EFFICIENCY FOR ACCESS

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THE STATE OF THE OFF-GRID APPLIANCE MARKET

COUNTRY PROFILES
OCTOBER 2019
EFFICIENCY FOR ACCESS COALITION

CONTEXT

This report analyzes major trends in the off-grid appliance sector, establishes its position as a fast-growing and attractive market, and seeks to mobilize investment and policy support to accelerate the sector's growth.

The report builds on the 2016 *State of the Off-grid Appliance Market* report, published by Global LEAP, which represented the first comprehensive accounting of the state of the household appliance sector. It provided the first-ever snapshot of the global off-grid appliance market via data-driven analysis of the scale, market trends, and barriers for three important and promising appliance categories: televisions, refrigerators, and fans. This report refreshes the 2016 analysis and builds upon its earlier findings, adding further data from recent Efficiency for Access Coalition research, GOGLA survey data on appliance sales, a review of the broader scholarly literature, updated interviews with key off-grid appliance enterprises, and country deep-dive profiles for Côte d'Ivoire, Ethiopia, India, Kenya, Myanmar, Nigeria, Sierra Leone, and Uganda to illustrate the diversity of sector challenges and opportunities.

This report was developed by Dalberg Advisors in close collaboration with CLASP as part of the Low Energy Inclusive Appliances program, a flagship program of the Efficiency for Access Coalition. Efficiency for Access is a global coalition promoting energy efficiency as a potent catalyst in clean energy access efforts. Currently Efficiency for Access Coalition members lead 12 programs and initiatives spanning three continents, 44 countries, and 22 key technologies.

The Efficiency for Access Coalition is jointly coordinated by CLASP, an international appliance energy efficiency and market development specialist non-for-profit organization, and the UK's Energy Saving Trust, which specializes in energy efficiency product verification, data and insight, advice, and research.

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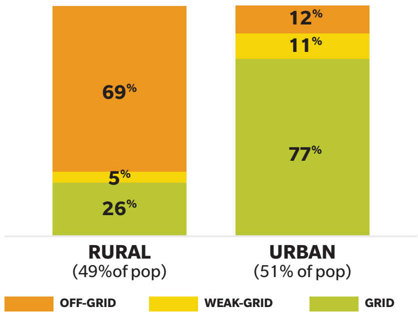
CÔTE D'IVOIRE APPLIANCE MARKET SNAPSHOT

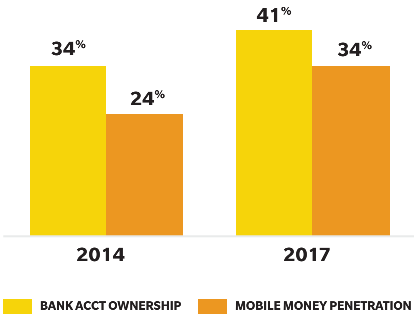
Côte d'Ivoire is a promising market for off-grid appliances. It features a relatively large off-grid population, rising income levels, and increasing mobile money penetration which is enabling the growth of PAYGO models. Numerous off-grid solar firms are prioritizing the market, and this is driving a sharp uptake in bundled appliance sales.

Key Statistics

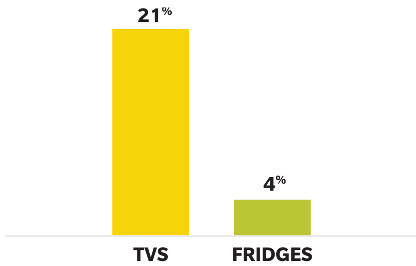
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]



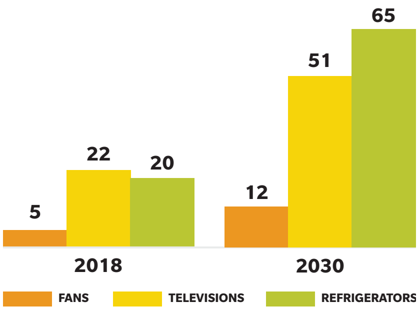
Share of rural population who own household appliances (%, 2011-2012)[3]



Fan ownership data is not available. Industry players report a very small market for fans.

Market Dynamics

Current (2018) and future (2030) obtainable market size (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Medium	356-406mm	15-50	The market is relatively nascent. A number of partnership approaches are being developed, especially in using MFIs for consumer financing and distribution.
	Very high	24"-32"	200-400	
	Very low	50-250L	200-1,300	

The off-grid appliance market is relatively young in Côte d'Ivoire, but the broader off-grid solar sector is growing rapidly and driving appliance uptake. Several international PAYGO solar companies have entered the market and are selling bundled solar home appliances. These include Baobab+, Zola Electric, Fenix International, Lumos, and PEG Africa. The competitive environment is driving down retail prices and forcing firms to differentiate their product offerings by providing high quality customer service. Consumers are reported to have high demand for televisions and radios, while fans are also in demand given the hot and humid climate.

Enabling Environment

Consumer financing: Traditionally, there has been limited access to credit for off-grid households in Côte d'Ivoire. The MFI sector does not have extensive reach into rural areas and most customers of off-grid appliances have never before taken credit. Over the past few years, off-grid solar firms have started to offer PAYGO financing for bundled appliances, either providing it themselves or in partnership with MFIs, rapidly expanding access to finance for off-grid appliances.

Policy: Côte d'Ivoire has seen a significant expansion of rural electrification, now at 38%, driven by the National Program for Rural Electrification (PRONER). This opens up the market for off-grid appropriate appliances. However, there is a relatively unfavorable tax environment for standalone solar and off-grid appliances which, despite a reduction from 18% VAT, are still subject to 9% VAT and 20-25% import duty. This raises the end cost to consumers and is cited as a major constraint to uptake. There is also some uncertainty over which off-grid appliances are eligible for the VAT reduction. Additionally, a policy under discussion seeks to restrict geographical distribution of standalone systems by suppliers in a bid to push them to address needs in underserved regions, this threatens to make the market less attractive.

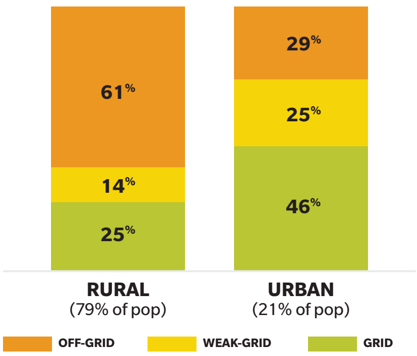
1. International Energy Agency, 2018, World Energy Outlook; Afrobarometer, 2017, Electrification rate; World Bank DataBank, 2018; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Data for TVs and Fridges is from the Côte d'Ivoire Demographic and Health Survey, 2011-2012; Anecdotally, fan ownership is reported to be very low. 4. Dalberg, Market sizing and analysis. 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews.

ETHIOPIA APPLIANCE MARKET SNAPSHOT

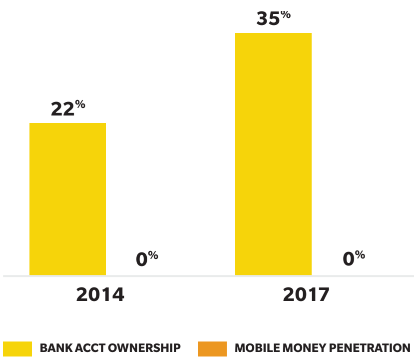
Despite a large off-grid population and national electrification efforts, Ethiopia's market for off-grid appliances has been restricted by a challenging regulatory environment, limiting uptake of both standalone solar systems and appliances.

Key Statistics

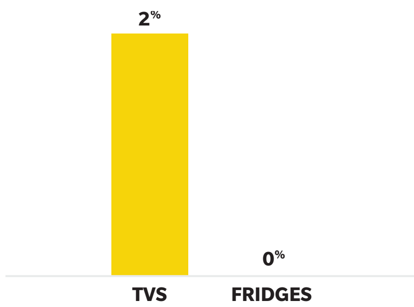
Grid, weak-grid and off-grid connection in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]



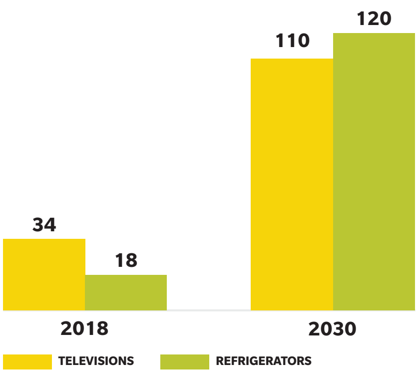
Share of rural population who own household appliances (%, 2016)[3]



Fan ownership data is not available. Industry players report a very small market for fans.

Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
Fan	Very Low	— —	— —	Distributors struggle to enter the Ethiopian market—despite its size and potential—due to the challenging regulatory and currency environment.
TV	Low	22"-24"	200-400	
Fridge	Very low	50-100L	700-900	

Local and small importers and wholesalers dominate the market, while international players hesitate to enter because foreign exchange controls prevent them from moving local currency out of Ethiopia. The high cost of appliances, the result of import taxes and foreign exchange restrictions, limits their sales. Purchases of cheaper lighting products such as lanterns are more common.

Enabling Environment

Consumer financing: The Ethiopian mobile money landscape is at a transition point, with Ethiotelecom, the national telecommunications company, in the process of exploring a variety of mobile money options. Unlocking this potential will increase consumers' ability to purchase off-grid appliances, especially as bank account ownership rates remain low.

Policy: The Government of Ethiopia is undertaking an ambitious National Electrification Program targeting universal access to electricity services by 2025. Off-grid services is one of the three core pillars of the program. To enable expansion of off-grid solutions, the Development Bank of Ethiopia has partnered with the World Bank's International Development Association (IDA) to provide USD 40 million in working capital loans to businesses providing household scale solar solutions. However, the Ethiopia market remains less attractive to international off-grid investors because of currency exchange controls and high import duties. Together, these restrictions drive up product prices but are yielding early investments in local manufacturing, with Fosera pioneering a local assembly plant.

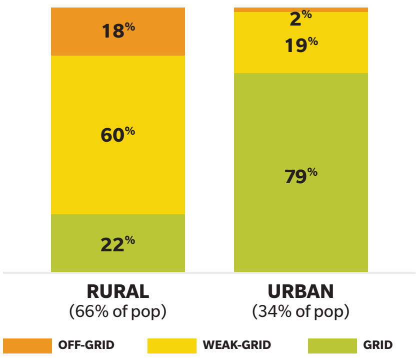
1. International Energy Agency, 2018, World Energy Outlook; World Bank DataBank, 2018; Dalberg estimates of bad-grid population size; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Data for TVs and Fridges is from the Ethiopia Demographic and Health Survey, 2016; Anecdotally, fan ownership is reported to be 0%. 4. Dalberg, Market sizing and analysis. 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews.

INDIA APPLIANCE MARKET SNAPSHOT

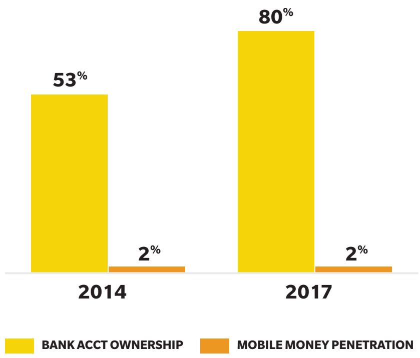
India is the largest potential off-grid appliance market due to its large population and high weak- and off-grid prevalence. Ownership of household appliances is already relatively high—a unique feature distinguishing India from other developing countries. India's connection status is improving rapidly but the grid remains weak in many areas, and demand for more efficient, off-grid appliances is expected to be material in the next five years in off- and weak-grid areas.

Key Statistics

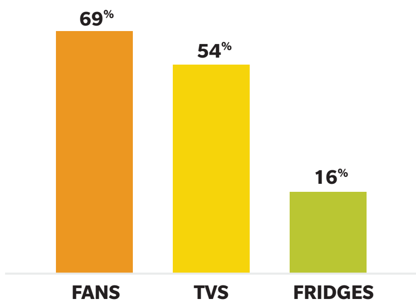
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]

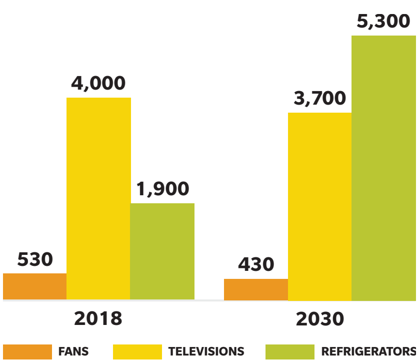


Share of rural population who own household appliances (%, 2015-2016)[3]



Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Very high	305-406 mm	9-40	The market is primarily served by domestic or generic manufacturers and distributors. It is competitive with many actors and price pressure. Demand for off-grid appliances is likely to remain material in the short-term (3-5 years) despite rapidly improving grid coverage.
	High	21"-32"	200-360	
	High	200-250L	525-825	

Local distributors and retailers drive distribution of off-grid appliances in India. These players partner with microfinance institutions to tap into their customer bases and offer financing. India already has a relatively high penetration of household appliances. Demand for off-grid appliances is expected to remain sizeable over the next 3-5 years, with households in weak-grid areas driving demand. Appliances that can work on both solar and grid-based electricity will be especially desirable because they are suited to the needs of these weak-grid customers. Fans remain India's most demanded appliances due to the hot and humid climate, while televisions are the next most popular product.

Enabling Environment

Consumer financing: Traditional PAYGO financing is not available due to low mobile money account penetration. However, mobile banking infrastructure is very strong (via Unified Payments Interface – UPI). The microfinance sector is well developed and has become the primary provider of off-grid appliance financing to consumers.

Policy: The government has instituted tax concession rates (5% Goods and Services Tax) for locally manufactured appliances such as solar TVs, fans and refrigerators to boost the solar manufacturing industry.

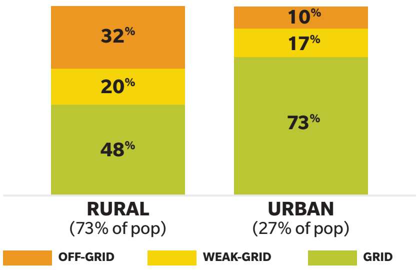
1. International Energy Agency, 2018, World Energy Outlook; World Bank DataBank, 2018; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. India Demographic and Health Survey, 2015-2016; 4. Dalberg, Market sizing and analysis; 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews.

KENYA APPLIANCE MARKET SNAPSHOT

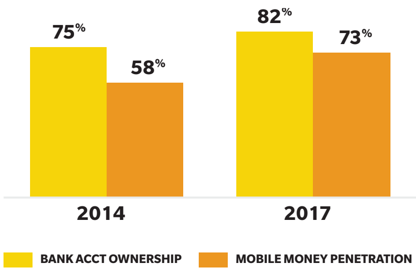
Kenya is the leading market for off-grid appliances in sub-Saharan Africa as a result of its mature solar industry, high mobile money penetration, and fast-growing consumer segment.

Key Statistics

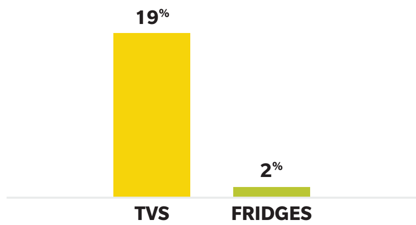
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]



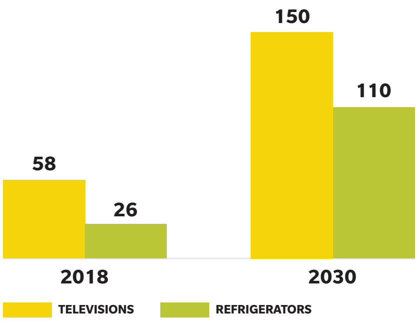
Share of rural population who own household appliances (%, 2015)[3]



Fan ownership data is not available. Industry players report a very small market for fans.

Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Very low	——	——	Established SHS players are accelerating the distribution and uptake of televisions; refrigerators are now starting to find a market as prices decline; fans are not as in demand.
	Very high	24"-32"	200-450	
	Low	35-112L	500-800	

The Kenyan off-grid appliances market is sizable and growing rapidly on the back of the country's existing solar customer base and footprint. Vertically-integrated off-grid solar firms, for whom Kenya is a key market, are upgrading their customers to larger systems and bundling them with appliances. Many generic DC and AC products are being imported from Asia, and though these products do not come with financing solutions, they are driving competition in the market. Televisions are in high demand and partnerships with content providers such as Zuku have further driven uptake. Early market testing of refrigerators indicates that there is significant demand and an off-grid customer base who can afford such products. Interest in fans is low due to the climate and consumer preferences.

Enabling Environment

Consumer financing: The mobile money ecosystem is relatively mature and features high penetration, making Kenya the leading market for PAYGO financing models in sub-Saharan Africa. This continues to make solar home systems and appliances affordable to many customers for whom the upfront cost would otherwise be prohibitive. Today, over 40% of verified sales of off-grid appliances in Kenya are sold using PAYGO. Local banks and MFIs have also started to develop loan products targeting solar products, and there are several working capital facilities expanding access to finance for distributors.

Policy: The Government of Kenya has implemented largely favorable policies for the off-grid energy sector. The national electrification strategy recognizes the important role which standalone solar and mini-grids will play in expanding access to energy for all Kenyans. There are numerous government-sponsored initiatives such as the Kenya Off-Grid Solar Access Project for Underserved Counties (KOSAP) which seeks to use smart subsidies to expand uptake of solar products in undeserved counties. The tax regime has overall been conducive to sector growth, with full VAT and import duty exemptions for off-grid appliances. However, the tax regime has been inconsistently applied by the authorities, so the benefits have not always been realized by industry.

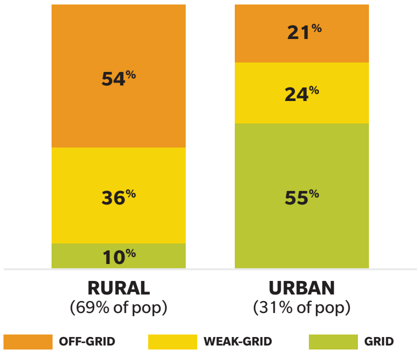
1. International Energy Agency, 2018, World Energy Outlook; Afrobarometer, 2017, Electrification rate; World Bank DataBank, 2018; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Kenya Demographic and Health Survey, 2015; 4. Dalberg, Market sizing and analysis; 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews.

MYANMAR APPLIANCE MARKET SNAPSHOT

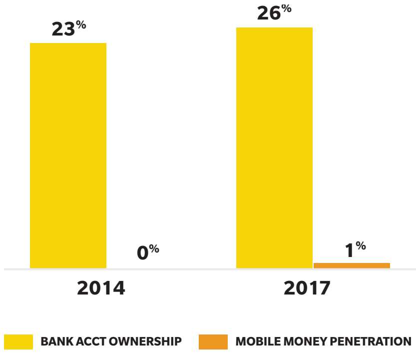
Myanmar represents a considerable appliances market. A national electrification initiative has prioritized the off-grid energy sector with a specific focus on appliances. The plan targets the distribution and sale of 800,000 quality-verified off-grid products, including appliances, for solar home systems and solar mini-grids by 2022.

Key Statistics

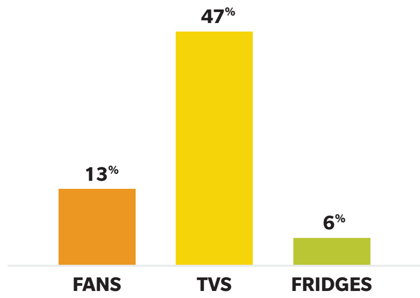
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]

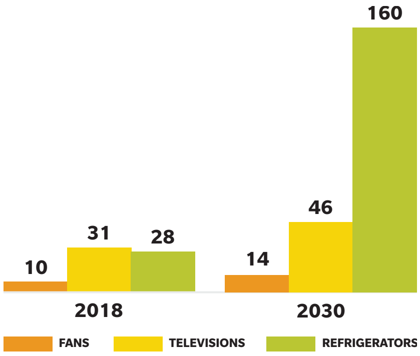


Share of rural population who own household appliances (%, 2015-2016)[3]



Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Very high	305-406 mm	9-40	Interest from larger brands is growing but trust in the industry is impeded by the influx of poor quality generic off-grid appliances.
	High	21"-32"	200-360	
	High	200-250L	525-825	

While local distributors dominate Myanmar's off-grid appliances market today, established vertically integrated businesses are showing increasing interest. TVs already represent a sizeable segment, with many cheap generic products available today. Refrigerators are high on households' wish lists, though affordability remains a constraint. Given the low penetration, persistently large base of off-grid and weak grid customers, increasing incomes, and strong mobile phone coverage, sales of off-grid refrigerators are likely to grow rapidly.

Enabling Environment

Consumer financing: Historically most purchases have been in cash or for cheaper off-grid appliances like mobile chargers and lights. Micro-finance institutions in partnership with local distributors are starting to avail financing solutions to consumers.

Policy: Absence of government regulation on quality control has led to an influx of cheap, low quality solar appliances in the market, although this is expected to change given the focus on quality-verified products in the national electrification plan and the partnership with Lighting Global.

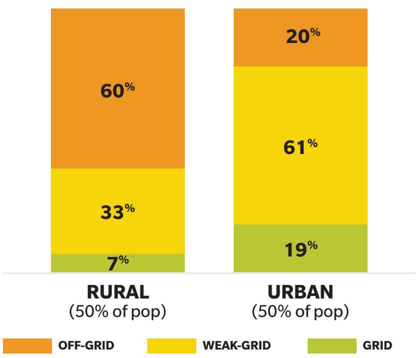
1. International Energy Agency, 2018, World Energy Outlook; World Bank DataBank, 2018; Dalberg estimates of bad-grid population size; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Myanmar Demographic and Health Survey, 2015-2016; 4. Dalberg, Market sizing and analysis; 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews; Product specifications listed here are for India due to data limitations.

NIGERIA APPLIANCE MARKET SNAPSHOT

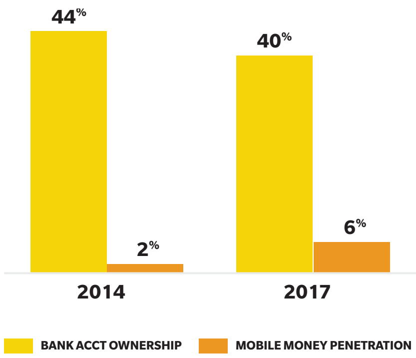
Nigeria represents a vast potential market for off-grid appliances. Many customers have traditionally relied on diesel generator powered appliances and are starting to see off-grid appliances as cost-effective alternatives. However, affordability remains a major challenge.

Key Statistics

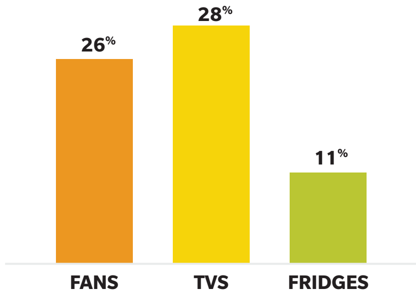
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]

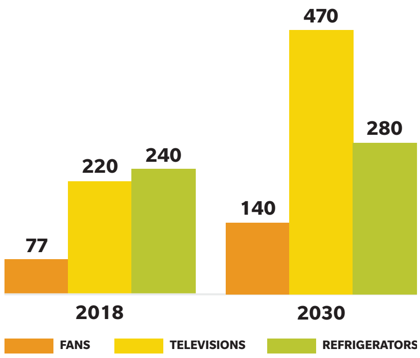


Share of rural population who own household appliances (%, 2015)[3]



Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Medium	406-600mm	30-45	Distributors are focusing on peri-urban and urban customers whose alternative solutions are powering traditional, inefficient appliances with a generator.
	High	24"-32"	200-400	
	Low	42-250L	250-1,000	

There are many new local businesses looking to serve Nigeria's off-grid appliance market; however, most are importing generic off-grid appliances. Nigeria represents one of the largest bases of urban and peri-urban customers who have supplemented weak-grid access by using costly yet reliable energy from diesel generators. This provides a unique sub-section of customers who could switch to solar home systems and off-grid appropriate appliances.

Enabling Environment

Consumer financing: Consumers predominantly make upfront cash purchases, yet financing solutions such as micro-credit facilities are growing in penetration. Uptake of mobile based PAYGO and other forms of financing is limited by low financial inclusion in Nigeria, especially lower mobile money penetration and declining bank account ownership rates.

Policy: Government bodies responsible for driving uptake of renewable energy in Nigeria include the Solar Department in the Office of the Vice President; the Renewable Energy Association of Nigeria (REAN); the Rural Electrification Agency, which is partnering with the World Bank Group to accelerate investment in mini grids; and the Nigerian Bank of Industry, which administers a dedicated fund for mini-grid expansion. Nigeria has a challenging tax regime for weak and off-grid appliances with solar home systems and their appliances subject to 5% VAT and 5-20% import duty.

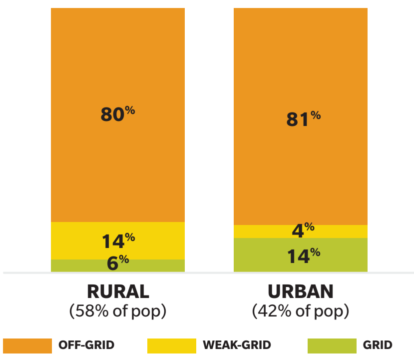
1. International Energy Agency, 2018, World Energy Outlook; Afrobarometer, 2017, Electrification rate; World Bank DataBank, 2018; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Nigeria Demographic and Health Survey, 2015; 4. Dalberg, Market sizing and analysis; 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews.

SIERRA LEONE APPLIANCE MARKET SNAPSHOT

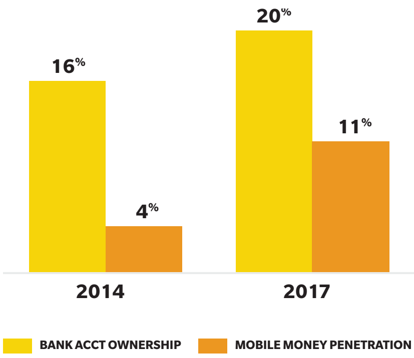
Sierra Leone is a small market with low electrification and relatively low income per capita. While Sierra Leone remains a nascent market for off-grid appliances, recently introduced tax concessions, as well as targeted donor support, have helped incentivize international distributors to enter the market and accelerate growth in the sector.

Key Statistics

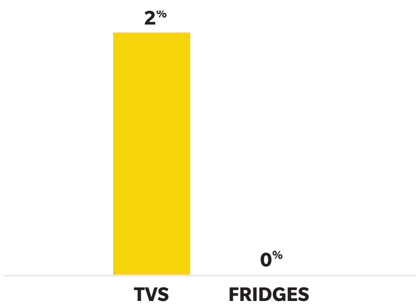
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]



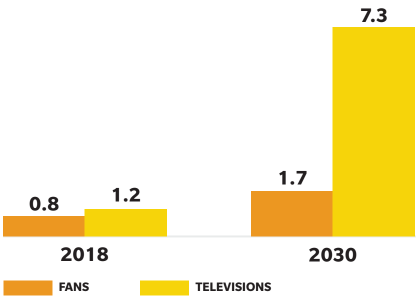
Share of rural population who own household appliances (%, 2013)[3]



Fan ownership data is not available. Industry players report a very small market for fans.

Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Estimated sales and market size for off-grid refrigerators are negligible given price point and income levels.

Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Medium	356-406mm	15-50	The market for off-grid appliance is nascent and dominated by generic off-grid appliances.
	High	24"-32"	200-400	
	Low	50-250L	200-1,300	

Uptake of off-grid appliances in Sierra Leone is low. Today, the market is dominated by distributors selling generic, low quality products. Donor-supported initiatives such as the DFID-backed Africa-Energy Compact are helping to drive demand and are moving the market from pico solar to larger solar home systems and mini-grids. These shifts are starting to increase demand for appliances such as TVs and fans. More recently, some larger vertically-integrated off-grid solar firms have entered Sierra Leone, but they are not yet investing in extensive distribution due to the nascency of the market.

Enabling Environment

Consumer financing: Purchasing power among off-grid households remains low, and limited access to finance is constraining growth. The low mobile money penetration rate, currently estimated at below 15%, limits the potential for PAYGO models. Companies such as Easy Solar are testing other mechanisms to extend credit and facilitate incremental payments for customers of solar products.

Policy: The Government of Sierra Leone has prioritized off-grid solar—both standalone and mini-grids—as important to national electrification plans. Recently, it has introduced a zero-rating for both goods and services sales tax and import duties to incentivize sales of off-grid appliances. However, firms report that this exemption does not apply to all solar-powered DC appliances, and implementation by custom officials is inconsistent.

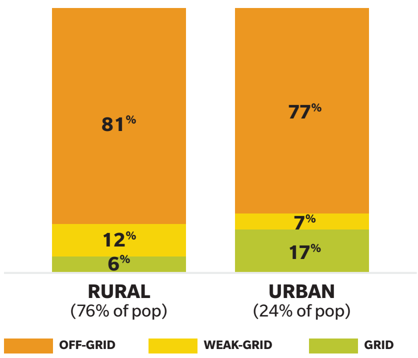
1. International Energy Agency, 2018, World Energy Outlook; Afrobarometer, 2017, Electrification rate; World Bank DataBank, 2018; On-grid refers to reliable connectivity; 2. World Bank Global Findex database, 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Data for TVs and Fridges is from Sierra Leone Demographic and Health Survey, 2013; Anecdotally, fan ownership is reported to be 0%.; 4. Dalberg, Market sizing and analysis; 5 CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews.

UGANDA APPLIANCE MARKET SNAPSHOT

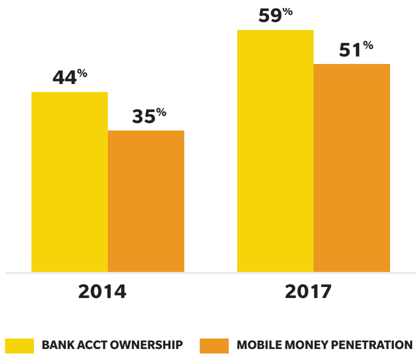
Uganda is a high potential off-grid appliance market with a large off- and weak-grid population. It has seen a sharp increase in mobile money operations and solar home system sales—and both of these trends are providing a foundation for appliance sales.

Key Statistics

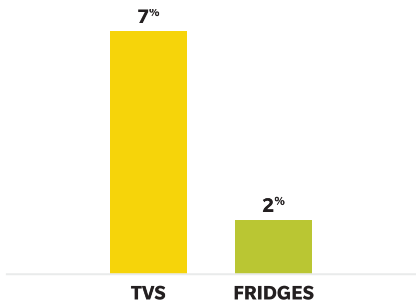
Grid, weak-grid, and off-grid connections in rural and urban areas (%, 2017)[1]



Bank account ownership and mobile money penetration (%)[2]



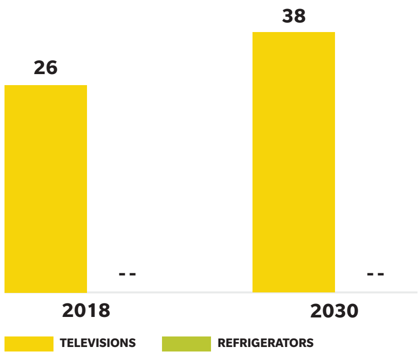
Share of rural population who own household appliances (%, 2016)[3]



Fan ownership data is not available. Industry players report a very small market for fans.

Market Dynamics

Current (2018) and future (2030) obtainable market size in (Millions of USD)[4]



Overview of off-grid products currently available in the market[5]

	LEVEL OF DEMAND	TYPICAL PRODUCT RANGE	PRICE (USD)	MARKET DYNAMICS
	Very low	——	——	Distributors plan to roll out larger screen TVs (up to 42") to meet demand for bigger systems. For refrigerators, high prices limit the market, though anecdotal evidence suggests demand is growing.
	Very high	22"-24"	200-350	
	Low	50-100L	700-900	

Both vertically integrated businesses and third party distributors compete in Uganda. The market has seen a recent uptick in demand unlocked by PAYGO providers such as Fenix and Mkopa. Radios and TVs continue to represent the highest sales, with most major companies concentrating on selling these products, especially in peri-urban areas. Demand for refrigerators is growing off a low base, but it remains limited by high price points relative to consumer incomes. Distributors indicate that there is very little demand for fans.

Enabling Environment

Consumer financing: Though affordability continues to constrain the market, the prevalence of mobile money is enabling PAYGO financing models and driving sales. PAYGO options are making it possible for consumers to shift from pico solutions to appliances with reduced upfront energy costs.

Policy: The Government of Uganda is increasingly recognizing the need for off-grid energy to drive rural electrification. Recent government supported initiatives, such as the Uganda off-grid energy market accelerator, have led to growth in the off-grid sector. However, the tax environment for solar home systems is unfavorable, with appliances subjected to 25% import duty, 18% VAT and 6% withdrawal tax. In addition, though recently introduced mobile money charges no longer impact PAYGO consumers, they have led to negative perceptions about the cost of using mobile money.[6]

1. International Energy Agency, 2018, World Energy Outlook; Afrobarometer, 2017, Electrification rate; World Bank DataBank, 2018; On-grid refers to reliable connectivity; 2. World BankGlobal Findex database 2018; Bank account ownership refers to ownership of an account in a bank or any other relevant financial institution; 3. Data for TVs and Fridges is from Uganda Demographic and Health Survey, 2016; Anecdotally, fan ownership is reported to be 0%. 4. Dalberg, Market sizing and analysis; Refrigerator and fan market sizing is not reflected here because data shows a very low base; Data is from 2016, and anecdotal evidence suggests that the refrigerator market has grown since; 5. CLASP, 2019, Retail market surveys; Dalberg, 2019, Stakeholder interviews. 6. Energy Ladder Research, Phase II, SERC.

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