 2020 and 14% higher volumes than in the first half of 2019. While solar lanterns still account for more than half of all sales (22,600), growth compared to the second half of 2020 has mainly been driven by multi-light systems (12,000)[48].

Appliance sales have reached almost 1,500 units. This represents a 19% increase compared to the period July-December 2020. Products sold include 934 TVs and 514 fans.

Côte d'Ivoire

Lighting product sales reached 19,000 sales this round, a 27% decrease compared to the second half of 2020. This evolution is likely due to changes in participation to the data collection in this country rather than to real trends. Sales volumes have likely remained more stable.

Appliances sales in Côte d'Ivoire have also decreased by 8% compared to the previous reporting round and by 48% compared to the first half of 2019. Sales of appliances in Côte d'Ivoire are partly seasonal, which could explain the slight decrease compared to the second half of 2020. **Sales reported between January and June 2021 reach close to 12,000 units of which 9,400 TVs and 2,400 fans.**

48 For more details visit the OCEF website.

West Africa Insights

Other West African Countries

Ghana

Aside from a spike in sales in the first part of 2020 which was connected to a programmatic intervention, volumes sold in Ghana have been stagnating since 2018 and have significantly decreased this round from 11,000 to 5,000 units sold. Volumes sold in the first half of 2021 are also 64% lower than in the first half of 2019. 61% of products were sold via PAYGo. Lanterns account for 42% of volumes. With few companies reporting, further data collection will be needed to confirm whether these results are indicative of a meaningful trend.

5,100 appliances were sold in the first half of 2021, an 8% decrease compared to the second half of 2020 and 42% lower than in the first half of 2019. 2,350 TVs were sold, a 16% decrease compared to the previous reporting round. Fan sales were stable with 2,700 units sold. Sales of SWPs and RUs were negligible.

Mali

In addition to COVID-19, Mali has had to cope with two coups in the space of nine months in 2020-2021.

21,000 units of solar lighting products were sold in the first half of 2021 of which almost 12,000 were lanterns. This is a 12% increase compared to the previous reporting round, but 40% lower than sales in the first half of 2019.

Sales of appliances reached 3,600 in the first half of 2021 up from just 800 units sold in the second half of 2020, but 22% lower than in the first half of 2019. Appliances sold between January and June 2021 include 2,879 TVs and 450 fans, with the balance made up of RUs and SWPs.

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Central Africa Insights

Central Africa Insights

Regional Sales Trends

Off-Grid Solar Lighting Products

Sales of off-grid solar products in Central Africa totaled 173,000 units between July - December 2020. Sales are stable compared to last round with just 680 more units sold than in the second half of 2020. Cash sales recorded significant growth in the second half of 2020 and have now stagnated (-3%) while PAYGo sales increased by 13%.

Product Trends

While sales in Central Africa are on a growth trajectory, there are few clearly discernible trends for different product categories. The 1.5-3 Wp lanterns and the 11-20 Wp SHSs both have seen particularly strong increases in sales over the last couple rounds. Multi-light systems (3-10 Wp) follow a more seasonal pattern and therefore conclusions about the segment should be withheld until data for the full year is available.

Figure 37 - Semi-annual Evolution of Volume of Lighting Products Sold - Central Africa

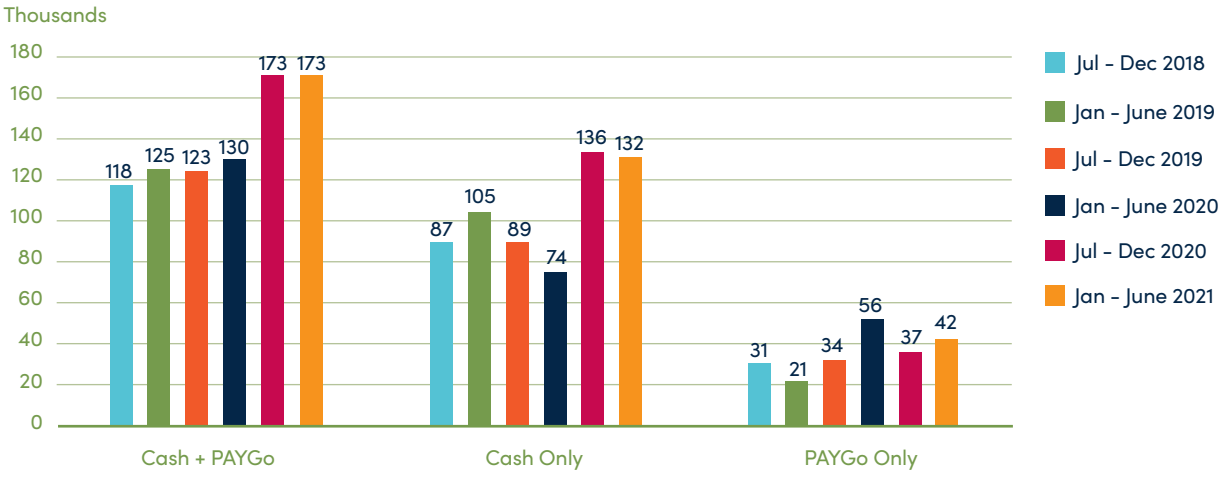

Table 11 - Semi-annual Evolution of Volume of Lighting Products Sold by Lighting Product Category - Central Africa

Categories		Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo
Lanterns	0-1.5Wp	**33,842**	-7%	-51%	-48%	0%
	1.5-3Wp	**112,007**	22%	218%	323%	33%
Multi-light systems	3-10Wp	**2,110**	-87%	-58%	-82%	80%
Solar Home Systems	11-20Wp	**10,102**	94%	1060%	648%	98%
	21-49Wp	**668**			-78%	80%
	50-100Wp	**14,576**	-23%	0%	-1%	-
	100+Wp	**12**				-

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

Central Africa Insights

Countries Overview

Few markets in the region have enough companies reporting to be included. Sales in Cameroon account for 63% of regional volumes for the first half of 2021 and are stable compared to the previous reporting round while sales in the DRC have decreased by 18%.

Table 12 - Semi-annual Evolution of Volume of Lighting Products Sold by Country - Central Africa

Region / Countries	Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019
Central Africa	**173,317**	**0%**	**41%**	**38%**
Cameroon	108,910	2%	52%	38%
Democratic Republic of Congo	41,814	-18%	-13%	10%
Chad	1,217			

NOTE:
Countries not featured in this table did not see enough companies reporting to pass the three-data point rule.

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Central Africa Insights

Off-Grid Solar Appliances

98% of sales of appliances reported in the region are from the DRC. The vast majority of these are TVs and fans which are sold bundled with SHS. Therefore, trends in solar lighting products for DRC are reflected in the appliance data. **Total volumes of key appliances sold decreased by 6% compared to the second half of 2020.**.

Product Trends

The decrease in fan sales shows the clear correlation with the DRC lighting market. Meanwhile refrigeration units' sales have doubled compared to the second half of 2020, but remain very low. Interestingly, the share of RUs sold bundled with a power system is significantly lower than in the previous reporting round.

Figure 38 - Semi-annual Evolution for Key Appliances and Fans Sales Volumes - Central Africa

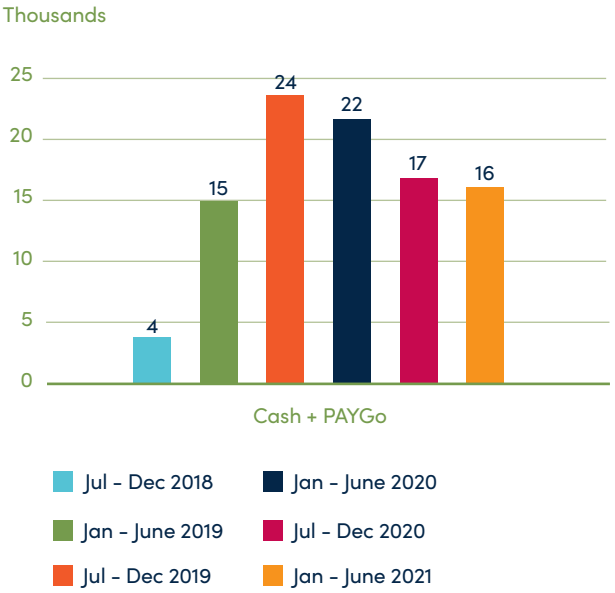

Table 13 - Semi-annual Evolution of Volume of Key Appliances Sold by Type - Central Africa

Appliance	Jan-June 2021 volumes Key Appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo	Share sold bundled with a power system
TVs	**11,963**		-51%	-18%	-	94%
Fans	**3,137**	-18%			-	91%
RUs	**359**	112%	5883%	221%	41%	42%
SWPs						

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

Central Africa Insights

Central African Countries

Cameroon

Sales of lighting products in Cameroon grew 2% compared to the second half of 2020 reaching close to 109,000 units. This is also 38% higher than in the first half of 2019 before the pandemic affected the market. The vast majority of volumes are solar lanterns.

Appliances sales volumes reported in Cameroon remain limited. **In the first half of 2021, 147 units were sold including 128 refrigeration units. No fans were sold.** Too few companies reported sales of TVs and SWPs to share data on those appliances.

Democratic Republic of the Congo

Close to 42,000 solar lighting products were sold between January and June 2021, an 18% decrease in sales compared to the second half of 2020.

Over 15,000 units of key appliances were sold in the DRC in 2021, 93% were bundled with power systems. Of the 15,000 products sold, 12,000 were TVs. Not enough companies reported fan and RU sales to include the data in this report. No SWPs were sold.

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South
Asia
Insights

South Asia Insights

Regional Sales Trends

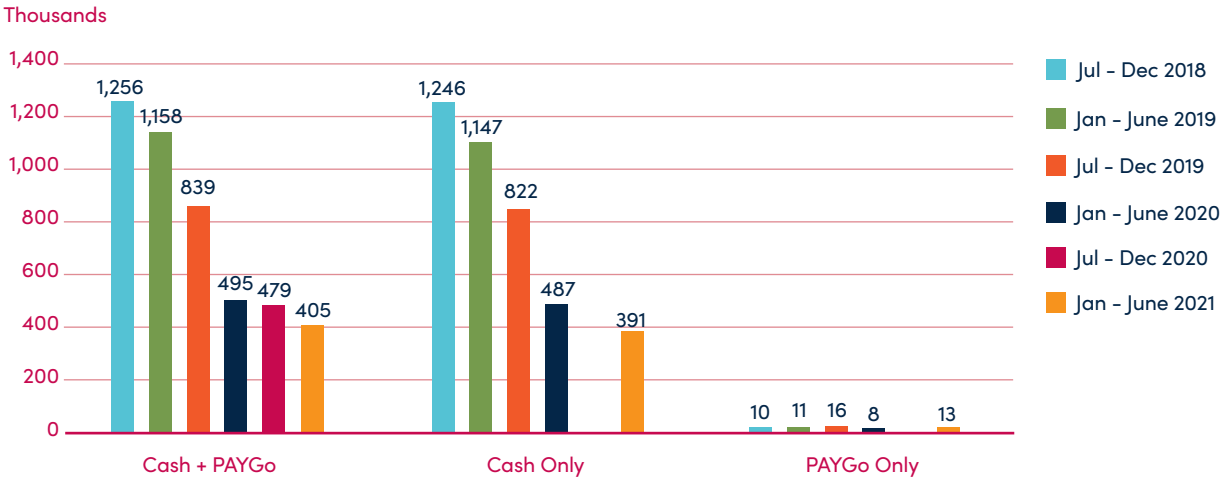
Off-Grid Solar Lighting Products

Overall, sales of off-grid lighting products in South Asia have further decreased by 16% compared to the second half of 2020 to reach 405,000 units sold which is a bit more than a third of the volumes recorded in the first half of 2019, before the COVID-19 pandemic.

Product Trends

Sales in South Asia are predominantly driven by solar lanterns (67% of all volumes this round) and cash sales (97%). With India, representing the majority of sales reported, the trends for the region tend to reflect the Indian market which was particularly hard-hit by the pandemic in the first half of 2021 and where the product mix has been progressively evolving away from traditional off-grid solutions (see India section below). High relative increases in sales of SHS compared to the previous reporting round are mostly due to particularly low sales reported in the second half of 2020 which was in part attributable to fewer companies participating in the data collection in India and Bangladesh. With approximately 65,500 units sold, the SHS segment remains below pre-COVID levels. In the second half of 2019, 101,000 SHS were reported to have been sold in South Asia.

Figure 39 - Semi-annual Evolution of Volume of Lighting Products Sold - South Asia



NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

Table 14 - Semi-annual Evolution of Volume of Lighting Products Sold by Lighting Product Category - South Asia

Categories		Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019
Lanterns	0-1.5Wp	**152,982**	-32%	-37%	-58%
	1.5-3Wp	**119,231**	-15%	-72%	-80%
Multi-light systems	3-10Wp	**67,126**	-33%	2%	-32%
Solar Home Systems	11-20Wp	**32,999**	905%	74%	3%
	21-49Wp	**11,946**	317%	-57%	-57%
	50-100Wp	**13,555**	200%	-9%	-43%
	100+Wp	**6,981**	807%	-82%	-51%

South Asia Insights

Countries Overview

Despite the market coming to a halt in India between March and June, the country remains by far the largest market in the region and recorded 81% of volumes for South Asia between January and June 2021 (for more details, see India section).

Sales in Bangladesh tend to be particularly seasonal. Therefore more appropriate comparisons are with the first half of 2019 when 185,000 units were sold before the COVID-19 pandemic and first half of 2020 when 92,000 units were sold. From that perspective, with 63,000 sales, the number of units sold in the country is 31% lower than a year ago and 66% lower than two years ago. It should also be noted that lantern sales in Bangladesh are driven by humanitarian efforts in refugee camps and therefore lead to abrupt evolutions in volumes.

Sales in Pakistan in the second half of 2020 recorded a surge linked to a one-off bulk procurement order. With almost 13,000 units sold in the first half of 2021, the market is back to normal and even recovering compared to 2020.

Table 15 - Semi-annual Evolution of Volume of Lighting Products Sold by Country - South Asia

Region / Countries	Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019
South Asia	**404,802**	**-16%**	**-52%**	**-65%**
India	328,711	-19%	-58%	-66%
Bangladesh	63,037		35%	-66%
Pakistan	12,766	-80%	19%	-28%

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South Asia Insights

Off-Grid Solar Appliances

Product Trends

172,000 sales of key appliances were recorded between January and June 2021. In contrast with trends in Sub-Saharan Africa, 98% of those sales were fans sold on a cash basis. The prevalence of cash in the region can be seen as a result of the limited penetration of PAYGo sales in the region more broadly and is also applicable to solar lighting products and home systems. However, this does not mean that customers do not have access to financing as microfinance institutions are key players in the distribution and financing of off-grid solar and energy-efficient appliances in the region. Furthermore, the product mix in the off-grid energy access market more broadly leans towards component-based systems than towards the kits being favored in Sub-Saharan Africa. Subsequently this also decreases the possibility for the bundling of appliances with sales of solar kits.

Usually recorded fan sales are higher during the first half of the year than during the second half of the year. Companies have indicated that fan sales operate on a pre-booking system, causing distributors to purchase fans in bulk quantity early in the year and then selling stock to end-users from March onwards, reordering in the next year when inventories run low. Therefore, while sales are only 4% lower this round than in the second half of 2020, a more appropriate comparison may be a 27% fall in sales compared to the first half of 2020. Market closures or limited hours of operation in Pakistan in the first quarter and in Spring in India are likely a factor. A high peak in volumes in the first half of 2019 makes comparisons with the pre-COVID period hard to interpret.

Beyond fans, 899 units of solar water pumps were reported as part of the data collection, this is the highest volume reported since data collection began with the exception of the second half of 2019 where large bulk procurements were recorded under schemes such as the KUSUM[49] one in India.

Noticeably, and in stark contrast to trends in Sub-Saharan Africa, the number of companies reporting TV and RU sales is too low for the data to be showcased in this report.

Figure 40 - Semi-annual Evolution for Key Appliances and Fans Sales Volumes - South Asia

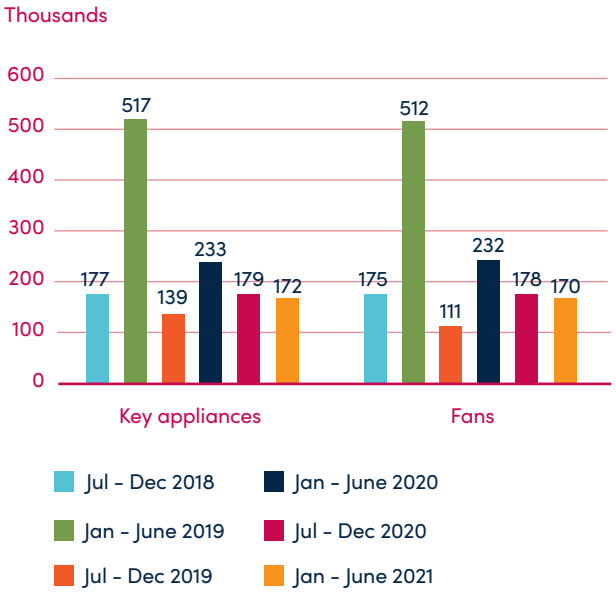
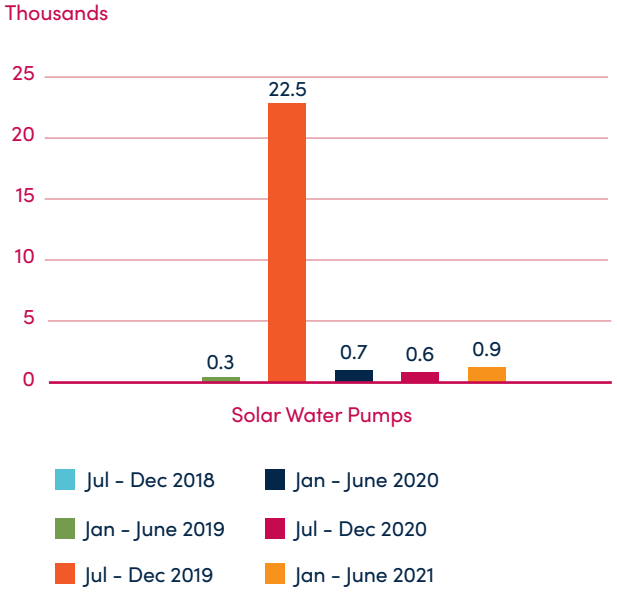


Figure 41 - Semi-annual Evolution of Volume of Solar Water Pumps - South Asia



49 More information here.

South Asia Insights

Countries Overview

Beyond this, little can be said of country-level data due to few companies reporting sales. In both Bangladesh and India, the vast majority of key appliances sold are fans. In Bangladesh, these are all large (12+'') table fans.

Table Table 16 - Semi-annual Evolution of Volume of Appliances Sold by Country - South Asia

Region / Countries	Jan-June 2021 volumes Key appliances (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019
South Asia	**172,412**	**-4%**	**24%**	**-67%**
Bangladesh	35,031	126%	94%	-70%
India	14,278	54%	-65%	-11%
Pakistan				

NOTE:

- The category 'Key Appliances' refers to the sum of all TVs, fans, solar water pumps and refrigeration units.
- Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

© Little Sun

South Asia Insights

India Insights

Background

India was hit hard by the COVID-19 pandemic in spring 2021. The second wave of the pandemic was particularly devastating. On April 30th the country recorded 400,000 new cases and 3,500 deaths within the same day[50]. The Indian market came to a halt from mid-March until the end of the reporting period. Companies have also highlighted issues in importing products from China due to increased custom duties from 8% to 18% on solar products, shortages of integrated circuits and raw material, and disruptions to supply chains leading to higher shipping costs and shortages. This may provide some tailwinds for the development of local manufacturing capacity for components, which has been supported by the government in recent years. In June, Reliance Industries announced an $8.1 billion investment to build Giga factories to create a fully integrated renewable energy value chain including solar and energy storage[51].

However, beyond circumstantial factors, sales reported in India have been declining as the product mix is evolving away from traditional off-grid products like solar lanterns towards weak-grid products which this report does not aim to capture.

Sales Trends

Off-Grid Solar Lighting

Sales of lighting products declined by 19% compared to the second half of 2020 and now stand at 329,000 units, 66% lower than during the first half of 2019 when sales were over 950,000 units. 96% of volumes were sold in cash.

Appliances

Just over 14,000 units of key appliances were sold in India between January and June 2021. Of these, 96% are fans. All fans were sold cash and just 24% were bundled with a power system. Fan sales have slowly recovered after falling to just 7,000 units sold in the first half of 2020 and are now almost back on par with pre-COVID levels.

Not enough companies reported sales of other appliances to include the data in this report.

Figure 42 - Semi-annual Evolution of Volume of Lighting Products Sold - India

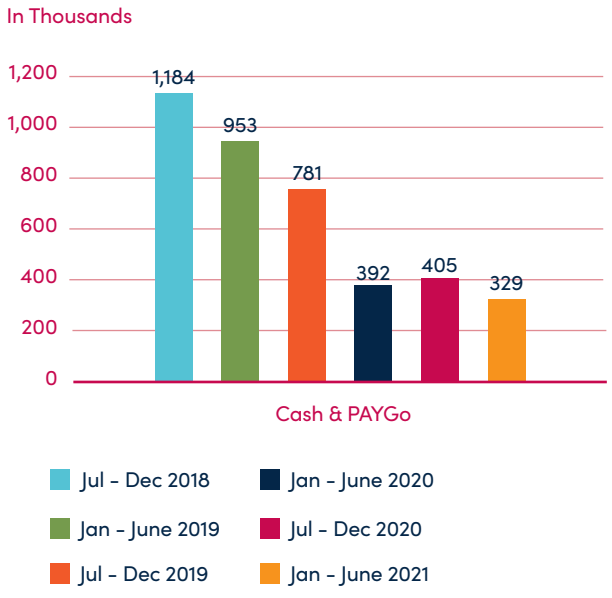
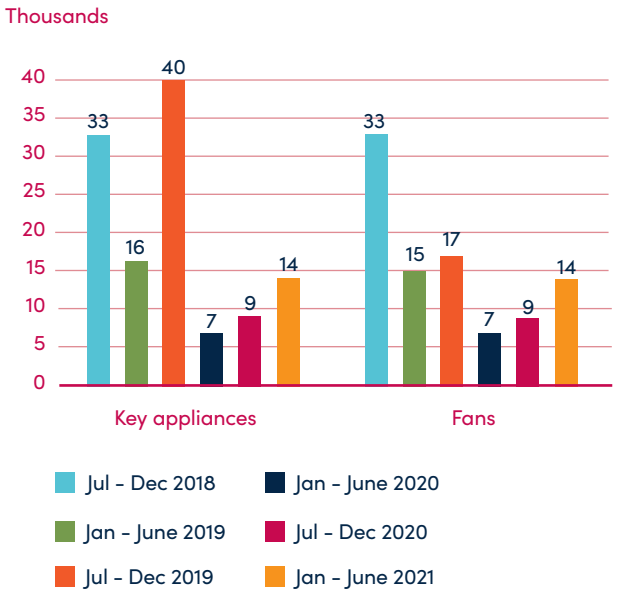


Figure 43 - Semi-annual Evolution of Volume of Key Appliances and Fans Sold - India



50 John Hopkins University, Coronavirus Resource Center.
51 PV Magazine India, Reliance Industries unveils $10-billion plan for solar and energy storage.

East Asia & Pacific Insights

East Asia & Pacific Insights

Regional Sales Trends

Off-Grid Solar Lighting Products

Sales of off-grid solar lighting products totalled 109,000 units in the region between January and June 2021. This is a 26% decrease in sales compared to the second half of 2020. While the total volumes sold do not show signs of a clear recovery - sales are 24% lower than in the first half of 2019 - the decrease compared to the previous reporting round may also be linked to seasonal effects.

82% of volumes were cash sales. However, while PAYGo sales remain a small share of volumes, they saw a 22% increase compared to the second semester of 2020.

Product Trends

Data shows declining lantern and multi-light system sales while SHS sales grow. However, it should be noted bulk procurements are at least partially responsible for the increased SHS sales.

Figure 44 - Semi-annual Evolution of Volume of Lighting Products Sold - East Asia and the Pacific

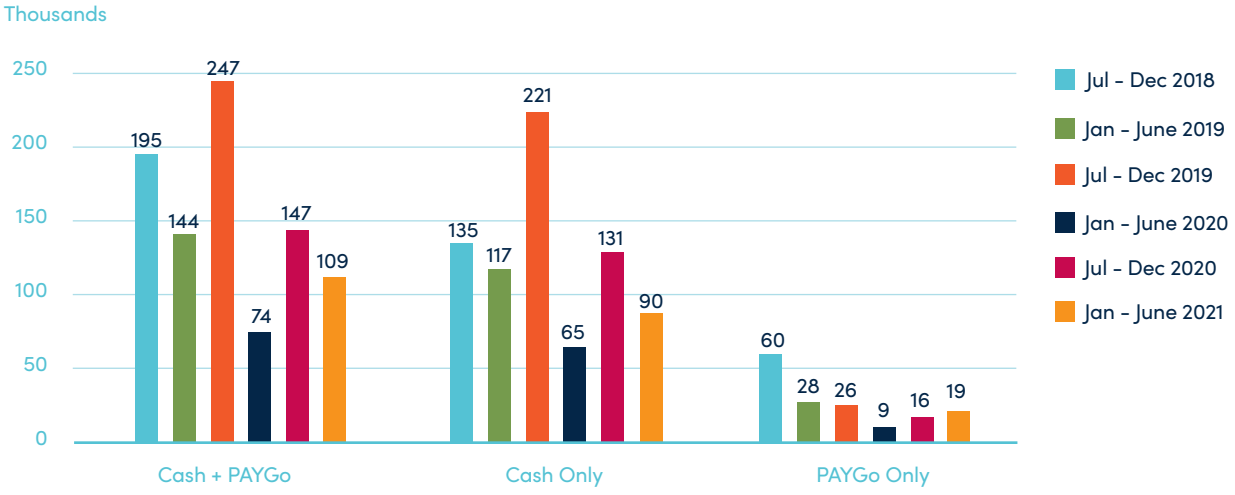


Table 17 - Semi-annual Evolution of Volume of Lighting Products Sold by Lighting Product Category - East Asia and the Pacific

Categories		Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jan-Jun 2019	Share reported as sold PAYGo
Lanterns	0-1.5Wp	**21,098**	-67%	-54%	-41%	0%
	1.5-3Wp	**11,498**	-54%	-55%	-53%	-
Multi-light systems	3-10Wp	**12,482**	-54%	-56%	-54%	25%
Solar Home Systems	11-20Wp	**26,072**	20%	194%	73%	38%
	21-49Wp	**5,000**	82%	7%	-28%	29%
	50-100Wp	**32,429**	425%	-59%	103%	-
	100+Wp					-

NOTE:
Products are classified as 'Cash' when sold in a single transaction (including products purchased via tenders), or as 'PAYGo', when the customer pays for the product in instalments over time or pays for use of the product as a service.

East Asia & Pacific Insights

Countries Overview

High sales in the Philippines are due to bulk procurements, likely in connection to the Philippines Access to Sustainable Energy Program (ASEP)[52].

Sales in Papua New Guinea decreased 38% compared to the previous reporting round, but sales reported for the country are generally irregular. The long term trend indicates a growing market (see section below)

Off-Grid Solar Appliances

Appliance sales in the East Asia and Pacific region seem to be slowly building back up after falling below 4,000 units in the first half of 2020. **Between January and June 2021, close to 6,500 units of key appliances were sold in the region.** The vast majority were sold in cash. Volumes reported for the first half of 2021 remain 37% lower than during the first half of 2019 before the pandemic. PAYGo sales reported in particular have fallen to an all time low of 542 units sold.

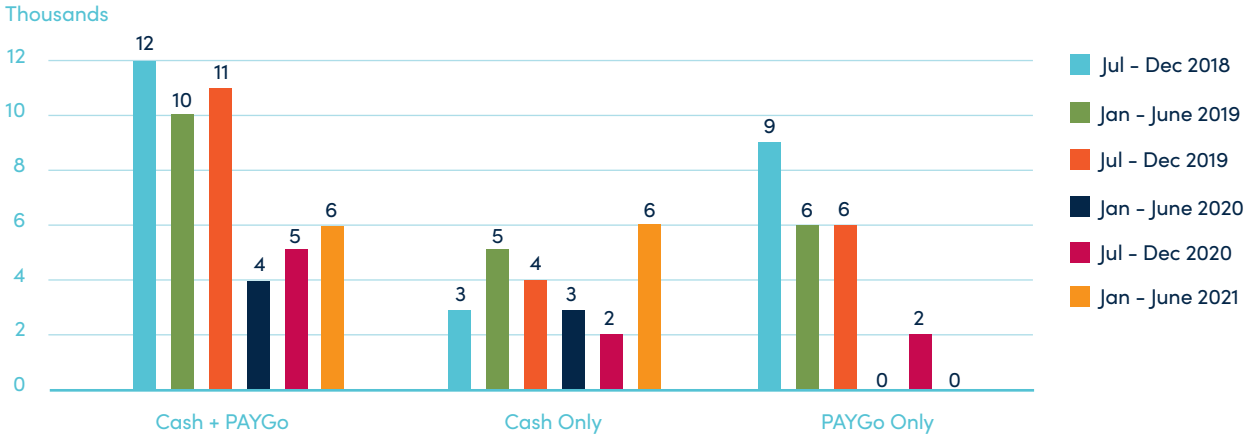
The sales include 5,700 fans, 400 refrigeration units and 300 TVs. The majority of all appliances are reported as being sold bundled with a power system.

Table 18 - Semi-annual Evolution of Volume of Lighting Products Sold by Country - East Asia and the Pacific

Region / Countries	Jan-June 2021 volumes (Cash & PAYGo)	% change v. Jul-Dec 2020	% change v. Jul-Dec 2019	% change v. Jul-Dec 2019
East Asia & Pac.	**109,371**	**-26%**	**-56%**	**-24%**
Philippines	54,493	356%	34%	392%
Papua New Guinea	42,044	-38%	72%	13%
Myanmar	4,775	-44%	-97%	-92%

NOTE:
Countries not featured in this table did not see enough companies reporting to pass the three-data point rule.

Figure 45 - Semi-annual Evolution of Volume of Key Appliances Sold - East Asia and the Pacific



52 See the ASEP website for more details.

East Asia & Pacific Insights

Papua New Guinea (PNG) Insights

Background

After a 3.3% contraction in 2020 due to the COVID-19 pandemic, the PNG economy is expected to return to moderate growth in 2021[53].

The access to energy sector should keep on benefitting from the support of the 'Pawarim Komuniti' grant program set up by the Australian Department of Foreign Affairs and Trade (DFAT). Two calls were closed in 2020 and a third call took place in 2021.

Further support is coming from the USAID-led PNG Electrification Partnership (PEP) which was announced in November 2020 with a $57 million budget and five years to electrify 200,000 households.

Sales Trends

Off-Grid Solar Lighting

Off-grid lighting product sales totalled 42,000 units in the first half of 2021. While this represents a 38% decrease in volumes compared to the second half of 2020, the overall trend for PNG is indicative of a growing off-grid market. Current sales are 13% higher than in the first six months of 2019. Future rounds of data collection will help validate that trend. With few companies reporting, limited data can be shared on product categories. Of particular notice is the fact that more than half of volumes sold in the first half of 2021 were SHS, including 21,000 11-20 Wp SHS. In previous reporting rounds, lanterns usually accounted for the largest share of volumes. Further observations will be necessary to confirm if this is a trend, or due to bulk procurement. Lanterns remain the second most popular category, while 3,100 sales of multi-light systems (3-10 Wp) were also reported.

Appliances

Limited data is available for appliance sales in PNG. 994 units sold were recorded between January and June 2021. **While this represents a 43% decrease compared to the previous reporting round, additional data collection rounds will be required to identify trends in the market as seasonality could also be a factor.**

Of the 994 appliances sold, 285 were TVs that were sold bundled with SHS and 507 were fans, about half of which were bundled with power systems. Not enough companies reported selling RUs or SWPs to be included in this report.

Figure 46 - Semi-annual Evolution of Volume of Lighting Products Sold - Papua New Guinea

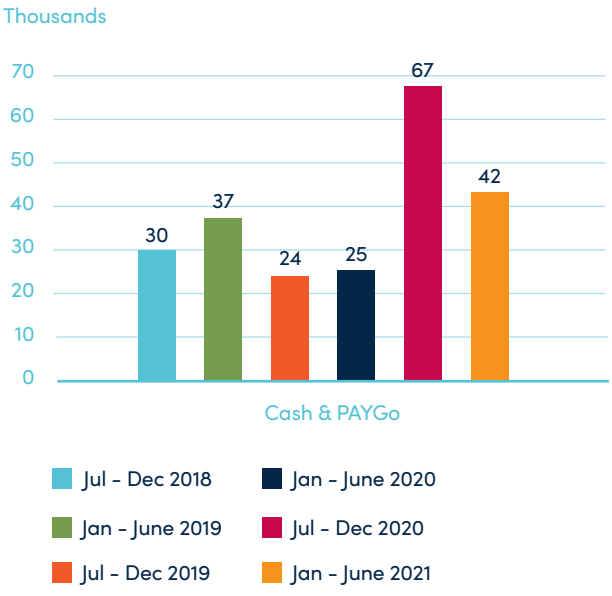
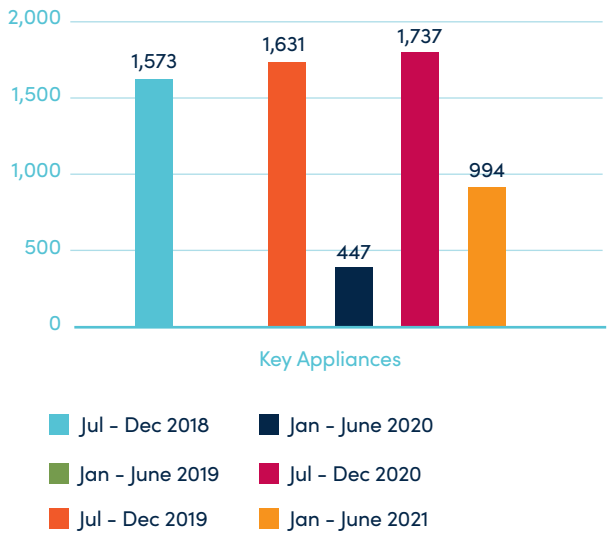


Figure 47 - Semi-annual Evolution of Volume of Key Appliances Sold - Papua New Guinea



53 Asian Development Bank, Economic indicators for Papua New Guinea.

Global Impact

Global Impact

Estimated Impact of Off-Grid Solar Lighting and Appliances

100 million
people currently living in a household with improved energy access[54]

2.6 million
people currently using their SHS to support an enterprise*

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

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

$12.5 billion
savings on energy expenditure, over the expected lifetimes of all portable lanterns or multi-light systems sold since July 2010

86 million
metric tonnes of carbon dioxide and black carbon emissions avoided (in CO_2e), over the expected lifetime of all off-grid solar lighting products sold since July 2010

4.8 million
people currently benefiting from high performing, off-grid televisionstelevisions

93,000
people using high-performing, off-grid TVs to support enterprise

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

4.2 million
currently accessing cooling service from high performing, off-grid fans

24,000
people using high-performing, off-grid fans to support enterprise

$6.7 billion
additional income generated as a result of off-grid system ownership, over the expected lifetime of all off-grid solar lighting products sold since July 2010

* E.g. charging phones for a fee or operating a bar, restaurant or shop/stall at night

54 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.

Energy Access

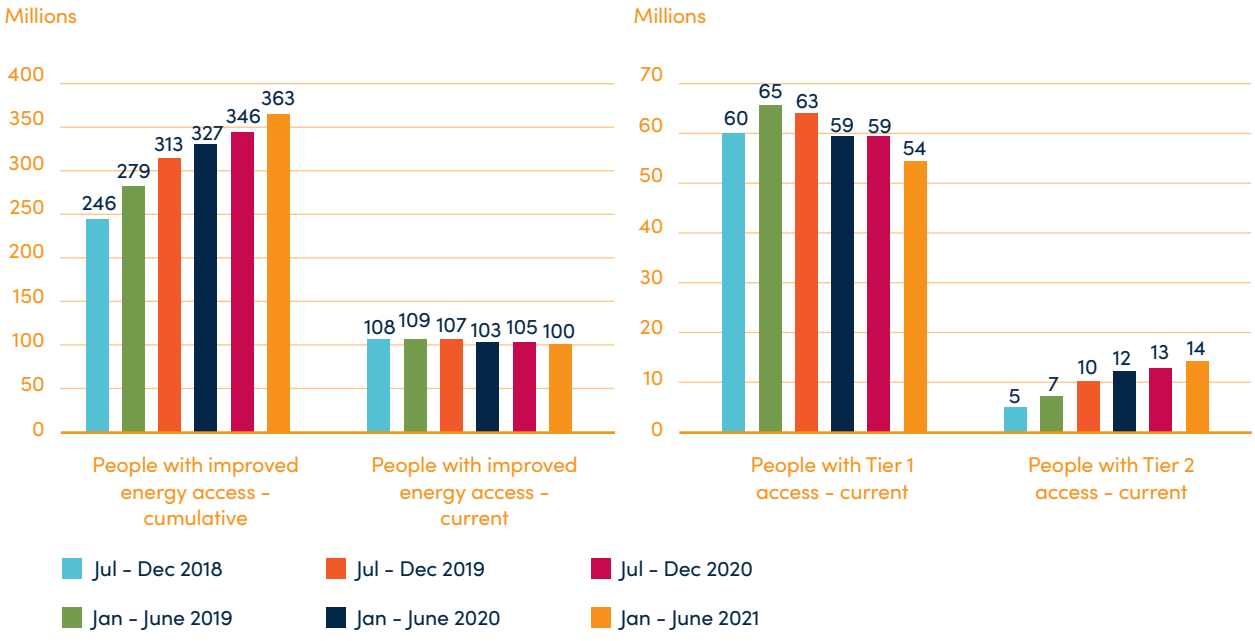
There are just 9 years left to achieve SDG7 - affordable, reliable, sustainable and modern energy for all. Currently, off-grid solutions sold by affiliates are serving 100 million people and have benefited more than 360 million people since 2010. Of these 104 million, 54 million are currently accessing Tier 1 solutions and 14 million are accessing larger SHS, Tier 2, solutions.

The prolonged fall in sales volumes along with past sales reaching their expected lifespan has led to a decrease in the number of people currently benefiting from energy access - with the exception of access to Tier 2 solution which has grown 4% compared to the last reporting round[55]. While this highlights the need for the sector to return to growth, it should be highlighted that the decreasing trend may not entirely translate into loss of access for customers. The methodology used to calculate current access to energy follows a conservative approach to expected product lifespan based on warranty periods and a multiplying factor[56]. Therefore, this method is likely to underestimate the number of active connections.

Nonetheless, 759 million people are still living in energy poverty[57], and population growth means that millions more will need to be reached by 2030. **Despite off-grid solar solutions providing the fastest and most affordable way to electrify hundreds of millions of people, across the last 18 months, the reversal in the growth of the off-grid solar market led to an estimated 12-23 million people missing out on improved energy access**[58].

Off-grid solar remains an important solution to address energy poverty and climate change. It has the potential to be deployed more rapidly than any other electrification technologies, and to reach the most remote communities that will not be connected to the grid for decades to come. Off-grid solar also delivers a wealth of other economic, social and environmental benefits which are detailed in the rest of this report.

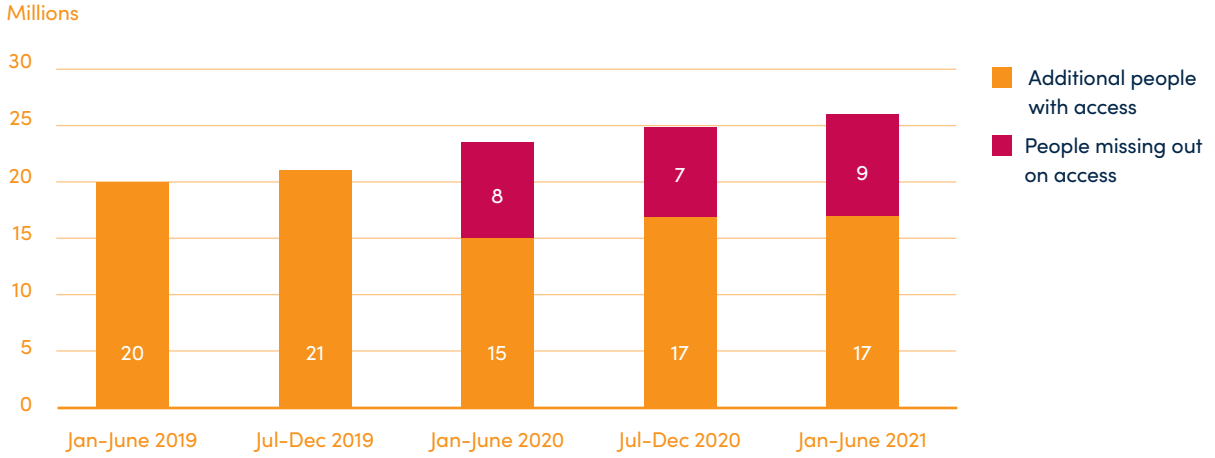
Figure 48 - Semi-annual Evolution of Energy Access (total and Tier 1 & 2) - World



NOTE:
The Tiers of Energy Access are computed based on the Sustainable Energy for All (SEforAll) Global Tracking Framework. Tier 1 refers to basic energy access, including lighting and phone charging, while households with Tier 2 access receive enough electricity to additionally power energy-efficient household appliances such as TVs.

55 The H2 2020 results for Tier 2 access included a product which only provided Tier 1 access as a Tier 2 solution. This has been corrected in this edition of the report for H2 2020 and H1 2021.
56 Expected product lifespan is estimated to be 1.5x the product warranty. See Methodology for more details.
57 IRENA et al. (2021), Tracking SDG 7: The Energy Progress Report 2021.
58 High level estimate based on access rates if sales numbers had been similar to numbers seen in 2019 (lower bound) or had risen by the same 13% increase as they did between 2018 and 2019 (upper bound), using the Standardised Impact Metrics.

Figure 49 - Semi-annual Evolution of the Number of People Gaining Improved Energy Access and of the Number of People Missing Out on Improved Energy Access due to the COVID-19 Pandemic[59] - World



Economic Impacts of Off-Grid Solar

4.8 million people are currently undertaking more economic activity as a direct result of owning an off-grid solar lighting product. **Cumulatively, economic opportunities unlocked or improved through ownership of off-grid solar products has led to $6.7 billion in additional income generated at the user-level since 2010.** Coupled with the savings that smaller off-grid products, such as lanterns and multi-light kits, have created for households, the sector's benefit to the finances of millions of low-income households is over $19 billion since 2010.

In particular, off-grid solutions are boosting economic opportunity across rural and peri-urban communities. **An estimated 2.6 million small and micro enterprises are currently supporting their activity with off-grid solar products - the majority of them are based in rural regions.**

The slowdown in sales also represents a missed opportunity to support entrepreneurs and help drive economic recovery from the COVID-19 pandemic. If the sales numbers for the past 18 months had been similar to that seen in 2019, or the market had seen the same levels of growth between 2019 and 2020 as it did between 2018 and 2019, the estimated number of enterprises benefiting from off-grid solar solutions could have jumped by an additional 300,000 - 600,000[60].

Return to growth and support for productive use of energy are key in building resiliency for the most vulnerable households and businesses by improving savings, income and productivity. Energy efficient appliances also play a key role in developing resilience in agriculture and food value chains by improving access to irrigation, cold storage and processing.

Environment & Air Pollution

As with economic impact, the rate of greenhouse gas reductions created by the sector has also slowed. **However, this has still taken the total CO_2e emissions avoided since 2010 (across product life-time) to almost 86 million metric tons.** This is equal to the emissions avoided by taking 22 coal power plants off-line for a year[61]. Emissions reductions also have critical health benefits. Most emissions are avoided when off-grid solar solutions replace the use of toxic kerosene lamps. Research shows that inhalation of kerosene can lead to respiratory illness, pneumonia and tuberculosis[62,63] and that its most damaging effects are on women and children. Removing kerosene pollution from homes significantly improves air quality and health.

New data is also available on the emissions avoided by the use of off-grid televisions and fans. Although these products commonly provide an

59 High level estimate based on access rates if sales numbers had risen by the same 13% increase as they did between 2018 and 2019, using the Standardised Impact Metrics. Estimates rely on simplified calculations and do not necessarily align exactly with impact metrics. Minor discrepancies due to rounding.
60 High level estimate based on access rates if sales numbers had been similar to numbers seen in 2019 (lower bound) or had risen by the same 13% increase as they did between 2018 and 2019 (upper bound), using the Standardised Impact Metrics.
61 United States Environmental Protection Agency (2021), Greenhouse Gas Equivalencies Calculator.
62 Pokhrel et al. (2010), Tuberculosis and Indoor Biomass and Kerosene Use in Nepal: A Case–Control Study.
63 Bates et al. (2013), Acute Lower Respiratory Infection in Childhood and Household Fuel Use in Bhaktapur, Nepal.

additional rather than replacement energy service, where solar powered TVs and fans replace those that are being powered by diesel generators, valuable benefits are seen.

Emissions avoided by high-performing fans and televisions since July 2018 are already close to 18,000 metric tons. This is equivalent to the carbon sequestered over 10 years by planting 298,000 trees[64].

Light Use & Quality

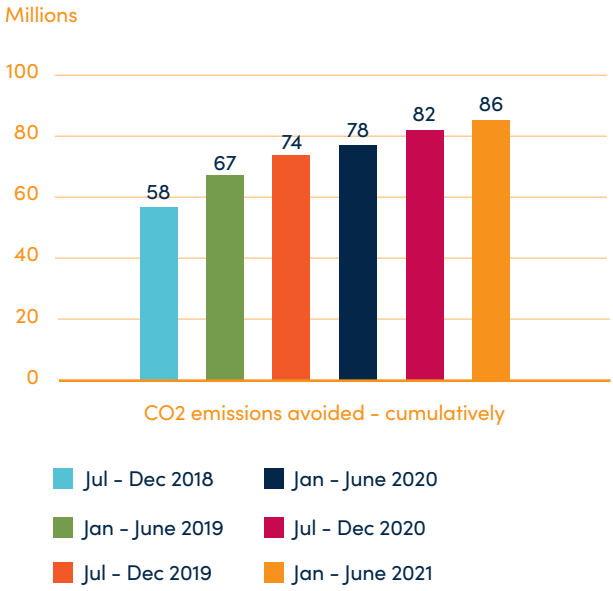
Product improvements in the sector on battery lifetime and lumen output (brightness) are leading to better and longer access to light for households. Households moving from kerosene lamps (25 lumens) or candles (12 lumens) to off-grid solar lighting products are gaining more than 200 lumens on average. They are also likely to gain more than 1,700 hours of access to light per year which amounts to almost five hours per day.

Access to High-Performing TVs

For the second time, the impact of high performing off-grid TVs and fans has been captured through the development of standardized impact metrics for these appliances, with support from the Efficiency for Access coalition. **An estimated 5.1 million people are currently benefiting from the use of off-grid TVs, with more than 90,000 people using their TV to support an enterprise.**

The importance of access to TVs and other communication devices, such as radios and mobile phones, has also been spotlighted by the COVID-19 pandemic. Solar powered TVs are playing a critical role in enabling households to access health information and news, with 90% of off-grid TV customers reporting that their knowledge or awareness of current affairs, politics, and general knowledge has improved[65].

Figure 50 - Semi-Annual Evolution of CO2e Emissions Avoided Cumulatively - World



Access to High-Performing Fans

This report reveals the impact of high-performing fans, which are currently benefiting 4.2 million people and are being used to support more than 24,000 businesses.

Fans play a critical role in cooling for health and comfort, keeping body temperature at a safe level and reducing fatigue. Research from Bangladesh found that 92% of off-grid fan customers observed improvement in their family's health, and that - on average - fans extended customers' productive time by more than two hours[66].

64 United States Environmental Protection Agency (2021), Greenhouse Gas Equivalencies Calculator.
65 Efficiency for Access and 60 Decibels (2020). The Use and Impact of Solar TVs.
66 Efficiency for Access Coalition (2020), The Socio-Economic Impact of Super-Efficient Off-Grid Fans in Bangladesh.

Global Impact

Table 19 - Global Impact by Product Category - Lighting

Product Categories	People with improved energy access - cumulatively	People with improved energy access - currently	People with access to Tier 1 energy services - currently	People with access to Tier 2 energy services - currently
All Categories	**363 million**	**100 million**	**54 million**	**14 million**
0-1.5 Wp	151.7 million	27.2 million	6.1 million	0
1.5-3 Wp	138.8 million	33.0 million	25.1 million	0
3-10 Wp	44.6 million	17.7 million	16.1 million	0
11-20 Wp	9.0 million	6.2 million	5.8 million	0.005 million
21-49 Wp	7.5 million	5.9 million	0.8 million	4.7 million
50-100 Wp	7.6 million	6.8 million	0.02 million	6.4 million
100+ Wp	3.5 million	2.9 million	-	2.9 million

Product Categories	People undertaking more economic activity	People using products to support enterprise	People that spend more time working	Additional income generated - cumulatively
All Categories	**4.9 million**	**2.6 million**	**2.5 million**	**US$ 7 billion**
0-1.5 Wp	0.8 million	0.7 million	0.3 million	US$ 1.6 billion
1.5-3 Wp	1.0 million	0.6 million	0.3 million	US$ 1.4 billion
3-10 Wp	1.6 million	0.7 million	1.0 million	US$ 2.1 billion
11-20 Wp	0.4 million	0.2 million	0.3 million	US$ 0.4 billion
21-49 Wp	0.4 million	0.2 million	0.3 million	US$ 0.4 billion
50-100 Wp	0.4 million	0.2 million	0.3 million	US$ 0.5 billion
100+ Wp	0.2 million	0.09 million	0.1 million	US$ 0.3 billion

Product Categories	Additional Light Hours Used - Cumulatively	Additional Light Hours Used - Household	Change in quality of light - Household (average in lumens)
All Categories	**93 billion**	**1,770**	**208**
0-1.5 Wp	37.1 billion	1,693	-8
1.5-3 Wp	34.4 billion	1,796	49
3-10 Wp	10.6 billion	1,481	153
11-20 Wp	2.5 billion	1,500	330
21-49 Wp	2.3 billion	1,566	811
50-100 Wp	3.9 billion	2,679	491
100+ Wp	1.9 billion	2,769	2,040

Table continues on next page >

Global Impact

Product Categories	Change in energy spending - cumulatively	Change in energy spending - household	Kerosene lanterns replaced - currently	CO2e emissions avoided - cumulatively
All Categories	**US$ 12 billion**	**$184**	**19.7 million**	**85.5 million**
0-1.5 Wp	US$ 6.4 billion	$173	5.7 million	35.1 million
1.5-3 Wp	US$ 4.8 billion	$202	6.8 million	31.2 million
3-10 Wp	US$ 1.3 billion	$198	3.3 million	10.2 million
11-20 Wp	$-	$-	1.2 million	2.4 million
21-49 Wp	$-	$-	1.2 million	2.2 million
50-100 Wp	$-	$-	1.1 million	2.9 million
100+ Wp	$-	$-	0.5 million	1.5 million

NOTE:

- Impact is estimated using the GOGLA Standardised Impact Metrics for the Off-Grid Solar Energy Sector. Please note that the current approach is based on best available research information and data. All numbers calculated using the metrics should be interpreted as estimates.
- Lanterns 0-1.499 Wp include one light and no mobile charging, lanterns 1.5-2.999 Wp one light and mobile charging, and multi-light systems 3-10.999 Wp at least two lights and mobile charging. Solar home systems >11 Wp are classified based on panel wattage.

Table 20 - Global Impact by Product Category - Appliances

	No. of people benefitting, cummulative appliances	No. of people benefitting, currently	No. of People using their appliance to support enterprise	No. of people generating additional income	Metric tons of CO2 avoided
TVs	5.1 million	4.8 million	92,678	41,190	11,182
Fans	8.1 million	4.2 million	23,873		6,631

NOTE:

- Impact is estimated using the Standardised Impact Metrics for High-Performing Appliances: Fans and TVs, Version 1, 2020 developed by GOGLA and the Efficiency for Access Coalition. Please note that the current approach is based on best available research information and data. All numbers calculated using the metrics should be interpreted as estimates.
- The metric 'Number of People Generating Additional Income' is currently only available for TVs.

Methodology

Methodology of Sales Data Collection

General

Overview

Every six months, GOGLA with support from Lighting Global, the Efficiency for Access coalition (the Partners) and Berenschot collect data from participating companies through an online survey. Companies share data on product specifications and volumes sold per product and per country for the past half-year. Products include lighting products (solar lanterns, multi-light systems and solar home systems) and energy-efficient electric appliances (with a focus on TVs, fans, refrigeration units and solar water pumps). This report collected sales data for the period ranging from January to June 2021.

Collected data is processed and aggregated by GOGLA and Berenschot, with support from Partners, to provide the insights needed for this report. All data goes through a thorough quality control process to ensure consistency, but companies are ultimately responsible for accurate reporting.

Data is collected from manufacturers and distributors (see definition below). To avoid double-counting sales, only data compiled from companies categorized as manufacturers is presented. Data published in this report is mostly aggregated sales volumes data. Other computations include:

- The estimated market value for lighting products is calculated separately for cash and PAYGo products (see definitions below). For cash sales, market value is determined by multiplying the sales volume by an estimate of retail price. This price is based on FOB prices reported by companies and a mark-up to estimate margins. For PAYGo, sales volumes are multiplied by the Total Cost of Ownership (TCO, see definition below).
- The newly installed capacity from lighting products represents the total peak power output of solar panels deployed during this reporting round.
- The sector's impact is estimated using the Standardised Impact Metrics for the Off-Grid Solar Energy Sector[67] and the Standardised Impact Metrics for High-Performing Appliances: Fans and TVs[68]. Metrics for solar water pumps are currently being developed.

The detailed methodology can be accessed on the GOGLA website.

Key definitions

Cash/PAYGo:

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

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

Total Cost of Ownership: The TCO represents the average amount received from a customer repaying the product in full and on time, including deposit payment and all regular daily, weekly, or monthly payments, without applying a financial discount rate to this value.

Scope

Participating companies

This report solely includes data on products sold by affiliates. Affiliates are companies connected to the partner organizations involved in the reporting process. Companies include GOGLA members, companies selling products that meet VeraSol Quality Standards, and appliance companies that participated in the Global LEAP Awards or are engaging with the Low Energy Inclusive Appliances (LEIA) program. **101 companies participated in this round and reported sales covering the period January - June 2021.** Among them 61 reported sales for both lighting and appliances, 26 just for lighting and 14 just for appliances.

67 GOGLA, Standardised Impact Metrics for the Off-Grid Solar Energy Sector.
68 CLASP, Standardised Impact Metrics for High-Performing Appliances: Fans and TVs.

Methodology of Sales Data Collection

Table 5 - List of Participants Reporting Sales

#	Company Name	Off-Grid Solar Lighting	Off-Grid Solar Appliances
1	A4&T Power Solutions Limited	DIS	-
2	Agsol	-	MAN
3	Algaria Solar	DIS	
4	ALTECH GROUP SARL	DIS	
5	ARESS	DIS	-
6	Azuri Technologies	MAN	
7	BAOBAB+	DIS	
8	Barefoot Power	MAN	
9	Bboxx Ltd	MAN	MAN & DIS
10	BeebeeJump Technology	MAN	
11	Bengal Renewable Energy	MAN	
12	BioLite	MAN	-
13	Bright Products AS	MAN	-
14	CECEP Solar Energy Technology	MAN	-
15	d.light design Inc.	MAN	
16	Dassy Eneterprise	DIS	-
17	Deevabits Green Energy	DIS	MAN
18	Devidayal Solar Solutions Pvt	MAN	
19	DGridEnergy LLC	MAN	-
20	Dulas Ltd	-	MAN
21	Earth Technologies	MAN	-
22	Easy Solar (Azimuth)	DIS	
23	Energy+ SA	DIS	
24	Ennos AG	-	MAN
25	Epicenter Africa	DIS	
26	Fenix International	MAN	
27	Finca Pus llc t/a BrightLife	DIS	
28	Fosera Solarsystems	MAN	
29	Futurepump Limited	-	MAN
30	GLOBAL ICE TEC	-	MAN
31	Goodbook Investments	DIS	-
32	Greenlight Planet	MAN	MAN & DIS
33	Guangdong Jinyuan Lighting	MAN	-
34	Innovation Africa	-	MAN & DIS
35	JIROGASY	MAN	
36	Jonchn Electrical Science & Technology	MAN	-
37	Jua Energy	MAN	
38	Koolboks	-	MAN
39	Lagazel	MAN	-
40	Little Sun	MAN	-
41	Mango Energy	MAN	-
42	Micergy	MAN	
43	M-KOPA	MAN	
44	Mobisol	MAN	
45	Moon	MAN	-
46	Mwezi Limited	DIS	
47	Namene Solar Light	MAN	-
48	National Solar Power Authority (NASPA)	DIS	
49	Niwa	MAN	
50	Offgridsun	MAN	
51	OmniVoltaic Energy Solutions	MAN	

#	Company Name	Off-Grid Solar Lighting	Off-Grid Solar Appliances
52	Oolu Solar	DIS	MAN
53	OVO Solar Technologies	-	MAN
54	Pawame	DIS	
55	PEG Africa	DIS	
56	Plug The Sun	MAN	DIS
57	Poly Solar Technologies	MAN	-
58	Power Trust Uganda	DIS	
59	Powerband Green Energy	MAN	DIS
60	Qingdao LEFF International Trading	MAN	
61	Qotto	DIS	MAN
62	Rahimafrooz Renewable Energy	MAN	
63	RDG Collective	MAN	
64	Shanghai Easy R-Energy	MAN	-
65	Shenzhen JCN New Energy Technology	MAN	-
66	Shenzhen Power Solutions	MAN	
67	Shenzhen Solar Run Energy	MAN	
68	Shenzhen Sun's Energy	MAN	DIS
69	Signify	MAN	-
70	Simusolar	-	MAN
71	Sinoware Technology	MAN	-
72	Smarter Grid International	MAN	
73	Solar Panda	MAN	
74	Solar Sister	DIS	
75	Solar Village	MAN	
76	SolarWorks!	DIS	MAN & DIS
77	Solektra Rwanda	DIS	-
78	Solibrium Solar	DIS	
79	Sosai Renewable Energies	DIS	
80	SUNami Solar	MAN	
81	SunCulture	MAN	
82	SunDanzer	-	MAN
83	SUNKEN	-	MAN
84	Sunny Irrigation	-	MAN
85	Sunny Money (Solar Aid)	DIS	-
86	SunTransfer Kenya	MAN	
87	Super Star Renewable Energy (SSG Solar)	MAN	
88	Taatisolar Namibia	DIS	
89	Tamoor Fans	-	MAN
90	Total Energies SAS	MAN & DIS	DIS
91	UltraTec	DIS	
92	UpOwa	DIS	-
93	Village Boom	MAN	-
95	Vitalite Senegal	DIS	
95	Vitalite Zambia	DIS	
96	Volt Africa	DIS	-
97	X-Solar Systems	MAN	DIS
98	Youmma Solar	-	MAN
99	Zola Electric	MAN	
100	Zonful Energy	DIS	MAN & DIS
101	Zuwa Energy	DIS	MAN & DIS

NOTE:
Companies are classified as either distributors (DIS) of other companies' branded products, or as manufacturers (MAN) if they are selling their own-brand products. For the Off-Grid Solar Appliances category, there may be companies classified as both manufacturers and distributors, as companies often sell both their own branded appliances, while also distributing other companies' products.

Methodology of Sales Data Collection

All data in this report is self-reported by the companies. Although it is cross-checked for consistency, the companies are ultimately responsible for accurate reporting of product specifications, pricing information, sales volumes, and locations of sales.

Market Share Represented

For Off-Grid Solar Appliances, the proportion of the total market that is represented by our affiliates has not yet been estimated. This is partly due to insufficient data on the total size and number of players in this market. Continuous efforts are made to estimate such coverage as well as ongoing efforts to engage a larger number of companies in upcoming rounds.

For Off-Grid Solar Lighting Products, based on the recently completed analysis for the '2020 Global Off-Grid Solar Market Trends Report', it is **estimated that in 2018 sales of affiliates represent over 50% of the market for plug-and-play solar home systems. When including portable lanterns and multi-light systems the percentage of affiliates in 2018 decreases to 28%.**

Countries and Regions

The regional groupings in this report follow those outlined by the World Bank country and lending groups[69]. Sub-regional groupings in sub-Saharan Africa follow the United Nations' categorization of geographical sub-regions[70].

Confidentiality and the Three-data Point Rule

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

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69 World Bank, World Bank Country and Lending Groups.
70 United Nations Statistics Division, Standard Country or Area Codes for Statistical Use (M49).

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