



**EFFICIENCY
FOR
ACCESS**



Empowering Livelihoods: New Research on Off-grid Appliances and Equipment

23 October 2018 / 10:00 a.m. EST | 4:00 p.m. CET

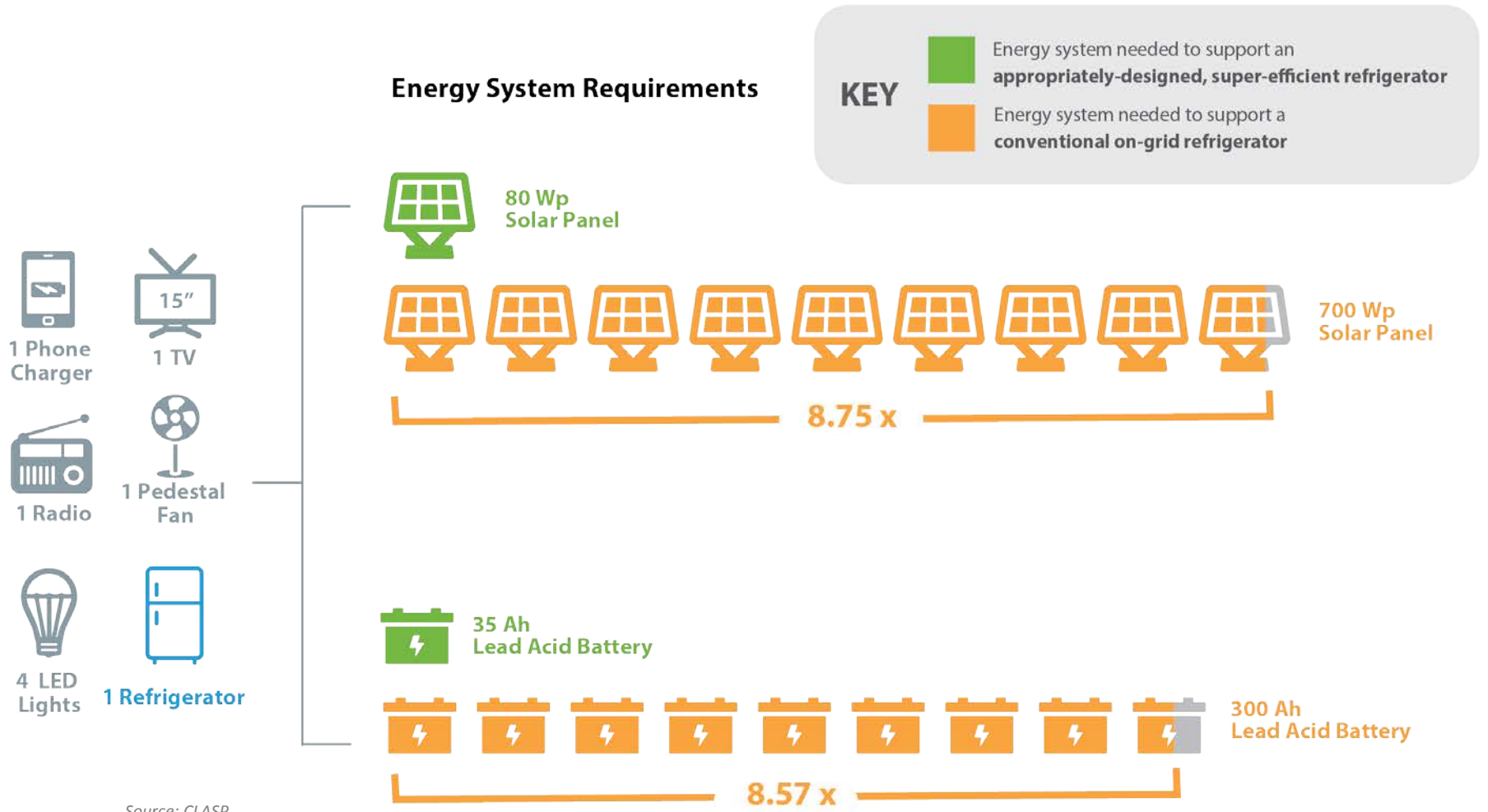




Energy Efficiency for Energy Access

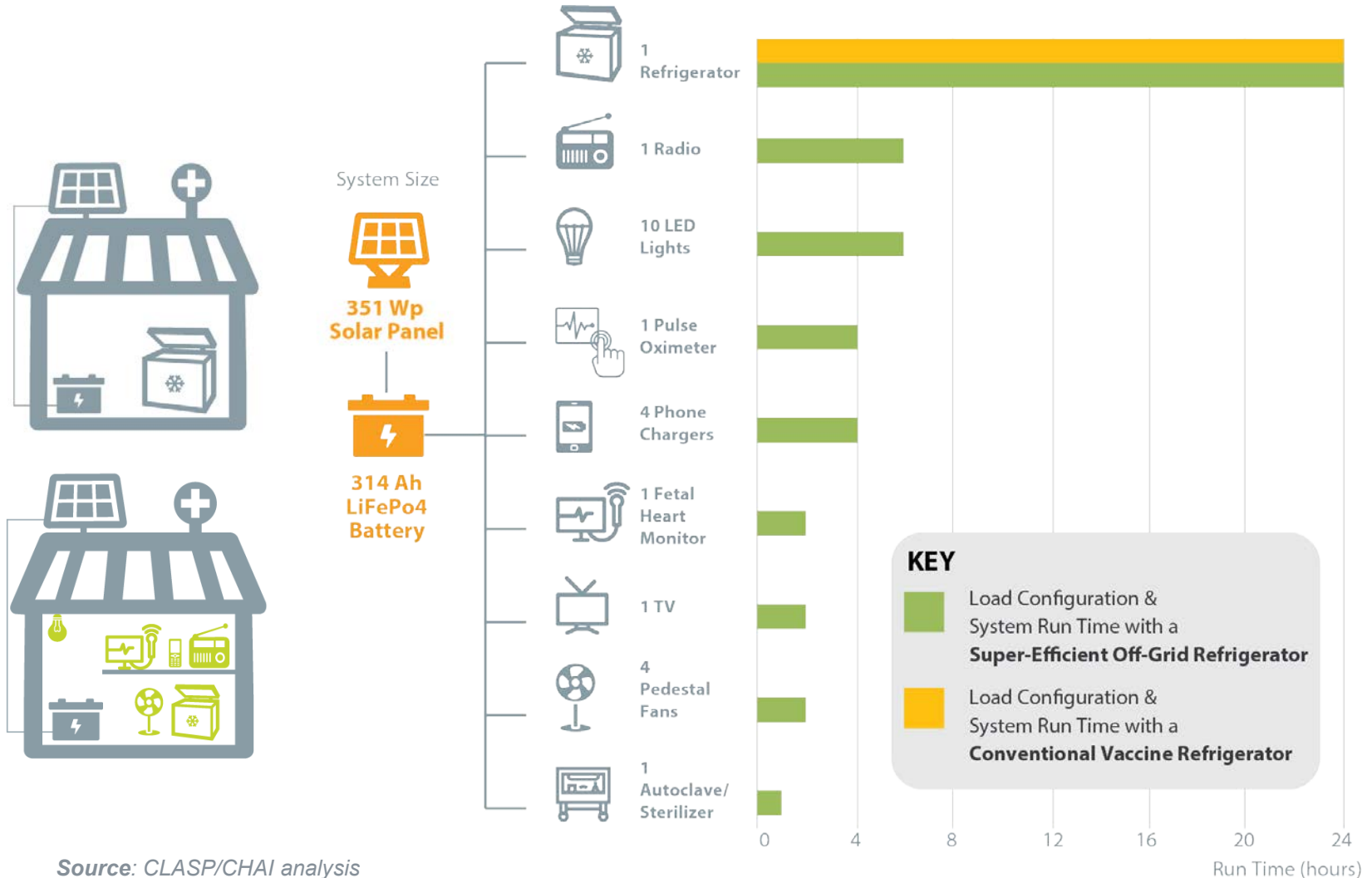
A Theory of Change on promoting energy efficiency
– **specifically efficient appliances** – as a potent
catalyst in global clean energy access efforts

Appliance Efficiency Unlocks Greater Energy Access Outcomes



Source: CLASP

Efficient Appliances Enable Cost-Effective, Holistic Electrification



Source: CLASP/CHAI analysis

Medical device sample sizes: 12 refrigerators; 11 autoclaves; 6 fetal heart monitors; 5 pulse oximeters

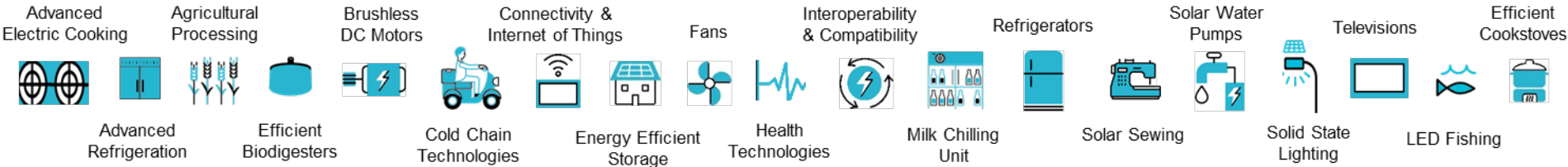
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Efficiency for Access Coalition

A coalition to **accelerate global energy access through energy-efficient appliances**



Efficiency for Access Coalition – Partner Mapping



- Good Energies Foundation
- UK Department for International Development (DFID)
- Shell Foundation
- Rockefeller Foundation
- Power Africa
- EnDev
- IFC
- World Bank
- Swedish International Development Agency (SIDA)



Low Energy Inclusive Appliances (LEIA)

A **research & innovation programme** to accelerate the availability, affordability, efficiency, and performance of appliances particularly suited to developing country contexts.

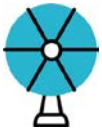
Technology Focus Areas

LEIA will help **halve the cost** and **double the efficiency** of a range of off- and weak-grid appliances in least developed countries.

Driving scale in **near-to-market** technologies:



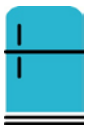
Televisions



Fans

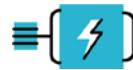


Solar Water Pumps



Refrigerators

Enabling innovation in **horizon and enabling** technologies



Brushless DC Motors



Connectivity/Internet of Things



Advanced Electric Cooking



Agricultural Processing






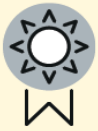





Interoperability



Advanced Cooling

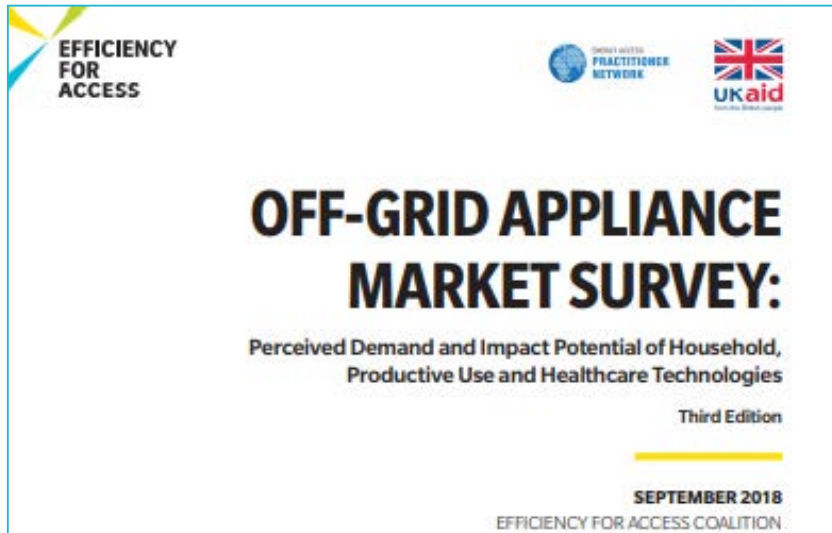
Activities Matched to Technology & Market Maturity

ACTIVITY TYPE	Solar Water Pumps 	Refrigerators 	Agricultural Processing 	Horizon Technologies 
Market Stimulation & Incentives 	2019 Global LEAP Awards Solar Water Pump Competition	2019 Global LEAP Awards Off-Grid Refrigerator Competition	N/A	Horizon technology innovation prizes (e.g., induction cooking, motors)
 Product Testing & Quality Assurance	<ul style="list-style-type: none"> • Test method development • Outreach re: testing harmonization • Field sample procurement, product testing, data-sharing (upcoming) 	<ul style="list-style-type: none"> • Field sample procurement, product testing, data-sharing (ongoing) • Field test protocol development • Expansion of product performance database 	N/A	<ul style="list-style-type: none"> • Test method development • Field sample procurement, product testing, data-sharing
Coordination, Communication & Market Education 	<ul style="list-style-type: none"> • Market development roundtable • Priority theme for comms campaign • Newsletter feature 	<ul style="list-style-type: none"> • Market development roundtable • Priority theme for comms campaign • Newsletter feature (upcoming) 	Priority theme for communications campaign	Socializing appliances & technologies of interest or direct activity for EforA Coalition
Market Intelligence & Technology Roadmapping 	<ul style="list-style-type: none"> • Global Market Trends Report • Convene Technical Working Group • Technology R&D roadmap 	<ul style="list-style-type: none"> • Market segmentation to identify likely/viable customer groups • Convene Technical Working Group • Technology R&D roadmap 	Pilot deployment of Agsoll milling machines in Kenya	Landscape analysis medical appliance supply chain
R&D Co-Investment & Partnerships 	TBD 2019-onwards	TBD 2019-onwards	TBD 2019-onwards	TBD 2019-onwards



2018 Off-Grid Appliance Market Survey

Market Survey Report: Approach & Methodology



Approach

1. Third iteration of online survey of energy access professionals, conducted semiannually
2. Branched & self-selected sections to ensure accurate aggregation of views
3. Regional, sectoral and yearly comparisons to plot changing signals

Segmentation



Household use



Business/ productive use



Healthcare/ clinic use

- Gender differentials for household appliances
- Demand and socio-economic impact comparisons
- Appliance sales snapshot

Key Takeaways



Some household appliances **remain top of mind** for industry leaders and consumers



Consumer demand for, and potential impact of, specific appliances varies widely **by region**



Refrigerator demand continues to grow and has the potential to drive significant economic growth



Demand for larger “**productive use**” or “income generating” appliances is rising



Highly varied, and at times divergent, responses regarding demand for **healthcare appliances** underscore a need for further research

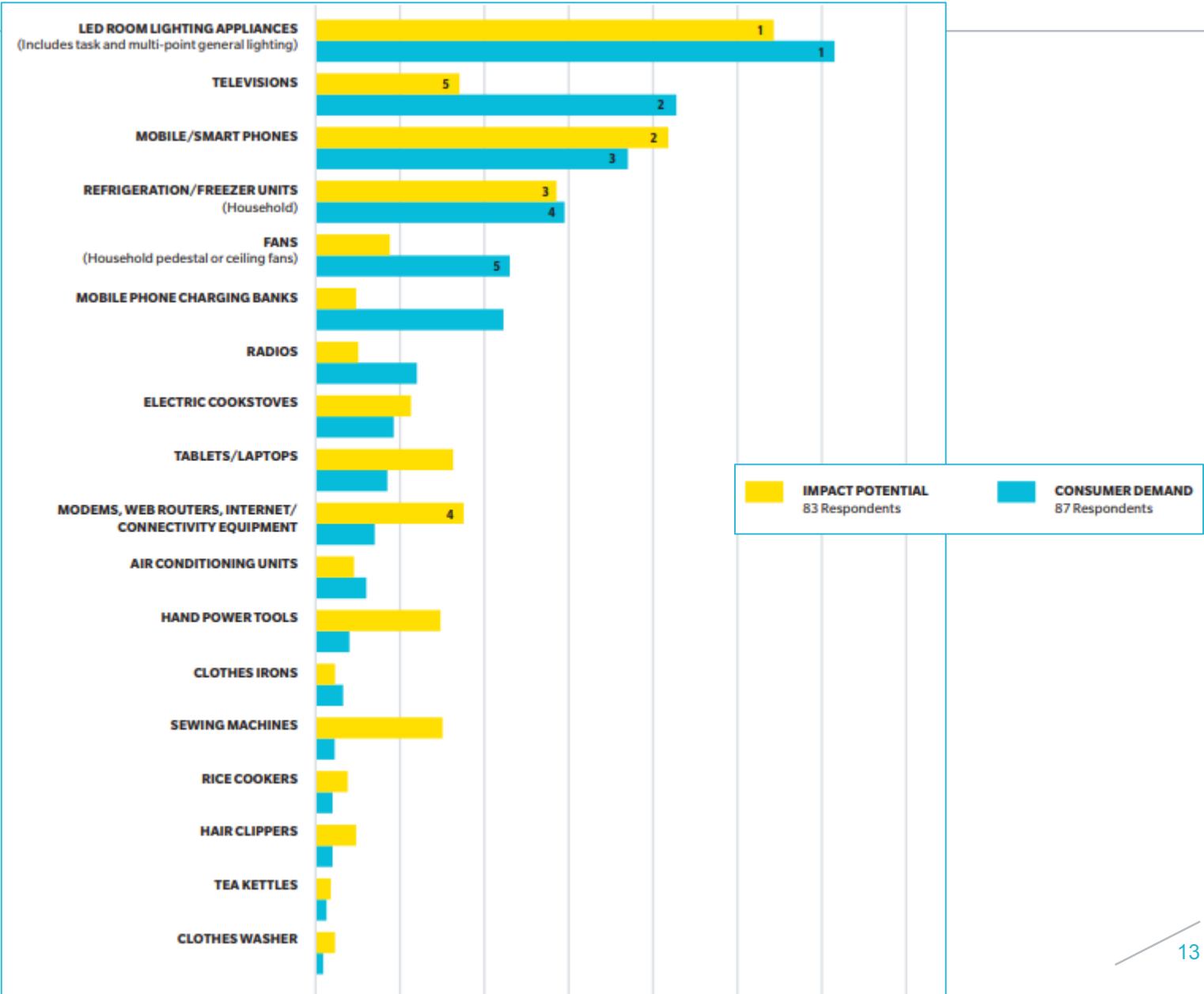


Demands and priorities shift based on **gender perspectives** for certain household appliances

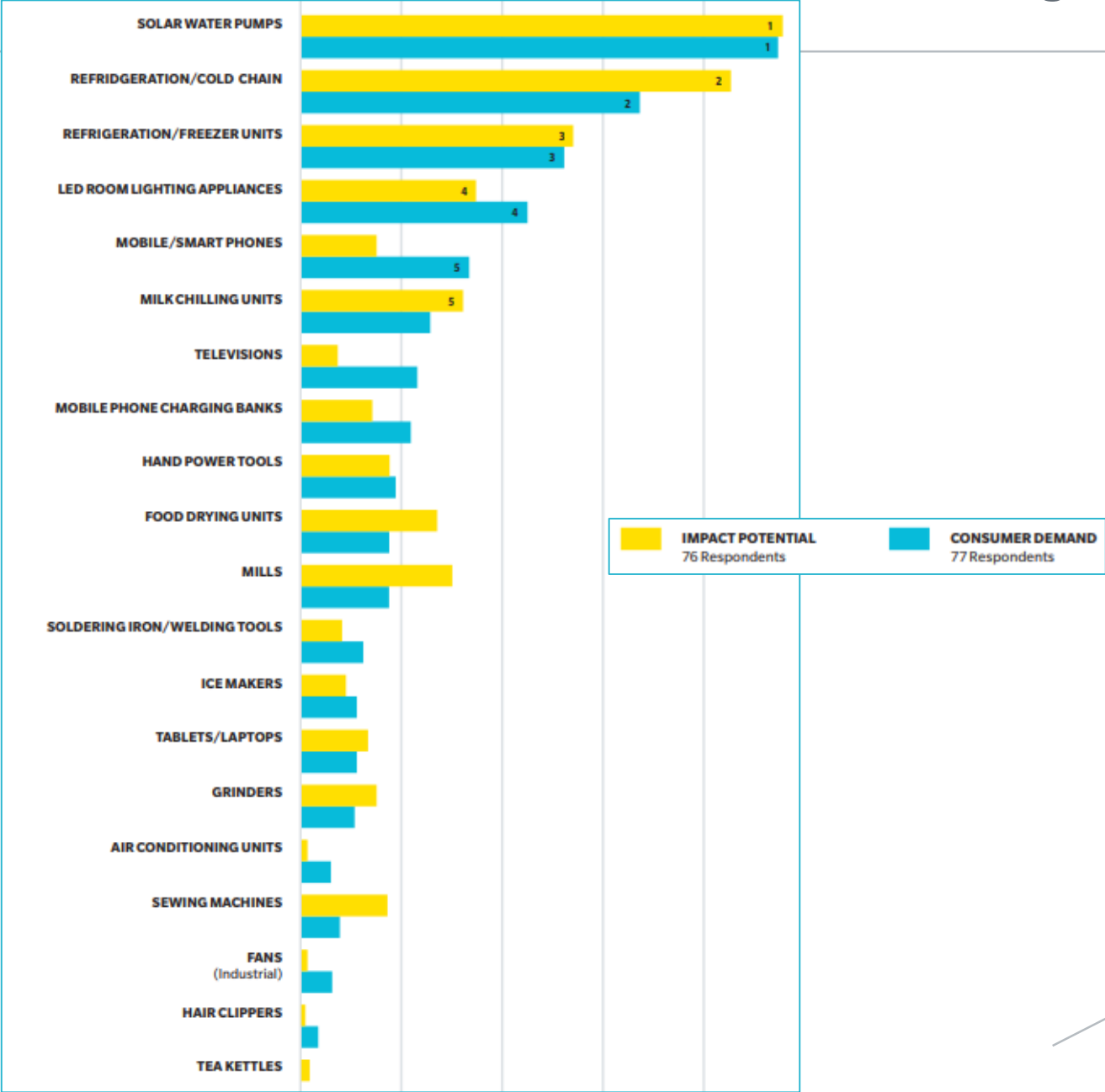


There is a critical difference between **theoretical needs versus market realities**

2018 Household Appliance Demand & Impact Rankings



2018 Productive Use Appliance Demand & Impact Rankings



Productive Use Appliance Rankings Through Time

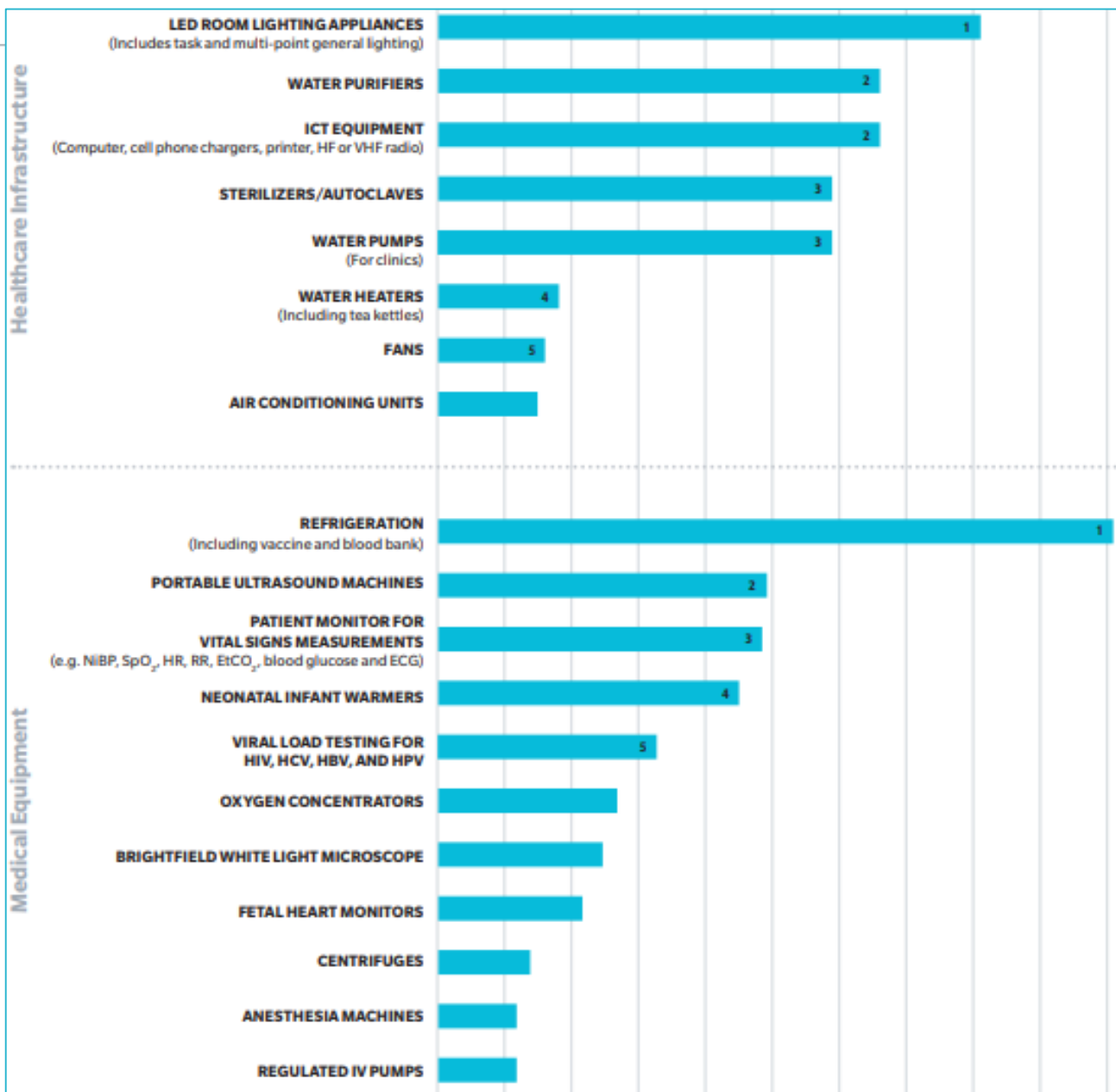
ANTICIPATED CONSUMER DEMAND

	2014 SURVEY RESULTS (MODIFIED*)	2016 SURVEY RESULTS (MODIFIED*)	2018 SURVEY RESULTS
1	LED lighting appliances	LED lighting appliances	Solar water pumps
2	Mobile charging banks	Televisions	Refrigeration/Cold chain technologies (Agricultural cold chain)
3	Televisions	Mobile/Smart phones	Refrigeration/Freezer units (Light commercial/SME)
4	Refrigeration	Mobile phone charging banks	LED lighting appliances
5	Fans	Fans	Mobile/Smart phones
6	Laptops	Refrigeration (Light commercial/SME)	Milk chilling units
7	Solar Water Pumps	Solar water pumps	Televisions
8	Tablets	Refrigeration (Agricultural cold chain)	Mobile phone charging banks
9	Clothes irons	Laptops	Hand power tools
10	Grinders	Hand Power Tools	Food drying units

DEVELOPMENT IMPACT POTENTIAL

	2014 SURVEY RESULTS (MODIFIED*)	2016 SURVEY RESULTS (MODIFIED*)	2018 SURVEY RESULTS
1	LED lighting appliances	LED lighting appliances	Solar water pumps
2	Refrigeration	Mobile/Smart phones	Refrigeration/cold chain technologies (Agricultural cold chain)
3	Mobile phone charging banks	Solar Water Pumps	Refrigeration/Freezer units (Light commercial/SME)
4	Solar water pumps	Refrigeration (Agricultural cold chain)	LED lighting appliances
5	Televisions	Refrigeration (Light commercial/SME)	Milk Chilling units
6	Laptops	Mobile Phone Charging Banks	Mills
7	Fans	Televisions	Food drying units
8	Rice mills	Hand power tools	Hand power tools
9	Grinders	Mills	Sewing machines
10	Hand power tools	Sewing Machines	Mobile/smart phones

Healthcare Appliance Demand Rankings in 2018



Gender Differentials for Household Use Appliances

The results indicate that LED room lighting, mobile phone charging banks, and refrigeration/freezer units showed little deviation between female and male user perspectives. Besides these three appliances, the top household use appliances that were considered to have the highest potential impact are:



FROM A FEMALE PERSPECTIVE:

- Electric cookers
- Sewing machines
- Clothes washers
- Mobile/smart phones
- Televisions



FROM A MALE PERSPECTIVE:

- Mobile/smart phones
- Hand power tools
- Televisions
- Tablets/laptops,
- Hair clippers

Products that showed the largest deviation between female and male consumer perspectives include:



HAND POWER TOOLS: ranked **third** highest impact from a male perspective and **18th** from a female perspective



CLOTHES WASHERS: ranked **17th** from a male perspective and **sixth** from a female perspective



SEWING MACHINES: ranked **14th** from a male perspective and **fourth** from a female perspective



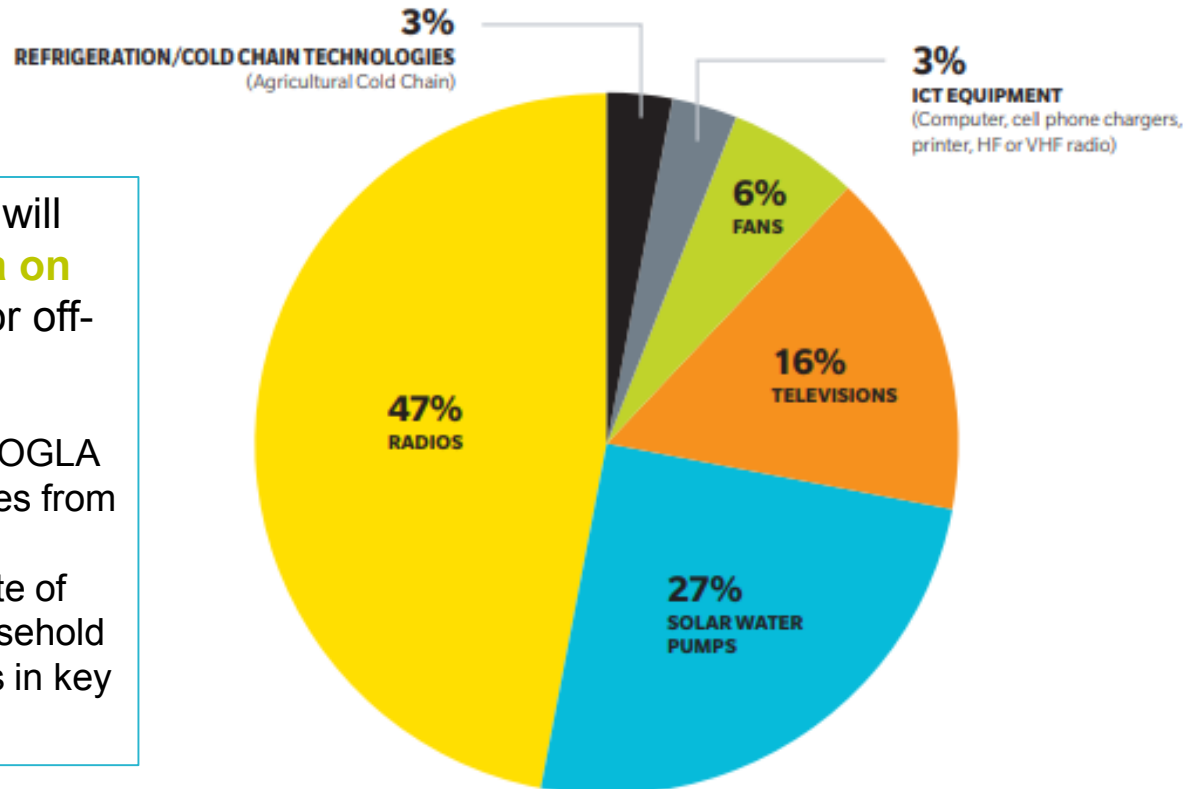
ELECTRIC COOKSTOVES: ranked **12th** from a male perspective and **third** from a female perspective.

Next Steps

- Continued **lack of commercial availability** of larger appliances in off-grid markets, with relatively high cost and load requirements.
- **Cost reductions & efficiency improvements** = a significant asset to scaling availability and commercial viability.

Relative volumes of appliance sales in 2017 reported by survey respondents

Number of Respondents = 44



Efficiency for Access Coalition will collect, verify, and publish **data on sales and market potential** for off-grid appliances going forward:

- Beginning in 2019, work with GOGLA to collect data on appliance sales from off-grid solar companies.
- Project the future sales of a suite of off-grid appliances for both household and productive use applications in key markets.



Off-Grid and Weak-Grid Appliance Data Trends

Critical Barriers Inhibiting the Off-Grid Appliance Market

The global off-grid clean energy market needs a complementary market of high-quality, super-efficient off-grid appliances to reach its full potential, but **significant barriers inhibit that market's development**:



Off-Grid Energy Service Companies struggle to identify, develop and source super-efficient, high-quality, and affordable appliances.



Appliance Manufacturers often are not familiar enough with the off-grid marketplace to design and market their products effectively.



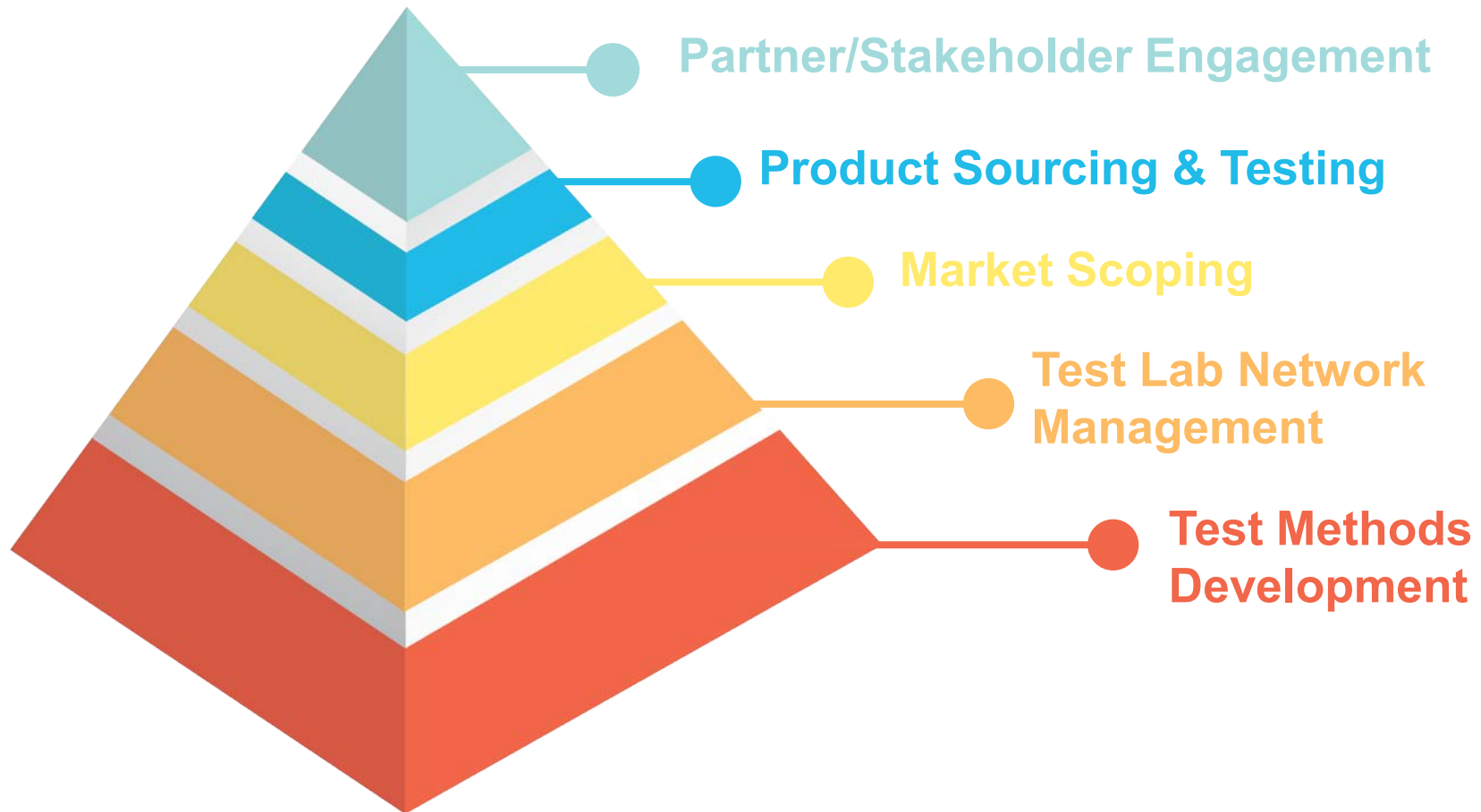
Investors & MFIs lack reliable benchmarks against which to target investment or evaluate and incentivize appropriate appliance procurement.



Policymakers lack the market and product performance data to target and scope market transformation policies or programs.

These barriers **inhibit growth and scale** in the global off-grid clean energy market and **exclude off-grid communities** from the socioeconomic, health, and environmental benefits of improved and expanded modern energy services.

Building Technical Foundations for Off-Grid and Weak-Grid Appropriate Appliances



Data Trends Report: Approach & Methodology



Approach

1. Mapping product efficiency and pricing
2. Developing year-by-year baselines
3. Comparing performance of off-grid and on-grid products

Sample sources

“**Baseline**” vs “**Awards**” products

Laboratory Testing



Off-Grid TV
Test Method



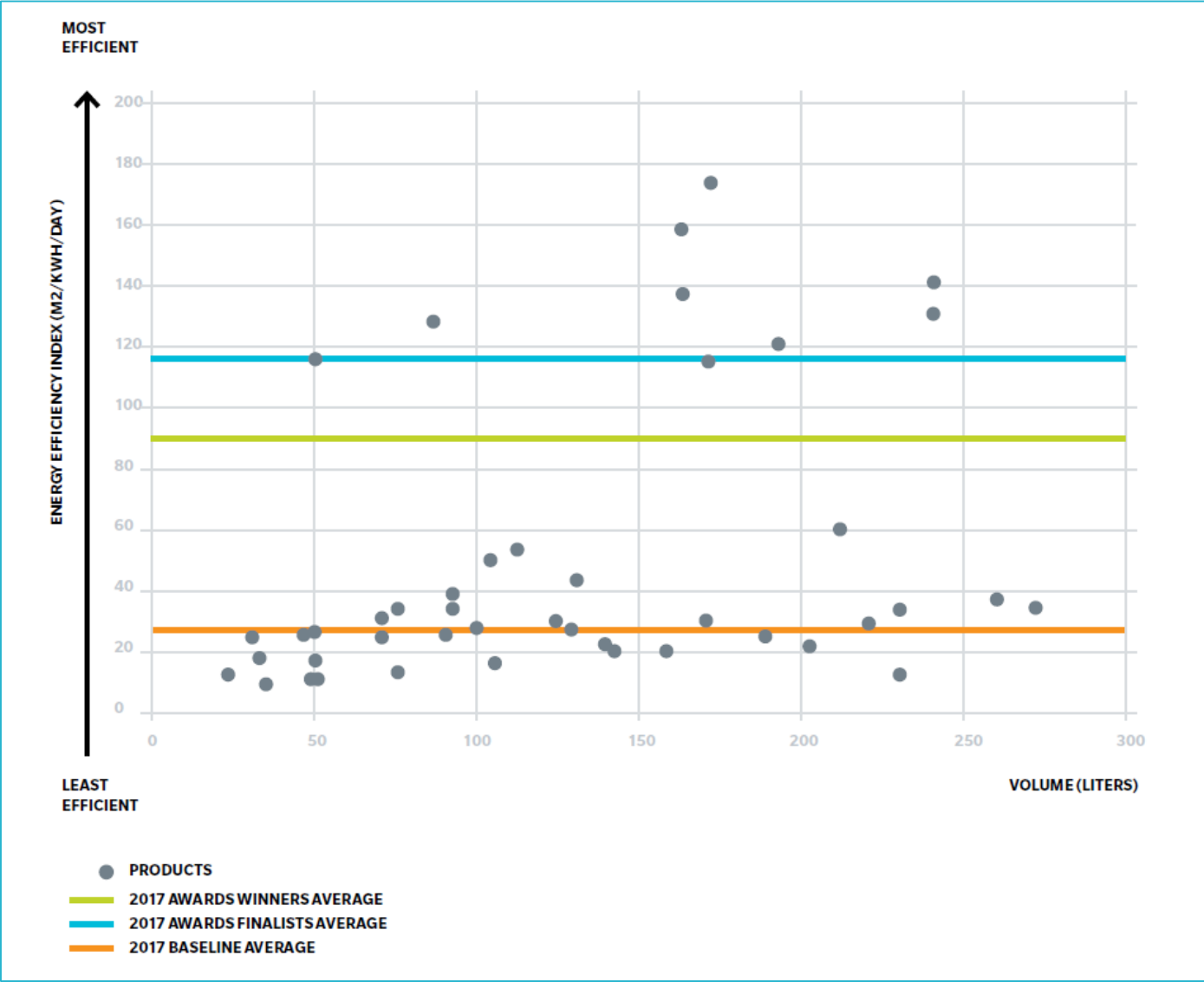
Off-Grid Fan
Test Method



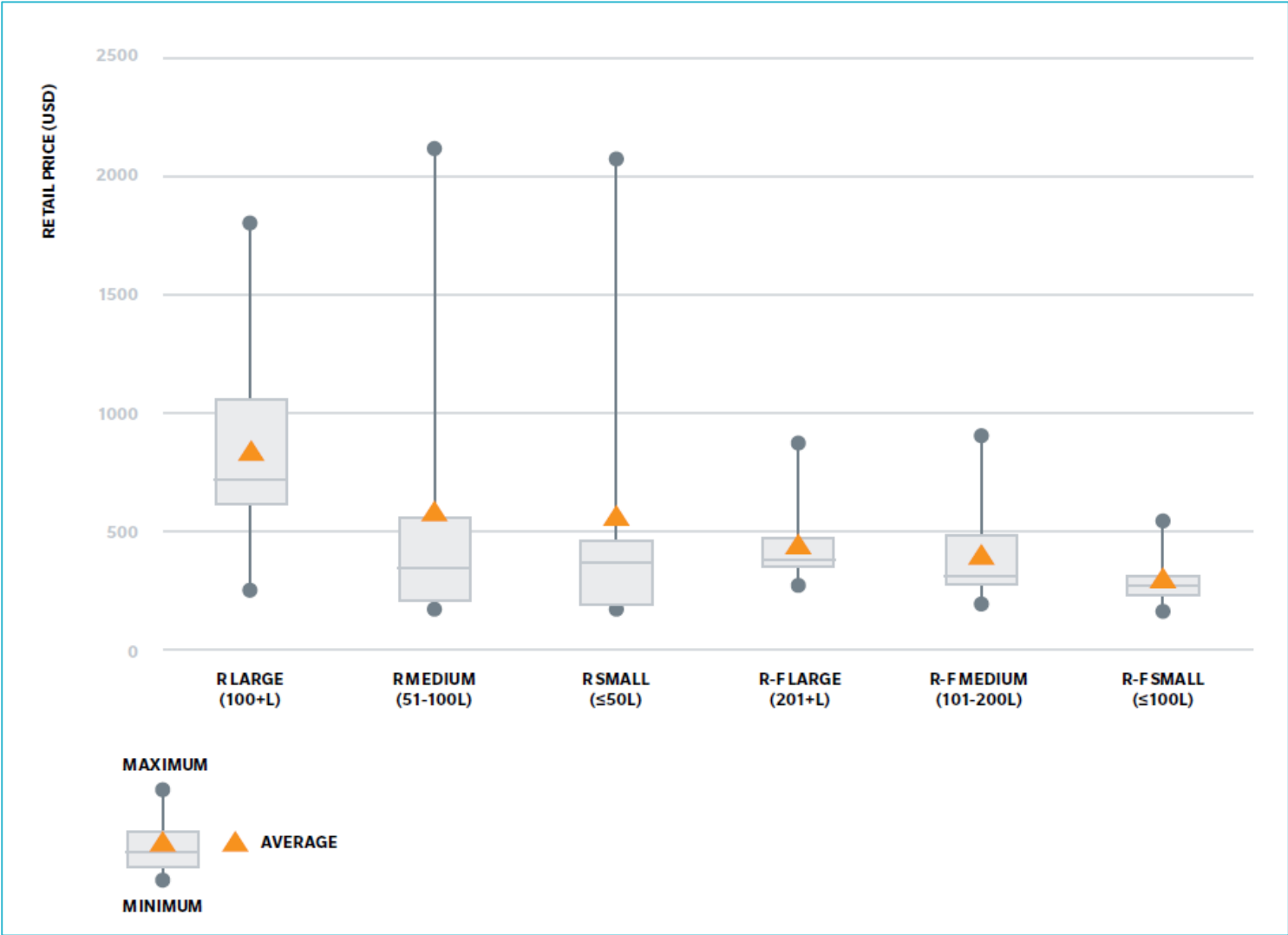
Off-Grid
Refrigerator
Test Method

- Energy performance and efficiency
- Service delivery
- Durability & safety
- Quality & workmanship

Off-Grid Refrigerator Energy Efficiency Trends



Off-Grid Refrigerator Price Trends



Comparison to Refrigerators Available in the On-Grid Market

REFRIGERATORS	OFF-GRID ²⁸	ON-GRID ²⁹	DIFFERENCE (%)
Lowest EEI	11	63	472
Mean EEI	69	133	93
Highest EEI	173	245	41
REFRIGERATOR-FREEZER COMBINATION UNITS	OFF-GRID ²⁸	ON-GRID ²⁹	DIFFERENCE (%)
Lowest EEI	9	58	560
Mean EEI	25	92	265
Highest EEI	60	135	125



Additional Insights



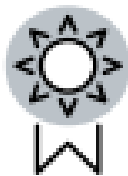
Discrepancies Between Laboratory versus Field Performance

Despite best efforts to simulate real-world conditions, laboratory testing can never truly predict a product's actual energy performance. Field testing is a necessary complement to support continued progress towards improved appliance quality and energy efficiency.



Accuracy of Claimed Energy Performance Values

Greater accuracy and consistency in product energy performance ratings & communication about performance variations in real-life settings is critical for consumer protection and to support the ongoing development of off-grid appliance markets.



Enhancing Product Durability & Quality

Off-grid consumers often live in remote areas with almost no access to repair technicians or replacement components. Product failures and bad user experiences can quickly erode consumer confidence. Quality and durability also improve investor confidence, enhance consumer safety, and help minimize e-waste.

Off-Grid Appliance Data Platform ... Coming Soon!

DATA PLATFORM

Efficiency for Access Data Platform

Providing access to off-grid appliances resources and product testing data

SELECT A PRODUCT TYPE

Browse, download and share global off-grid appliances product specifications and testing data.





EfficiencyforAccess.org
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