

ideas to impact.



**2016-17 GLOBAL LEAP OFF-GRID
REFRIGERATOR COMPETITION
(ROUND 1)**
FOLLOW-UP REVIEW

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In association with IMC Worldwide

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DISCLAIMER

The views expressed in this report are those of the evaluators. They do not represent those of IMC, DFID or of any of the individuals and organisations referred to in the report.

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List of acronyms

B2B	Business-to-business
DFID	Department for International Development
E&L	Evaluation and Learning
IIP	Innovation Inducement Prizes
KII	Key Informant Interviews
PEQ	Programme Evaluation Question
RBF	Results-based financing
SEQ	Sub-Evaluation Question
SHS	Solar Home Systems
ToC	Theory of Change
VfM	Value for Money

Summary

Where refrigeration is available, it brings with it a range of benefits including improving human health, income generation and reducing the burden that typically falls on women to shop for, gather and prepare food. In rural areas of sub-Saharan Africa, where there are particularly low levels of electrification, prevalence of off-grid refrigerators is low and is dependent on the uptake of solar home systems (SHS).

For the global market of off-grid refrigerators to develop, more energy efficient and cost-effective appliances are needed, but refrigerators are one of the most challenging off-grid appliances to design and develop, leaving consumers, for now, with expensive, inefficient and faulty products.

The 2016-17 Global LEAP Off-Grid Refrigerator Competition (Round 1) aimed to transform the global market for off-grid refrigerators by incentivising companies to nominate appliances to be tested in laboratory and field settings, and then to be benchmarked against one other. As is characteristic of the Global LEAP Awards, a subsequent round followed (the 2019 Global LEAP Off-Grid Refrigerator Competition or Round 2), however Nesta's evaluation and this follow-up review focus on the results and effects of Round 1.

The competition was launched in 2016 and a set of awards were made to the best appliance in each of five categories plus two innovation prizes (for Overall Value and Energy Efficiency). A third and final innovation prize was awarded for Appropriate Design & User Experience, in November 2018, as the results of field testing, in Uganda, of shortlisted appliances became available. Soon after this third prize was awarded, the innovation foundation, Nesta, submitted its evaluation report¹ to the competition's funding partners, the Efficiency for Access Coalition (DFID and USAID).

Round 1 of the competition was delivered by the NGO, CLASP, with support from Ideas to Impact, a programme funded by DFID to test the value and use of innovation prizes for development by designing, implementing and evaluating prizes in a range of contexts. Unlike other prizes in the Ideas to Impact portfolio, the Global LEAP Off-Grid Refrigeration Competition takes the form of a Recognition Prize, i.e. awards are made for innovation that is likely to have taken place ahead of the prize being launched.

To enable learning from the Global LEAP Off-Grid Refrigerator Competition to join those identified through evaluations of other prizes in the Ideas to Impact portfolio, Itad (as the programme's Evaluation & Learning Team) carried out a follow-up review to Nesta's evaluation, the findings of which are presented in detail in this report.

The follow-up review takes the evaluation findings from Nesta's report, and combines them with a second collection of largely qualitative data to consider three areas of particular interest to DFID:

What happened next to the finalists and winners of Round 1 of the Global LEAP Off-Grid Refrigerator Competition e.g. did participating in the competition lead to further innovation?

If and how did the competition change the market and specifically, what was the effect of the Results-based Finance (RBF) mechanism used in the competition (see Box 1 for information on the RBF programme)?

How did learning from Round 1 of the competition influence the design of Round 2 and that of the Off-Grid Cold-Chain Challenge (another prize run by Global LEAP, funded through the Ideas to Impact programme)?

¹ Available at https://pdf.usaid.gov/pdf_docs/PA00W6NC.pdf

What happened next to the finalists and winners of the 2016-17 Global LEAP Off-Grid Refrigerator Competition?

According to the Nesta evaluation, sales of the shortlisted and winning appliances were low (zero or a few thousand) and the follow-up review found no evidence of additional sales, and limited evidence of business-to-business (B2B) relationships since November 2018 as a result of participating in Round 1 (see **Sections 5.2 and 5.3**).

“The issue is cost, internationally. The cost to the end customer is still too high. And this is, I would say, principally caused by duties and tariffs and certifications.”

- Finalist of Round 1

There were a few signs of optimism of future sales among the winners and finalists interviewed during this follow-up review. However most key informant interviews discussed the barriers that the market still needs to overcome including, the cost of the appliances and their distribution, and lack of demand for off-grid refrigerators (see **Section 5.4**).

“The programme has pushed us to look at the trade-off and make decisions in a different way...in the past I think we were very much driven by an engineering, best-in-class, highest efficiency product, but that’s not always what best serves the market.”

- Finalist of Round 1

Innovation among participants was largely anticipated to come *after* the awards were made i.e. it was expected that the provision of third-party test data, benchmarking and involvement in the competition process would be catalysts for subsequent innovation.

To this end, the competition produced mixed results (see **Section 5.1**).

Three of the seven winner and finalist organisations interviewed for the follow-up review gave examples of how they had innovated since November 2018, as a result of participation in Round 1.

The remaining four organisations put their lack of change down to: focussing on a different part of the business, not finding the test data useful or being satisfied with their current product.

Value of third-party test data

Two sets of data were made available to winners and finalists of the competition:

Detailed laboratory test results for their appliances only (basic data was also available to them on other winners and finalists).

Energy consumption data from the field test, including a comparison against other products in the same size category and technology type, and a summary of qualitative data from end-user interviews.

Five of the seven winners and finalists interviewed for this follow-up review said they valued the laboratory test data. One manufacturer, for example, said the data was new to them and helped them to identify a way to save energy consumption.

The field testing in Round 1 was the first to be run for a Global LEAP Award and the Prize Team experienced a number of technical issues which prevented certain types of performance data from being collected for the duration of the field test, such as internal compartment temperature and relative humidity. This limited what could be shared with winners and finalists and perhaps inevitably, we found little evidence that the field test data was valued by the winners and finalists. However, the field testing did help the Prize Team to identify several ways of making laboratory testing more relevant to the way in which off-grid refrigerators function and are used by micro-enterprises in developing countries (see **Section 5.6**). Indeed, the organisation awarded the innovation prize for Appropriate Design and User Experience (which drew on the field test data), was different to the organisation that won the other two innovation prizes (which were based only on laboratory test data).

Importantly, the field test data demonstrated that to be appropriate to the real-world setting, future laboratory tests would need to deviate from the international approach (as widely adopted in national standard and labelling programmes), and this learning has been applied in Round 2 of the competition, and other Global LEAP Awards.

How has the competition affected the market and what role did the Results-Based Finance (RBF) incentives play?

Box 1 The Global LEAP RBF Incentives Programme

The purpose of Global LEAP's RBF Programme

Alongside its prizes, Global LEAP Awards offers financial incentives to appliance suppliers and off-grid solar companies that partner to distribute large quantities of Winner and Finalist products from the Global LEAP Awards in target markets.

The RBF incentives programme has two aims:

- To lower the cost to off-grid solar companies of procuring large volumes of best-in-class off-grid appliances.
- To facilitate new business partnerships for appliance suppliers that have invested in producing high-quality off-grid appliances.

In submitting Expressions of Interest, applicants are required to explain how the incentive funds will enable them to reach more customers than they would through normal business operations.

<https://globalleapawards.org/results-based-financing>

A key component of the competition's design was a set of activities delivered during and after the awards were made, to help stimulate the market (see **Section 5.5**). These included:

- The 2017 Buyer's Guide for Outstanding Off-Grid Refrigerators – designed as a procurement tool for off-grid solar companies and off-grid solar product distributors in which Global LEAP published information on the winners and finalists of the competition.
- An RBF programme which aimed to encourage off-grid appliance suppliers and solar distributors to place bulk orders of selected appliances and market them to their customers.

The majority of winners and finalists interviewed by Itad rated the Global LEAP RBF incentives programme despite the low number of sales that had come from it. Only one finalist had negative

comments; they found it to be too complicated and commented that it required a lot of explanation to people outside of the competition. The follow-up review found that:

- The competition, its winners, and the 2017 Buyer's Guide received substantial media coverage, primarily on the websites of trade media and organisations promoting solar power.
- Only 2 of 7 winners and finalists interviewed during the follow-up review could link product enquiries to their appliances being featured in the 2017 Buyer's Guide.
- While the Global LEAP RBF incentives programme had a limited impact on sales during Round 1, the majority of stakeholders interviewed for the follow-up review felt it important to include in future rounds.
- The redesigned Reverse Auction version of the RBF incentives programme in Round 2 generated considerably higher sales commitments. Interviews with the Prize Team and external experts confirmed that this growth would be typical of repeated rounds (the first round priming the market and subsequent rounds leading to greater sales). The Prize Team also had feedback that the redesigned approach was preferable to other RBF designs.
- All the winners and finalists expressed interest in participating in future rounds of the competition, although one said this would depend on the details of the laboratory test method. Motivations varied among them and included the RBF incentives programme, the Buyer's Guide and benchmarking against competitors.

"Having an RBF is always very [welcome] I mean it really helped open up our market."

- Finalist of Round 1

How has learning from Round 1 of the competition influenced the design of future prizes?

The laboratory test method used in Round 1 was designed to align with that already used internationally but the experience of the Prize Team was that this needed to be reviewed for the future. Several changes have since been made to the laboratory test method for Round 2, based on feedback from Round 1 participants and insights obtained by the Prize Team from the field testing (see **Section 5.6**).

These include:

- Evaluating appliances based on how they are being powered e.g. by solar home system, AC weak-grid or solar direct drive.
- Factoring into the laboratory test, what the appliance is being used to store e.g. adjusting the temperature range if the compartment is intended to cool beverages rather than meat or vegetables, and how often the door is likely to be opened and closed.
- Introducing a new test condition to simulate the power supply obtained from solar power including solar day simulations. These simulations have also been brought into the design of the laboratory tests for the new Global LEAP Solar Water Pump competition.

As well as acting on its learning, the Prize Team has put substantial effort into sharing its learning from Round 1 through peer-reviewed publications, conference panel sessions and reports published by partner organisations.

Conclusions

According to its Theory of Change, the Global LEAP Off-Grid Refrigerator Competition was expected to:

- Contribute to making more off-grid refrigeration products available on the market that are appropriate for developing country consumers.
- Signal to manufacturers, designers and innovators that the off-grid market has promising opportunities deserving of their skills and investment.
- Boost the demand for solar home systems connections (SHS).

In this follow-up review, we found little evidence of additional sales of products since the Nesta evaluation took place (i.e. since November 2018) however this tended to be accompanied by comments from interviewees on the need to manage expectations given the very early stage of the market still and the significant challenges to its growth.

“We’ve just been interviewing people and people will tell you that solar fridges don’t exist.”

- External sector stakeholder

“Low-income marginal groups will always be beyond the market...if you want to achieve universal energy access, some subsidy will be needed.”

- External sector stakeholder

A recurring theme in the follow-up review has been the need to focus on the trade-offs between efficiency and cost in order to have products available that people are willing and able to buy, so it is good to see evidence of innovation among some of the winners and finalists in this area. The RBF incentives scheme offered by Global LEAP was also viewed by most key informants as a step in the right direction in helping to tackle barriers to market growth.

Although the field test piloted in Round 1 experienced several challenges,² the learning from it has led to innovation in laboratory testing of off-grid refrigerators (an unintended but useful consequence of the competition). Many of those interviewed for this follow-up review appeared to value highly the provision of third-party data on appliances if based on an approach to laboratory testing that is informed by the realities of the conditions and manner in which they will be used.

² Ideas to Impact published a Learning Paper on the approach taken to field testing and lessons learned from it http://www.imcworldwide.com/wp-content/uploads/2019/02/Ideas-to-Impact_Learning-paper-the-challenges-of-field-testing-off-grid-refrigerators.pdf

Our conclusion from this follow-up review is that long-term approaches to supporting companies in this market will be needed for the market to grow. These include efforts to make available relevant, third-party data and funding mechanisms such as RBF and grants, that build awareness and demand for off-grid refrigerators for the benefit of all companies working in the sector.

Introduction

The 2016-17 Global LEAP Off-Grid Refrigerator Competition

The 2016-17 Global LEAP Off-Grid Refrigerator Competition ('the competition') was designed to help stimulate the development of the off-grid refrigerator market in sub-Saharan Africa. Round 2 of the competition has since been launched and awarded but is not the main focus of this report.

Round 1 of the competition was initially designed to offer prizes to be awarded based on laboratory testing and was managed by the NGO, CLASP, with support from the Efficiency for Access Coalition (DFID and USAID). Ideas to Impact joined the competition to provide additional support³ including a third prize which drew on data obtained through a new field-testing component, run in Uganda by Ideas to Impact partner, Energy for Impact.⁴

The purpose of this follow-up review

The Ideas to Impact programme, funded by the UK Department for International Development (DFID), tests whether innovation inducement prizes (IIPs) can stimulate innovative solutions to long-standing development challenges for low-income households. Itad, the Evaluation and Learning Team for Ideas to Impact, is evaluating Ideas to Impact's portfolio of prizes to understand more about the value and use of innovation prizes for development and will be synthesising this learning into a set of research outputs towards the end of the programme. Each of the Itad-led evaluations are designed around a set of shared Programme Evaluation Questions (PEQs), as listed in Box 2.

Box 2: Programme-level evaluation questions for Ideas to Impact

Ideas to Impact Programme Evaluation Questions (PEQs)

1. How effective has the prize been at catalysing innovation on the focus problem?
2. To what extent has the effect of the prize been sustained beyond the point of award?
3. Does the prize offer value for money when compared to alternative funding modalities?
4. Were there any unintended consequences of the prizes and did they outweigh the benefits?

In the case of Round 1 of the Global LEAP Off-Grid Refrigerator Competition, an evaluation has already taken place. This was carried out by the innovation foundation, Nesta, on behalf of the competition's funding partners and draws on survey, interview and secondary data obtained up to the final award being made in November 2018.⁵ While the Nesta evaluation adopted a different framework to the PEQs used by Itad, its findings can be reframed under these questions and will be brought into the final Ideas to Impact research outputs.

³ This support was largely in the form of Energy for Impact (E4I) - an Ideas to Impact partner - managing the field testing in Uganda, and advice on judging and communications activities about the prize from IMC and provision of half of the overall prize purse.

⁴ When this report refers to the 'Prize Team' for Round 1, this is the team brought together to support the design, organisation and management of Round 1 of the competition i.e. CLASP, IMC Worldwide and Energy for Impact.

⁵ Doshi, B., 2019. Global LEAP Off-Grid Refrigerator Competition 2016-17 Evaluation Report

Scope of the follow-up review

Itad's purpose in collecting additional data, therefore, is to look at what has happened to the finalists and winners, and to the market itself, subsequent to the competition ending. Based on consultation with CLASP, Ideas to Impact and DFID, and considering the modest resources⁶ assigned to this follow-up review it was agreed to focus on the following areas:

- Investigating what happened next to the finalists and winners of Round 1 of the Global LEAP Off-Grid Refrigerator Competition e.g. did participating in the competition lead to further innovation?
- If and how the competition has changed the market and the specific effect of the Results-based Finance (RBF) mechanism used in the competition.
- How learning from Round 1 of the competition has influenced the design of Round 2 and that of the Off-Grid Cold-Chain Challenge (a prize run by Global LEAP funded through the Ideas to Impact programme).

To better reflect the limited resources and scope of this study, we have classified it as a Follow-up Review rather than an Evaluation. This review does not try to disentangle the Ideas to Impact-funded component from the overall competition. Instead it draws heavily on the Nesta assessment of Round 1 effects, and focusses on what happened next (post-prize) as a proxy indication of impact and sustainability. While Round 2 of the competition as a whole, is beyond the scope of this study, the timing of the follow-up review allows us to compare some data on participation in Round 2's initial window of RBF incentives funding, with data from Round 1.

The proposed questions for this follow-up review were refined in the light of consultation and are listed in Table 1 where their relationship to the Ideas to Impact PEQs is indicated.

Table 1: Set of refined questions for the follow-up review of the Global LEAP Off-Grid Refrigerator Competition 2016/17

Follow-up review questions	Link to PEQs
1. Is there further evidence of how effective the competition was at stimulating the market for off-grid refrigerators in sub-Saharan Africa?	PEQ1
2. How has the Prize Team adapted Round 2 in response to learning from Round 1?	PEQ1
3. To what extent has the prize catalysed innovation among the finalists and winners since the Appropriate Design and User Experience award was made?	PEQ2
4. What is the status of the B2B relationships established between winners or finalists and pay-as-you-go solar companies, existing customers, importers, manufacturers and distributors? Are those reported through the Nesta evaluation still in place? Have new ones been created since November 2018?	PEQ2

⁶ Within the portfolio of evaluations and follow-up reviews being carried out for Ideas to Impact by the Evaluation and Learning (E&L) Team, this is one of the smallest in terms of resources and scope (having approximately 20 days of E&L Team time available to it, as compared to approximately 150 days for the Climate Information Prize).

5. To what extent did the competition's post-award communications raise awareness of the winners and finalists (11 organisations)?	PEQ2
6.1. Have finalists or winners increased actual or projected sales in sub-Saharan Africa?	PEQ2
6.2. What contribution did the competition's Positioning Activities have on these sales?	
7.1. Has the competition resulted in unintended consequences?	PEQ4
7.2. Did the negative consequences outweigh the benefits of the competition?	
7.3. How have these been mitigated in the design of the second round?	
8.1. If solver support was delivered to the competition participants, how did solver support activities reduce barriers to improve solver ability to: (i) participate in the competition; (ii) build effective B2B partnerships?	PEQ5
8.2. If solver support was not delivered to competition participants, what solver support activities could have reduced barriers to improve solver ability to: (i) participate in the competition; (ii) build effective B2B partnerships?	
8.3 How has learning about solver support been addressed in the second round of the competition?	

Follow-up Review Methodology

This is a primarily qualitative study based on secondary data and documents, and Key Informant Interviews (KIs). While small in total number (13 interviews with 15 people), the KIs for this follow-up review cover a significant proportion of key informants for the main stakeholder groups (e.g. 2 of 2 Innovation Prize winning organisations, 5 of 8 other winners and finalists still involved in the programme) and includes interviews with Prize Team members. KIs were carried out with four other organisations operating in the sector that were not involved in Round 1 of the competition, (industry experts and representatives of manufacturers and distributors of SHS or off-grid refrigerators). These, together with data from the Nesta evaluation (which includes interviews with Round 1 participants in 2018), provide important insights about the post-award effects of Round 1 of the competition and how learning has informed Round 2, and wherever possible are triangulated with multiple sources.

More details of the follow-up review methodology are available in Annex 1. At this point in the report, some **limitations** are worth highlighting:

1. Due to the nature of the follow-up review and the likelihood of the report being made public, some interviewees were cautious in how they answered questions and/or requested data they considered commercially sensitive to be excluded from the review, e.g. details of their future plans, partnerships, etc.
2. Only seven of the 10 winning or finalist organisations approached agreed to be interviewed during the follow-up review (see Box 3). However, Itad did get a response from a finalist who had participated in interviews for the Nesta evaluation, thus giving them an opportunity to add their view this time.

3. Interviews were held with five organisations uninvolved in Round 1 of the competition, selected on the basis of their knowledge of the market; however, the off-grid refrigeration sector is very small and these interviewees inevitably have some connections with other organisations involved in the competition.
4. Where statistical findings from the Nesta evaluation are presented in this report, e.g. “50% of finalists...” these are as reported in Nesta’s published evaluation report rather obtained from secondary analysis by Itad of Nesta’s raw data. However, to enhance our understanding of some of the messages from the KIs and to prepare for interviewing winners and finalists, we have gone back to Nesta’s qualitative data and undertaken secondary analysis of notes from interviews and focus groups.

Box 3: Follow-up interviews with winners and finalists

Participation of winners and finalists in the follow-up review

- 11 organisations were competition winners or finalists.
- 10 organisations invited to be interviewed by Itad (One finalist no longer involved in the Global LEAP programme).
- Seven organisations agreed (three innovation prize or category winners and four finalists).
- Three organisations did not respond despite introductions from CLASP, follow-up emails and phone calls.

Section 1: Global LEAP Off-Grid Refrigerator Competition (Round 1): Rationale and background

1.1. Problem statement

Where refrigeration is available, it brings with it a range of benefits including improving human health, income generation and reducing the burden that typically falls on women to shop for, gather and prepare food (see Box 4). In rural areas of sub-Saharan Africa, where there are particularly low levels of electrification, prevalence of off-grid refrigerators is low and is dependent on the uptake of solar home systems (SHS).

For the global market of off-grid refrigerators to develop, more energy efficient and cost-effective appliances are needed, but these are one of the most challenging off-grid appliances to design and develop, leaving consumers, for now, with expensive, inefficient, and faulty products.

Box 4: The benefits of refrigeration as summarised in the competition's problem statement

Problem statement taken from the evaluation report by Nesta of the Global LEAP Off-Grid Refrigerator Competition (Doshi, 2019)

Access to refrigeration can facilitate the development of income-generating activities, prolong the shelf life of fresh foods, reduce spoilage and waste, diversify and enhance the nutritional value of diets, and reduce the time that households – particularly female members – spend shopping for, gathering or preparing food. The market, however, for off-grid refrigeration products is nascent and the prevalence of refrigerators in developing countries, particularly in rural areas, remains extremely low. Highly efficient, appropriately designed and competitively priced refrigerators are essential to this market's development and to its subsequent positive development impacts.

1.2. Competition aim

Round 1 of the Global LEAP Off-Grid Refrigerator Competition aimed to transform the global market for off-grid energy products. More specifically, as part of the competition's Theory of Change (see p.15 of Doshi, 2019), the competition had eight intended outcomes clustered under the headings of Innovation Impact, Innovation Capabilities and Innovation Ecosystem. Annex 3 presents these outcomes and Nesta's assessment of the extent to which they were reached by the time the final Innovation Prize was awarded.

1.3. Target and scope

The competition had three levels of geographical focus:

Uganda: chosen as the site for field testing, the competition was expected to affect the local market via changes to the attitudes, knowledge and experience of the field testers (local shop owners) regarding off-grid refrigerators and solar home systems.

Sub-Saharan Africa: the competition was launched to stimulate the market for off-grid appliances in this region which was selected as the focus based on its lack of energy access, and because it was a common space where all the competition partners were working.

Global: The competition was open to nominations by manufacturers and distributors of eligible off-grid refrigerators located worldwide. Furthermore, although the primary focus for impact was sub-Saharan Africa, it was the hope of the competition partners that the results would benefit global off-grid energy consumers.

1.4. Prize mechanism

Unlike other prizes in the Ideas to Impact portfolio, the Global LEAP Off-Grid Refrigerator Competition takes the form of a Recognition Prize, i.e. awards are made for innovation that is likely to have taken place ahead of the prize being launched. However, by including a field-testing stage in Round 1, and subsequently providing data to participants about their technology's performance in the field, it was anticipated that the competition would catalyse further innovation among participants.

The competition comprised two sets of prizes (see Box 5 for details of winners):

Box 5: Winners of the Global LEAP Off-Grid Refrigerator Competition (Round 1)

Best-in-class winners:

Large Refrigerator:

Palfridge – LC221

Medium Refrigerator:

Palfridge – LC86

Small Refrigerator:

SunDanzer Refrigeration Inc. – DCR50

Large Refrigerator-Freezer Combination Unit: Basil Energetics LTD - Domestic Direct Cool Refrigerator/DC170L

Small Refrigerator-Freezer Combination Unit:

Metropolitan Electrical Appliance Mfg. Co. LTD

Innovation Prize Winners:

ENERGY EFFICIENCY: SunDanzer Refrigeration Inc. – DCR165

OVERALL VALUE: SunDanzer Refrigeration Inc. – DCR50

Non-financial prizes recognising best-in-class – The most energy efficient and highest quality commercially-available product in each of five categories was identified e.g. small refrigerator, based on nominations received during a three-month period starting September 21, 2016. The five winners were decided by an expert judging panel informed by the results of laboratory testing only.

Innovation Prizes (with cash awards) – Open to commercially-available or late-stage prototype products, three prizes were on offer: Overall Value; Energy Efficiency; and Appropriate Design and User Experience. Products were evaluated in the laboratory for their energy performance, quality, design and reliability according to rigorous international best practice and these results were used by the expert judging panel to award the Overall Value and Energy Efficiency prizes. To decide on

the winner of the Appropriate Design and User Experience award, the panel also drew on the results of field testing of eligible products, by local businesses in Uganda.

The final elements of the prize mechanism were the **Positioning Activities**:

Buyer's Guide: Global LEAP published information on the winners and finalists of the competition in its 2017 Buyer's Guide for Outstanding Off-Grid Refrigerators – designed as a procurement tool for off-grid solar companies and off-grid solar product distributors.

Results-based financing (RBF): Winners and finalists were invited to take part in the 'Off-Grid Appliance Procurement Incentives' programme (see Box 6), an RBF programme that encourages off-grid appliance suppliers and solar distributors to place bulk orders of selected appliances and market them to their customers.

Box 6: The RBF Incentives Programme

About the Global LEAP RBF Incentives Programme

Alongside its prizes, Global LEAP Awards offers financial incentives to appliance suppliers and off-grid solar companies that partner to distribute large quantities of Winner and Finalist products from the Global LEAP Awards in target markets.

The RBF incentives programme has two aims:

- To lower the cost to off-grid solar companies of procuring large volumes of best-in-class off-grid appliances.
- To facilitate new business partnerships for appliance suppliers that have invested in producing high-quality off-grid appliances.

In submitting Expressions of Interest, applicants are required to explain how the incentive funds will enable them to reach more customers than they would through normal business operations.

<https://globalleapawards.org/results-based-financing>

Winners and finalists were also given access to the Efficiency for Access Coalition and Acumen investor network which supports debt and equity investors to gain market intelligence, builds an investable pipeline; and allows investors to ask more technical questions about specific technologies during their due diligence.

The Global LEAP Off-Grid Refrigerator Competition is not easy to classify, combining as it does recognition prizes and post-award activities. As a case study for Ideas to Impact's research outputs, it might be best categorised as a form of Market Stimulation Prize⁷ which differs in design from the Grand Innovation Prizes that are usually used as examples of this category, not least in the size of the cash prize.

⁷ In proposing four categories of innovation inducement prize, Everett et al (2012) describe the Market Stimulation Prizes as "also known as Grand Innovation Prizes, these large purse prizes are intended to change the way we live by stimulating the development of innovation ecosystems and catalysing new market growth."

Section 2: Findings

How effective was the competition at stimulating the market for off-grid refrigerators in sub-Saharan Africa?

2.1. Findings on effectiveness from the Nesta evaluation

One aspect of this study is to understand what the competition’s evaluation findings (as carried out by Nesta) add to Ideas to Impact’s understanding of the value and use of innovation prizes for development. In this section we consider the extent to which the evaluation shows the competition achieved its primary intended effect (Ideas to Impact PEQ1) and whether our follow-up interviews add any further insights to this.

Nesta produced its final evaluation report a year after the prizes based on laboratory testing had been awarded and shortly after the winner of the final prize (the Appropriate Design and User Experience prize) was announced (see Figure 1). The evaluation included among its data sources, surveys of participants, judges and partners, and interviews with winners and finalists from October 2018, after field test data had been made available to them but before the final prize had been awarded.

Figure 1: Timing of Nesta evaluation and Itad follow-up review in relation to Round 1 competition events



Primary intended prize effect

As part of its evaluation, Nesta identified eight intended outcomes of the competition and Annex 3 presents the key evaluation findings against these intended outcomes. Ideas to Impact uses a set of prize effects to evaluate the effectiveness of all of its prizes (see Annex 2 for details) and Table 2 illustrates the relationship between these prize effects and the intended outcomes used in the Nesta evaluation of the Global LEAP Off-Grid Refrigerator Competition.

Based on the set of prize effects used by Ideas to Impact, and the stated aims and design of the competition (see Section 3), the primary intended effect of the competition was **Market Stimulation**. Ideas to Impact describes this prize effect as helping to increase economic activity in an existing market or starting a new one for a particular good or service through a high value prize that, as a result of all of the other effects (such as Raise Awareness and Point Solution), results in a changed market or opens up a new market.

Table 2: Relationship between intended outcomes (Nesta evaluation) and prize effects (Ideas to Impact)

Intended outcome (from Nesta evaluation)	Related prize effect (used by Ideas to Impact)
1. Generate solutions for off-grid connectivity (to give people the benefits of a life with electrical goods).	Point Solution
2. Generate technical and market innovation to develop off-grid appropriate refrigeration for developing countries.	Point Solution
3. Mobilise new talent to generate innovative off-grid refrigerators.	Open Innovation
4. Build business-to-business (B2B) partnerships to accelerate distribution (partnerships with distributors and investors).	Facilitate and Strengthen Partnerships and Networks
5. Build consumers' capacity (to increase the awareness and value associated with solar systems in local businesses and final clients/consumers).	Raise Awareness
6. Grow a diverse market for efficient off-grid appliances to increase income, property and the quality of products.	Market Stimulation
7. Build value of solar home systems to increase demand for new systems and to increase subscription value.	Market Stimulation
8. Raise market awareness of the existence of high quality off-grid products.	Raise Awareness Market Stimulation

According to its Theory of Change, the competition aimed to stimulate the market in three ways:

1. Contributing to making more off-grid refrigeration products available on the market that are appropriate for developing country consumers.
2. Signalling to manufacturers, designers and innovators that the off-grid market has promising opportunities deserving of their skills and investment.
3. Boosting the demand for solar home systems connections (SHS).

The Nesta evaluation findings on effectiveness are summarised below under the heading of these three aspects of market stimulation. We note too that Nesta's evaluation report (published towards the end of 2019) through its circulation, may itself contribute further to this prize effect.

1. Contribution to making more off-grid refrigeration products available on the market that are appropriate for developing country consumers

The competition succeeded in identifying and publicising a set of off-grid refrigeration products and 6 of 7 winners and finalists interviewed during the follow-up review cited how this had benefitted their business.

The competition contributed to market availability in two ways: raising awareness of products and running an RBF incentives scheme for products listed in the Buyer's Guide. All entrants to the competition had to be commercially available to be eligible for the "Best-in-Class" prizes, of which five were awarded. Late-stage prototypes could be entered for consideration for the three

Innovation prizes but the data available to Itad, indicates the these were won by commercially available products.

The Nesta evaluation reported that the competition succeeded in raising market awareness of the existence of 17 high quality off-grid refrigerators (as identified through the laboratory testing). However, the data in the report suggests that some of these products were already available on another market (e.g. for medical use, or in a different geographical market such as North America). This is confirmed by Itad's interviews for the follow-up review with finalists in which 2 of 7 commented on having nominated a product that was already being produced for a different market.

The Nesta evaluation report comments that "market awareness was at the core of the competition's activities" (Doshi, 2019, p.64) and that 85% of finalists felt that Global LEAP raised the credibility of their organisations and products in the off-grid market and elevated their products to investors and customers. 6 of 7 winners and finalists interviewed by Itad for this follow-up review reported having benefitted from the publicity around the competition (see section 5.3). One interviewee however explained that this awareness raising was a negative experience for them due to how they felt their product's test results would be perceived by readers of the Buyer's Guide.

2. Signalling to manufacturers, designers and innovators that the off-grid market has promising opportunities deserving of their skills and investment

The competition attracted four new entrants to the off-grid refrigeration market, and 4 of 7 finalists and winners interviewed in the follow-up review observed that the competition had increased their awareness of the market's opportunities.

One aim of the communications about the competition was to persuade those who could be involved in developing refrigerators, that the off-grid market was worthy of their attention. As noted above, some finalists and winners already had commercially available off-grid refrigerators, but these were targeted at a different type of customer (by location in the world, or in terms of use).

The Nesta evaluation reported that four nominees in Round 1 were completely new to the off-grid refrigeration market before the competition. Itad's interviews with finalists and winners as part of this follow-up review confirmed that Round 1 had some success among the participants, in drawing attention to a new market. 4 of the 7 winners and finalists interviewed by Itad, said they had learned more about the broader opportunities of the market through taking part in the competition or had increased their understanding of the organisations operating within it.

For example, one company interviewed by Itad, now appeared confident of moving into the African market and was looking to identify a partner, which they directly attributed to their participation in the competition and the connections made through it. Another company commented that the process of being in the competition helped them to realise there was a larger market for their products than they were currently addressing and had acted as a catalyst for them to put more resources into sales and marketing.

3. Boosting the demand for solar home systems (SHS) connections.

Little evidence was found through the Nesta evaluation or the follow-up review of the competition boosting demand for SHS connections.

Off-grid refrigeration requires an SHS connection suitable for running large appliances. One key informant interviewed for this review cited data that showed an increase in demand for larger SHS over a number of years, which they attributed in part to the increasing availability for Pay-As-You-Go options (PAYG).

While the Ugandan entrepreneurs involved in field testing were (by design) new to off-grid refrigerator ownership, they were required to have experience of SHS e.g. for powering lights or fans, etc. The Nesta evaluation found that field testers valued their off-grid refrigerators, for example, 84% of field testers said they would purchase the off-grid refrigerator they tested and the amount they were prepared to pay (after testing) was higher than the amount obtained through earlier research⁸ (among people who had not tested appliances). CLASP has produced a short video⁹ in which one of the entrepreneurs who took part in the field testing, shares the wider benefits the SHS connected to the refrigerator has brought to his village. From the Nesta evaluation finding, we could infer that the field-testers' perception of the value of SHS increased. However any boost in demand attributed to this is limited by the number of field testers i.e. 36.

KIIs for this follow-up review, with CLASP and external sector stakeholders, suggest that any inferences about demand for SHS as a result of demand for off-grid refrigerators need to be realistic. All of these interviews (6 of 6) made reference to the continuing low uptake of off-grid refrigerators in developing countries and the effect this has on demand, coupled with the absence of any campaigns to promote off-grid refrigeration to the market. As one key informant noted, "people don't think they can get a fridge if they're not on the grid".

As Section 5.6 explains, an unexpected result of the competition was the extensive learning acquired in how to monitor and judge the refrigerators,¹⁰ which was then used to support subsequent prizes.

⁸ Earlier competition research indicated that users would only pay in the region of USD100.

⁹ <https://vimeo.com/307312993>

¹⁰ The learning on the field testing (e.g. use of remote monitors, etc.) has been shared through several online publications including http://www.imcworldwide.com/wp-content/uploads/2019/02/Ideas-to-Impact_Learning-paper-the-challenges-of-field-testing-off-grid-refrigerators.pdf and <https://link.springer.com/article/10.1007/s12053-019-09783-1>

Section 3: To what extent has the effect of the competition been sustained beyond the point of award?

3.1. Influence of the competition on innovation among the finalists and winners

Three of the seven winner and finalist organisations interviewed for the follow-up review gave examples of how they had innovated since November 2018, as a result of participation in Round 1.

The remaining four organisations reported that they had not made changes based on the competition because they had not found the test data useful (two interviewees), were focussing on a different part of the business (one interviewee) or were satisfied with their current product (one interviewee).

As noted in section 2.3, Itad interviewed seven organisations out of the 11 whose products were listed in the Buyers Guide (i.e. Round 1 winners or finalists). The focus of these interviews was on what happened to the organisations since the awarding of the final Innovation Prize in November 2018 and particularly if and how the competition had led them to innovate in the area of off-grid refrigeration.

Ideas to Impact defines innovation as: the application of new or improved products, processes, technologies or services that are either new to the world (novel), new to a region or business (imitative) or new to the field of endeavour, that is, repurposed (adaptive). Based on this definition, it is unclear from the Nesta evaluation how much innovation took place among participants in preparation for entering the competition, although interviews with the Prize Team during the follow-up review produced anecdotal evidence of participants modifying their products to fit the testing requirements of Round 1 e.g. changing an adaptor from AC to DC. However, Itad's understanding of the competition's Theory of Change and DFID's expectations, is that innovation was largely anticipated to come *after* the awards were made i.e. that the provision of third-party test data, benchmarking and involvement in the competition process would be the catalysts for innovation.

Three of the seven organisations interviewed could give examples of how the prize had directly influenced them to adapt their existing product, or develop a new one:

- One organisation had redesigned their refrigerator to bring the price down, something they said the competition catalysed.
- Another organisation developed a new product model as a result of the data obtained about customer demands regarding capacity and price. They had also moved resources into marketing to the off-grid refrigerator market.
- A third organisation had tried to improve the performance of their product since winning their award.

“The programme has pushed us to look at the trade-off and make decisions in a different way...In the past I think we were very much driven by an engineering, best-in-class, highest efficiency product, but that’s not always what best serves the market.”

- Finalist of Round 1

The remaining four organisations gave reasons for why their participation in the competition had not driven them to make changes to their product, including:

- The competition test method was not appropriate to their appliance.
- They were focussing on other parts of the business.
- The data was insufficient to be useful for them (they were bringing out a new version of the product but did not consider this a result of the competition).
- They were distributors rather than manufacturers and happy with the orders received for the product through the RBF mechanism (implication being that they did not need to make any changes).

Recognition of the continued need to bring down price

The majority of stakeholders interviewed for the follow-up review considered affordability to be a continuing barrier to increasing off-grid refrigerator sales

As highlighted above, 2 of the 7 winners and finalists interviewed by Itad reported being catalysed by the competition to try to improve product affordability. However, most (6 of 7) commented more broadly on some aspect of the continued need to reduce the cost to off-grid refrigerator customers either by highlighting the value of the RBF incentives scheme offered by Global LEAP, or the need for manufacturers to rethink the trade-off between efficiency and price in this market.

The challenge of getting prices low enough to encourage sales in developing countries was investigated further in the follow-up review through interviews with six key informants (two members of CLASP and four members of other organisations with an interest in the off-grid sector). All agreed that affordability was still a problem in the market and 4 of the 6 noted the additional challenges involved in selling refrigerators over televisions in terms of cost and size (sales and distribution challenges). For example, one interviewee observed that the impact of refrigerators might be higher than from televisions, but that refrigerators would need to become closer in price to a television before being attractive to buyers.

For CLASP, this recognition (based on learning from Round 1) has directly influenced the design of Round 2 of the competition, with the inclusion of two prizes that are intended to induce companies to find ways to make off-grid refrigerators more affordable.¹¹

¹¹ The innovation prizes for Round 2 were: Consumer Affordability Prize, for commercial innovations that make it easier for customers to purchase products and the Unit Cost Affordability Prize, for technical innovations that reduce the cost to manufacture products, were sponsored by UK aid.

Value obtained from the laboratory and field tests data

Five of the seven winners and finalists interviewed for this follow-up review said they found the laboratory test data useful either to inform product development (two interviewees) or as independent confirmation of their own data (three interviewees).

Of the two winners and finalists who did not report receiving value from the data, one organisation was unhappy about the design and reporting of the laboratory test and the other said while the data was fine, they had not used it.

We found little evidence that the field test data was valued by the winners and finalists; its primary value was to the Prize Team in identifying the winner of the third Innovation Prize and in strengthening the laboratory testing for the future.

Two sets of test data were made available to winners and finalists of the competition:

Detailed laboratory test results for their appliances only (basic data was also available to them on other winners and finalists through the published Buyer's Guide).

Energy consumption data from the field test, including a comparison against other products in the same size category and technology type and a summary of qualitative data from end-user interviews.

Laboratory test data

The follow-up review found evidence that 5 of the 7 winners and finalists interviewed valued the data supplied to them by CLASP, from their laboratory test, about their appliances. One of these five organisations said that the test had collected data that was different to that which they had already collected about their product, which helped them to identify a way to save on energy consumption. Of the remaining two interviewees, one organisation was unhappy about the appropriateness of the laboratory testing method for the technology used in their product and how the results were subsequently reported in the Buyer's Guide; the other had no complaints about the data but had not used it.

Three of the seven winners and finalists interviewed in the follow-up review commented on the value they saw in having unbiased third-party data about their appliances and one of them reported using it for marketing their products. Two industry experts interviewed for the follow-up review observed that the potential this third-party data had to build confidence in the market was a key value offered by the competition, with one going so far as stating it was *the* key value.

"I think it was valuable feedback to have in that it was, you know, coming from a third party in an independent, unbiased format. I don't think that much of it was a surprise to us."

- Finalist of Round 1

Field test data

The field testing in Round 1 was the first to be run for a Global LEAP Award and the team experienced a number of technical issues which prevented certain types of performance data from being collected for the duration of the field test such as internal compartment temperature and relative humidity.

However, the data that was collected enabled the judges, and therefore the competition, to identify which of the best-in-class category winners should be awarded the third innovation prize for Appropriate Design and User Experience. The winner of this third prize was a different company to that which had won the two innovation prizes that had been based solely on laboratory test data. Section 5.6 explores how changes have been made to testing during Round 2 of the competition in response to learning obtained through Round 1.

The follow-up interviews reconfirmed some of the comments made to Nesta during the evaluation about weaknesses in the field data supplied to them e.g. interviewees would have liked to have known what temperature customers wanted from appliances, or the market potential at different price points.

“The field and user data was almost non-existent. There was nothing of any meaning coming back to us...a lot of trouble, effort spent trying to get the products in the field and tested in the field; to come back with no clear results was very disappointing.”

- Finalist of Round 1

3.2. Status of B2B relationships established as a result of the competition

Limited evidence of B2B relationships since November 2018 as a result of Round 1

The evaluation by Nesta reported that 50% of finalists had developed partnerships in order to further develop or produce their solution, and another 25% were feeling optimistic about building partnerships in the near future.

Among the seven winners and finalists interviewed by Itad in this follow-up review, five had no new partnerships to report since November 2018 as a result of this prize competition, with one of the interviewees commenting that they felt it was too soon for this. The two finalists and winners who were able to give examples of new relationships, directly attributed these to being involved in the competition. One had received funding through connections they said had been made by participating in the competition while the other reported that being involved in the competition had enabled them to develop a relationship with another finalist which they felt had the potential to develop into a partnership.

3.3. Finalists and winners’ actual and projected sales in sub-Saharan Africa

Sales of the shortlisted and winning appliances were low (zero or a few thousand) according to the Nesta evaluation and the follow-up review found no evidence of additional sales.

There are a few signs of optimism among the winners and finalists interviewed during this follow-up review, of future sales

In its evaluation report, Nesta found that sales of appliances for finalists and winners were low, either at zero or in the low thousands and Itad’s follow-up interviews with winners and finalists did not uncover any evidence of additional sales. However, this needs to be put into the context of the

global market for off-grid refrigeration and the broader (closely related) market for larger SHS in sub-Saharan Africa. Sales of refrigerator units in Uganda, between January and June 2019, for example, totalled just 291 units (GOGLA, 2019).

As two key informants from the sector noted during interviews for the follow-up review, the market for larger SHS in developing countries (of which off-grid refrigerators is a sub-set) is still very small and faces significant obstacles to growth, especially due to cost. A fact sheet by Power For All (2018) observes that even Bangladesh – the world’s biggest off-grid energy market – has a market penetration rate of only 6% for off-grid refrigeration.

Three of the seven finalists and winners interviewed by Itad were optimistic about future sales:

- One expected sales from the new off-grid refrigerators they were planning to introduce (rather than the appliance they had entered into Round 1).
- One had invested in product development, marketing and sales and identified Global LEAP as the catalyst for that investment.
- One observed that the competition helped them to realise that there was a larger market for their product than previously thought.

Research commissioned by CLASP in 2019 among owners of appliances purchased through the Round 1 RBF scheme found that 91% of customers believe their off-grid refrigerator was ‘very good’ or ‘good’ value for money, the appliances had a good Net Promoter Score (owners likely to recommend to other people) and 62% heard about the products through Word of Mouth (friends and family). In the light of the barriers to adoption of off-grid refrigerators (as identified through KIIs with industry experts for this review) e.g. high cost and unfamiliarity with the value to be obtained from the technology compared to a television, for example, word of mouth from trusted sources is likely to be key in building demand.

3.4. Barriers to establishing B2B relationships and sales

Kendall and Pais (2018) identify five key factors for attracting investment to the SHS sector: off-grid regulations, business environment, logistics and channels, affordability and willingness to pay, and ease of payment, and score countries on the presence or lack of these factors. These factors resonate with the interviews held with finalists and winners during the follow-up review on the challenges companies have experienced in establishing B2B relationships and sales. These were subsequently investigated in KIIs with the Prize Team and sector stakeholders.

Cost of appliances and distribution

“The issue is cost, internationally. The cost to the end customer is still too high. And this is, I would say, principally caused by duties and tariffs and certifications.”

- Finalist of Round 1

As noted earlier in this report (section 5.1.1), the majority of stakeholders interviewed for the follow-up review considered affordability to be a continuing barrier to increases in off-grid refrigerator sales.

Three of the KIs carried out by Itad with sector stakeholders identified the gap between the cost of the products currently available (that were technically excellent) and what the market could afford to pay. Two of the seven winners and finalists interviewed by Itad also observed the need to close this gap and were rethinking the trade-offs in their products between efficiency and price.

Lack of demand for off-grid refrigerators

"We've just been interviewing people and people will tell you that solar fridges don't exist."

- External sector stakeholder

All KIs for this follow-up review with CLASP and sector stakeholders, indicated that the value (to buyers) of owning a refrigerator still needs to be made clear. Only one interviewee was able to name an organisation that was working on behalf of the sector to build demand and suggested that refrigerators are a low priority among other appliances for this kind of activity.

One key informant from the sector explained that part of this challenge is lack of awareness and aspiration; few people own a solar-powered refrigerator that many people do not know anyone who has one and therefore are not motivated to aspire for one themselves. KIs with sector stakeholders also highlighted that the micro and small businesses market is likely to be more attractive to manufacturers and distributors than the consumer (household) market, because the justification for the financial investment needed is clearer to them. One industry expert observed that they had seen no good studies that adequately quantify the payback period for a household purchasing an off-grid refrigerator.

Lack of marketing capacity: 2 of the 7 finalists and winners interviewed in the follow-up review put their shortage of new partnerships and sales down to having insufficient capacity to pursue sales. The message from most of the KIs (across the groups interviewed) is that the value of owning an off-grid refrigerator needs to be made clearer to potential customers (as compared to televisions). Companies that lack capacity to promote their appliances, therefore, especially in the absence of any major collective approaches to marketing off-grid refrigerators, are likely to struggle to make sales.

Wider economy: 3 of the 7 finalists and winners interviewed by Itad commented on the effect of the economy (of their target markets) on their sales. One noted that their sales had dropped recently and linked this to changes in the economy of the market in which they were selling, another referred to their target market's economy as being 'dead', while a third was optimistic that when the target market's economy improved, so would their sales.

In addition to the challenges raised by the winners and finalists during the follow-up review, KIs with the Prize Team and industry experts highlighted other challenges facing the market including **physical distribution and customs**, something the Prize Team themselves experienced first-hand when sending appliances to Uganda for field testing.

3.5. Effectiveness of the competition's post-award activities

The competition, its winners, and the Buyer's Guide received substantial media coverage, primarily on the websites of trade media and organisations promoting solar power.

Only 2 of 7 winners and finalists interviewed during the follow-up review could link product enquiries to their appliances being featured in the 2017 Buyer's Guide.

The majority of stakeholders interviewed for the follow-up review supported the Global LEAP RBF incentives programme despite the low level of sales it generated during Round 1.

There is little concrete evidence from the Nesta evaluation or the follow-up review of a contribution of Round 1 of the competition to sales, outside of those generated through the RBF scheme, largely because sales remain generally low. However, a few winners and finalists interviewed by Itad cited how the competition had helped increase awareness and felt that this may, in future, help contribute to improving sales. This optimism is strengthened by the growth seen in uptake of the RBF programme associated with Round 2 of the competition. The Prize Team reported approximately 300 refrigerator sales associated with the first round of RBF while the second round generated 9,400 sales commitments. The Prize Team attributed this increase to awareness built through Round 1 and the changes to design (see Section 5.6).

One of the finalists explained how brand recognition in Africa of the Global LEAP awards had proven useful in starting conversations with potential partners in that region: "If we say we have this award, I mean, that breaks the initial ice". Another commented on the value of the competition in raising awareness of smaller players in the sector, and a third said they had received some enquiries by telephone or email, however these had not developed further and they felt this was likely to be due to the barriers of price and lack of internal sales staff.

As explained in section 3.4, Round 1 of the Global LEAP Off-Grid Refrigerator Competition included a set of "Positioning Activities" two of which (the 2017 Buyer's Guide for Outstanding Off-Grid Refrigerators and the Off-Grid Appliance Procurement Incentives programme) were explored as part of this follow-up review.

3.6. 2017 Buyer's Guide for Outstanding Off-Grid Refrigerators

After the laboratory test results were available and the first set of prizes were awarded, CLASP produced and publicised a Buyer's Guide in which all the finalist and winning appliances were listed with their product specifications, performance metrics based on the laboratory testing, and sales contact details. A new web interface¹² has been launched by Efficiency for Access to house all Global LEAP product testing, which can be updated as test results come in and allows companies to search against specifications. In light of this, future rounds of the competition may not need to include a published Buyer's Guide.

The publication was designed as a procurement tool for off-grid solar companies and off-grid solar product distributors. It was hosted on the Efficiency for Access website and promoted through CLASP news releases. A significant amount of media coverage was obtained for the competition after the first two innovation prizes were awarded, some of which included links to the Buyer's Guide. This coverage included an interview with a member of the Prize Team on BBC Radio 4 and news items on the websites of trade media and organisations promoting clean energy. The Prize

¹² <https://equipdata.efficiencyforaccess.org/products/refrigerator>

Team also put substantial efforts into making their insights from Round 1 of the competition available to the sector through a publication for Ideas to Impact and peer-reviewed journal articles and conference papers¹³ (see also section 5.6.).

From the website statistics available to the Prize Team, the Buyer's Guide had been downloaded 145 times from its location on the Efficiency for Access website¹⁴ by 5 August 2019. The Nesta evaluation considered this publication "a key tool in ensuring finalists got exposure to a wider pool of players in the off-grid solar ecosystem". However, by the time of this follow-up review, only 2 of the 7 winners and finalists interviewed by Itad said they had received enquiries as a result of being in the Buyer's Guide, although one of these companies said it had definitely driven sales.

Off-Grid Appliance Procurement Incentives programme

"Having an RBF is always very [welcome] I mean it really helped open up our market."

- Finalist of Round 1

A key component of the competition's design was the inclusion of an RBF programme which aimed to encourage off-grid appliance suppliers and solar distributors to place bulk orders of selected appliances and market them to their customers.

The majority of winners and finalists interviewed by Itad valued the Global LEAP RBF incentives programme despite the low number of sales that had come from it. Only one finalist had negative comments; they found it to be too complicated and commented that it required a lot of explanation to people outside of the competition. They expressed a fear that customers might not understand that the incentives were short-term and that it may have raised expectations about pricing.

"Low-income marginal groups will always be beyond the market...if you want to achieve universal energy access, some subsidy will be needed"

- External sector stakeholder

The view from the four organisations interviewed as external sector stakeholders, for this follow-up review, was that the RBF incentives scheme was useful in growing the market given the necessity for products to be made more affordable, however one interviewee was concerned about its sustainability at scale.

A report published by GOGLA (2019) during the follow-up review points out that most refrigerator units are sold on a cash basis as they are rarely included with SHS packages (although this is starting to change). However, the authors note a large increase in the pay-as-you-go (PAYG) section of the market. The report's authors (which include a member of CLASP) attribute this to be likely due to the

¹³ See for example, Abagi et al (2019a) and (2019b), and Kuria et al (2019).

¹⁴ Data received 5th August, 2019 – the numbers may be higher as changes were made to the website prior to this date which affected collection of website statistics.

Global LEAP RBF programme incentivising off-grid solar sector companies to increase their adoption of refrigerators into the products and services they offer to customers and also anticipate further increases to come from the 2019–20 round of the Global LEAP RBF incentives.

There was consensus among interviews during the follow-up review, with external stakeholders, that some form of subsidy would continue to be necessary until the market was able to sustain itself, although two key informants noted the challenge in doing this in a way that passed savings onto customers without distorting the market.

3.7. What influence has learning from Round 1 had on other prizes?

A review of lessons learned and best practices of awards programmes (published by Efficiency For Access), includes a set of lessons learned by this competition and recommendations for future programmes that appear to respond to issues highlighted elsewhere in this report, e.g. soliciting input on test methods from a wide range of stakeholders. Interviews with the Prize Team and finalists for this follow-up review confirm that this input has taken place for Round 2.

The second round of the competition was launched in 2019 and is still in progress¹⁵ and this presents an opportunity to look at how its design is different to that of the 2016-17 Global LEAP Off-Grid Refrigerator Competition and how learning from the earlier prize has informed these design differences.

Use of cash award as a financial incentive

Unlike Round 1 of the competition, at the time of its launch, Round 2 was not offering cash prizes. This is understood to be due to limited funding available for Round 2 at launch, rather than a deliberate design choice, as cash prizes have been added subsequently. However this was announced after nominations had closed, yet the lack of immediate financial reward for winners on offer during the nomination period does not seem to have had a negative effect on participation.

Table 3 compares the levels of participation in Round 1 and Round 2 and it is interesting to note that four companies that entered Round 1 (two winners and two finalists) have also entered Round 2.

¹⁵ At the time of data analysis for this report, the announcement had not yet been made of the winners of Round 2.

Table 3: Levels of participation in Rounds 1 and 2 of the competition

Aspect of participation	Round 1	Round 2
<i>Nominations received</i>	57 from 28 companies 14 countries represented	38 nominations from 21 companies 12 countries (plus Hong Kong) represented
<i>Nominations passing the pre-screening</i>	24 (out of 57) nominations from a total of 15 companies	37 (out of 38) nominations from a total of 20 companies
<i>Product samples available for lab testing</i>	24 nominations from a total of 15 companies provided product samples.	24 nominations from a total of 15 companies provided product samples, including 4 companies among the winners and finalists of Round 1.

One sector stakeholder and one member of the Prize Team observed during the follow-up review that an increase is to be expected with each subsequent round and this has proven the case in terms of both the quality of nominations received¹⁶ and applicants to the RBF scheme.

Adaptations to the RBF programme

According to data supplied by the Prize Team, the RBF programme associated with Round 1 of the competition led to the sale by three companies of approximately 300 refrigerators collectively, while that associated with Round 2 generated 9,400 sales commitments, and across products of more companies. Interviews with the Prize Team and external experts confirmed that this growth would be typical of repeated rounds (the first round priming the market and subsequent rounds leading to greater sales).

In addition, the Prize Team also had feedback that the redesigned approach used in Round 2 was preferable to other RBF designs. Round 2 changed to a reverse auction model where participants were invited to submit a bid in which they decided how many refrigerators they thought they could sell over 12 months and requested the subsidies they thought were needed. This new design appears to respond to the problem identified by one of the finalists, that of the RBF scheme being too complicated and difficult to understand.

Alterations to testing method for Round 2

According to the Prize Team, the laboratory test method used in Round 1 was deliberately designed to align with the international approach widely adopted in national standard and labelling programmes. Several changes have been made to the method for Round 2, based on feedback from Round 1 participants and insights obtained by the Prize Team from the field testing.

As noted earlier in the report, one finalist interviewed by Itad had concerns about the appropriateness of the laboratory test method for their appliance. Drawing on their feedback and in consultation with other stakeholders, CLASP has adapted the laboratory test so it can evaluate an

¹⁶ The Prize Team’s explanation for the differences between nominations received in Rounds 1 and 2 is that a higher number of unsuitable products were nominated in Round 1 including cold-chain solutions.

appliance based on how it is being powered e.g. by SHS, AC weak-grid or solar direct drive and what it is being used to store e.g. adjusting the temperature range if the compartment is intended to cool beverages rather than meat or vegetables. Finally, a new test condition has been introduced to simulate the power supply obtained from solar power including solar day simulations. These simulations have also been brought into the design of the laboratory tests for the new Global LEAP solar water pump competition.

The field-testing component of Round 1 was funded through Ideas to Impact, but funding was not available for field testing during Round 2 of the competition (which is running independently of Ideas to Impact). Primary and secondary data from the Prize Team indicates they saw the field testing as offering value in terms of data and also in informing how to make laboratory testing more appropriate.

A key insight obtained from field testing for example, was the size of the energy consumption spike observed when products were used in the field compared to laboratory testing. A finalist interviewed during the follow-up review also commented on their surprise in the differences seen in performance of appliances in the two settings (laboratory and real-life use in Ugandan shops). CLASP's own published analysis of the data from the laboratory and field tests (Abagi et al., 2019a) found that most of the products consumed significantly higher energy when used in the field which was attributed in part to how the refrigerators were used by businesses (frequently opening and closing the door to access products).¹⁷ As a result, the Round 2 lab test method now includes a load processing test – while this is a deviation from the method used internationally, CLASP noted that the field test had demonstrated how the current international test method is not appropriate for evaluating off-grid conditions.

Influence on the Off-Grid Cold Chain Challenge

While Round 1 of the competition was running, a new prize was being developed as a collaboration between Ideas to Impact and CLASP: The Off-Grid Cold Chain Challenge (OGCCC). The OGCCC was designed from the start as an innovation *inducement* prize and would require monitoring in the field of implementation by finalists of their solutions. In contrast to the field testing of Round 1, manufacturers are directly involved in the monitoring. The Prize Team reported that the lessons learned through the field testing in Round 1 of the Off-Grid Refrigerator Competition have informed the approach to testing in the OGCCC, however the early signs are that there is still more to be learned such as how best to design and install monitoring units on cold units that have very different technical configurations.

¹⁷ This addition may provide reassurance to distributors; one sector stakeholder interviewed for this follow-up review commented that an organisation they were in contact with had reported experiencing problems when the performance of an appliance listed in the Buyer's Guide (as used by a customer) was dramatically different to the lab test results.

Section 4: Is solver support necessary for prizes to be successful?

The competition placed low demands on participants compared to other prizes in the Ideas to Impact programme.

Limited feedback was provided by winners and finalists interviewed for the follow-up review on unmet needs.

DFID, as funders of the Ideas to Impact programme, is interested in understanding the value and necessity of solver support to an effective prize process. Other prizes in the Ideas to Impact portfolio have used a range of mechanisms to enable more of the target solvers to enter a prize e.g. allowing application forms to be submitted in the local language, or as hand-written forms rather than via an online platform. In other cases, Prize Teams have identified a need to support solvers taking part in lengthy implementation stages e.g. through providing workshops.

For this competition, the level of solver support focussed on two areas:

Nominations: the Prize Team encouraged companies to enter the competition and reminded them about deadlines.

Laboratory and field testing: the Prize Team managed the costs of both, and the installation of shortlisted appliances into test sites in Uganda.

The demands placed on participants in the competition were low compared to those seen by most of the prizes run by Ideas to Impact. The competition participants had to nominate and make available their products, whereas other Ideas to Impact prizes have required participants to implement their solutions and report on the results so it is unsurprising that winners and finalists had little to say about barriers to participation during KIs with Itad.

One aspect that the Prize Team might review in competition design is flexibility over entry deadlines and how to support organisations who are new to this type of prize to navigate the terms and conditions. Two of the seven finalists and winners interviewed for the follow-up review, spoke of the lack of capacity they had to engage with the necessary administration associated with this kind of prize. However, this might require balancing with the need to provide enough information to potential participants e.g. about details of testing methods, which another finalist from Round 1 noted would be necessary for them to enter in a future round of the competition. There is evidence from Round 2 and the OGCCC that the Prize Team already recognises this issue and is starting to adjust the design and engage more with organisations as part of the process.

Section 5: Conclusions

The purpose of this follow-up review was to pick up the story where the evaluators of the competition left it just after the final Innovation Prize was awarded and answer the question “What happened next?”.

5.1. What happened to the finalists and winners?

We saw little evidence of additional sales of products since the Nesta evaluation took place and several finalists and winners interviewed by Itad spoke of the ongoing challenges in the market. A recurring theme in this review has been the need to focus on the trade-offs between efficiency and cost in order to have products available that people are willing and able to buy.

Three of the seven winners and finalists we interviewed have been inspired to do further research and development: adapting the product to bring the price down, working to improve their product's efficiency or developing a new product in response to insights gained from the testing. Two finalists have entered into new relationships and directly attributed these to being involved in the competition and four of the Round 1 finalists and winners have gone on to enter Round 2 of the competition.

5.2. What happened to the market?

As noted earlier, a limitation of this follow-up review is the commercially sensitive nature of some of the data, including developments that cannot be shared publicly yet, despite this, our conclusion is that progress is slow in this sector and there are significant barriers that continue to limit market growth.

Key among these is the need to get costs down considerably for off-grid refrigerators to be affordable to the target market. Allied to this, are the challenges of perceptions of value compared to alternatives and lack of acceptable financing arrangements. KIs from this follow-up review highlighted the need for sales staff (which some manufacturers said they lacked) and the challenges in promoting and distributing the refrigerators as compared to televisions, for example.

The increased uptake of the competition's RBF programme when a reverse auction approach was taken in Round 2 could suggest that manufacturers have a clear idea of what the market can afford to pay and that lowering of the costs through incentives is effective. The RBF programme does appear to be a draw to the competition for companies; Round 2 was initially launched with RBF incentives as the only financial benefit to finalists and the number of quality entries to that round suggests that RBF incentives are sufficient to motivate appropriate companies to enter.

A message from sector stakeholder interviews for this follow-up review is that long-term approaches to supporting companies in this market are needed for the market to grow. This includes funding mechanisms such as RBF and grants, that build awareness and demand for off-grid refrigerators for the benefit of all companies working in the sector.

5.3. What happened to the learning CLASP gained from running the first Round?

CLASP has put significant efforts into documenting and sharing its learning from Round 1 of the competition. Several peer-reviewed papers have been published based on their experience and the lessons learned from the data obtained through the competition. For Ideas to Impact, the Prize

Team produced a learning paper¹⁸ specifically on the field-testing method which was new to the Global LEAP Awards. While some of this learning could not be directly transferred into Round 2 of the competition (as there is no field-testing component), the Prize Team have used their learning to inform improvements to the laboratory testing and it has been used to guide the field testing of the OGCCC.¹⁹

This follow-up review finds support for the prize design rationale that provision of third-party data has a value in this sector, where quality assurance remains important. Finalists interviewed for the follow-up review spoke about their association with Global LEAP having facilitated conversations with potential new partners. However, recognition prizes, which inevitably are accompanied with publicity, carry risks for participants and the follow-up review also shows that these can deter future participation unless companies can be reassured on the testing method (including field testing).

While the four organisations that have taken part in Round 2 can be interpreted as an endorsement of the competition, it is important that the Prize Team investigates why other organisations have not re-entered. Our interviews with seven of the finalists and winners of Round 1 suggest that confidence in the testing is critical, and that a greater draw than a cash prize is the opportunity to participate in the RBF incentives programme.

¹⁸ <http://ideastoimpact.net/content/learning-paper-challenges-field-testing-grid-refrigerators>

¹⁹ For example, for the field testing of the OGCCC the Prize Team spent a significant amount of time identifying a remote monitoring partner as the partner used in the field testing of the refrigerators was not qualified for this new task.

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Follow-up review annexes

Annex 1: Summary of follow-up review methodology

The methods for the follow-up review were outlined in the internal Global LEAP Off-Grid Refrigerator Competition Evaluation Methods Note for Stage 2, submitted to DFID 8 July 2019. The Evaluation Team developed and refined the methods outlined in the methods note ahead of implementing the follow-up review, in August 2019. These changes and developments are indicated here, to provide an account of the methodology used in practice.

Follow-up review questions

Table 4 below summarises how we responded to the Programme Evaluation Questions (PEQs) that apply to all the Ideas to Impact prize evaluations. The Nesta evaluation provided some answers to the five PEQs and so the purpose of the follow-up evaluation was to update the findings of the Nesta evaluation and fill in any gaps.

While our study focussed on PEQ2 (what happened next to the winners and finalists), through our data collection we found evidence that adds to the answers already obtained by Nesta to the other PEQs. In place of undertaking a VfM analysis, the Evaluation Team followed a request from DFID to look at whether the Results-based Finance (RBF) mechanism used in the Competition was a key driver to taking part and the effect of that mechanism, linked to the hypothesis that prizes offer better VfM when part of a broader programme.

Table 4: How the follow-up review responded to the Ideas to Impact Programme Evaluation Questions

Programme Evaluation questions (PEQs)	Follow-up review questions (SEQs)
PEQ 1. How effective was the competition at stimulating the market for off-grid refrigerators in sub-Saharan Africa?	<ol style="list-style-type: none">1. Is there further evidence of how effective the competition was at stimulating the market for off-grid refrigerators in sub-Saharan Africa?2. How has the Prize Team adapted Round 2 in response to learning from Round 1?
PEQ 2. To what extent has the effect of the prize been sustained beyond the point of award?	<ol style="list-style-type: none">3. To what extent has the prize catalysed innovation among the finalists and winners since the Appropriate Design and User Experience award was made?4. What is the status of the B2B relationships established between winners or finalists and pay-as-you-go solar companies, existing customers, importers, manufacturers and distributors? Are those reported through the Nesta evaluation still in place? Have new ones been created since November 2018?

	<p>5. To what extent did the competition’s post-award communications raise awareness of the winners and finalists (11 organisations)?</p> <p>6.1 Have finalists or winners increased actual or projected sales in sub-Saharan Africa?</p> <p>6.2 What contribution did the competition’s Positioning Activities have on these sales? and finalists (11 organisations)?</p>
<p>PEQ 3. Does the prize offer value for money (VfM) when compared to alternative funding modalities?</p>	<p>Not examined in this follow-up review</p>
<p>PEQ 4. Were there any unintended consequences of the prize and did they outweigh the benefits?</p>	<p>7.1. Has the competition resulted in unintended consequences?</p> <p>7.2. Did the negative consequences outweigh the benefits of the competition?</p> <p>7.3. How have these been mitigated in the design of the second round?</p>
<p>PEQ 5. Is solver support necessary for prizes to be successful?</p>	<p>8.1. If solver support was delivered to the competition participants, how did solver support activities reduce barriers to improve solver ability to: (i) participate in the competition; (ii) build effective B2B partnerships?</p> <p>8.2. If solver support was not delivered to competition participants, what solver support activities could have reduced barriers to improve solver ability to: (i) participate in the competition; (ii) build effective B2B partnerships?</p> <p>8.3 How has learning about solver support been addressed in the second round of the competition?</p>

Methods

PEQ 1: How effective was the competition at stimulating the market for off-grid refrigerators in sub-Saharan Africa?

Nesta has already evaluated the competition in terms of how effective it has been at transforming the global market for off-grid energy products. This follow-up review aimed to avoid duplicating this work, instead the Evaluation Team's aim was to structure and present the findings in a way that would enable the competition to be included in the synthesis work scheduled for the end of the Ideas to Impact programme.

Nesta's findings were summarised against the three intended impact areas:

1. Contributing to making more off-grid refrigeration products available on the market that are appropriate for developing country consumers.
2. Signalling to manufacturers/designers and innovators that the off-grid market has promising opportunities deserving of their skills and investment.
3. Boosting the demand for solar home systems connections.

For the competition to be included as a case study, we will also outline the competition's structure, type, solvers, etc and analyse the findings against Ideas to Impact's set of Prize Effects (see Annex 1).

Data sources: secondary data – documentation on the competition and IMC quarterly reports, Nesta evaluation report and interview and focus groups notes; primary data – Key Informant Interviews with CLASP, IMC and industry experts; interviews with finalists and winners.

PEQ 2: To what extent has the effect of the prize been sustained beyond the point of award?

As a follow-up review, our resources focussed largely on answering this question to understand what happened next to the winners/finalists of the competition, what effect did their participation in the prize have on their business? Within this we looked at the contribution made by the competition's positioning activities – the Buyer's Guide²⁰ and Off-Grid Appliance Procurement Incentives²¹ programme. In comparison to the other Ideas to Impact prizes, the competition is unusual in building post-award activities into its design and ToC that go beyond an awards ceremony and announcing the winners. For this reason, we were interested in exploring what value they add to prizes. This PEQ picks up where the previous PEQ left off i.e. from the point of the final award being made in November 2018, when Nesta carried out its evaluation.²²

²⁰ <https://efficiencyforaccess.org/publications/global-leap-buyers-guide-refrigerators>

²¹ <https://globalleapawards.org/results-based-financing>

²² "Beyond the point of award" is a term used in the programme-level evaluation questions given that most prizes end their activity at the point of making an award and the main intended outcomes of the prize should be achieved by that point. Global LEAP is unusual in two respects: there were two end points of Stage 2 – January 2018, when the Overall Value and Energy Efficiency awards were made; and November 2018, when the Appropriate Design and User Experience award was made. Because interviews with winners/finalists were undertaken by Nesta at the end of October 2018 (after field testing had completed) and data on partnerships and sales were captured then, we take "the point of award" to be November 2018 i.e. what happened to winners/finalists since Nesta interviewed them.

The benefit to finalists/winners of the data obtained from laboratory testing and the extent to which they adapted their appliance as a consequence, was investigated by Nesta. Our assumption was that the field testing would have provided the manufacturers with new insights and our aim was to uncover whether this prompted any further innovation on their part.

Just prior to the final award being made, Nesta determined that 50% of finalists had developed partnerships in order to further develop or produce their solution, and that a further 25% were optimistic about building partnerships in the near future. As one of the intended outcomes of the prize, we investigated what happened to those partnerships, if any new ones were formed and the extent to which that was attributable to the prize.

The Buyers Guide and Incentives Programme were both promoted online and viewed as tools designed to raise awareness of the 17 appliances that were winners and finalists of the competition. We used desk-based analysis of uptake of the Buyers Guide and the Incentive Programme product list.²³ This drew on data from CLASP on website activity of the relevant pages and downloads of the two publications and Google searches to identify number of links made to these publications and other information about the finalists and winners, by organisations that are not partners of the competition.

Based on interviews with finalists and winners in October 2018, Nesta found that sales for finalists and winners were low being either at zero or in the low thousands. By reviewing data from CLASP on the outcome of the Incentives Programme and supplementing it with follow-up Key Informant Interviews with winners/finalists, we assessed the situation approximately nine months later and what contribution the prize made to further sales or projections.

Data sources: secondary data – competition website statistics, Google link reports, Nesta evaluation report, BBC Radio 4 Interview with Makena Ireri, reports and articles from other organisations in the sector; primary data – Key Informant Interviews with CLASP, IMC and industry experts; interviews with finalists and winners.

PEQ 4: Were there any unintended consequences of the prize and did they outweigh the benefits?

We drew on documentation from CLASP and Ideas to Impact on the competition's risks and challenges and the Nesta evaluation data to identify any instances of negative consequences, or indeed positive outcomes that were not anticipated during the prize design. A question was included in the interviews undertaken with winners and finalists as part of answering PEQ2, to pick up unintended consequences.

Data sources: secondary data – Nesta evaluation report and Ideas to Impact quarterly reports; primary data – Key Informant Interviews with CLASP, IMC and industry experts; interviews with finalists and winners.

PEQ 5: Is solver support necessary for prizes to be successful?

DFID is interested in understanding the value and necessity of solver support to an effective prize process. We have prioritised other questions over this one for the Global LEAP Off-Grid Refrigerator Competition, but we will analyse the existing Nesta evaluation data and prize documentation for any evidence to help us answer the two follow-up review questions:

²³ <https://storage.googleapis.com/clasp-siteattachments/Global-LEAP-Off-Grid-Appliance-Procurement-Incentives-Product-List-Refrigerators.pdf>

8.1 If solver support was delivered to the competition participants, how did solver support activities reduce barriers to improve solver ability to: (i) participate in the competition; (ii) build effective B2B partnerships?

8.2. If solver support was not delivered to competition participants, what solver support activities could have reduced barriers to improve solver ability to: (i) participate in the competition; (ii) build effective B2B partnerships?

We also obtained new data relevant to these questions from Key Informant Interviews with winners and finalists, e.g. when asking about progress made on sales and partnerships, we included a question on the barriers interviewees faced and what support the competition could have provided that might have been helpful.

In January 2019, Ideas to Impact published a paper²⁴ on the challenges of field-testing off-grid refrigerators which shared the learning from the experiences of this competition. As noted previously, a second round of the competition was launched by CLASP and due to award in July 2019. While this follow-up review did not look at the full effect of the second competition (which at the time of data collection had not been awarded), there was an opportunity to understand from CLASP how they had responded to the barriers experienced by solvers in the first round.

Data sources: secondary data –Nesta evaluation report and Ideas to Impact quarterly reports; primary data - Key Informant Interviews with CLASP, IMC and industry experts; interviews with finalists and winners.

Data collection, analysis and reporting

This follow-up review took secondary data as its starting point, supplemented by Key Informant Interviews, including interviews with the winners and finalists. The interviews were designed based on our secondary data analysis, to verify the data and fill the gaps needed to answer the follow-up review questions. Where possible we looked to triangulate across respondents (comparing CLASP's perspective with that of the winners, for example).

Key Informant Interviews: We interviewed members of CLASP and Ideas to Impact who were involved in managing or designing the competition, using a semi-structured interview format, with questions developed based on the particular stakeholder. These were conducted over the phone or via Skype. We also requested data and answers to follow-up questions, by email.

Semi-structured interviews: We invited the 11 organisations represented by the winners/finalists to take part in interviews. The interviewer prepared for these interviews by reading background material on the organisation, its participation in the competition and any comments previously made to the Nesta evaluation team. We also reached out to several industry contacts as suggested by DFID, CLASP and from online research to gain an external perspective on issues raised during interviews with the Prize Team and competition participants. A list of questions included in interviews with winners and finalists is appended to this annex. Table 5 summarises the success achieved in securing interviews with the different stakeholder groups.

²⁴ Kuria, D., Ileri, M', and Geronimo, L., 2019, Learning Paper: The Challenges of Field-Testing Off-Grid Refrigerators.

Table 5: Summary of interviews obtained from each of the competition’s stakeholder groups

Stakeholder	Target sample	Actual sample	Total participants	Explanation
Prize Team (CLASP and Ideas to Impact)	3	3	4	Due to movement and turnover of staff within CLASP since the Nesta evaluation, interviews were held with a lead contact who suggested who else we should speak to on different aspects of Rounds 1 and 2 and also fielded our data requests to other members of the Prize Team.
All Winners and Finalists of Round 1	11	7 of the 10 contacted, including the two organisations winning the Innovation Prizes	7	10 organisations invited to be interviewed by Itad (1 finalist was no longer involved in the Global LEAP programme). 3 organisations did not respond despite introductions from CLASP, and several follow-up emails and phone calls.
Industry stakeholders – including industry experts, and representatives of manufacturers and distributors of SHS and off-grid refrigerators (not involved in Round 1 of the competition)	4	3	4	Invited commercial and non-profit organisations with good understanding of the sector to add their perspectives; 3 interviews by Skype (1 of which including 2 people). An additional interview was scheduled but the organisation withdrew as they felt unqualified to answer the questions.

Primary data collection, storage and analysis

Primary data was collected and stored in a way that protects the anonymity of the respondents. The interviews were conducted using a voice recorder (where permission given) and subsequently transcribed. This data was verified by sending the notes to respondents to check they have been correctly interpreted.

Due to the anticipated small number of interviews, we used a standard structure for interviews with the winners and finalists; this formed the basis for organising data in an Excel spreadsheet before coding further with any emerging themes. Interviews with other stakeholders (CLASP, industry experts, Ideas to Impact) were looser in structure, designed to explore themes emerging from data analysis. These were analysed through annotating interview transcripts and notes.

Questions for inclusion in interviews with competition winners/finalists

1. Use of Global LEAP Award lab and field testing data

- 1.1 Are you doing anything differently [organisation] as a result of taking part in the Global LEAP Award? If so, what? Why? How is this benefitting the organisation/others?
- 1.2 Have you or your organisation made any use of the data you received from the laboratory and field testing about your appliance/s?
 - IF YES, how has it been used? How useful was the field test data?
 - IF NO, why not?

2. Status of business partnerships and sales

- 2.1 The Nesta Evaluation Team looked into B2B relationships around October 2018. We're looking at the period since November 2018 when the final award was made after the field testing results. So can I ask you what the situation is for you now, using November as the starting point, have you developed any new B2B relationships or have the ones you already had at that time developed further?
 - Name of the partner, nature of it, what's happened to those partnerships since then?
 - Have you experienced any challenges in these partnerships?
 - If YES, would further support/data/advice, etc. from Global LEAP have been helpful? What kind?
- 2.2 Have you established any **new** relationships with pay-as-you-go solar companies, existing customers, importers, manufacturers and distributors since November 2018?
 - IF YES, what's the output of the partnership? What do you attribute the relationship to? Is there any evidence that it came as a result of taking part in the prize? How do you know?
 - IF NO, why not? Have you experienced any challenges in trying to create these relationships where further support/data/advice, etc. from Global LEAP would have been helpful?
- 2.3 What's the situation with sales of your off-grid refrigerators in general? Have they increased, decreased, or stayed the same? Reasons why. Is this what you were expecting? And does that look to stay the same for the next 12 months or do you think that will change? Reasons why. Is this what you were expecting?

- Specifically, how do the sales of the [appliance] that you entered in the competition compare with this picture?

If there **has** been an increase in sales or projections:

- What, if any of this increase, do you think could be attributed directly to taking part in the Global LEAP Award?

3. Prize benefits

3.1 Would you consider entering a future Global LEAP Award? Why?

3.2 What aspects of its design would encourage you to take part (including *the Off-Grid Appliance Procurement Incentives Programme*)?

4. Anything else that has happened

4.1 Have there been any drawbacks or negative consequences from being a participant in the Global LEAP Award?

4.2 Did taking part in the Global LEAP Award bring any other benefits to your organisation that have not already been mentioned?

4.3 What are your plans for the [appliance]? What is the timeframe for this?

4.4 These sets of question have all investigated the effect on your organisation or on the specific appliance of being involved in the Global LEAP Award. Along the lines of this topic is there anything else you would like to tell me about that has happened to your organisation or the appliance as a result of being a finalist/winner?

Annex 2: Ideas to Impact Prize Effects

Raise Awareness

Either brings something to someone's/some people's attention or increases their understanding of something. Often about increasing awareness and knowledge of an issue (especially one that is neglected or has been previously communicated to that group of people).

Promote best practice

A prize can do this by: Identifying best practice in a certain field (through solutions submitted) and encouraging adoption (through publicising the winning solutions) OR making potential solvers aware of current best practice as part of the prize application process.

Facilitate and Strengthen Partnerships and Networks

Raises visibility and brings those also working in the space to the attention of others, helping to establish new networks and strengthening partnerships towards a common goal. Some prizes may require new partnerships through criteria or conditions.

Maximising participation towards the sponsor's aims.

Benefits to the sponsor are provided by all effective participants not just by the winners.

Community Action

Incentivising communities (broadly defined as people living in the same place/sharing a communal interest), to take action, encouraging ownership of the problem and solution. Each prize to define 'communities' for its own purposes.

Point Solution

Finding a solution to a problem that has been broken down to a component part. For example, a new product or process. Problem is highly specified.

Open Innovation

Open innovation enables new solvers to enter the field of endeavour. For some prizes this could include local and grassroots innovators, e.g. small community organisations, students, etc.

Market Stimulation

Helps to increase economic activity in an existing market or starts a new one for a particular good or service through a high value prize that, as a result of all of the other effects, results in a changed market. Can also be to open up a new market.

Altering the Policy Environment

Raised awareness, market stimulation, etc. can lead to corresponding policy change in reaction to the other prize effects.

Annex 3: Findings of the Nesta evaluation

Table 6: Summary of Nesta Evaluation Findings of 2016 Global LEAP Off-Grid Refrigerator Competition (Doshi, 2019)

Intended Outcome of the Competition	Nesta evaluation findings
Generate solutions for off-grid connectivity (to give people the benefits of a life with electrical goods).	12 to 13 finalist off-grid refrigerators (dependent on the test) outperformed current off-grid refrigerators in the market in four major tests.
Generate technical and market innovation to develop off-grid appropriate refrigeration for developing countries.	96% of field testers were happy with the off-grid refrigerators, and 100% found the products easy to use.
Mobilise new talent to generate innovative off-grid refrigerators.	4 nominees had never worked in the off-grid refrigeration market before the competition.
Build business-to-business (B2B) partnerships to accelerate distribution (partnerships with distributors and investors).	50% of finalists had developed partnerships in order to further develop or produce their solution, with a further 25% feeling optimistic about building partnerships in the near future.
Build consumers' capacity (to increase the awareness and value associated with solar systems in local businesses and final clients/consumers).	84% of field testers said they would purchase the off-grid refrigerator they tested.
Grow a diverse market for efficient off-grid appliances to increase income, property and the quality of products.	95% of field testers found that they had increased sales by using the off-grid refrigerators. Sales of appliances for finalists and winners were low, either at zero or in the low thousands.
Build value of solar home systems to increase demand for new systems and to increase subscription value.	74% of field testers would be willing to pay between \$200 and \$700 for an off-grid refrigerator with a SHS.
Raise market awareness of the existence of high quality off-grid products.	There are now 17 high quality off-grid refrigerators available on the market.



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