

ideas to impact.



# 2018-19 GLOBAL LEAP OFF-GRID COLD CHAIN CHALLENGE

REVIEW REPORT

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Submitted by Itad  
In association with IMC Worldwide

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JUNE 2020



## ACKNOWLEDGEMENTS

This report was written by lead evaluator, Cheryl Brown. The author would like to thank the participants of the review for their time and insights. Thanks, also, to the Ideas to Impact Evaluation & Learning Team at Itad, particularly Clare Stott and Catherine Gould for their advice on design, to Jessica Roberts for her support in qualitative data collection, coding and analysis, and to Chris Barnett for support with quality assurance.

Finally, to the Prize Team (CLASP, Energy 4 Impact and Blue Globe) for their ongoing information provision, clarifications and feedback for this report and to IMC and DFID for reviewing the draft of this report.

## 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
OGCCC	Off-Grid Cold Chain Challenge
PEQ	Programme Evaluation Question
R&D	Research and Development
SEQ	Sub-Evaluation Question
ToC	Theory of Change
VfM	Value for Money

## Summary

The 'cold chain' describes how the temperature of perishable products is managed to maintain their quality and safety throughout the supply chain from where they are harvested or slaughtered to where they are consumed. Cold chains play a critical role in reducing food loss and increasing food supplies, but in developing countries they are either fragmented or do not exist.

The Global LEAP Off-Grid Cold Chain Challenge (OGCCC) was launched in August 2018 as part of the Ideas to Impact programme to fill information gaps about one component of the off-grid cold chain (cold storage) with the hopes of contributing to a larger discourse addressing off-grid cold chains designed to support smallholder farmers. The OGCCC aimed to identify and reward the most appropriate technologies for off-grid cold storage, and by promoting the technologies and their associated business models, stimulate appropriate support from donors, investors and government.

Ideas to Impact is funded by the UK Department for International Development (DFID) to test whether innovation inducement prizes can stimulate innovative solutions to longstanding development challenges for low-income households. The OGCCC made its final prize awards in November 2019 and shortly afterwards, Itad (as Ideas to Impact's Evaluation & Learning Team) carried out a review to understand if participating in the prize stimulated innovation among the participants. The review also explored:

- What value the OGCCC offered compared to the broader system of interventions in the sector?
- What effect post-award activity aimed at raising awareness had among key stakeholders of off-grid cold storage?
- What has been learned from the experiences of the OGCCC participants in implementing their business models?

## How successful was the OGCCC at stimulating innovation?

While the nomination stage (Stage 1) of the OGCCC served to identify existing technologies, the prize incentivised innovation among the Stage 2 participants when they were required to introduce their products to a new geographical market. The demands of having to deploy their products encouraged three (of six) OGCCC Stage 2 participants who made it that far, to introduce adaptations to their products.

Beyond this, the prize was successful in field testing four cold storage technologies (and associated business models), two of which showed originality in their use of locally sourced materials (including one that used recycled plastic bottles), to keep costs down.

There is evidence that the prize also laid the foundation for future innovation and business development, as three of the six participants that went through to successfully deploy at Stage 2, reported gaining substantial learning from the prize including how to scale their business, technical specifications and standards and options for alternative models.

### Key findings include:

- Stage 1 helped to identify existing technologies (including late stage prototypes) from established and well-known organisations, as well as those that were newer to the market or

previously unknown by the Prize Team; 10 promising technologies were shortlisted out of 29 nominated (see Section 2.1).

- The OGCCC operated within a challenging market segment which made forecasting success in deployment hard for the Prize Team and participants. Despite this, Stage 2 resulted in four technologies and business models being deployed and tested in the field (see Section 2.2).
- The four finalists who succeeded in commercially deploying their cold storage units, were organisations located outside of North America and Europe (Nigeria, India, Uganda and Kenya).
- Innovation was stimulated at Stage 2 of the prize (when products were deployed), rather than Stage 1 (when products were nominated). See Section 2.3.
- The Stage 2 finalists valued the field test data either for validating their own monitoring (Prize Team-led remote measurement), or for the insights provided into the new market (feedback from users of their cold storage technology). See Section 2.4.

### How effective was the post-award activity?

The Prize Team succeeded in promoting the OGCCC winners and the development challenge it tackled, to key external stakeholders including potential investors and policymakers. This is despite the reduction in time available for post-award activity (due to postponement of awarding Stage 2).

Although Stage 2 participants themselves did not state this as a consequence of participating in the prize, key informants noted that three organisations received additional finance. One received US\$6 million (over £4.8 million) and two others received funding of €250,000 (over £220,000).

### What value does the OGCCC offer to funders?

Interviews with experts as part of this review, suggest that the primary value offered by the OGCCC lies in drawing attention to an issue, and the realities of deployment of technologies into developing country markets gleaned through field testing of a range of off-grid cold storage technologies.

In comparison to other interventions, the OGCCC was considered by two (of four) judges as unique in establishing standards for off-grid cold storage. OGCCC is also unusual among global technology prizes in having succeeded in shortlisting at proposal stage organisations that were themselves based in developing countries. One external stakeholder noted that prizes tended to be won by companies that could write good proposals and work with Western-style competition processes, which did not always go hand in hand with the ability to deliver in a developing country.

Key findings include:

- Two (of four) judges highlighted the unique contribution the OGCCC made to establishing product performance standards and testing for off-grid cold storage and a third judge felt that the prize filled a niche in the sector, by providing financial incentives for innovation (see Section 4).
- The design of OGCCC appears to have overcome challenges observed in other prizes in succeeding in shortlisting proposals at Stage 1 from organisations that were then able to successfully deliver in a developing country.

- While no evidence was found of negative (or positive) unintended consequences, two of seven key informant interviews highlighted potential risks for future prizes to be aware of.
- Key informants recommended that future prizes be connected to sources of follow-on grant funding, so that participants can refine their ideas and prove their concepts sufficiently to attract more substantial investment.

## What can we learn from the experience of the OGCCC participants?

The experience of the OGCCC participants in implementing their business models produced further evidence of the challenges that organisations were expected (by key informants) to face when deploying this type of technology in a developing country setting (see Section 5). These included lack of local skills or components, difficulties with obtaining customs clearance, gaps in knowledge of standards and market intelligence, and securing funding beyond the Stage 1 prize money, to cover the costs of deployment.

While participants appreciated the support they received from the Prize Team, they highlighted some areas of assistance they would have found particularly beneficial: technical advice and additional time for deployment during the prize and more opportunities after the prize awarded to connect with potential investors (see Section 5.1).

## Conclusions

### Driving innovation

We find that innovation largely took place during Stage 2 of the prize, when the 10 shortlisted organisations attempted to introduce their products to a new location (and often a new country). The aim of the prize was to identify, reward and promote the most appropriate technologies for off-grid cold storage and by raising awareness of them, and their associated business models, stimulate appropriate support from donors, investors and government. While Stage 1 of the prize recognised, rather than stimulated, innovation, Stage 2 of the prize succeeded in incentivising deployment of the shortlisted technologies and their associated business models, in new, challenging contexts.

### Value of this prize

This suggests that prizes, in this kind of sector, can be best used to gather existing technologies and models (including those at late stage of development) from a diverse range of solvers, and identify those that show promise of stimulating the market, if follow-up support is available. In the case of the OGCCC, the ongoing financial support required to take ideas forward had to be identified by the participants themselves, although some assistance was given by the Prize Team where possible, through promoting participants to potential investors and other programmes<sup>1</sup>.

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<sup>1</sup> For example, the programmes Low Energy Inclusive Appliances (LEIA) and Transforming Energy Access (TEA), which both receive DFID funding.

## **Additional benefit accrued for participants**

Our review finds that Stage 2 participants, whether successful or not, in general, had their expectations confirmed about the challenges deployment to a new location presents. In addition, individual participants came away from the OGCCC having gained valuable market intelligence which they reported having plans to act on, in the future. The information obtained about the experience of all participants, successful and not, is also of value to other sector stakeholders, including investors, donors and governments.

## **Improvements for future prizes**

Extending Stage 2 would give organisations more time to proceed with deployment (during which technical advice could be provided to support them in overcoming some of the challenges that this presents). Prize design also needs to respond to the amount of time required for appropriate technology to be developed and to be proven to be commercially successful (and thus attractive to substantial investment). This implies a need to link the prize to a mechanism that helps promising technologies identified at Stage 1, and those that succeed in completing Stage 2, to be developed and supported further, for example, results-based financing schemes that support the deployment of technology into markets.



# Introduction

## The 2018-19 Global LEAP Off-Grid Cold Chain Challenge

The Ideas to Impact programme, funded by DFID, tests whether innovation inducement prizes can stimulate innovative solutions to longstanding development challenges for low-income households.

Within the energy access theme, Ideas to Impact ran the 2018-19 Global LEAP Off-Grid Cold Chain Challenge (OGCCC) with a Prize Team comprising members of IMC Worldwide, Energy 4 Impact and CLASP, and supported by Power Africa's Beyond the Grid initiative.

The OGCCC aimed to identify, reward and promote the most appropriate technologies for off-grid cold storage and by filling the information gaps in the off-grid cold storage sector, stimulate appropriate support from donors, investors and government. Stage 1 of the prize (the Nominations stage) was completed in August 2018. Stage 2 (the Verification stage) was awarded in November 2019 (Section 2 describes the prize in more detail).

## The purpose of this review

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 is synthesising this learning into a set of research outputs towards the end of the programme.<sup>2</sup> Considering the modest resources available for the OGCCC<sup>3</sup>, this review of the prize focuses on two of the five Ideas to Impact Programme Evaluation Questions (PEQs):

**PEQ 1: How effective has the prize been at catalysing innovation on the focus problem?** Has participating in the prize stimulated innovation among the participants?

**PEQ 5: Is solver support necessary for prizes to be successful?** What has been learned from the experiences of the OGCCC participants in implementing their business models?

It was also agreed the review should explore:

- What effect post-award activity aimed at raising awareness had among key stakeholders of off-grid cold storage?
- What value the OGCCC offered compared to the broader system of interventions in the sector?

The evaluation methodology used for this review and key limitations are described in Annex 1.

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<sup>2</sup> All Ideas to Impact publications are available from <http://www.ideastoimpact.net/research>

<sup>3</sup> Within the portfolio of evaluations and 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). To better reflect the limited resources and scope of this study, we have classified this assessment of the OGCCC as a review rather than an evaluation, for example, while the Lead Evaluator has maintained contact with the Prize Team at key stages in the prize process, data collection has happened after the prize awarded rather than throughout.

# Section 1: Global LEAP Off-Grid Cold Chain Challenge: Rationale and background

## 1.1 Prize problem statement

The 'cold chain' describes how the temperature of perishable products is managed to maintain their quality and safety throughout the supply chain from where they are harvested or slaughtered to where they are consumed. Cold chains play a critical role in reducing food loss and increasing food supplies but in developing countries they are either fragmented or do not exist (see Box 1).

Box 1: OGCCC problem statement

### **Problem statement taken from OGCCC Theory of Change**

Lack of affordable off-grid cold storage solutions in dairy/fruit/vegetable farms in developing countries, leads to food waste, low productivity and the inability to access larger markets.

Commercially sustainable cold chains would allow farmers to diversify production to include high-value perishable crops, link them to regional and international markets, and increase earnings.

The International Institute of Refrigeration estimates that setting up cold chains for perishable foodstuffs, on a par with those of industrialised countries, would enable developing countries to raise food supply by about 15% (about 250 million tonnes). The Prize Team research, as part of prize design, identified that improved cold chains as a consequence of the prize, would offer developing countries the following benefits:

- Economic outcomes for agriculture-based economies, such as in East Africa, where gains in GDP from agriculture are linked to higher growth in the expenditure of the poor than gains from other sectors.
- Enable farmers to grow high-value perishable crops and create the opportunity to link to regional and international markets, leading to increased earnings.
- Create opportunities within the cold chain facilities themselves for labour, services, and value-added processing.

In many emerging economies, cold chains constitute a variety of uncoordinated actors, drivers, influencers and regulators. These complex linkages mean that building and strengthening cold chain systems requires coordinated and comprehensive efforts from government, industry, academics, and international development organisations.

## 1.2 Prize aim

The OGCCC aimed to improve off-grid cold chains and thus improve the livelihoods of small entrepreneurs (e.g. dairy farmers, subsistence farmers, market retailers), through increased productivity, reduced produce loss, and greater market access. The OGCCC Theory of Change (see Annex 3), presents the central hypothesis of the prize thus:

*The Challenge aims to identify, reward and promote the most appropriate technologies for off-grid cold storage. We hope that greater transparency around these technologies and their associated business models will stimulate appropriate support from donors, investors and government.*

By testing cold room technologies in market settings, the OGCCC aimed to help fill information gaps in one component of the off-grid cold chain (cold storage) with the hopes of contributing to a larger discourse addressing off-grid cold chains designed to support small-holder farmers.

The Theory of Change<sup>4</sup> specifies three outcomes and one output linked to the set of 'Prize Effects' that Ideas to Impact uses to describe the results that can be achieved through a prize (see Annex 1 for descriptions of the effects):

- Identifying the most promising technologies for cold storage and shortlisting them for in-situ verification.<sup>5</sup> [Outcome 1, to be achieved by end of Stage 1; Prize Effect: Point Solution].
- Raising awareness of the technology targets for off-grid cold storage in developing countries, amongst technology manufacturers, SMEs, investors who are not familiar with the problems. [Outcome 2, to be achieved throughout the prize's implementation; Prize Effect: Raise Awareness].
- Attracting investment towards the prize winners and non-winning ideas for growth and scale-up (existing & new companies, communities and contexts). [Outcome 3, to be achieved after Stage 2 prizes are awarded; Prize Effect: Stimulating the Market].

In the OGCCC concept note (Energy 4 Impact, 2019), the Prize Team also identified other aims for the prize (effects it hoped it would have):

- Attract further investment and or technical support for shortlisted products.
- Increase participation in other ongoing projects/programmes.
- Promote franchise development for larger technology manufacturers.
- Uncover important barriers that could be addressed through additional programming.

### 1.3 Target and scope

OGCCC was a global competition that focussed on businesses that deploy or will deploy off-grid cold chain storage solutions. The nominations for Stage 1 were open to anyone whose cold storage technologies could meet certain size and temperature requirements, the goal at this stage being to identify as many cold storage solutions as possible. Stage 2 was restricted to technology suppliers among those shortlisted in Stage 1 that have deployed or could deploy cold storage solutions in any

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<sup>4</sup> During consultation on the approach to the review, it was noted that the theory of change should be amended to capture more fully the expectations of Stage 2 of the prize, i.e. that prizes would be awarded to the technologies for cold storage and their associated business models, if verified through in situ testing, as appropriate for developing countries (Prize Effect: Point Solution). This amendment is highlighted in the theory of change in Annex 4.

<sup>5</sup> 'Verification' in the case of the OGCCC means the use of data obtained from commercial use of the technology in the field to assess claims made by prize participants about the appropriateness for use in developing countries, of the products nominated during Stage 1 of the prize process. Part of the evaluation (by Judges – not this review) of Stage 1 applications aimed to determine if the solution could be deployed during Stage 2 e.g. if the company had knowledge of the intended market and had made steps towards forming partnerships.

of the following DFID focus countries: Tanzania, Uganda, Kenya, Rwanda, Nigeria, Ghana, Senegal, Sierra Leone and Burkina Faso.

In its concept note for OGCCC, the Prize Team identified four potential participant types:

- Large traditional manufacturers who would like to enter developing country contexts.
- SMEs/researchers with unique technology/prototypes.
- Off-grid cold storage technology providers or distributors in developing countries.
- Mini-grid operators or other technology incubators.

## 1.4 Prize mechanism

The OGCCC was a Point Solution prize in terms of overall design, comprising two consecutive stages: Nomination and Verification. Point Solution prizes incentivise participants to find a solution to a highly specified problem that has been broken down to a component part. For example, a new product or process. In the case of the OGCCC, the solution is a product (an off-grid cold chain container) and the business model that enables it to be successfully deployed and taken up in a developing country.

Box 2: Definitions of OGCCC Participants

**Stage 1 Participants:** organisations that nominated a product during Stage 1 by submitting an application.

**Stage 2 Participants:** the 10 organisations selected by judges at the end of Stage 1 to progress to the next stage (winners of Stage 1).

**Finalists:** the four Stage 2 organisations that were able to get their products deployed, into commercial use for testing, and proceeded to judging.

**Stage 1: Nomination** (March-May 2018) – Participants (see Box 2) were required to register online and then submit product nominations of a technology (and associated business model) for off-grid cold chain container deployment. The Prize Team anticipated that participants would carry out additional R&D/adaptation activities to enable them to nominate products.

Each submission was reviewed to confirm if it met the eligibility requirements. A judging process was then used to identify the best technologies and 10 were selected to progress to the second stage of the competition. At this stage, the prize award was £10,000 for each winner, specifically to contribute to the costs incurred by companies in shipping and setting up a new container in an eligible country.

**Stage 2: Verification** (planned duration: March 2019 – July 2019) - The 10 products shortlisted by the judges in the Nomination Stage were invited to deploy to one of a shortlist of developing countries.<sup>6</sup> Field test data was captured on deployed products in situ through two means:

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<sup>6</sup> This was either a new country, or a new location within a developing country on the shortlist, in which the organisation already operated.

- Technical performance data (power consumption, usage, etc.) collected by Ideas to Impact, through remote monitoring equipment, installed and monitored by the Prize Team.
- Qualitative data on business performance (among those put to productive use within the timeframe of Stage 2) collected from product users by the participants, through telephone surveys or on site.

Data were reviewed and evaluated by a panel of off-grid market experts ('the Judges'). The Prize Team expected to make awards to three winners towards the end of July 2019, who would receive innovation prizes of £75,000, £35,000, and £25,000 respectively (although the number and value of awards were subject to change, with the second prize winner subsequently being awarded £50,000).

In line with the intended outcomes of the OGCCC, the Prize Team also made plans for outreach and engagement throughout the prize timeline. These activities were to include:

- Raising awareness of the challenge and generating interest in the formation of partnerships among key cold chain actors.
- Seeking opportunities to participate in networking events to showcase the participating companies and to present the final prizes and learnings.

However, delays to awarding of the Stage 2 prizes (with the OGCCC prize activity ending December 2019) limited the time available for post-award outreach and engagement (see Annex 2 for summary of changes). The implications of this are explored in Section 3.

## Section 2: Has participating in the prize stimulated innovation among the participants?

**Section summary:** The OGCCC stimulated innovation among the 10 organisations who attempted to introduce their products to a new geographical market in Stage 2 of the prize. The demands of having to deploy their products encouraged three (of six) OGCCC Stage 2 participants who made it that far, to introduce adaptations to their products. Beyond this, the prize was successful in testing four cold storage technologies (and associated business models), two of which showed originality in their use of locally sourced materials, including recycled plastic bottles, to keep costs down.

### 2.1 How effective has the OGCCC been at identifying promising and verified technologies for cold storage in developing countries?

#### Key findings:

- Stage 1 helped to identify existing technologies (including late stage prototypes) from established and well-known organisations, as well as those that were newer to the market or previously unknown by the Prize Team; 10 promising technologies were shortlisted out of 29 nominated.
- Field test data was collected on 4 of the 10 shortlisted products during Stage 2, which was used by judges to evaluate their technological and business performance.

Stage 1 of the OGCCC was expected to bring in as many potential technologies as possible to enable a shortlist of ten promising technologies to move forward to Stage 2 during which they would be deployed, by the prize participant, into a new location in a developing country. As Box 3 shows, the prize was successful during Stage 1 in identifying a shortlist of ten **promising** technologies, from a total of 29 nominated out of 74 organisations that registered to participate.

### **OGCCC participation in numbers**

#### **Stage 1:**

74 companies registered to participate in Stage 1

29 registered participants went on to nominate a product

20 nominated products passed eligibility screening

10 products (and business models) shortlisted to proceed to Stage 2 and given £10,000 to help cover deployment costs of their cold rooms.

#### **Stage 2:**

6 participants successfully deployed their product to the test site; technical performance data captured.

4 of these deployed products were put to productive use (in Nigeria, Kenya (2 participants) and Rwanda), and business performance data captured.

#### **Stage 2 winners and prize awards:**

1st Place – ColdHubs - £75,000

2nd Place – EcoZen - £50,000

3rd Place – FreshBox - £25,000

Runner Up – Ecolife

Subsequently, the prize was successful in obtaining in situ test data<sup>7</sup> on four technologies.<sup>8</sup> Three of the four judges interviewed observed that the difficulty in identifying a higher number of verified technologies for cold storage stemmed from the sector being so new, with many products still in their prototype or early development stages, including those entered in the OGCCC. The assessment criteria for Stage 1, by design, enabled newer products or companies as well as more established ones to move forward to Stage 2, to open up the prize to new entrants. However, during Key Informant Interviews (KIIs), the Prize Team acknowledged that this would increase the risk of fewer Stage 2 participants making it to the end of the prize. One of the judges confirmed this risk noting “the specific market segment that the programme was approaching has uniquely challenging technical factors and business model factors that make it difficult to predict the success ahead of time”.

Verification of the promising technologies identified through Stage 1 took place during judging at the end of Stage 2. A panel of four judges with expertise and experience in off-grid solar and cooling value chains assessed the Stage 2 finalists’ products in terms of:

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<sup>7</sup> Based on technical and business performance data obtained through remote monitoring equipment and surveys.

<sup>8</sup> The Prize Team forecast (in the Theory of Change) that six of the ten products would be tested during Stage 2; in practice, six were successfully deployed to their test sites, but two of these were not able to be put into commercial use in time, and therefore field test data could not be collected on them.

- Total Cost/Financial Viability.
- Technical Performance.
- End User Impact.
- Ease of Use.

This assessment drew on qualitative information captured during the competition and a temperature performance chart for each of the finalists able to successfully deploy their cold storage units to the test site and get it into commercial use.

Six Stage 2 participants were able to deliver their units to a test location for performance monitoring, but only four were able to get them successfully up and running in time for data to be collected on commercial use, that would enable verification (and judging of awards) to take place. The challenges experienced during deployment are explored in Section 5.

While all groups interviewed confirmed that these challenges were not unexpected by participants or uncommon in this sector, field data collection (and therefore verification) relied on the extent to which participants were able to overcome these challenges within the timeframe of the prize. Thus, the prize would have been more effective in identifying verified technologies if participants had been given more time for deployment – suggested by the Stage 2 extension and from reflections (by the Prize Team) on the challenges experienced by the Stage 2 participants. However, the risk of extending Stage 2 further would be that participants who were able to complete their installation sooner than others would have needed replacement batteries for remote monitoring equipment (a problem experienced by one of the Stage 2 participants). This would be something for the Prize Team to factor into their support to the verification stage of a future prize.

## 2.2 How effective has the OGCCC been at identifying innovative business models for SMEs to sustainably deploy cold storage for poor smallholders in developing countries

### Key findings:

- **By successfully applying to a new setting, a technology and business model that had been proven to work previously elsewhere, the four Stage 2 finalists demonstrated innovation and two showed originality through their use of locally sourced materials to keep costs low.**
- **Despite OGCCC operating within a challenging market segment, making it hard for the Prize Team to forecast how many participants would be successful, Stage 2 resulted in four technologies and business models being deployed and tested in the field (see Box 4).**
- **The four finalists who succeeded in commercially deploying their cold storage units, were organisations located outside of North America and Europe (Nigeria, India, Uganda and Kenya).**
- **All four finalists (and the four additional Stage 1 winners that agreed to be interviewed) confirmed that they were still active in the market, having plans to launch new products, expand into new markets or to continue their research and development while two reported sales or increased revenue.**

OGCCC was launched under the banner of the Global LEAP Awards. Unlike the OGCCC, Global LEAP Awards typically manage the testing of nominated products (fans, televisions, etc.) in a



laboratory setting. In the case of the Global LEAP Off-grid Refrigerator Competition, which included an Ideas to Impact innovation prize and was reviewed by Itad in 2019,<sup>9</sup> the products were then tested in the field, in Uganda, through a process managed by the same Prize Team responsible for the OGCCC. In that case the refrigerators were given (free of charge) to small businesses in return for participating in user testing.

By contrast, the OGCCC did not include laboratory testing of the units nominated at Stage 1, nor did the Prize Team manage the shipping and installing of units into a developing country setting for field testing. Instead, the OGCCC required participants to deploy their product to an untested market, in a developing country and operate it commercially, e.g. selling or leasing their units. For most participants this required them to manage the process of importing, exporting, installation and maintenance in a different country to where they were located. While the participants were provided with £10,000 (winnings of the Stage 1 award) to help cover their costs, the Prize Team acknowledged that deployment was “a big ask” and forecasting in advance which companies would succeed was difficult. Although the three winners and runner-up were able to gain some commercial success from their product, only the three winners’ products were still in operation at the time of the judging of Stage 2 (November 2019). The winners reported a range of different measurable benefits to users including extending shelf-life of products thus enabling the user to sell products when they want to and reducing the number of deliveries needing to be made by a producer.

Box 4: Summary of business models used by Stage 2 winners and runner-up

#### **Business models used by the winners and runner-up of Stage 2 of OGCCC**

**1<sup>st</sup> Place – ColdHubs** – Medium sized enterprise based in Nigeria. Offers ‘Cooling as a Service’ to fresh fruit and vegetable market vendors, who rent space in the cold room on a daily basis, rather than vendors needing to purchase and operate the equipment themselves.

**2<sup>nd</sup> Place – EcoZen** – Medium sized enterprise based in India. For the competition, EcoZen sold their cold room to a farmer located in Northern Kenya who grows herbs for export. EcoZen’s cold room uses sophisticated monitoring equipment that can be accessed by the user through an online app.

**3<sup>rd</sup> Place – FreshBox** – Small start-up based in Nairobi, Kenya. The FreshBox cold unit built from low-cost locally sourced materials and sold to a farmer in Northern Kenya for use in cooling milk produced on the farm.

**Runner-Up – EcoLife** – Small, woman led non-profit based in Kampala, Uganda. Cold room built from locally sourced materials including recycled plastic bottles as insulation, and used to store mangoes from seven different farmers.

*Source: Information sent to the judges of Stage 2.*

Business model innovation was examined within the judging of Stage 2, specifically with an interest in innovations that would increase overall affordability for end users. Two of the four Stage 2 finalists

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<sup>9</sup> Brown (2020).

(participants that went forward to judging) showed originality in their use of locally sourced materials, including recycled plastic bottles, to keep costs down.

While all of the judges were in agreement that the first place winner had an excellent business model (selling cooling as a service, rather than selling the unit itself), and two noted the diversity in the finalists' business models (see Box 4), there was not clear agreement between them on whether the business models were innovative. One judge expressed the view that the OGCCC served to recognise what already existed and that the overall winner was a previously established product and business model. By contrast, another judge reflected that innovation was evident in the way participants tackled the challenges they experienced and expected them to go on to apply this to their businesses in future.

Ideas to Impact, understands innovation as a broader concept than pure novel invention (see Box 5), and by successfully applying to a new setting, a technology and business model that had been proven to work previously elsewhere, the four finalists demonstrated (adaptive) innovation.

Box 5: Ideas to Impact definition of innovation

**Ideas to Impact defines innovation as:** a new process, technology or service, and often a blend of all three, and includes: new to the world – NOVEL, new to the location or firm – IMITATIVE, and new to the field of endeavour, i.e. repurposed – ADAPTIVE.

All eight Stage 1 winners that agreed to be interviewed (out of the 10 invited) confirmed that they were still active in the market either having plans to launch new products, expand into new markets or to continue their research and development (noting that they needed more time than Stage 2 allowed to do this work but intended continuing despite the prize having concluded). One commented that they were now more focussed on the social impact of their product as a result of their participation in the OGCCC and another had been inspired to invest more of their own resources in further development.

One prize-winner of Stage 2 reported sales of two units, with deployment expected in the first quarter of 2020, another claimed to have increased their revenue one thousandfold since participating in the prize due to attracting a new client.

In terms of sustainability, two judges noted that the early stage of the products meant that there were high upfront costs to purchasers, and one judge queried whether Stage 2 was long enough to assess if products had been sustainably deployed and suggested that a future prize might instead look at value created for farmers as a more appropriate measure. One of the external experts commented that there had been a shift in focus in the sector, from looking for new technical solutions, to looking at sustainable and innovative business models. They went on to observe that the OGCCC had proven useful in highlighting the challenges of innovation in the off-grid cold chain, that companies are still thinking through business models and that there is still a need to invest in those companies. The need to provide early stage financing was noted by key informants when asked about the future use of prizes (see section 4).

## 2.3 To what extent did the prize inspire solvers (prize participants) to innovate at Stages 1 and 2?

### Key findings:

- Innovation was stimulated at Stage 2 of the prize (when products were deployed), rather than Stage 1 (when products were nominated).
- Three (of six) participants who deployed their products made adaptations in response to the realities of the markets into which the products were deployed and the demands of the target customers.

The definition of innovation used by Ideas to Impact is again worth referring to, to understand the extent to which the participants were inspired by the prize to innovate, either in order to nominate a product (Stage 1) or to participate in Stage 2. The review finds that in this area, the judges and the participants had different perspectives and may reflect their position and experience in the sector, and how broadly they interpreted innovation.

The judges' view (three of four) was that the prize had little or no effect on inducing innovation at either stage, with the exception of one judge, who reported a winner's use of remote monitoring technology as innovation stimulated by the prize and as noted above, overcoming the challenges experienced during deployment. Participants however, were able to give examples of how they had needed to find new ways of building, supplying and running their products or services from participating in the prize; the majority of these came through the experience of deployment (Stage 2) rather than work they did in order to nominate an eligible product (Stage 1).

### Innovation prior to nomination (Stage 1)

Eight of the ten Stage 1 winners were interviewed for the review, and five of these nominated a fully established product. There was no evidence of the eight interviewed having adapted their products in order to meet the requirements of Stage 1. In terms of business models, participants reported having planned to use an established business model, however one winner switched from their existing model of customers renting space in the unit, to selling the unit upfront to a single farmer.<sup>10</sup>

### Innovation prior to deployment (commencing Stage 2)

As participants prepared for deployment, there were two examples of adaptations made to the products in direct response to the prize. One of the Stage 2 winners had to change their refrigerant to meet prize requirements and another made small scale adjustments to improve overall quality. One finalist, (who did not complete Stage 2) recognised that their existing high-end product would need to be heavily adapted for use in a developing country setting, to compete in Stage 2 but were unable to do so in time to meet the prize deadline. Although one participant had to change to deploying to a different country at the request of the Prize Team, due to safety concerns, there were no changes to business models at this stage.

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<sup>10</sup> While the cost of the products deployed in Stage 2 were too great for 'Bottom of the Pyramid' to purchase outright, the OGCCC Theory of Change anticipated that adoption of the technologies identified through the prize would be supported in the future by an RBF or similar enabling programme.

### **Innovation during deployment (to close of Stage 2)**

Six of the ten Stage 1 winners successfully deployed their products. Of these, three reported making adaptations to their products in response to the realities of the situations into which the products were deployed and the demands of the target customers:

- Made changes to the product to increase power and capacity.
- Change of location within the country necessitated a whole new design process to find better materials for insulation and construction (participant's approach based on using local materials).
- Client requested changes to flooring and wall thickness prior to use.

This last participant also took steps to simplify installation and maintenance in response to the rural location of the product, some distance from the company's base.

### **What did participants learn from their experience of the prize?**

This question is explored further in section 5 in connection with the challenges experienced by participants during Stage 2. Specifically, in relation to the product and business model, however, three of the six participants that went through to successfully deploy at Stage 2, reported gaining substantial learning including:

- Understanding of the market – what an appropriate product mix, business model and target segment would be for the country they deployed into; that customer satisfaction and commercial success is about more than just the technology; there is need to understand the benefits to the end user.
- How to scale their business – that it would be easier to replicate if working with a single farmer per cold storage unit.
- Technical specifications and standards – one participant now recognised the importance of using a more eco-friendly refrigerant, another reported understanding more about the cold storage standards that needed to be met for a product to be acceptable.
- Options for alternative models – for example, changing approach to product assembly and sourcing of parts, to respond to the challenge of maintaining units from a distance.

## 2.4 Value of field testing to participants and Prize Team

### Key findings:

- The Stage 2 finalists valued the field test data either for validating their own monitoring (Prize Team-led remote measurement), or for the insights provided into the new market (user feedback).
- The field testing was also of value to the Prize Team both demonstrating the necessity of in situ testing to assess the appropriateness of technologies to developing country settings and in terms of the learning gained about the challenges of deployment.

Field test data was captured on products through two means:

**Technical performance data** of successfully deployed products, via remote monitoring equipment installed by the Prize Team. Data was recorded, at ten-minute intervals, and made available to the Prize Team, on the ambient temperature and humidity, internal temperature of each of the deployed units and whether the door was open or closed.

**Qualitative data on user experience** for the four units that were put to productive use within the timeframe of Stage 2 was collected by the companies participating in the prize, by telephone or on site. Prize participants obtained data about their users' experience of the cold storage unit following collection of baseline data on the end-user's method of keeping produce cool prior to using the unit. Thus, through their involvement in Stage 2, prize participants obtained market research on their product. The qualitative data was then shared with judges and included information on:

- Ease of use and any technical problems experienced
- Satisfaction with the unit and the service and information provided by the supplier
- Costs incurred
- Estimates of additional income, savings or reduction in produce losses since using the unit

The Prize Team observed that they learned little about the nominated cold storage technologies from just running Stage 1 of the prize whereas during Stage 2, when products went from paper to being used in the field, it was possible to get a fuller picture, including where things can go wrong during implementation.

Due to differences in when they were able to get their cold storage units operating in the field and technical issues with monitoring e.g. sourcing replacement batteries, the amount of data available on the three winners and runner-up varied from two weeks to seven months. For the OGCCC, the Prize Team were trialling new and more sophisticated monitoring equipment (building on learning from their experience of remote monitoring of the 2016-17 Off-Grid Refrigerator Competition)<sup>11</sup> but acknowledged that there were still improvements that could be made.

Two of the four finalists commented that the data on performance collected by the Prize Team replicated, to a large extent, the system they already had in place but recognised value in this validation of their own data. The other two finalists were keen to have some or all of the data

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<sup>11</sup> While sub-evaluation question (SEQ) 7: (How did learning from the Global LEAP Off-Grid Refrigerator Competition (Round 1) influence prize design?) was not directly investigated during interviews this example was shared by the Prize Team.

obtainable through the remote monitoring e.g. eco-efficiency. One of the winners reported that the feedback they received from the customer during the prize led to them making adjustments to the unit to improve its efficiency and another winner that it gave them valuable insights into their marketing approach for that country in the future: “[OGCCC] has helped supporting us to explore the African market. So, it has opened [a] new market for us.”

## Section 3: Effect of post-award activity on raising awareness

**Section summary:** The Prize Team has succeeded in promoting the OGCCC winners and the development challenge it tackled, to key external stakeholders including potential investors and policymakers. This is despite the reduction in time available for post-award activity (due to postponement of awarding Stage 2). Although Stage 2 participants themselves did not state this as a consequence of participating in the prize, KIIIs identified that three organisations had received additional finance of US\$6 million (one participant) and €250,000 (two participants).

The Prize Team worked on raising awareness of the prize and its winners at Stage 1 and 2 up to, and shortly after, the Stage 2 prizes were awarded. However, with the awarding of the Stage 2 prizes being delayed to November 2019 (and OGCCC prize activity ending December 2019) the Prize Team were left with less time than anticipated for post-award outreach and engagement, i.e. one month.<sup>12</sup> Furthermore, in light of the Ideas to Impact programme closing at end of March 2020, the review has only been able to look at the immediate effect the prize had on raising awareness, just after the closure of the prize. Both of these factors limit what can be said about the effect of post-award activity.

### 3.1 Raising awareness of winning and shortlisted technologies

**The ten winners of Stage 1 have been brought to the attention of target audiences through a range of channels.**

In addition to their own and partner websites (Ideas to Impact, Global LEAP, etc.), short profiles of all ten companies were published in a special cold chain issue of 'Agriculture for Development' (Spring 2019)<sup>13</sup> and the Prize Team had particular success in receiving coverage in Kenyan news sites<sup>14</sup> (which may be linked to the location of the prize implementing partner, CLASP, in Nairobi).

Videos of three of the Stage 2 finalists were created by the Prize Team and made available online<sup>15</sup> with a fourth due for release in February 2020, and several of the prize winners promoted their success in the OGCCC through their own websites and social media channels.

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<sup>12</sup> Prize Team members subsequently presented on OGCCC at the GOGLA conference in Nairobi, in February and have ambitions to carry out further outreach activities in 2020 (dependent on available resources).

<sup>13</sup> Available online open access at [https://taa.org.uk/wp-content/uploads/2019/04/Ag4Dev36\\_web\\_version.pdf](https://taa.org.uk/wp-content/uploads/2019/04/Ag4Dev36_web_version.pdf)

<sup>14</sup> <https://businesstoday.co.ke/10-innovative-tech-firms-receive-sh1-3m-off-grid-cold-chain-challenge/>  
<https://biznakenya.com/10-innovative-technology-companies-receive-10000-gbp-in-uk-aid-funded-off-grid-cold-chain-challenge/> and <https://www.capitalfm.co.ke/business/2018/08/kenyan-fresh-produce-storage-firm-shortlisted-for-international-award/>

<sup>15</sup> <https://vimeo.com/claspappliances>

One winner commented that a small ceremony to celebrate the success of the winners and finalists and connect them directly with potential investors and partners would have been valuable. The OGCCC Theory of Change indicates that there had been plans for an award ceremony, however, the Prize Team explained that the geographical distribution of the winners made it difficult to find an appropriate event to bring winners to and that it was decided that the resources would have a longer-lasting impact if spent on promotional activities, e.g. video profiles (see Box 6). Furthermore, winners were promoted as part of the Prize Team’s involvement in relevant workshops and meetings.

Box 6: Examples of reach of promotional activities

#### Examples of reach of Prize Team communications about winning and shortlisted technologies

At the time of the review:

- The OGCCC programme page had received 1,095 page views on the Global LEAP site and 567 page views on the Efficiency for Access website.
- PDFs available on the OGCCC landing page had been downloaded 141 times.
- Efficiency for Access webpage announcing the OGCCC winners had been accessed by 189 people.
- Ecozen video profile: 242 views via the CLASP blog.
- Freshbox video profile: 62 views via the CLASP blog.

## 3.2 Stimulating discussions about off-grid cold chains designed to support smallholder farmers in developing countries

**By invitation, the Prize Team has shared information about the OGCCC at various cold chain meetings.** These include the Asia Clean Energy Summit, an international workshop on energy efficient cooling, the 2<sup>nd</sup> Annual Cooling Congress and a meeting with the Energy Access team of the World Bank. To support this face-to-face activity, the Prize Team produced a set of materials including handouts on off-grid cold storage technology and business models, and types of cold-chains in off-grid areas.<sup>16</sup>

The Prize Team observed that there was potential to do more depending on availability of resources, and at the time of the interview, plans were being made for attendance at more conferences. The value of this work was supported by two key informants. An external expert said that in the last two years (since the prize had launched) donors had “woken up” to the opportunity for investing in cold chain solutions and that cooling in general was moving up the development agenda. One of the prize judges emphasised the need for policies that would encourage adoption of the technologies identified through the OGCCC and felt that the policy environment needed to understand more about the problem, the need for a solution and that there has been some progress made towards finding a solution.

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<sup>16</sup> See the Resources section of <https://globalleapawards.org/ogccc>



### 3.3 Attracting finance to Stage 1 and Stage 2 winners

**Some participants of Stage 2 have received substantial additional finance since their involvement in the OGCCC and the Prize Team was approached by potential investors who expressed interest in the prize and its winners.**

While the timing of the review is too soon to answer this question for Stage 2 winners, there was some expectation from the Prize Team that investment may have been made in some of the Stage 1 winning solutions as a result of the prize, regardless of whether they were involved in Stage 2. Prize Team records show that potential investors made enquiries based on hearing about the OGCCC and were keen to hear more about the winners and the prize's experience and the Prize Team facilitated a site visit by a private equity fund to one of the winning units.

While no evidence came through interviews with participants of their securing additional finance as a direct result of their involvement in the prize, key informants highlighted that some participants of Stage 2 had received additional finance since their involvement in the OGCCC: Ecozen, which generated significant interest from external investors, raised US\$6 million (over £4.8 million) through a Series A round of funding<sup>17</sup> and two of the Stage 2 participants (non-winners) each received funding of €250,000 (over £220,000), through the Efficiency for Access Research and Development Fund. There is also evidence of at least three Stage 2 participants having promoted their success in the prize.<sup>18</sup>

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<sup>17</sup> <https://agfundernews.com/indias-ecozen-closes-series-a-from-impact-funds.html>

<sup>18</sup> E.g. <https://www.ecozensolutions.com/uncategorized/ecofrost-wins-big-at-the-global-leap-awards.html>

## Section 4: What value does the OGCCC offer compared to the broader system of interventions in the sector?

**Section summary:** KIIls with experts suggest that the primary value offered by the OGCCC lies in drawing attention to an issue, and the realities of deployment of technologies into developing country markets. In comparison to other interventions, the OGCCC was considered by two (of four) judges as unique in establishing standards for off-grid cold storage. OGCCC may also be unusual among prizes in shortlisting and making awards to organisations that were themselves based in developing countries; one external stakeholder noted that prizes tended to be won by companies that could write good proposals, which did not always go hand in hand with the ability to deliver in a developing country.

### Key findings

- **Sector experts (judges and external stakeholders) viewed the OGCCC, and other prizes, as offering value in terms of drawing attention to an issue and the realities of introducing cold storage technologies into the market.**
- **Two (of four) judges highlighted the unique contribution the OGCCC made to establishing product performance standards and testing for off-grid cold storage and a third judge felt that the prize filled a niche in the sector, by providing financial incentives for innovation.**
- **The design of OGCCC appears to have overcome challenges observed in other prizes by one external stakeholder, in succeeding in shortlisting proposals at Stage 1 from organisations that were then able to deliver in a developing country.**

Through consultation on the methods note, it was agreed not to carry out VfM analysis and external comparisons for the OGCCC and instead focus on how the prize fits with and adds value to the broader system of other interventions in the cold chain sector. The primary source for this part of the review was seven KIIs (funders, industry representatives, researchers, etc.) including those with the OGCCC judges, drawing on their experience of the sector to understand what value the OGCCC and prizes in general represented.

Two external stakeholders summarised the *potential* value of the OGCCC as lying in the attention it could attract, with one observing that a prize “breathes new life” into an issue. In terms of what was observed in practice, the primary value that the OGCCC was seen to contribute was:

**Raising awareness of the issue and of the realities of deployment** – three KIIs (one judge and two external stakeholders) commented that there needed to be more recognition that technologies were part of systems and that the OGCCC focus on raising awareness of business models was important to avoid donors opting for quick technological wins. The focus of the prize on rewarding and raising awareness of appropriate business models was therefore seen as adding value to what already existed. The prize was viewed as having a role in creating more visibility to the scale of the off-grid cold chain market in terms of need and opportunity, and drawing attention to those trying to solve the problem.

“a lot of technology already exists but it’s not understood how that can actually be a viable business yet”

- External stakeholder.

**Filling gaps in knowledge with a reliable source of data** – One aspect of this other source of value was reducing risks for investors through independent testing of products where little or no standardisation of performance testing exists. One judge commented that this was required so that the drive towards commercialisation did not reduce consumer protection. The collection of user, rather than just participant and product, data was highlighted by one judge as a strength of the OGCCC.

A comment by one external stakeholder suggests that the OGCCC is untypical of other global technology prizes. The interviewee felt that prizes tended to be won by companies that were good at writing proposals and working with Western-style competition processes<sup>19</sup>, but who may not have the ability to deliver the product on the ground. This is reflected in the results of the OGCCC, where, of those shortlisted at the end of Stage 1, the companies that were able to deploy in Stage 2 were all based in Africa and India, while those from the US and UK were unsuccessful. However, a strength of this prize, is that companies from developing countries were shortlisted at the nomination stage and therefore succeeded in competing with those from North America and Europe at the proposal stage.

#### 4.1 Potential negative unintended consequences

While the interviews with participants and Prize Team did not uncover any unintended negative consequences of the prize (PEQ4), beyond the challenges experienced and largely anticipated, in deployment, KIs with judges and experts identified risks associated with the prize design that could be responded to in future rounds.

Two interviewees expressed concerns about the OGCCC (and other interventions) focussing on one element of the cold chain (cold storage) in isolation. One judge was concerned that the title of the prize itself (the Cold Chain Challenge) implied it was finding cold chain solutions, rather than focussing on just cold storage, and that this could lead to individual technologies being seen as the solution over joined up approaches. Equally, an external stakeholder was keen for other stages in the cold chain to receive attention, warning that (in their experience) people who talk about cold chains often mean cold storage and overlook the necessity for pre-cooling and refrigerated transportation.

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<sup>19</sup> This challenge has been observed in other forms of funding, for example, a report for the UK Collaborative on Development Sciences (Kunaratnam, 2017) notes the difficulties experienced by Southern organisations in competing for development research and programme funding.

Finally, one of the sector specialists interviewed was concerned that prize participants risk incurring the financial burden of developing an innovation and then failing to secure funding to maintain research and development.

“just running this prize is not going to transform the off-grid cold chain situation”

- External stakeholder.

## 4.2 Suggestions for future prizes

A recurring theme in interviews was the need for future prizes to be part of a broader partnership and connected to sources of follow-on grant funding, so they can refine their ideas and prove their concepts, before more substantial investment is possible, with one judge citing the Global Cooling Prize as a better model in this regard. One external stakeholder recommended that regardless of business model, given how far off-grid cold chain technology is from being commercially viable, prizes can only play a role in stimulating a market if linked to other interventions and noted the potential for connecting prizes with procurement incentives and subsidies (an approach adopted in the Global LEAP Off-Grid Refrigerator Competition, for example). In the case of the OGCCC, while a procurement incentives scheme was not employed, two participants were linked to further research and development funding through the Efficiency for Access coalition.

Two KIIs highlighted the need for prizes to respond to an increased focus on climate change and environmental protection, although one interviewee acknowledged that there was a tension between creating clean technology that is commercially viable. A recommendation made to improve future prize design was to include life cycle analysis as part of the data collection on entries e.g. the type of batteries used by units and to restrict to clean cooling.

Prizes were seen as having the potential to uncover valuable insights if a longer-term approach was taken to evaluation. Three interviewees expressed interest in follow-up of the Stage 2 finalists in the future to learn more about their results and challenges experienced in commercialising their products although the external expert observed that this was untypical of prizes.

## Section 5: What has been learned from the challenges experienced by the OGCCC participants in implementing their business models?

**Section summary:** The experience of the OGCCC participants in implementing their business models produced further evidence of the challenges that organisations were expected (by key informants) to face when deploying this type of technology in a developing country setting. While participants appreciated the support they received from the Prize Team, they highlighted three areas of assistance that would have been particularly beneficial: technical advice, help with sourcing finance, and additional time for deployment.

### Key findings:

- **One or more Stage 2 participants experienced each of the following challenges during deployment: lack of local skills or components, difficulties with obtaining customs clearance, gaps in knowledge of standards and market intelligence, and securing funding beyond the Stage 1 prize money.**
- **Key informants confirmed that these challenges were typical of the environment in which the prize operated and the nature of the (large and unfamiliar) technology.**
- **The Prize Team highlighted additional challenges experienced by Stage 2 participants, particularly those who failed to deploy their products: forming partnerships and gaining permission to locate their cold storage units.**

By contrast with prizes previously run under the Global LEAP Awards banner, the OGCCC was unique in inducing prize participants to enter a new geographical market with their products. This shifted the focus from comparing products based on their performance in a laboratory setting, to their appeal to potential customers and their ability to demonstrate benefits to those customers in real life settings. Interviews with Stage 2 participants identified a set of challenges experienced by many, if not all of those interviewed for the review. These challenges were subsequently explored during KIs with the Prize Team, judges and external stakeholders, none of whom expressed surprise that these had arisen. Equally, the tone of comments from participants tended to be that of frustration (not being able to fully participate or being slowed down) rather than surprise.

**Lack of relevant skills and components locally** – in deploying their products to a new location, sometimes a different country altogether, prize participants had to find new ways to set up their cold storage units. As one participant reported, fully built cold storage units were at risk of being damaged during shipping, so participants tended to send their own personnel to build the units or tried to work with local partners, with mixed success. One external stakeholder commented that even if successfully deployed, companies might then face issues in maintaining the products, given their reliance on local skills and that one solution identified in a recent workshop had been a network of trained personnel. Another external stakeholder, who supported training and education, pointed out that technical knowledge would need to include how to use the cold storage effectively, the right temperature to store products at, etc.

Sending their own staff brought its own challenges e.g. in finding appropriate accommodation in unfamiliar rural areas, for example, while using local partners required one participant to create a set of standard operating procedures and another participant to withdraw from the prize when their local partner proved unsuitable.

Even when participants were based in the same country and were deploying to a new area, weak infrastructure presented a challenge in travelling to remote rural areas to carry out timely repairs on units (as reported by two of the Stage 2 participants). As a result, one participant noted that switching the cooling from solar to thermal would be needed in future to reduce the amount of maintenance needed. Similarly, one participant reported being unable to obtain batteries locally, having to import them (again, with the risk of damage during transit).

“The technology might be perfectly good; the business case might be fine but if you can’t find the local staff or you can’t navigate the local licences then you’re really nowhere.” Prize Team.

**Importation and local regulations** – One participant experienced considerable problems in obtaining customs clearance for their product, having to send out a member of staff and then identify a local partner before successfully deploying their product. It is worth noting that this experience did not deter them from continuing and indeed subsequently identifying the country as an attractive market for their product in the future.

Klls (one Prize Team and one external stakeholders) identified the need for providing support and additional time to businesses in this area, and two external stakeholders anticipated that this would be exacerbated by the size of the units being imported compared to other appliances, who would also experience a degree of challenge in importing their technology.

**Knowledge gaps on standards and market intelligence** – Two (of eight) participants commented on their lack of awareness of performance standards for their technology and a lack of operating standards needed to work at scale. This was notably present among start-ups than more established businesses.

Gaps in local knowledge ranged from differences in weather within a country (with its influence on solar power), how the storage would be used when in situ (necessitating adjustments after installation) to practical information on how feasible it would be to transport cold storage units to their rural locations and access to fuel required to complete the installation.

One winner (one of the larger and more established participants of Stage 2) commented that they experienced few problems during deployment because of their experience in the industry and from scoping undertaken in advance, again pointing to the additional support that less experienced organisations may require. An interesting exception was a start-up that invested time while waiting to commence deployment, trialling different effects that cold storage would have on people selling produce to a market. A finalist, that was unable to meet the deadline for deployment, said that they realised that the prize needed prototypes that were ready to be shipped out, rather than those that would need major adaptations and a lesson for them was to be sure in future what type of product a prize is interested in.

**Securing funding** – while the £10,000 awarded to Stage 1 winners was designed to support deployment it was not intended to fully cover costs and participants were expected to secure additional funding. Start-ups and entrepreneurs among the Stage 2 participants reported problems in this area specifically the amount of time involved in applying for funding, and for one participant, the length of time it took for promised funding to materialise (unfortunately, not in time for the participant to complete Stage 2). Another participant invested their money in pursuing additional funding that did not materialise.

One judge noted that donors would be looking for beneficiary impact and sustainable business models, but that proposals often fall short on business acumen. Another commented that a challenge to securing funding was lack of understanding of the technology among financial institutions who would therefore assess it as high risk. This judge recommended that future prizes should require participants to provide evidence of having funding in place in advance, and to be judged on the value to be created over the product's lifetime. However, interviews with two external stakeholders suggest that this would risk overlooking companies with great technology who lacked the finances to test them out through deployment; start-up financing being easier to obtain than the ongoing funding that was needed.

One unsuccessful participant commented that most of the problems they experienced e.g. work taking longer than expected, could be solved with money. KIs with judges and external experts highlighted that the cold chain sector in developing countries is so new that true costs are not yet sufficiently understood, to enable companies to assess whether their business model will be commercially viable.

### **Other challenges**

In addition to the above issues identified by Stage 2 participants during interviews, the Prize Team observed two more challenges that participants had reported to them. These were: problems with identifying and establishing partnerships (which the Prize Team linked to participants who failed to deploy their products) and obtaining permission in busy markets to locate cold storage units.

## **5.1 Was the level of solver support received sufficient?**

### **Key finding:**

- **While six (of eight) participants interviewed praised the support they received from the Prize Team, they observed that further support in terms of technical advice, help with sourcing finance, and additional time for deployment would have been beneficial.**

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. Prizes in the Ideas to Impact portfolio used a range of mechanisms to enable more of the target solvers to participate in a prize. For the OGCCC, planned solver support was limited to:

- Encouraging potential participants to register for Stage 1 and to submit nominations.
- Provision of the cash prize for shortlisted solutions at the end of Stage 1 (which was intended to help participants deploy and set up their solutions in the chosen developing country but not designed to cover the full costs).
- Support in provision and initial installation of remote monitoring equipment.

Interviews with participants show that in practice, support went beyond this, for example alerting a participant to issues with the unit based on remote monitoring data and support with customs clearance paperwork.

Stage 2 participants were asked about the degree to which the support they received was sufficient, and what further support would have made them more successful. Six (of eight) participants interviewed praised the support received from the Prize Team, giving examples of help received e.g. the quality of the videos produced for winners. One (a winner) commented however, that while the support received during deployment was good, they felt there was insufficient follow-up, and two participants made no comments on solver support.<sup>20</sup> Two participants gave examples of solver support that they requested, but which the Prize Team was unable to provide, however both interviewees acknowledged that either the Prize Team tried (but was unsuccessful) or was not in a position to help (e.g. sourcing finance).

Participants had several suggestions for additional support that would have benefitted them during or after the prize including, for winners, certificates and an awards ceremony at which they could meet potential investors.

One participant, reflecting on their experience of Stage 1, and concerned at the barriers presented to innovators with limited experience of funding applications, recommended finding a simpler method of applying, that would be more appropriate for non-academics e.g. the submission of a video or a site visit to see a working prototype. Another participant suggested provision of technical advisors to help teams in late stage of prototyping and during deployment, e.g. with connections to local farmers. While this level of support may be beyond the scope of a prize model, the request highlights the combination of expertise and resources that may be required to drive innovation in this sector and the value of locating a prize within a broader programme of support.

From their experience of running the OGCCC, the Prize Team identified a need for future prizes to make available importation guidelines to support participants in deploying to a new country,<sup>21</sup> and for those guidelines to be approved at Ministry level. They also observed that a longer period for deployment could have helped more participants to be successful.

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<sup>20</sup> One of these was an interviewee who had to end the call before reaching questions on solver support.

<sup>21</sup> One external stakeholder cited two CLASP publications already produced for the LEIA programme: a shipping guide (for manufacturers and distributors of off-grid appliances) and a policy brief to advise governments on the importance of adopting voluntary standards.



## Section 6: Conclusions

The purpose of this review of the OGCCC was to focus on some key aspects of the prize (rather than cover all of the evaluation questions used for other Ideas to Impact prizes), the main one being whether the prize induced innovation among the participants. The review found that innovation largely took place during Stage 2 of the prize, when the 10 shortlisted organisations attempted to introduce their products to a new geographical market. We saw examples of participants adapting their products and business models in response to customer requirements and the realities of the environment into which they were introducing their cold storage units.

What did participants learn from taking part? The review found that Stage 2 participants, whether successful or not, in general, had their expectations confirmed about the challenges deployment to a new location presents. In addition, individual participants came away from the OGCCC having gained valuable market intelligence which they reported having plans to act on, in the future.

The aim of the prize was to identify, reward and promote the most appropriate technologies for off-grid cold storage and by raising awareness of them (and their associated business models), stimulate appropriate support from donors, investors and government. While Stage 1 of the prize recognised, rather than stimulated, innovation, Stage 2 of the prize succeeded in incentivising deployment of the shortlisted technologies and their associated business models, in new, challenging, contexts.

This suggests that prizes, in this kind of sector, can be best used to gather existing technologies and models (including those at late stage of development) from a diverse range of solvers, and identify those that show promise of stimulating the market, if follow-up support is available. In the case of the OGCCC, the ongoing financial support required to take ideas forward had to be identified by the participants themselves, although some assistance was given by the Prize Team where possible, through promoting participants to potential investors.

### Improvements for future prizes

A second round of the OGCCC could be made more effective and generate more value for the prize funder by lengthening the prize duration and providing more technical assistance and regulatory support to shortlisted organisations. Extending Stage 2 in particular, would give organisations more time to proceed with deployment (during which technical advice could be provided to support them in overcoming some of the challenges that this presents).

Prize design also needs to respond to the amount of time required for appropriate technology to be developed and to be proven to be commercially successful (and thus attractive to substantial investment). This implies a need to link the prize to a mechanism that helps promising technologies identified at Stage 1, and those that succeed in completing Stage 2, to be developed and supported further.

While the prize and this review have captured useful insights and market intelligence, there would be value in additional resources being put into follow-up evaluations of future prize winners and finalists to learn more about the opportunities and challenges of commercialising off-grid cold storage units in sub-Saharan markets.

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[https://www.ukcdr.org.uk/wpcontent/uploads/2017/11/UKCDS\\_Striking-the-Balance.pdf](https://www.ukcdr.org.uk/wpcontent/uploads/2017/11/UKCDS_Striking-the-Balance.pdf)

## Review annexes

### Annex 1: Summary of review methodology

The methods for the review were outlined in the internal Global LEAP Off-Grid Cold Chain Challenge Evaluation Methods Note, submitted to DFID, 8 July 2019. The Evaluation Team developed and refined the methods outlined in the methods note ahead of implementing the review, between December 2019 and February 2020. These changes and developments are indicated here, to provide an account of the methodology used in practice.

#### Review Scope

Based on consultation with DFID and the Prize Team, and the agreed focus for the review, a set of questions to guide data collection was developed and presented in Table 1 indicating the relationship to the Ideas to Impact PEQs. The priority questions are highlighted in the table, in **bold**.

Table 1: Set of refined questions for the review of the Global LEAP Off-Grid Cold Chain Challenge 2018/19

Programme Evaluation questions (PEQs)	Review questions (SEQs)
	<b>SEQ 1. How effective has the OGCCC been at identifying promising and verified technologies for cold storage in developing countries?</b>
<b>PEQ 1. How effective has the prize been at catalysing innovation on the focus problem?</b>	<b>SEQ 2. How effective has the OGCCC been at identifying innovative business models for SMEs to sustainably deploy cold storage for poor smallholders in developing countries?</b>
	<b>SEQ 3. To what extent did the prize inspire solvers (prize participants) to innovate at Stages 1 and 2?</b>
<b>PEQ 2. To what extent has the effect of the prize been sustained beyond the point of award?</b>	<p>SEQ 4. How effective have the post-award outreach and engagement activities been at:</p> <ul style="list-style-type: none"> <li>• Raising awareness of winning and shortlisted technologies?</li> <li>• Stimulating discussions about off-grid cold chains designed to support smallholder farmers in developing countries?</li> <li>• Attracting investment to Stage 1 and Stage 2 winners?</li> </ul>

Programme Evaluation questions (PEQs)	Review questions (SEQs)
	<p>SEQ 5. To what extent has the prize motivated solvers to continue working in the off-grid cold chain sector? e.g. Are Stage 2 winners planning to expand the rollout of new units in their selected country? Are participants planning to continue R&amp;D in off-grid cold chain technology?</p>
<p>PEQ 3. Does the prize offer value for money (VfM) when compared to alternative funding modalities?</p>	<p>While a VfM assessment was not undertaken for this prize, two questions explored the relationship between the prize and other interventions tackling the issue:</p> <p>SEQ 6. What value does the OGCCC offer compared to the broader system of complementary prizes and initiatives, including the Global LEAP Off-Grid Refrigerator Prize?</p> <p>SEQ 7. How did learning from the Global LEAP Off-Grid Refrigerator Competition (Round 1) influence prize design?</p>
<p>PEQ 4. Were there any unintended consequences of the prize and did they outweigh the benefits?</p>	<p>SEQ 8.1. Has the prize resulted in unintended consequences?</p> <p>SEQ 8.2. Did the negative consequences outweigh the benefits of the prize?</p>
<p><b>PEQ 5. Is solver support necessary for prizes to be successful?</b></p>	<p><b>SEQ 9. What has been learned about the challenges experienced by the participants in implementing their business models?</b></p> <p>SEQ 10.1. If solver support was delivered to the participants of Stage 2, how did it reduce barriers to improve solver ability to participate?</p> <p>SEQ 10.2. What solver support activities could have reduced barriers to improve solver ability to participate in the competition?</p>

## Review Methodology

This is a primarily qualitative study based on semi-structured interviews with Stage 2 participants, key informant interviews (KIs) and prize data and documentation (e.g. judges' scores, data submitted to the Prize Team by participants, etc.). As Table 2 illustrates, while the interviews for this review are small in total number (17), they cover a significant proportion of key informants for the main stakeholder groups (e.g. three of three prize winning organisations, four of six other winners of Stage 1 who proceeded to Stage 2, four of four Stage 2 judges, etc.). Key informants included industry stakeholders<sup>22</sup> not directly connected with the prize, to help contextualise the OGCCC within the broader sector. These interviews provided important insights about the effects of the OGCCC and the potential role of prizes. Wherever possible, findings are triangulated with multiple sources.

More details of the review methodology are available in Annex 3. At this point, three **limitations** are worth highlighting:

**Data availability:** Due to the nature of the review and the likelihood of the report being made public, some interviewees were cautious in how they answered questions and/or requested data to be excluded from the review, e.g. future business plans and partnerships.

**Review timing:** Plans for data collection and analysis were made on the assumption that Stage 2 would award in July 2019 and this report would need to be published and disseminated before the Ideas to Impact programme closed in March 2020. Stage 2 awarding was delayed to November 2019 and consequently the period for data collection was truncated. This limited the Evaluation Team's ability to interview some external stakeholders (based on their availability) and affected what could be investigated about the post-award effects of the prize, as data collection needed to happen sooner after award than planned.

**Key informant bias:** Four external organisations were approached for interview (as requested by DFID), to understand the relationship of the challenge to other interventions in the sector. Three of those approached were available for interview during the data collection period, but despite not being directly involved in the OGCCC, two of the organisations have connections to the Prize Team and/or the OGCCC participants. This bias also applies to some extent to the judges.

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<sup>22</sup> Interviews were held with staff from the Energy Saving Trust, DFID and the Global Cold Chain Alliance.

Table 2: Summary of interviews sought and obtained

Stakeholder	Total population	Sample
Prize Team organisations (CLASP, Energy 4 Impact and Blue Globe)	3	3
1st, 2nd, 3rd winners and Runner Up of Stage 2	4	4
Other participants of Stage 2	6	4 (one incomplete)
Judges of Stage 2	4	4
External experts/industry stakeholders	4	3

## Methods

### PEQ 1: How effective has the prize been at catalysing innovation on the focus problem?

Ideas to Impact prizes are described in terms of the effects they are trying to achieve. OGCCC has more than one intended effect, but the priority effect that the review focussed on was that of Point Solution; to what extent did OGCCC stimulate the development and implementation of innovative approaches to cold storage in developing countries (technology *and* business models) rather than recognise and reward existing innovations? The PEQ also looked at the extent to which the prize attracted new entrants and what participants of the prize process learned about implementation i.e. deployment and getting the equipment into productive use.

We define "**new entrants**" for this prize, as anyone deploying a unit in a new geographical location (country or region of a country) for the first time, including designers/manufacturers who attempted to build a unit for an off-grid area for the first time.

While the focus of the primary data collection was on the prize effect of Point Solution, the OGCCC Theory of Change (Annex 3) specified a second effect (Raise Awareness) and this is addressed in PEQ2.

**Data sources:** secondary data – prize reports on registrations, screening, awards made, and judges’ scoring and comments; primary data – semi-structured interviews by Skype/phone with Stage 2 participants (winners, finalists, those unable to deploy), Key Informant Interviews (KIIs) with the Prize Team and judges.

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

The awarding of the OGCCC in November 2019, in the context of the Ideas to Impact programme closing in March 2020, meant that this review was only able to look at the effect the prize had up to the awards being made (and very shortly afterwards); there would not be time to investigate, for example, whether the publicity of the Stage 2 awards (the effect of Raise Awareness) led to investment in the winning solutions in subsequent months.

However, feedback from the Prize Team suggested that we might find evidence already of investment in some of the Stage 1 winning solutions as a result of the prize, regardless of whether they were involved in Stage 2. The review also focussed on whether the effect of Point Solution was likely to continue beyond the awarding of the prizes i.e. had Stage 2 participants learned through participating and were they likely to apply those insights to future innovation?

**Data sources:** secondary data – OGCCC Communications Strategy monitoring data including records kept of requests by off-grid cold chain stakeholders for CLASP to share learning with them on the prize; Online research into uptake of prize communication products. Primary data – KIs with Prize Team and external stakeholders, and semi-structured interviews with Stage 2 participants (including winners).

## PEQ 3: Does the prize offer value for money (VfM) when compared to alternative funding modalities?

Through consultation on the methods note, it was agreed that VfM analysis and external comparisons were not necessary for this prize. Instead, there was interest in teasing out how the prize fits with and adds value to the broader system of other interventions, including the Shell Foundation and Low Energy Inclusive Appliances (LEIA).

**Data sources:** secondary data – Global LEAP Off-Grid Refrigerator Competition Follow-up Review Report; Primary data - KIs with Prize Team, judges and external stakeholders.

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

Although this was identified during consultation to be a low priority question, it was anticipated that interviews with Stage 2 participants would help us to identify the challenges the solvers faced in implementing their business models and that checking these with the experience of the Prize Team, judges and others working in the sector, would generate useful learning for the sector, and for future prize design.

**Data sources:** primary data – KIs with Stage 2 prize participants, Prize Team, judges and external stakeholders.

## 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. At the outset, the Prize Team did not expect to be providing solver support beyond the cash prize for shortlisted solutions at the end of Stage 1 (which was intended to help participants deploy and set up their solutions in the chosen developing country but not designed to cover the full costs). As the prize progressed, they changed their approach in response to barriers experienced by Stage 2 participants.

We have prioritised other questions over this one for the OGCCC, but included a question in interviews with Stage 2 participants to investigate the degree to which the support they received was sufficient, and what more would have been appreciated for them to be more successful.

**Data sources:** primary data – KII with Prize Team, semi-structured interviews with Stage 2 participants.

### Data collection, analysis and reporting

This review was largely focussed on semi-structured interviews with Stage 2 participants, followed by KIIs with the Prize Team, judges and external stakeholders designed to verify the data and fill any gaps needed to answer the review questions. Where possible we looked to triangulate across respondents (comparing the CLASP perspective with that of the winners, for example).

- **Key Informant Interviews:** We interviewed members of the Prize Team (CLASP, Energy 4 Impact and Blue Globe) who were involved in managing or designing the competition, and the judges of Stage 2. We also reached out to several industry contacts as suggested by DFID and from online research to gain an external perspective on issues raised during interviews with the Prize Team and prize participants. We used 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 10 organisations represented by the participants of Stage 2 (the winners of Stage 1) to take part in interviews. A list of questions included in interviews with Stage 2 participants is appended to this annex.

### 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 in most cases by sending the notes to respondents to check they had been correctly interpreted.

Due to the anticipated small number of interviews, we used a standard structure for interviews with the Stage 2 participants and judges; this formed the basis for organising data in an Excel spreadsheet before coding further with any emerging themes. Interviews with other stakeholders (Prize Team, industry experts) were looser in structure, designed to explore themes emerging from



interviews with Stage 2 participants. These were analysed through annotating interview transcripts and notes and brought into the spreadsheet where appropriate.

## Questions for inclusion in interviews with Stage 2 participants

**Q1.1 The product that you nominated during stage 1 of the competition was one of 10 winners selected to go to Stage 2. At stage 1, was your product already established as a working business model or was it still just a prototype at this point?**

Did you have to develop either the technology or the business model in any way before you nominated it for stage 1?

If yes, what changes did you have to make? Why did you have to make these changes?

When you proceeded into stage 2, did you have to make any further changes to either the technology or the business model?

If yes, what changes did you make? Why?

What do you think you learned from this period of development?

**Q1.2 You were one of the 10 winners selected to move from stage 1 to stage 2. Did you move on to Stage 2?**

Were you able to deploy your product to a new site?

If no, why not?

**Q1.3 If you did deploy your product, how successful were you in setting up and running your product?**

What problems did you encounter?

How able were you to deal with these problems?

What do you think you and your team learned from the deployment process?

Has your learning and experience led to any changes in the way in which you do things as an organisation?

If yes, what? What?

Are there any additional changes you plan to make in the future with your new learning and experience?

**Q1.4 If you were successful in getting your unit deployed and field tested,**

Do you feel you learned anything new from the field testing?

If yes, what?

If no, why not?

How useful do you think the field data generated has been to you and your team?

Have you applied this learning? What have you done with this knowledge?

Has this learning influenced your product design? Distribution? Pricing? Promotion? New produce design?

Do you think this new knowledge will lead to any further changes in the future?

If you do not think the field data was useful, what would have improved it? What data would have been more beneficial to you?

**Q1.5 What future plans do you have for the cold chain solution you took forward to Stage 2?**

Do you plan to make any further changes to the product's development?

What changes?

Why these changes?

When do you think you will make these changes?

What further changes do you plan to make to its deployment?

New areas of deployment?

Why these changes?

When do you think you will make this new deployment?

**Q2.1 Since you won stage 1|2 – have you attracted any new investment for your product?**

If yes, where has the investment come from?

If yes, how influential do you think winning the prize was on obtaining that investment

**Q2.2 Since you won, have you developed any new partnerships?**

If yes, with who? What sort of organisation?

If yes, how influential do you think winning the prize was on securing that partnership?

Are there any other potential future partnerships that you think might occur because of your involvement in the prize?

**Q2.3 Have you developed any other useful new contacts as a result of your involvement in the prize and your raised profile?**

Who?

What value do these contacts have to you?

**Q3.1 What support did the prize team offer you and your team during stage 2?**

What types of support did the prize team offer you during the competition?

How valuable do you think this support was to you whilst you took part in the competition?

Did you request any additional support from the prize team during the competition?

What?

Why?

Did you request any additional support from other places outside of the prize team during the prize?

What?

Why?

Is there any additional support that you think the prize team could have offered participants that you think would have been of value to participating teams?

What?

Why of value?

**Q4.1 Following your experience of the OGCCC, would you consider entering another innovation prize in the future?**

a) Yes? Why?

b) No? Why?

**Q4.2. If you did decide to enter another prize, what aspects of the design would encourage you to take part? What would your priorities be?**

Would anything discourage you to take part?

**Q5.1 We are interested in any positive or negative impacts to participants or their products from having participated in the OGCCC.**

Do you consider there to have been any key benefits that you have not already mentioned?

Yes? What?

Do you consider there to have been any negative impacts that you have not already mentioned?

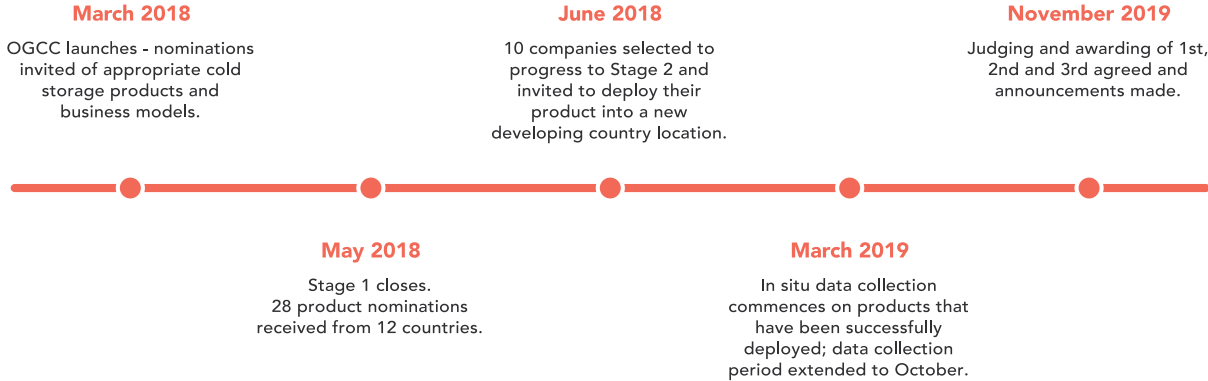
Yes? What?

**Q5.2. We are interested in hearing participants views on what they think the effects have been on themselves and their organisations of being involved in the OGCCC. Is there anything else you would like to tell us that you do not think we have had the opportunity to discuss already?**

# Annex 2: Changes made to the OGCCC prize timeline

By May 2019, field test data (technical and business performance) was being collected on the three products that had successfully been deployed and put into productive business use. In July 2019, a fourth Stage 2 participant was able to complete installation of their product in the test country and the decision was taken to delay judging of Stage 2 to enable field test data to be collected on this participant's entry. Judging and awarding was consequently delayed to November 2019 and the post-award activities completed by end of December 2019. Figure 1 summarises the prize timeline.

Figure 1: OGCCC timeline



## **Annex 3: 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 4: OGCCC Theory of Change (from Off-grid Cold Chain Challenge Concept Note v5)

### Central hypothesis of The Prize

The Challenge aims to identify, reward and promote the most appropriate technologies for off-grid cold storage. We hope that greater transparency around these technologies and their associated business models will stimulate appropriate support from donors, investors and government.

NB: During consultation on the approach to the review, it was noted that the theory of change should be amended to capture the expectations of Stage 2 of the prize, i.e. that the prize would identify business models verified as appropriate for deployment to developing countries, as part of the verification of the shortlisted technologies. These amendments are **highlighted** below.

Prize Stage	Level	Description	IF ->THEN	Assumptions, Enablers and Constraints	Means of Verification
<b>Problem statement</b>	Problem	Lack of affordable off-grid cold storage solutions in dairy/fruit/vegetable farms in developing countries, leads to food waste, low productivity and the inability to access larger markets. Commercially sustainable cold chain would allow farmers to diversify production to include high-value perishable crops, link them to regional and international markets, and increase earnings.	IF a financial prize mechanism is designed and offered THEN this will identify promising cold storage and lay out a road map for further adoption.	Lack of awareness of appropriate technologies for specific value chains can lead to unsuccessful pilots and the misallocation on funding.  Fragmented cold chains limit the ability of cold storage to scale in isolation. Solutions must be multisectoral, involve multiple actors, and be introduced in an enabling policy environment.  Ongoing programmes that are looking at reshaping value chains to enable better access to international markets e.g. Yieldwise by Rockefeller, Powering Agriculture (USAID) etc.	Established through detailed design research A review of information shared by sector and experts in agricultural value chains and cold chains.
<b>Prize design</b>	Inputs	Prize design and resource mobilisation	IF the overall team is assembled and the prize is designed THEN → Output 1	Sufficient resources are deployed to ensure the robust and timely design of the prize. The prize is designed to address all aspects of the prize problem statement. The prize design draws on lessons from other I2I prize experiences to date.	Prize design overview document Judging Criteria Application nomination forms Stakeholder and sector specialist consultations
<b>Prize Launch (Q1 2018)</b>	Output 1	The prize is launched and communicated	IF information about the Prize reaches as many cold storage manufacturers,	The messages and media used to communicate about the prize reach the intended audiences.	Monitoring data from the prize platform supplied by CLASP.

			research institutions, SMEs as possible THEN → Output 2 and Outcome 2	Greater awareness will lead to higher quality nominations. CLASP (through their monitoring data) provide sufficient and timely information and feedback for the design team to understand the effectiveness of the communications activities and adapt these accordingly.	Communications monitoring information (number of entrants registered and Google analytics on where/how much/how people are using the website)
<b>Nomination period (Q2 2018)</b>	Output 2	Participants apply for the prize and submit products <b>with associated business models</b> that meet the eligibility criteria and pass the screening criteria.	IF applicants submit eligible concepts that pass the screening criteria THEN → Outcome 1 and Outcome 2	<p>Cold storage manufacturers, research institutions, SMEs from around the world know about the prize in time to apply.</p> <p>The prize attracts new entrepreneurs and those who have not worked on a DFID related programme before.</p> <p>Products meet the eligibility criteria for the prize.</p> <p>The prize generates “unexpected” or “out-of-the-box” solutions.</p> <p>The prize value max (US\$250,000) and any other perceived benefits (e.g. independent verification and ranking against competition) are appropriate to attract a sufficient number of quality nominations.</p> <p>The prize application content and process is accessible and of sufficient duration for interested parties to apply</p> <p>One-on-one follow up by CLASP to target audience takes place.</p>	<p>Monitoring of prize applicant profiles</p> <p>Monitoring of number of registrations</p> <p>Log of Q&amp;A between applicants and prize team</p> <p>Communications monitoring info (as above)</p> <p>Numbers and ratio of applications to those meeting eligibility criteria</p> <p>Feedback from applicants on advice available to them.</p>



<p><b>End of Nomination period (Q3 2018)</b></p>	<p>Outcome 1</p>	<p>The most promising technologies for cold storage are identified and shortlisted for in-situ verification (10).</p>	<p>IF a number of appropriate technologies (and their business models) can be shortlisted for verification THEN → Output 3.</p>	<p>Existing technologies are adaptable and applicable to the specific requirements of value chains in developing countries. Product manufacturers have an appetite to be involved in developing country cold chains. Entrepreneurs have a sufficient understanding of the challenge context presented to them.</p>	<p>Number of applications that pass the eligibility criteria and initial screening criteria (for completeness and clarity) and are sent on to verification.</p>
<p><b>Throughout the prize implementation (Q1-2018 to end of I2I programme)</b></p>	<p>Outcome 2</p>	<p>Awareness of the technology targets for off-grid cold storage in developing countries increases amongst technology manufacturers, SMEs, investors who are not familiar with the problems.</p> <p>[I2I prize effect: Raise Awareness]</p>	<p>IF the media buzz created by the prize reaches the target groups THEN their awareness, perceptions and behaviour towards off grid cold chain technology in developing countries will change and → Impact 2</p>	<p>The messages and media used to communicate about the prize reach the intended audiences.</p> <p>Technology manufacturers, SMEs investors that had a lack of awareness and understanding of the technology benchmarks for off grid cold chain technology in dairy and FFV value chains in developing countries are reached.</p> <p>A lack of awareness and understanding technology benchmarks for off grid cold chain technology in dairy and FFV value chains in developing countries is affecting manufacturers desire to enter into this market with potential technological solutions and retarding progress in identifying workable solutions.</p>	<p>Perceptions survey of key stakeholders at key points in the prize process</p>

<b>Prize Verification (Q3 2018 to Q1 2019)</b>	Output 3	Shortlisted products <b>and their business models</b> are verified in the field, classified and ranked against products in the same category (Target = 10)  [I2I prize effect: Point Solution]	IF shortlisted products <b>and their business models</b> are verified, classified and ranked & IF products meet the judging criteria <b>(including being appropriate for deployment to developing countries)</b> THEN → Output 4 and Outcome 2.	The prize is able to attract a credible verification/judging panel drawn from recognised industry leaders, representative from ongoing programmes with potential for additionality.  Judges/verifiers with sufficient time, expertise and no conflicts of interest can be found and consistently interpret the judging criteria to make an award. There is sufficient time and budget to verify all shortlisted products.	Number of applications that pass the eligibility criteria and initial screening criteria (for completeness and clarity). Judge panel profile Report from verifiers Report from judges
<b>Prizes awarding (Q2 2019)</b>	Output 4	Prizes are awarded to the technologies <b>for cold storage (and their associated business models)</b> that best meet the target requirements in their classification <b>and have been verified as appropriate for deployment to developing countries.</b>  (Target = 6). [I2I prize effect: Point Solution] [direct I2I beneficiaries]	IF successful candidates are awarded the prizes at a live event THEN → Output 5 and Outcome 2 and Outcome 3	Output 3 assumptions also apply.	Prize winner profile Catalogue of all verified solutions including their technical specs and rankings.
<b>(Ongoing throughout Prize)</b>	Output 5	Any emerging innovations and learning captured is shared with SMEs, on-going programmes, sector experts, investors and	IF learning and innovation from the prize is shared with key sector, financial	Prize team has resources to capture and share relevant learning and innovations.	Communications and dissemination activities reports e.g.

		innovators, donors, governments and NGOs.	and political stakeholders THEN → Outcome 2 and Outcome 3.	Credible, influential Intermediaries are willing to participate in dissemination activities	conferences presented at, etc.
<b>Beyond prize award</b>	Outcome 3	<p>Growth and scale-up is measured through the adoption and deployment of technologies through attraction of investment towards the prize winners and non-winning ideas, (existing &amp; new companies, communities and contexts). SMEs, on-going programmes, sector experts, investors and innovators, donors, governments and NGOs not involved in the prize express interest in, engage and deploy identified technology solutions.</p> <p>[Target: 70% of winners get additional investment, post award, to enable a new deployment.]</p> <p>[Indirect I2I beneficiaries]</p>	IF other SMEs, on-going programmes, sector experts, investors and innovators, donors, governments and NGO's engage with and deploy technology solutions identified by the prize THEN → Impact 1	<p>Prize winners and shortlisted products continue to gain coverage and attention.</p> <p>The prize is a recognised and respected initiative.</p> <p>Prize delivers legitimacy for verified products; Participating in the prize and being judged by industry experts (our judges) brings a level of confidence in the shortlisted products.</p> <p>Audiences are interested in the prize and its outputs and engaging with the products manufacturers identified. Prize team actively promotes effective solutions to potential implementers. Policy/regulatory environment supports solutions and development on cold chains.</p> <p>An RBF or similar enabling programme is set up or pick up technologies identified to stimulate adoption.</p>	<p>Post programme perceptions survey with key stakeholders</p> <p>Review of events and key literature for references to implementations of products from the prize</p> <p>Informal discussions with key stakeholders.</p>

<b>Beyond prize award</b>	Impact 1	Improvement in livelihoods of small entrepreneurs (e.g. dairy farmers, subsistence farmers, market retailers), through increased productivity, reduced produce loss, and greater market access		Other links in the cold chain are maintained/developed Increased affordability Required infrastructure is available and maintained e.g. roads to market, facilities for processing of excess produce	Additional income and livelihood indicators for target beneficiaries (e.g. access to services, access to energy, health, and time savings)
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