

Global LEAP Off-Grid Appliance Market Survey



Executive Summary

The Global Lighting and Energy Access Partnership (Global LEAP) is a Clean Energy Ministerial initiative that supports self-sustaining commercial markets for off-grid energy products through the promotion of quality assurance efforts, demand-side super-efficiency, and partner collaboration. Through activities such as the Global LEAP Awards, Global LEAP is leading efforts to develop and accelerate the global marketplace for quality-assured, super-efficient off-grid appliances.

Quality-assured, super-efficient off-grid appliances are essential to providing modern clean energy services at least cost and moving under-served communities up the “energy ladder.” A robust, competitive global marketplace for these appliances is needed to bring down costs and foster innovation. However, this market is underdeveloped and industry and market stakeholders lack the information needed to make timely decisions about off-grid appliance design, procurement, and policy and programmatic intervention.

With this challenge in mind, Global LEAP is sponsoring a series of research efforts to enhance global understanding of the off-grid appliance market and provide a framework for stakeholders to identify business opportunities and policy and programmatic interventions. The goal is to help market actors throughout the energy access value chain make better informed decisions about off-grid appliances, from investment and policy, to manufacturing and procurement.

Between 18 December 2014 and 13 January 2015, Global LEAP conducted an online survey of energy access professionals – including members of the United Nations Foundation’s Energy Access Practitioners Network

and the International Finance Corporation’s Lighting Global community – with two key questions.

First, over the next three to five years, what appliance products are likely to inspire the greatest off-grid consumer demand? And second, what appliances are likely to drive the greatest energy access (e.g. socio-economic or environmental) benefits?

A total of 27 product categories were split into two groups: appliances commonly used by off-grid households and small- to medium-sized enterprises (SME), and clinical applications. See Table 1, next page, for a comprehensive list of household/SME and clinical product categories. The survey received a total of 239 responses from industry, policy, and development stakeholders all over the world.

Results

The survey finds that – for off-grid household and SME applications – LED room lighting appliances, mobile phone charging banks, televisions, radios, refrigeration, fans, and solar water pumps are the appliances with the highest likely demand, in that order. These also tend to be viewed as the highest impact appliances.

Demand for these appliances tends to be consistent across regions. However, in South Asia (e.g. India and Bangladesh) fans are the fourth most demanded product, behind televisions but ahead of radios and refrigeration.

For healthcare and clinical applications, the demand for refrigeration, sterilizers/autoclaves, patient monitors, portable ultrasound machines and regulated IV pumps is highest. Again these also tended to be viewed as the highest impact applications, along with oxygen concentrators.

Methodology

The survey was conducted online, and respondents were asked to participate through their affiliation with the United Nations Foundations' Energy Access Practitioners Network and Lighting Global. The survey was also made available on Twitter, as well as LuminaNet and several energy access LinkedIn Group pages.

For each question, survey respondents were asked to rank their top five (5) appliance product categories, one through five (one being their top choice). Survey respondents were also invited to provide additional appliance product categories that the survey did not include. The appliance categories included were identified in consultation with several market experts. The order of the appliances in each question was randomized.

Each time a product received a ranking of "1," that product was assigned fifty (50) points. Each time a product received a ranking of "2," it was assigned forty (40) points, and so on. Products not selected among the top five received zero (0) points. For each question, points were summed to provide an indication of the survey respondents' expectations for a product's relative anticipated demand and impacts.

A NOTE ON DEFINITIONS

For the purposes of this survey and other Global LEAP activities, "off-grid appliances" are electricity-consuming products that plug into and can operate on an off-grid (i.e. low-voltage DC) energy system.

Table 1: Product Categories of Household/SME & Healthcare and Clinical Appliances

Household /SME Appliances				
Clothes Irons	Fans	Grinders	Hair Clippers	Hand Power Tools
Laptops	LED Lighting Appliances	Mobile Charging Banks	Radios	Refrigeration
Rice Cookers	Rice Mills	Sewing Machines	Small Speaker Systems	Solar Water Pumps
Soldering Irons	Tablets	Tea Kettles	Televisions	

Healthcare and Clinical Appliances			
Cautery Machines/ Diathermy	O40 Concentrators	Patient Monitor for Vital Signs Measurements	Patient Monitor for Vital Signs Measurements
Refrigeration	Regulated IV Pumps	Sterilizers/Autoclaves	Surgical Suction Machines

Household & SME Appliances

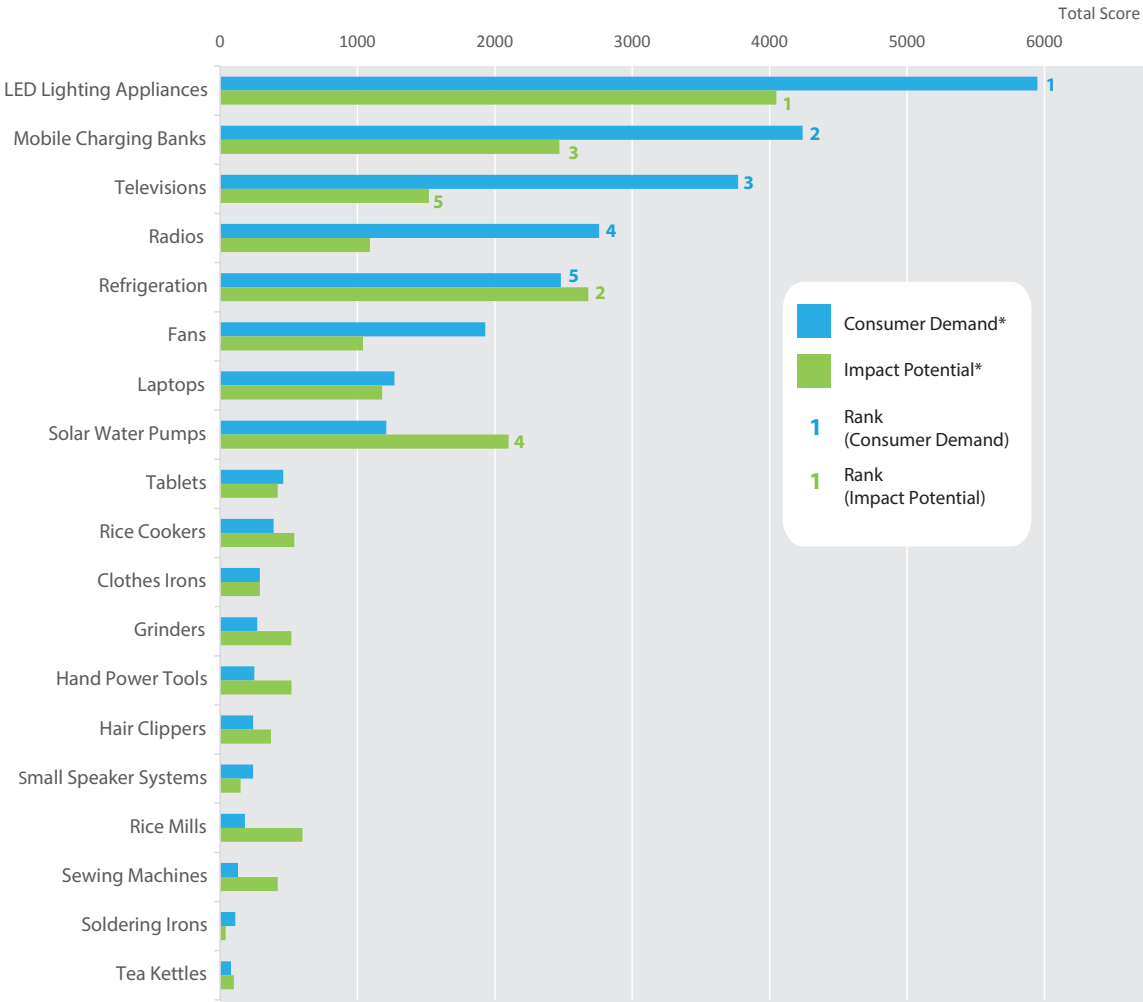
Figure 1, below, provides an overview of the **anticipated off-grid consumer demand** and **clean energy access impact potential** of the 19 products in the household/SME appliance product category.

In terms of anticipated off-grid consumer demand, the top five household/SME appliances are: LED room lighting appliances, mobile phone charging banks, televisions, radios, and refrigeration.

Fans – a high-demand off-grid appliance in hot and humid climates like South Asia – rank sixth.

In terms of clean energy access impact potential, LED room lighting appliances are also the top ranking product. Refrigeration is the next highest impact product, followed by mobile phone charging banks, solar water pumps, and televisions.

Figure 1: Ranking Overview: Household or SME Off-Grid Appliances




























**The survey respondents were asked to rank top 5 household/SME off-grid appliances based on anticipated off-grid consumer demand and clean energy access impact potential for the next 3-5 years.*







Product Rankings by Region

Global LEAP examined product rankings by region to see if respondents in different off-grid markets express significantly different product priorities. As identified in Table 2, aside from off-grid fans, product rankings are

largely similar across regions. In South Asia and West Africa, off-grid fans are identified as fourth highest in terms of anticipated consumer demand.

Table 2: Rankings of Household or SME Appliances by Region

Regional Ranking By Anticipated Off-Grid Consumer Demand					
Ranking	1	2	3	4	5
Region					
East Africa					
West Africa				Tied for 4th  	
Latin America					
South Asia					
Southern Africa				Tied for 4th  	

KEY		
	LED Room Lighting Appliances	
	Radios	
	Fans	
		Refrigeration

Healthcare & Clinical Appliances

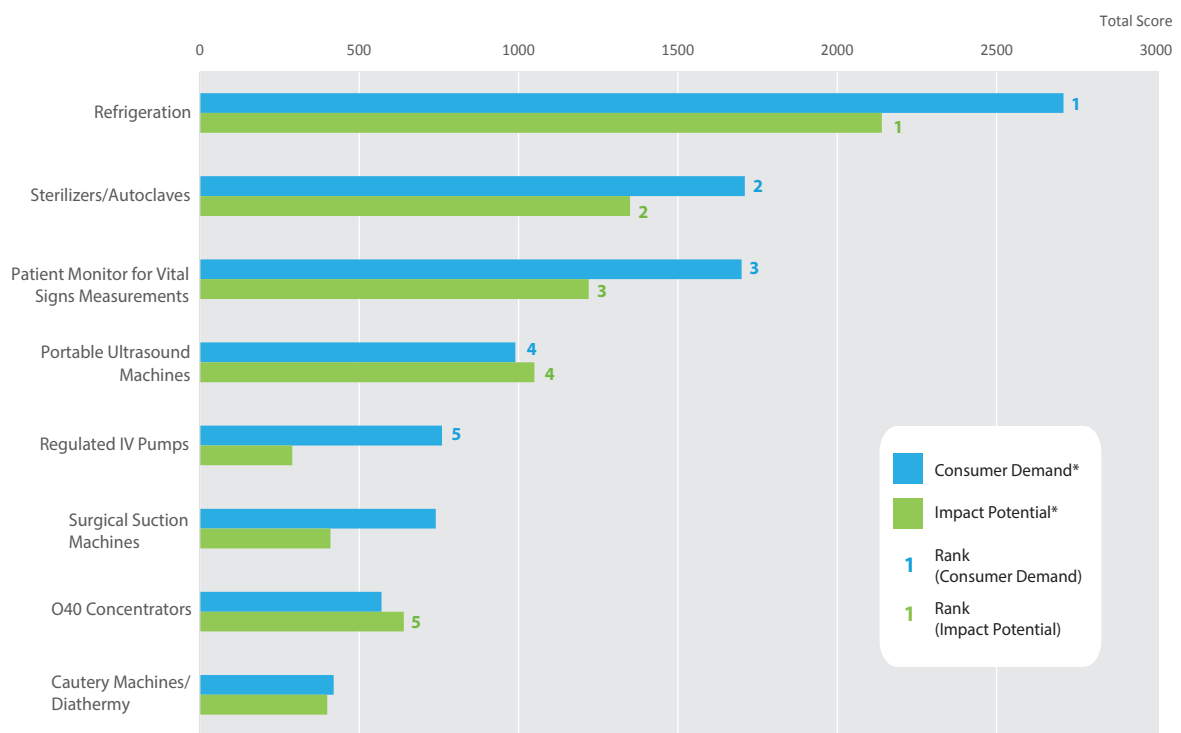
The top five healthcare and clinical appliances in terms of anticipated demand and potential impact are very consistent. Refrigeration (e.g. vaccine refrigerators), sterilizers/ autoclaves, patient monitors for vital signs measurements (e.g. NiBP, SpO40, HR, RR, EtCO40 and ECG), and portable ultrasound machines are ranked first through fourth for both anticipated demand and potential impact. Regulated IV pumps rank fifth in terms of anticipated off-grid consumer demand, while O40 concentrators rank fifth in terms of impact potential.

Product Rankings by Region

Responses from different regions show a high degree of similarity with only slight differences (see Table 3, next page). In terms of anticipated off-grid consumer demand, refrigeration, sterilizer, patient monitor, and portable ultrasound are the top four clinical appliances across all regions.

In West Africa, Latin America, and South Asia, regulated IV pumps rank fifth – whereas in East Africa and Southern Africa, O40 concentrators and cautery machines rank fifth.

Figure 2: Ranking Overview: Healthcare and Clinical Off-Grid Appliances



**The survey respondents were asked to rank top 5 healthcare and clinical appliances based on anticipated off-grid consumer demand and clean energy access impact potential for the next 3-5 years.*

Table 3: Rankings of Healthcare & Clinical Appliances by Region

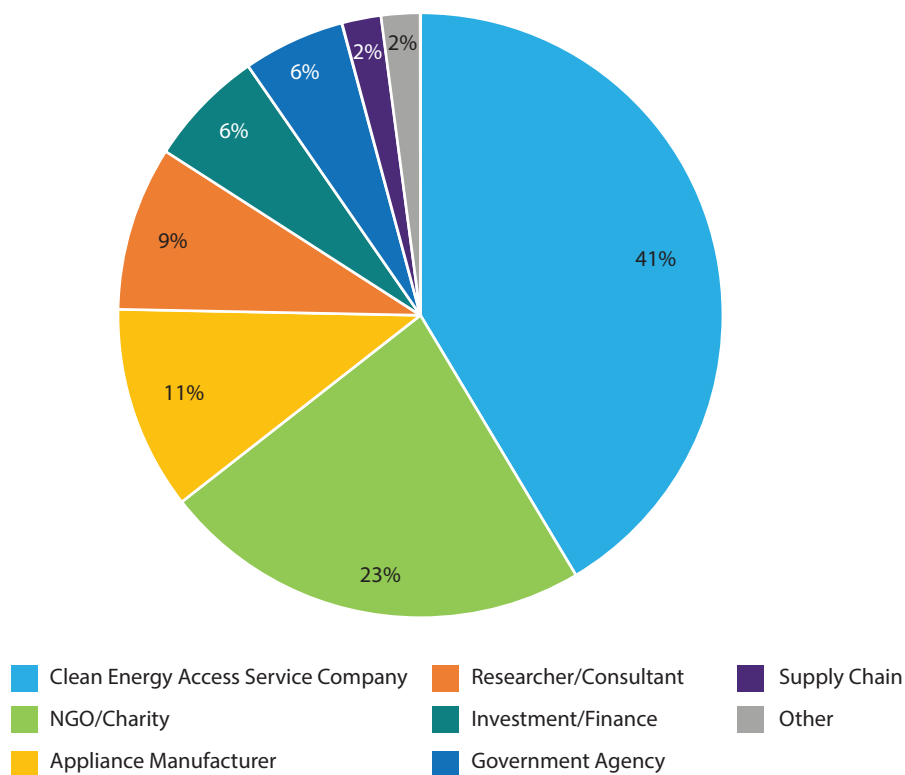
Rankings by Anticipated Off-Grid Consumer Demand					
Ranking	1	2	3	4	5
Region					
East Africa	Refrigeration	Sterilizers/ Autoclaves	Patient Monitor	Portable Ultrasound	O4O Concentrators
West Africa	Refrigeration	Sterilizers/ Autoclaves	Patient Monitor	Portable Ultrasound	Regulated IV Pumps
Latin America	Refrigeration	Sterilizers/ Autoclaves	Patient Monitor	Portable Ultrasound	Regulated IV Pumps
South Asia	Refrigeration	Sterilizers/ Autoclaves	Patient Monitor	Portable Ultrasound	Regulated IV Pumps
Southern Africa	Refrigeration	Sterilizers/ Autoclaves	Patient Monitor	Portable Ultrasound	Cautery Machines/ Diathermy

Respondent Characteristics

The majority of the respondents (41%) are from clean energy access service companies, including solar home system companies, distributors, and mini-grid companies. NGO employees account for over 20% of the re-

sponses, while appliance manufacturers and supply chain professionals account for 13% of the total response. Other respondents include consultants, researchers, academics and others.

Figure 3: Distribution of Respondents' Affiliations



East Africa and West Africa are the two best represented regions by survey respondents—nearly 50% and 40% of the respondents report having operations or offices in these two regions, respectively. Respondents were given the choice of several regions, as many companies and organizations operate globally and/or with several regional offices.

Perspectives from Clean Energy Access Service Companies

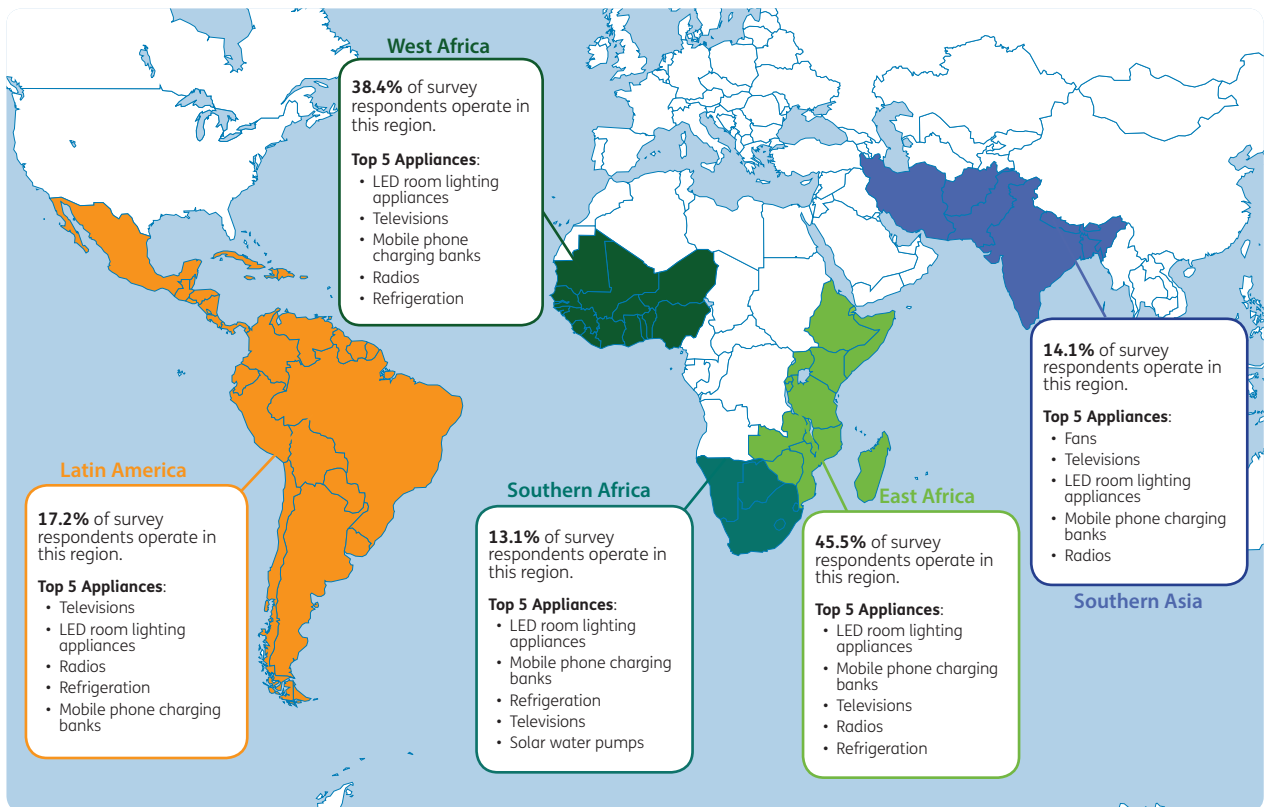
Because clean energy access service companies are likely to work most closely with off-grid consumers, we looked specifically at how respondents affiliated with these companies ranked products in terms of potential consumer demand (see Figure 4, below).

Overall, these companies' responses are similar across regions, but also express some distinctive regional characteristics. For example:

- Fans are the most demanded off-grid appliance according to clean energy access service companies operating in South Asia. Unlike other regions, refrigeration is not among the top five most demanded appliance in South Asia.
- In Southern Africa, solar water pumps are given higher priority and replaced radios as the fifth most demanded off-grid appliance.

These perspectives from clean energy access service companies operating in different regions suggests that while, according to respondents, off-grid consumer demand remains broadly similar across regions, regional differences will be an important element in product prioritization, and should not be overlooked by industry, policymakers and clean energy access stakeholders.

Figure 4: Product Priorities (in Terms of Anticipated Consumer Demand) of Clean Energy Access Service Company in Key Regions



* Geographical sub-region groupings in Figure 4 are indicative based on definitions of the United Nations Geoscheme. The assignment of countries or areas to specific groupings is for statistical convenience and does not imply any assumption regarding political or other affiliation of countries or territories.



Recommendations & Next Steps

Market, policy, and programmatic initiatives would do well to focus on developing the markets for these high-demand, high-impact product categories over the next three to five years. Quality-assurance and super-efficiency will be essential to successful, self-sustaining markets for these products.

Surveys such as this are, of course, limited by their structure and the number and characteristics of respondents. Additional market research efforts taking deeper, more systematic looks at these and related questions would be fruitful.