



# **Evidence Review – Environmental Innovation Prizes for Development**

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## **Disclaimer**

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## SUMMARY

This paper assesses the evidence underlying the effectiveness and value for money of innovation prizes, and seeks to address two fundamental questions:

- a. Do prizes work - are they effective in stimulating innovation?
- b. Are prizes better than other methods to achieve the same purpose (value for money)?

An independent perspective on the strength of evidence surrounding the impact of 16 key innovation prizes has been combined to learn lessons, which can help shape potential future investments in this area. By gathering evidence from a broad range of prizes, grouped into four main prize types, this research has found that:

- a. Prizes do work - they can be effective in stimulating innovation in appropriate circumstances if undertaken within the right environment and appropriately designed;
- b. While it is possible to illustrate returns on investment (RoI) in hard numbers (e.g. benefit cost ratios spanning 2:1 to 33:1 for innovation awards; 50-80% cost reductions and RoI up to 182% from open innovation prizes; benefit costs ratios around 8:1 to 16:1 for market stimulation (grand) prizes) the approaches used to estimate longer term benefits, beyond just leveraged investment, are highly dependent on the nature of the prize. Whether or not the prize approach represents better value for money than alternatives, is more difficult to assess due to a lack of data in the prize market and because few have measured the RoI of other traditional methods. However, while the optimal level of investment in prizes is not clear, it is likely to be much larger than at present and the potential payoffs of adding these new mechanisms to a toolkit for encouraging innovation are considerable.

Prizes exist along the Innovation Chain from ideas to invention to commercialisation and adoption, with the majority of current challenges operating at the beginning of the chain around ideas and invention. Grouping prizes along the Innovation Chain we find:

**Innovation Awards**, prizes typically awarded for best new start up business ideas<sup>2</sup>, are effective at:

- ✓ Generating Media Buzz for promoters and applicants
- ✓ Identifying new and diverse problems solvers and innovators
- ✓ Leveraging inward investment
- ✓ Getting funds quickly and easily to small start up companies
- ! Integration of the awards into broader programmes of support can strengthen the potential to achieve tangible results

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<sup>2</sup> The term "business ideas" can relate to technologies that are already well advanced but are commercially still at start-up or Small and Medium Sized Enterprise (SME) phase.

**Open Innovation**, the process of posting a specific problem to a wide audience, taking advantage of a large pool of potential problem solvers, indicates:

- ✓ A potential positive return on investment compared to grant funding
- ✓ A good rate of problem resolution
- ✓ The effective identification of new and diverse solvers
- ! There is no evidence to suggest any link between the solution and the widespread use and adoption of the technology

**Social Challenges**, designed to engage with and benefit communities and typically rewarding the achievement of tangible results, can:

- ✓ Attract new participants
- ✓ Generate creative, ambitious and innovative ideas
- ✓ Provide flexibility for communities to respond to challenges
- ✓ Leverage other support to community issues
- ✓ Incentivise mass behavioural change
- ✓ Benefit the most marginalised communities
- ✓ Be very popular with communities
- ! Work better when supported by other initiatives
- ! Present challenges in relation to monitoring and verification

**Market Stimulation Prizes**, also known as Grand Innovation Awards, are typically large<sup>3</sup> purse prizes intended to change the way we live, stimulating activity along the innovation chain and having considerable impact. These prizes are demonstrated to be effective at achieving:

- ✓ Significant Promotional Value “media buzz”
- ✓ Significant leverage of research and development funding
- ✓ Post prize leverage of commercial activity
- ✓ Identification of solutions from unexpected sources
- ! The external environment is critical a broad package of support may be appropriate
- ! The time frame is also critical

In all four prize types it was found that additional support in the form of establishment of appropriate regulation and policies, grants and other types of funding, technical assistance, and networking and promotion can have a considerable impact on the ultimate effectiveness and value for money of the prize process.

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<sup>3</sup> Typically greater than \$1Million

Whether prizes are better than other methods employed to achieve the same purpose is less clear, though prizes often have a distinct set of attributes not present in other modalities, giving them a niche role to play, and indicating that while some can be used effectively on their own, they may be used to best advantage when included within broader platforms of support. Prizes can be used to help address market failures associated with environmental and social goods, and in the developing world; however the need for additional support to the prize process is particularly evident in these scenarios.

Consideration of the external environment and in particular the value chain, are vital to ensure a thorough understanding of the influences at play on the prize process. In particular one needs to consider the ability to innovate, the ability to pay [for new technology], the operational capacity of the public sector and the forces at play in the commercial market (infrastructure, credit, regulation, stability etc.), all of which have significant impacts on the up take of new technologies or innovative processes.

Evidence of the effectiveness of prizes to spur innovation at the idea and invention end of the Innovation Chain is clear. There is still much to learn about the potential of prize processes and other incentive mechanisms at the results end of the Innovation Chain, where the potential to have a dramatic impact on the uptake and application of technology advancement seems highly possible.

Summaries of the benefits and costs of the following case studies prizes are included in the Case Studies Annex:

**Innovation Awards:**

Changemakers  
NHS Innovation Challenges  
Shell Springboard  
Global Security Challenge  
Ashden Awards

**Open Innovation**

InnoCentive and NineSigma  
Rockefeller / InnoCentive Initiatives

**Social Prizes**

NESTA's Big Green Challenge  
The Nirmal Gram Pursakar

**Market Stimulation Prizes**

The Ansari X Prize  
The Orteig Prize  
The Longitude Prize  
The Saltire Prize  
The Grainger Prize  
The Super Efficient Refrigerator Programme (SERP)  
The China Energy Efficient Refrigerator Programme





## INTRODUCTION

The total funds available for prizes have more than tripled over the last decade to an estimated 1-2 billion<sup>4</sup> dollars and the sector continues to grow fast, with more than 60 new prizes of more than \$100,000 having debuted since 2000. Innovation prizes have been used for centuries to encourage innovation; one of the most famous early inducements prizes was the “Longitude Prize” of 1714 awarded to a watch maker who found a way for ships to identify their longitude not by the stars as expected, but by measuring time. This highly successful prize was followed by many others, including Napoleon Bonaparte’s 1800 food preservation prize which resulted in the advent of canning as we know it, and the Orteig Prize in the 1920s which Charles Lindberg won by flying from New York to Paris in 1927.

There is a ground swell of opinion that prizes can be of great benefit to society today, though very little empirical evidence.<sup>5</sup> In this paper we consider the broad benefits and drawbacks of innovation prizes presented in the prize literature, and present the findings of a number of case studies selected across the prize landscape, identifying and drawing together the existing evidence base. In

**An Innovation Prize**  
Is something offered or won for renewing, advancing or changing the way things are done. An innovation prize could be awarded or offered at any point along the Innovation Chain from first raw ideas to the achievement of tangible results.

particular we analyse innovation prizes’ potential *effectiveness*<sup>6</sup> and *value for money*<sup>7</sup> as a tool to encourage innovation in environmental technologies for development. The paper addresses questions around spill-over benefits, lessons learnt, common assumptions and mistakes, and identifies any differences in incentives and motivations in different parts of the world<sup>8</sup>.

The research has its limitations; there is very little empirical data available, prize promoters have rarely evaluated the performance of prizes or have used different or undefined criteria to do so. Obtaining data from the commercial sector is particularly difficult. This paper examines a number of

<sup>4</sup> Mckinsey (2008) “And the winner is.....”

<sup>5</sup> As far as we are aware the only empirical study on large incentive prizes is the Lakhani Study dated 2006, this has recently been followed up by a thesis presented by Campbell (June 2011). Harvard Business School have also compared awards for inventiveness offered by the Royal Agricultural Society of England from 1839 to 1939 with patents.

<sup>6</sup> Effectiveness is a measure of the degree to which objectives are achieved and the extent to which targeted problems are resolved; it is the relationship between inputs and outcomes.

<sup>7</sup> Value for Money is about, “*obtaining the maximum benefit over time with the resources available. It is about achieving the right local balance between economy, efficiency and effectiveness, or, spending less, spending well and spending wisely to achieve local priorities...VFM is high when there is an optimum balance between all three elements, when costs are relatively low, productivity is high and successful outcomes have been achieved*”. Taken from the Audit Commission, and follows the same 3Es (economy, efficiency, effectiveness) framework employed by the National Audit Office.

<sup>8</sup> This paper is in response to Terms of Reference provided by DFID.

selected<sup>9</sup> case studies to draw out the extent to which the benefits documented in the prize literature are achieved. We ask two fundamental questions:

- Are prizes good (effective) at stimulating innovation?
- Are prizes better than other methods employed to achieve the same purpose (value for money)?

Evidence has been collected from each of the Case Studies, principally from informant interview<sup>10</sup>, and also from available reports and other media (presentations, articles, websites etc.). Interviews were held with the prize promoters and, where necessary and possible, prize applicants and winners. Much of the evidence presented is qualitative and in some cases the quantitative data is from interviewee recall. A full list of interviewees is provided at the end of the paper. Questions focus on a number of key areas:

To prize promoters:

- What were the intended and actual benefits of the prize process
- What were the costs of running the prize process

To prize promoters and applicants alike:

- How did the prize process compare to grants or other modalities used to achieve the same or similar aims
- What motivates applicants to apply, would they apply again
- What happens after participating in the prize
- What are the spin off costs and benefits of the prize
- What external factors impact on the effectiveness of the prize process
- What were the risks and lessons learnt

## Defining an Innovation Prize

**Innovation** is the renewing, advancing or changing the way things are done. An innovation can refer to a particular activity or a set of activities, anywhere along the innovation chain represented in Figure 1, from the development of an idea to the point at which the idea enters into practice.

**Figure 1: Innovation Chain**



<sup>9</sup> At least two case studies from each prize type were selected, based on their relevance to low carbon technology for the developing world, and availability of data.

<sup>10</sup> A list of interviewees is provided in Annex 1.

## INTRODUCTION

An innovation is not necessarily a technical solution; it could be a new process, a change in behaviour or approach, or new ways of working with others. The majority of prizes focus on technical innovation and exist at the idea and invention end of the innovation chain, with few examples of prizes focussed on the results end. Donors are increasingly concerned about being able to demonstrate results and there is growing interest in Results Based Financing (RBF)<sup>11</sup>. RBF includes approaches to contracting a service provider based on results and incentivising and rewarding beneficiaries for changes in behaviour. The approaches may be used independently or in tandem, and include voucher schemes, cash transfers and output based contracts<sup>12</sup>. Prizes at the results end of the spectrum fall within this definition and this paper pays particular attention to the relationship between the case study prize and the attainment of tangible results, defined as the wide scale adoption and use of the innovation.

Prize processes operate in very different contexts between developed and developing world markets. Differences that could impact on the prize process include the ability to innovate, the ability to pay [for new technology], the operational capacity of the public sector and the forces at play in the commercial market (infrastructure, credit, regulation, stability etc.). These all have significant impacts on the uptake of new technologies or innovative processes. This paper therefore pays particular attention to the context and environment in which the prizes operate and the influence they have on the ultimate uptake of new innovations.

There are several typologies and prize definitions in the literature<sup>13</sup>, the simplest distinction between prizes is that made between Recognition and Inducement; the former being prizes that are awarded “ex-post” after the fact and in recognition of a specific or general achievement, for example the Nobel Peace Prize or the Man Booker Prize. The latter, Inducement Prizes, are established “ex-ante”, by defining award criteria in advance in order to spur innovation towards a pre-defined goal. This paper focuses on ex-ante or Inducement Prizes. Within Inducement Prizes it is problematic to bind different prizes to a specific type because the distinction between prizes is at best blurred and any one prize may have multiple intentions (stimulating the market, resolving a technical problem, generating media and public relations (PR) value, finding new innovators, changing behaviours, building networks etc). In order to avoid being trapped by prize distinctions we have broken our research into four loosely defined prize types that encompass the range of prize definitions put forward by McKinsey and others:

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<sup>11</sup> Pearson 2011, HLSP Institute Results based aid and results based financing: what are they? Have they delivered results?

<sup>12</sup> We apply the DFID definitions of RBA and RBF in this paper

<sup>13</sup> Morgan 2009, Masters 2008, Mckinsey 2009

- **Innovation Awards**<sup>14</sup> – Prizes typically awarded for best new start up business ideas<sup>15</sup>. Here we draw evidence from Shell Springboard and the Ashden Awards (both philanthropically funded), the Global Security Challenge and National Health Services Challenges (both Public Sector prizes). We also consider an alternative scheme to the prize approach, looking at the Carbon Trust’s Entrepreneur Fast Track - drawing out the distinctions and differences.
- **Open Innovation** – the process of posting a specific problem to a wide audience, taking advantage of a large pool of potential problem solvers. Here we consider a range of challenges run through the open innovation platform, InnoCentive, looking at both commercial and philanthropic challenges, and touch on the work of NineSigma.
- **Social Challenges** – design to engage with and benefit communities. We look at two public sector community engagement prizes, the Big Green Challenge run in the UK and the Nirmal Gram Pursakar in India.
- **Market Stimulation**, also known as Grand Innovation, these large<sup>16</sup> purse prizes are intended to change the way we live, stimulating innovations that impact on everyone. We consider the well documented X PRIZE challenges, the Grainger Prize and the on-going Saltire Prize, and lead in to **Market Transformation Programmes** both in the US and China.

Details on each of the case studies are presented in a Case Study Annex to this paper.

### The Cited Advantages and Disadvantages of Innovation Prizes

A number of papers<sup>17</sup> discuss in some detail the advantages and disadvantages of prizes versus grants and patents and come to the conclusion that [some] funds should be diverted to the creation of technology innovation prizes. A number of reasons are given by Adler (2010)<sup>18</sup>: he states first that currently decisions about which project to fund are centralised, limiting the range of promising ventures that may receive funding and increasing the risk that research funding will not result in useful technological innovations. Second, with ex ante grants, the funder pays up front for research and development (R&D) whether or not the R&D produces anything of value in return. Allocating grant money effectively requires the grant-making entity to pick “winners” and “losers” in advance, which they may not be best placed to do.

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<sup>14</sup> Also known as Exposition Awards by McKinsey

<sup>15</sup> The term “business ideas” can relate to technologies that are already well advanced but are commercially still at start-up or Small and Medium Sized Enterprise (SME) phase.

<sup>16</sup> Typically > \$1Million

<sup>17</sup> Brunt, Lerner, Nichols ( 2008), Adler (2010 ), Wright (1983), Kalil (2006), Kremer (2009), Davis (2004) Newell and Wilson (2005), The Case Foundation (2010), Kay 2010.

<sup>18</sup> Jonathan H. Adler (2010) EYES ON A CLIMATE PRIZE: Rewarding Energy Innovation to Achieve Climate Stabilization.

In relation to patents or Intellectual Property Rights (IPR), prizes provide a similar reward structure without establishing monopoly rights over the invention<sup>19</sup>, depending on the prize construct<sup>20</sup>. Patents can often be a difficult hurdle for small inventors tinkering in their garage; a prize process can help lower this hurdle. While much of the relevant academic literature discusses prizes as a potential substitute for patent protection, the two need not be mutually exclusive.

Some scholars have pointed out that prizes can induce technological innovation in research areas connected with the provision of public goods, suggesting prizes could help with environmental technologies (Newell and Wilson)<sup>21</sup>, vaccine development (Kremer)<sup>22</sup> and agricultural development (Masters)<sup>23</sup>.

Counter arguments against prizes include the potentially significant drawback that researchers must obtain funding for their research in order to compete and prizes may lead to duplication of effort, more so than with government grants.

Beyond the comparison with grants and patents, prizes have a number of well documented though not empirically supported benefits; these are listed in the box below. The open nature of prizes not only lever diverse resources but can help to bring together rational and creative minds, often polarised within and between organisations.

#### Assigning Value to Prizes

When assigning value to innovation it is difficult to account for benefits into the future as one does not know what it holds or what other innovations may occur. Value can only be considered based on cost avoidance (i.e. how much it would have cost to achieve the same output or outcome in a different way). An example that demonstrates this is a recent technology developed in the form of a badge that assesses how much radiation a person has been subjected to. An evaluation done last year in 2010 would possibly have attributed little value to it, this year after the Japanese earthquake that resulted in national nuclear radiation uncertainty, the badge has been in high demand and provides incalculable value in terms of letting people know they are safe - it is known as the "I'm okay badge".

There is nothing to say that the development of a technology will lead to its ultimate commercialisation and use (Davis, 2004; Kieff, 2001); this is particularly the case for social goods with a high social and low commercial value, environmental goods such as low carbon technologies where the benefits of CO<sub>2</sub> savings, for example, are not reflected in the market price, and in the developing world where market imperfections and barriers to entry can restrict the wide scale application of new technologies. These barriers can prevent the movement of innovations along the chain from raw idea to tangible results. Recognising this is important and we therefore highlight the position of the prize along the innovation chain and its relation to tangible benefits throughout this paper.

<sup>19</sup> Brian D. Wright, 1983 *The Economics of Innovation incentives: Patents, Prizes, and Research Contracts*, 73 AMER.ECON. REV. 691; David (2004) How effective are prizes as incentives to Innovation.

<sup>20</sup> Some prizes require the transfer of IP rights, others not.

<sup>21</sup> Newell and Wilson 2005 "Technology Prizes for Climate Change Mitigation"

<sup>22</sup> Kremer 2009 "Incentivising Innovation; Adding to the toolkit" Harvard University, Brookings Institute

<sup>23</sup> Masters and Delbecq (2008) Accelerating Innovation with Prize Rewards

In summary, using prizes and challenges have a number of benefits: <sup>24</sup>

#### The Benefits of Prizes

- ✓ Can establish an important goal without having to choose the approach or the team that is most likely to succeed
- ✓ Allow sponsors to pay only for results
- ✓ Can highlight excellence in a particular domain of human endeavour to motivate, inspire, and guide others
- ✓ Can increase the number and diversity of the individuals, organisations, and teams that are addressing a particular problem or challenge of national or international significance
- ✓ Can improve the skills of the participants in the competition and create communities of practices and solver networks
- ✓ Can stimulate private sector investment that is many times greater than the cash value of the prize
- ✓ Can attract more interest and attention to a defined programme, activity, or issue of concern
- ✓ Can capture the public imagination and change the public's perception of what is possible
- ✓ Can showcase multiple approaches to the resolution of a problem

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<sup>24</sup> The Case Foundation Conference Report 2010 "Promoting Innovation: Prizes, Challenges and Open Grantmaking".



## INNOVATION AWARDS

Innovation Awards are designed to highlight promising ideas, identify excellence and mobilise capital. Here we present the findings of the Shell Springboard, the Global Security Challenge (GSC) and the Ashden Awards, supported by evidence from the NHS Challenges and Changemakers open innovation platform; all are detailed in the Case Study Annex. In these cases the prizes are not intended to induce new technology; they identify and then provide a promotional and financial boost to existing ideas and innovations with the aim of stimulating the market by helping winners (SMEs and start ups and Non Governmental Organisations (NGOs)) secure investment funding and develop their work or businesses. The Ashden Awards are the odd one out here in that they are Recognition Awards that reward the application of low carbon technology, rather than new ideas and invention. They are included as they demonstrate a similar set of benefits to the prize promoter.

The case studies demonstrate that Innovation Awards are effective at:

- ✓ Generating Media Buzz for promoters and applicants
- ✓ Identifying new and diverse applicants
- ✓ Leveraging investment
- ✓ Getting funds quickly and easily to small start up companies
- ! Integration of the awards into broader programmes can strengthen the potential to achieve tangible results

### Benefits of Innovation Awards from the promoter’s perspective

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>• Diversity of applicants</li> <li>• Identifying new future partners</li> <li>• Improved quality of submissions over time*</li> </ul>	<ul style="list-style-type: none"> <li>• Leverage of investment funds</li> <li>• Media Buzz</li> <li>• Preferential pricing for new technologies*</li> <li>• Social and environmental benefits</li> </ul>

*\*advantages specific to the GSC*

**Generating Media Buzz:** In the first month after the 2011 awards of the Shell Springboard, 92 pieces of coverage were generated in one month reaching an audience of 24 million for 10 winners. Coverage included local, regional and national broad sheet press and trade publications as well as a lot of activity on Twitter. We estimate this to have a promotional value to the prize promoter and

applicants of approximately £495,000<sup>25</sup>. This kind of buzz plays a critical role in encouraging entrepreneurs to apply for the prize as it plays a key role in both validating the companies and leveraging investment funding. The developing world winners of the Ashden Awards have achieved significant social standing and public relations advantage in their countries of origin. The branding associated with the Ashden Awards and Shell Springboard is also of considerable benefit to applicants.

**Identifying New and Diverse Applicants:** The prize promoter of the GSC cites “dramatically” broader submissions, both internationally and organizationally, than they do to their Annual Solicitation process<sup>26</sup> which is the mechanism they use to hand out grants. The broader range of applicants also includes “dramatically greater international responses” both in terms of larger numbers of submission from other countries and also from countries that do not normally submit. Approximately 80% of companies applying to the GSC had not previously submitted funding applications to the prize promoter; after participating in the GSC, applicants subsequently go on to apply to the prize promoter for future funding opportunities.

The diversity of applicants is an important element of these types of prizes as Baumol (2004) states *“the independent innovator and the independent entrepreneur have tended to account for most of the true, fundamentally novel innovations.....a substantial number if not the majority turn out to be derived from these sources rather than from the laboratories of giant business enterprises”*

Neither Shell Springboard nor GSC focus on developing world technologies or businesses which would enable us to draw any conclusions about incentives in different locations. The winner of the GSC in 2010 however was MPedigree, a Ghanaian company who have developed a low cost approach to verifying the source of medicines in Africa. The head of MPedigree felt that innovation awards have a particular role to play in helping identify innovators that are often overlooked and that global prize processes provide an opportunity for developing world innovators to *“bubble up to the surface”*.

**Leveraging Investment:** According to statistics prepared by Shell following interviews with 26 winners since 2005, there has been an average increase in employee numbers among winning firms by a factor of 7.4, with the average employee size of 16 staff; a total of £27,432,000 investment has been secured. Finalists of the Global Security Challenge, which has been running for 5 years, have received \$104 Million in private investment since their involvement in the prize.

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<sup>25</sup> This is based on 3 times the estimated advertising cost to achieve the same reach, giving a PR value assumed to be a multiple of advertising cost on premise that editorial content has greater PR value than advertising.

<sup>26</sup> Every year the prize promoter runs a separate round of grant funding called their Annual Solicitation



The Return on Investment has been calculated for both Shell Springboard and the Global Security Challenge (based on estimated cost figures for Shell Springboard) as detailed in the Case Study Annex and summarised below. No common standard is set for the extent to which future investments received by prize applicants should be attributed to the prize and over what time scale. Clearly a number of factor external to the prize will affect this. The annex provides different figures for the Return on Investment (RoI) based on different levels of attribution, as demonstrated in the table below. Even at a very low level of attribution (20%) a positive RoI is achieved.

The RoI for the two programmes is significantly different but there are a number of externalities that could impact on this, not least the sector in which they operate and associated levels of growth and availability of venture capital (VC) funding. Figures will also vary depending on when surveys were last done and what level of attribution is awarded.

<b>Shell Springboard</b>	<b>Benefit to cost Ratio (100% attribution)</b>	<b>Benefit to cost Ratio (20% attribution)</b>
3.5% discount rate	9.36	2.01
10% discount rate	8.93	1.96

*(based on estimated costs, and estimated values for PR Benefit)*

<b>The Global Security Challenge</b>	<b>Benefit to cost Ratio (100% attribution)</b>	<b>Benefit to cost Ratio (20% attribution)</b>
3.5% discount rate	33.17	6.63
10% discount rate	32.47	6.49

The Ashden Awards have leveraged over £8 Million in investment funding for their winners, a basic return on investment of 7.4 not including other significant benefits associated with carbon savings and improved social welfare. The Awards are able to claim 100% attribution based on having directly supported the identification of financing for their winners.

An initial study of the NHS innovation challenges provided in the Case Study Annex also shows the potential for delivering considerable returns on investment. From their first round of challenges the NHS will have recovered all their costs by the time they have treated 10 dialysis patients at home using a more cost effective procedure identified as just one of the solutions from the challenge. A second solution has also demonstrated the potential for highly significant returns on investment.

The levels of ROI<sup>27</sup> for the case studies clearly indicate that Innovation Awards are good, but are they better than other methods that could be used to reach the same aim? The Carbon Trust's Entrepreneurs Fast Track (EFT) offers a customised package of expert commercial advice, networking

<sup>27</sup> We have not included benefits associated with carbon savings as they would need require forecasting of the future sales revenues and CO<sub>2</sub> savings against other products on the market place in the future which will be too tenuous to forecast.

opportunities and grant funding to small enterprises that are developing low carbon technologies in the UK. The programme has leveraged £130million in private funding<sup>28</sup> representing a ROI of £13 for every £1 spent.<sup>29</sup>

**Integration of the awards into broader programmes of support can strengthen the potential to achieve tangible results:** The Ashden Awards, Shell Springboard and the EFT all provide excellent return on investment (ROI); however to compare one with the other is unrealistic as they offer a different set of services, albeit to the same industry. The high ROI for the EFT is likely to be attributable to the strength of the infrastructure provided by the programme to help companies grow (which is beyond the scope of the prize process and private philanthropy) and it includes up to £70,000 of fully funded expert commercial support per applicant. Grant funding for research and development is also provided by EFT but requires match funding of at least 40% owing to UK Government rules related to State Aid. The EFT has focussed on simplifying the application process, so the often cited benefit of prizes versus grants – that the application is much simpler – is negated in this particular case.

**Getting funds quickly and easily to small start up companies:** Applicants to Shell Springboard indicate that the simplicity of application and speed of award are critical and make up for the relatively low value of the award. Providing a small amount of money early on can make a very big difference to start up companies. A key advantage of the Shell Springboard stated by the interviewees was that, unlike most grants including the EFT, no match funding is required. It was pointed out that such grant schemes are often only possible for larger firms who have resources to invest in developing and managing applications, and match funding available. For very small start up companies, where cash is typically the major constraint, prizes provide easy access to ready cash in way no other mechanisms do. The no-strings-attached prize approach allows technology developers to be flexible and adapt their technologies to the market without the constraints of grant milestones and commitments.

Applicants perspectives in the difference between grants and prizes indicate that the EFT is possibly fairly rare in its ease of application compared to other grants, most of the interviewees we spoke to pointed out that the due diligence demanded by public grants such as the European Framework, need significantly higher investment in order to submit the application, was often followed up by complicated post award monitoring, and in some cases required the establishment of partnerships with organisations that they otherwise would not have chosen to make.

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<sup>28</sup> Post support Venture Capital, Sales, Licence deals, Joint Development Agreements and Acquisitions. A case by case approach is taken to selecting supported companies that CT decides it can claim credit for.

<sup>29</sup> Dave Ravel, Head of Entrepreneur Fast Tract at the Carbon Trust, May 2011

Another stated mechanism that has helped Shell Springboard winners are Research and Development tax credits which have helped return vital cash into the start up company. However, these only work if the company already pays corporation tax (i.e. makes a profit), or pays income tax and National Insurance to its employees, and can wait until the year end to get their money back. It is therefore of no value to very small companies.

The Innovation Award approach has a particular niche role to play as an effective component of support to small and start up businesses and NGOs, helping to identify good ideas and operations with the aim of assisting them to secure further funding (bank loans, investments, carbon finance, donor funding) and grow their operation. Innovation Awards do not ensure the attainment of tangible results, however linking with broader programmes of support can improve the potential. A prize either on its own or as part of a programmatic approach can be useful to achieve specific aims.

Innovation Awards are useful for:

- ✓ Identifying a broader diversity new and novel (potentially high risk) innovations
- ✓ Leveraging funding to SMEs and Start ups
- ✓ Providing flexibility for innovators to adapt to changing markets
- ✓ Getting small amounts of money out simply and quickly to fledgling companies where every penny counts
- ✓ Providing financial support to companies that do not have the resources to provide match funding required by grants, and companies too small to benefit from tax subsidies and other public schemes
- ✓ Generating public awareness and profile raising

There is a distinct difference between large grant awards and multiple small prizes. The first requires a considerable investment and has correspondingly good returns, the latter (and most certainly in the case of Shell Springboard) provides a relatively cheap and quick way to positively support SMEs and gain considerable PR advantage and credibility that enables them to leverage more investment.

Relevance to the developing world will be dependent on intended benefits; as a mechanism to get funding to grass roots innovators, these prizes occupy a particularly interesting space in identifying overlooked innovators and supporting companies that lack the capacity to put in grant applications, struggle with match funding, and are not able to lever other forms of financing. If the prize is intended to showcase technology and lever private investment, then consideration of the external environment, particularly in relation to availability of venture capital the size and strength of the consumer market need to be considered.

**Things to consider when managing innovation awards**

- Managing Intellectual property is critical – Shell successfully achieves this by allowing only 2 people within the organisation to see the applications
- Ensuring the legitimacy of ideas is also a challenge. Stringent checking to ensure that ideas are not “stolen” is important and often difficult given that there are many people dealing with the same technology challenges. Sufficient resources need to be applied to carry out legitimacy checks.
- The credibility of the award is also tantamount; high profile independent judges are essential for the awards to have meaning in the business and investor community.
- Awareness raising of the prize is vital to maximise opportunities to lever additional resources and ensure a wide diversity of applicants
- Post prize support both in terms of networking and business advice were considered valuable.
- External policy and economic environments will have a considerable effect on the post prize success (or otherwise) of award winners.
- Having larger numbers of finalists can extend the benefits of the prize to a greater number of participants. We were only able to interview finalists for each of the case studies and have no information available on the views and thoughts on non-finalist participants.

## OPEN INNOVATION

This section focuses on prizes that use open innovation platforms and processes to find solutions to problems. Open Innovation is the process of opening up a problem to external actors, thereby extending the range to find ideas and solutions (Lakhani 2005; Laursen and Salter 2006, Ogawa and Piller 2006). It is in contrast to traditional closed innovation processes in which firms only make use of the ideas, knowledge and technical competences in their own domain (Chesbrough 2003). Mansfield (1986) showed that innovation projects which are based to a large extent on external developments have a shorter time frame to be developed and require less investment than similar projects based solely on internal research and development<sup>30</sup>. The rapid rise of social media has presented an unparalleled opportunity to source solutions from a global community. The commercial sector is rapidly taking advantage of new media, evidenced by the rapid increase in sales and business activity in particular of specialist and non-mainstream products via the internet<sup>31</sup>.

We consider results from the Open Innovation Platforms InnoCentive and NineSigma which post specific technical challenges to a global pool of solvers with the aim of identifying previously unknown problem solvers, either individuals or organisations.

Evidence suggests that Open Innovation can offer:

- ✓ A positive return on investment compared to grant funding
- ✓ A good rate of problem resolution
- ✓ The identification of new and diverse solvers
- ! There is no evidence to suggest any link between the solution and the widespread use and adoption of the technology

**A positive return on investment:** A Total Economic Impact<sup>32</sup> of 56 Challenges posted on the InnoCentive site by Syngenta over a 3 year period, calculated a 3 year risk adjusted RoI of 182%<sup>33</sup> with a payback of less than 2 months against an average award value of US\$ 39,280. GoldCorp who

<sup>30</sup> Pillar Ail and Vossen, A typology of customer co-creation in the innovation process 2011.

<sup>31</sup> Greg Dushnitsky, London Business School 2011.

<sup>32</sup> Forrester Consulting, The Total Economic Impact of InnoCentives' Enterprize Solution Feb 2010.

<sup>33</sup> when compared to the costs of the study and including the benefits associated with efficiency and cost savings from solutions generated, licensing and legal fee savings from InnoCentives IP transfer process, and productivity savings for internal researchers.

used Open Innovation to identify “where the next 6 million ounces [of gold]” would be found, experienced an “80% reduction in costs and production increase of 900%”<sup>34</sup>.

Comparing the average cost of problem resolution for developing world technologies posted under the Rockefeller InnoCentive initiative with the average cost of grant contracts under DFID Renewable Natural Resources Research Programme<sup>35</sup>, we surmise that the Open Innovation could represent a 48% cost saving, although further research is required<sup>36</sup>.

**A good rate of problem resolution:** Lakhani (2006) who studied 166 discrete scientific problems posted to InnoCentive and found that “*broadcasting of problem information to outside scientists results in a 29.5 resolution rate for problems that previously remained unsolved inside R&D laboratories of well-known science-driven firms*”. The two Rockefeller InnoCentive partnerships achieved solver rates of 60% and 100% respectively, demonstrating a particularly high solver rate for development related problems. The extent to which the problems had previously been researched is unknown, they may simply have been easier to solve, or philanthropic incentives may have come into play. One of the problem posting organisations looking for a developing world technology was delighted with the off grid lighting solution he received. The technology for the SunNight Solar Light came from a New Zealand scientist; the CEO says “without trying we invented the world’s best flashlight”.

*“the broadcasting of problem information to a diverse community of solvers can yield effective solution rates. We do not yet have an empirical basis for comparing this outcome with the effectiveness of traditional problem solving activities within academic or commercial laboratories for similar discrete problems. However many of the R&D laboratories posting these problems had been unsuccessful in creating solutions to these problems, thus implying a noteworthy outcome” Lakhani (2006)*

**The identification of new and diverse solvers:** An evaluation<sup>37</sup> of a 13 month pilot programme between NASA and InnoCentive demonstrates the effect that open innovation platforms can have on the identification of new innovators: 81.2% of solvers surveyed reported that they had never

<sup>34</sup> The Case Foundation Conference Report 2010 “Promoting Innovation: Prizes, Challenges and Open Grantmaking”.

<sup>35</sup> A ball park average for grant contracts under DFID’s Renewable Natural Resources Research Programme (RNNRS) was £70,000 per annum, usually running for 3 years. Exchange rate £/US\$ in 2007 averages 0.5, we compare one year of a RNNRS grant with one solution from Open Innovation.

<sup>36</sup> It is unknown how practical the solutions from InnoCentive were, how do they compare to RNNRS, is a one year equivalent appropriate? Did one produce better results than other?

<sup>37</sup> InnoCentive investigation of the Challenge Based Open Innovation Platform at NASA Oct 2010.

responded to a government challenge before and 98% reported they were interested in working on more NASA challenges.

These findings become important when we consider research undertaken by Lakhani (2006) who studied 166 discrete scientific problems posted to InnoCentive and found that:

- *“Successful solvers created solutions to problems that were on the boundary or outside of the field of expertise”*
- *“Solvers mainly relied on information from previously developed solutions when attempting to solve broadcast problems”*
- *“The more diverse the scientific interests of the solver community the more likely the problem would be solved”*

A more recent study (Pillar 2011) looked at problems posted to the NineSigma platform by the German drivetrain industry and found the results *“impressive”*. The majority of solution providers were entirely new despite it being a highly specialised field, and in just 6 out of 26 solutions the technologies were known before. The case study concludes:

*“The utilisation of [open innovation specialists like NineSigma] clearly pays off. As long as there is a fair interaction between seekers and solvers, the problem broadcasting method will be successful and improve a company’s problem solving activities in terms of quality and efficiency”*

**Benefits of Open Innovation:**

Qualitative Benefits	Quantitative Benefits
	<ul style="list-style-type: none"> <li>• New and diverse solvers from outside the field</li> <li>• Solutions to previously unsolved problems</li> <li>• Good Return on Investment compared to traditional Research and Development</li> </ul>

**There is no evidence to suggest any link between the solution and the widespread use and adoption of the technology:** The evidence for using Open Innovation platforms to find solutions to technical problems is compelling, but the InnoCentive and NineSigma case studies above focus on commercial problems and solutions that have a real value to the prize promoter who has the means to utilise the solution. Is this applicable to technical solutions for the developing world? The

disconnect between the solution and tangible results are clearly demonstrated in the case study we present on the first initiative run by Rockefeller. Follow-on costs to test, develop and distribute the technologies were not met - one of the two technologies looked at had not be implemented, the second was donated to the developing world off the back of sales in the US and a “buy one donate one” scheme. With no commercial value (despite considerable social value) the leveraging of funds to distribute the technology is not assured.

In summary, using Open Innovation platforms to find solutions relevant for the developing world appears to be just as effective<sup>38</sup>, if not more so, than for the commercial sector. However, it must be recognized that the Open Innovation prize process is limited to the finding of specific solutions. This problem is not unique to prizes, the same issues relate to grants. The impact evaluation of DFID’s ten-year Renewable Natural Resources Research Programme (2006) recommended that *“uptake systems be identified within research activities and supported at a policy level – research results require uptake systems in order to deliver benefits”*.

There are an insufficient number of developing world prizes and data on which to do a realistic return on investment. For future comparison purposes, a study on rates of return to agricultural research, commissioned by DFID, reports Rates of Return greater than 20% on average<sup>39</sup>.

The Integrated Agricultural Research for Development (IAR4D) approach provides another interesting parallel, weaknesses in adoption of research technology from traditional approaches<sup>40</sup> to agricultural research led to the development of IAR4D which embeds research within an “innovation system”, moving through the process of development transfer, diffusion and adoption. The system is relatively new, but early results indicate superiority to traditional agricultural research for development approaches. Early reported Benefit–Cost-Ratios for IAR4D on a number of commodities in Uganda vary between 28: 1 and 64: 1, albeit these figures are still preliminary and not backed up by data from other countries.

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<sup>38</sup> Average award rate for InnoCentive is 38%, for the Rockefeller initiatives the award rates were 60% and 100%.

<sup>39</sup> DFID 2005 Rates of Return to Research, A literature Review and Critique.

<sup>40</sup> Farming systems, participatory research, agricultural knowledge and information systems, double green revolution etc.



## SOCIAL PRIZES

Social Prizes refer to both participation prizes intended to inspire participants to change their behaviour (McKinsey 2008) and prizes aimed at stimulating community action; they typically reward the achievement of tangible results. We present evidence from two different community action or social prizes: the Big Green Challenge (BGC) run by NESTA in the UK and the Nirmal Gram Pursakar (NGP) in India, details of which are presented in the Case Study Annex.

Innovation in the context of social prizes is typically not about new technology but about enhancing the transfer of existing technology, behaviours or processes into the mainstream. Innovation is defined in terms of practice rather than products<sup>41</sup>. Innovation at the community level often draws on ideas and approaches from elsewhere; it is less about re-inventing the wheel and more about utilising leadership, ingenuity and creativity to build approaches specific to local needs and aspirations<sup>42</sup>. These definitions of social innovation ring true for both the BGC and NGP, where the “newness” of innovation is the application of existing technology or behaviours to specific situations.

The evidence finds that social prizes can:

- ✓ Attract new participants
- ✓ Generate creative, ambitious and innovative ideas
- ✓ Provide flexibility for communities to respond to challenges
- ✓ Leverage other support to community issues
- ✓ Incentivise mass behavioural change
- ✓ Benefit the most marginalised communities
- ✓ Be very popular with communities
- ! Work better when supported by other initiatives
- ! Monitoring and verification can be a challenge

**Attract new participants:** A significant number of the Big Green Challenge participants were informal groups and one of the winners<sup>43</sup> was an un-constituted group of individuals at the start of the challenge. The programme attracted over 350 different groups and large numbers of volunteers. All of the non-winning finalists continued with and adapted their work after failing to win the prize.

**Generate creative, ambitious and innovative ideas:** the new participants to the BGC tended to come with highly innovative approaches that are unlikely to be considered under traditional grant

<sup>41</sup> The term social innovation refers to new ideas, institutions or ways of working that aim to tackle social needs or tackle social problems (Young Foundation 2008).

<sup>42</sup> Appleby and NESTA 2009.

<sup>43</sup> The Green Valleys.

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funding schemes. The prize has been widely praised for giving communities an opportunity to be creative and ambitious. The staged supportive approach of the BGC allowed the best ideas to be implemented regardless of the track record of the proposing organisation or group.

**Provide flexibility for communities to respond to challenges:** Finalists valued the no-strings-attached funding provided by the prize which gave them breathing space from chasing grants and enabled them to plan and reorganise their next steps. Most finalists interviewed a year later said that they would take part again if reporting demands could be reduced.

**Lever other support to community issues:** The quality and value of the new ideas generated by the prize was recognised when government funds of £600,000 for community led action plans were diverted to 17 of the round 2 applicants. A number of finalists have secured “very large” funds or loan facilities since their association with the BGC.

### Benefits of the Big Green Challenge

Qualitative Benefits	Quantitative Benefits
<p>Directly related to prize process:</p> <ul style="list-style-type: none"> <li>• Diversity of applicants</li> <li>• Creative and ambitious project designs</li> <li>• Identification of strong leaders and initiatives</li> <li>• Sustainability</li> <li>• Flexibility of funding</li> </ul> <p>Indirectly related from project activities:</p> <ul style="list-style-type: none"> <li>• Social Cohesion</li> <li>• Social Inclusion</li> <li>• Personal skills and capacity</li> <li>• Social capital – consolidation of multiple local skills</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction in CO<sub>2</sub> emissions</li> <li>• Number of new applicants to government funded schemes</li> <li>• Leverage of additional funding for community based initiatives</li> <li>• Financial benefits</li> </ul>

**Mass Behavioural Change:** The Nirmal Gram Pursakar (NGP) demonstrates the dramatic effect that incentives, both in financial terms and prestige, can have in stimulating mass behavioural change. Prior to the inception of the NGP, sanitation coverage was increasing across India under the Total Sanitation Campaign at a rate of around 3% annually. Since the inception of the NGP rates have increased to 7-8 % and sanitation coverage has jumped from 21.9% in 2001 to 68.4% in 2011.

As a result of NGP 92% of health workers say households have a better understanding of water and excreta related diseases; the human health impacts are considerable with reported reduced

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instances of diarrhoea among children, reduced incidence of water borne diseases and a visible reduction in infant mortality.<sup>44</sup>

**Benefit the most marginalised communities:** The NGP has been particularly credited with achieving improved sanitation in “the last mile”, bringing previously excluded below-poverty-households<sup>45</sup> into the Total Sanitation Campaign.

### Benefits of the Nirmal Gram Pursakar

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>• Reduction in incidence of diarrhoea</li> <li>• Reduction in household disease</li> <li>• Improved understanding of water and excreta related diseases</li> <li>• Reduction in infant mortality</li> <li>• Improved local governance</li> </ul>	<ul style="list-style-type: none"> <li>• No of GPs achieving Nirmal Gram<sup>46</sup> status</li> <li>• National sanitation coverage</li> <li>• Sanitation coverage for Below Poverty Line (BPL) households</li> <li>• Extensive household survey data</li> </ul>

**Popularity:** Both case studies demonstrate the popularity of Social Prizes; the NGP has been awarded to over 25,000 Gram Panchayats, reaching an estimated population of 121 Million.

**Support from other initiatives:** The impact of both case studies is to some degree contingent on support from other initiatives; the NGP was a component of a wider programme, the Total Sanitation Campaign, without which it would not have achieved its aims. It was also found that those villages where a wider range of social mobilisation processes had taken place achieved better results. An evaluation of the BGC found that BGC finalists were able to work best when they had access to other pots of funding.

**Monitoring and Verification:** In both case studies significant challenges are reported around the setting up and maintaining of suitable monitoring and verification processes. This is a particular challenge for community led programmes that are both diffuse and where participants have limited resources.

**Value for money** for both case study prizes is highly subjective. The NGP has cost approximately one dollar per beneficiary of the incentive programme<sup>47</sup> (i.e. not including associated and necessary costs of the Total Sanitation Campaign). 97% of Government and 87% of Panchayati Raj respondents said the NGP should be continued. Further research is needed to assess the financial and human benefits of the NGP. Questions are raised about the extent to which open defecation free status is

<sup>44</sup> NGP Evaluation Report 2011.

<sup>45</sup> “Below Poverty Line” is an established indicator used to determine the poorest member of society.

<sup>46</sup> A “Nirmal Gram” is an “Open Defecation Free” village where all houses, Schools and Anganwadis have sanitary toilets and there is awareness amongst the community on the importance of maintaining personal and community hygiene and clean environment. A “GP” is a Gram Panchayat, or village.

<sup>47</sup> See Case Study Annex

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maintained after the NGP award, and difficulties arise in attributing benefit between the Total Sanitation Campaign, the NGP and other external factors.

The BGC has not resulted in mass mobilisation yet. While finalists remain ambitious they also face considerable barriers, including managing to recruit and retain volunteers, attracting grant funding or private and social finance, and negotiating regulatory and planning regimes. Limited diffusion of the process has taken place, reinforcing the view that such activities need to be supported financially. Significant questions remain about the speed at which community-led carbon reduction activity can reach a substantial scale. An industry insider who evaluated the BGC, as well as other government funded community led initiatives, suggested that there was not enough evidence to indicate that one approach was significantly better than the other. Much of the benefits of grants and prizes are a function of the programme design. Arguably there is a range of programme designs, including elements of both prizes and grants that could have achieved the same results. It is however questionable that any other method would have achieved the same levels of diversity of applicants and proposals as the prize approach adopted by the BGC.

## MARKET STIMULATION PRIZES

Market Stimulation Prizes or Grand Innovation Prizes are typically multimillion dollar prizes that aim to overcome large scale innovation hurdles. These types of prize are often intended to change the boundaries in which we live and generate significant public interest. Here we consider the literature<sup>48</sup> around the Longitude, Orteig, Ansari X PRIZE and Progressive Automotive X PRIZE<sup>49</sup>, and present our findings on the Grainger and Saltire Prizes. All, with the exception of the Grainger prize which was for social benefit, intended to result in active commercial markets for their sector. The prizes provide compelling evidence of the value of prizes to stimulate innovation, in particular they demonstrate:

- ✓ Significant Promotional Value “media buzz”
- ✓ Significant leverage of research and development funding
- ✓ Post prize leverage of commercial activity
- ✓ Identification of solutions from unexpected sources
- ! The external environment is critical; a broad package of support may be appropriate
- ! The time frame is also critical

**Promotion “media buzz”:** Benefiting promoter and applicants alike the media buzz generated by large market stimulation prizes is clearly evident. By July 2004 the Ansari X PRIZE had registered 3 billion print impressions of its name in the newspapers journals and websites<sup>50</sup>; and the Saltire Prize, although ongoing and not due to be complete until 2017, has already generated significant publicity. This publicity not only benefits the promoter but has the potential to benefit all participants whether they win or not. The Scottish Government which promotes the prize considers it has already attained considerable value for money from the promotion the prize has generated. We estimate a PR value of between £1 and 1.5 million against a total cost to date of £400,000. In addition, the media attention surrounding the prize has helped play a role in positively engaging with the local community.

**Significant leverage of research and development funding:** The promotional buzz generated helps to attract research and development funding. The Ansari X PRIZE is credited with leveraging \$100

<sup>48</sup> The thesis by Campbell 2011 is the first empirical study on a market stimulation prize.

<sup>49</sup> Campbell 2004 Incentive Competitions as a policy tool for Technological Innovation.

<sup>50</sup> This figure was stated by Peter Diamandis of the X prize quoted in Schroeder 2004 The Application and administration of inducement prizes in technology.

million<sup>51</sup> in research and development finance to achieve the \$10 million prize, the Orteig \$400,000 against a \$25,000 prize.

**Post prize leverage of commercial activity:** Since the award of the Ansari X PRIZE, public and private expenditure in support of the private space flight industry has topped \$1.5 billion. As one applicant put it, the Ansari X PRIZE “*inspired an entirely new industry of would be entrepreneurs*”. The extent to which the Orteig stimulated the commercial air flight market is harder to attribute, although as identified by Morgan (2008)<sup>52</sup> within a year of Lindberg crossing the Atlantic applications for pilot licenses in the U.S increased by 300 per cent and the number of licensed aircraft grew by 400 per cent. Of the 26 teams who competed in the Ansari X Prize at least 7 are still in operation today with many of the members of other teams still in the industry in some form or other.

**Identification of solutions from unexpected sources:** Solutions to both the Orteig and Longitude prizes challenged the conventional wisdom of the day, demonstrating the value of prizes over grants which would have followed conventional wisdom. Campbell (2011), in her thesis on the Progressive Automotive X PRIZE (PIAXP), provides evidence that the prize attracted and focused a diverse set of solvers: 35% of the teams that competed did not exist before the prize. Of those teams that did exist, 30% were informal and 17% were non-vehicle-related. The teams were not funded through traditional means, such as government grants or venture capital but were mostly self-funded. Her thesis also provides interesting evidence on incentives influencing different innovators.

**Benefits of the Longitude, Ansari X PRIZE, and Orteig**

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>● Attributable growth in the market post prize</li> <li>● Solutions from unexpected sources</li> <li>● Partnerships and networks</li> <li>● Promotion and PR</li> <li>● Consolidation of expertise</li> <li>● Sailor welfare*</li> </ul>	<ul style="list-style-type: none"> <li>● Research and Development Investment</li> <li>● Attainment of prize goal</li> </ul>

*\*Longitude prize only*

These types of prizes are without their limitations. In most circumstances they should not be the policy instrument of choice for science and technology<sup>53</sup>; these types of prizes have very specific and

<sup>51</sup> This figure was stated by Peter Diamantis of the X prize and is repeatedly quoted in the prize literature, our own approximate calculations show that this is probably realistic if you include the value of team members’ time.

<sup>52</sup> Inducing Innovation through Prizes, Jaison Morgan (2008).

<sup>53</sup> The Hamilton Project Dec 2006.

time-bound opportunities that have to be met at exactly the right time, when the market is ready to respond to the challenge and both human and investment capital is available. It is worth noting that Harrison, who finally won the Longitude Prize after 50 years, was supported by several grants during that time from the prize promoters.

**The External Environment:** The Grainger prize followed a Market Stimulation approach for development purposes, identifying a low cost arsenic water filter for application in the developing world. The prize successfully stimulated water filter technology, with careful consideration of social acceptability<sup>54</sup> in South Asia, but had no mechanisms in place to ensure its manufacture, distribution and uptake. For technologies with the potential for high commercial value such as air travel and space flight (pre flight sales of suborbital flights are showing interest<sup>55</sup>) the development of the technology to the point of commercialisation can be left to the market. The water filter, while having significant human benefits, lacks a strong commercial market; those who need it have limited ability to pay. While the technology has positively impacted on over 1 million people thanks to ongoing philanthropy, this is around 1-2% of what is required. Barriers between the development of the technology and its ultimate uptake were not addressed by the prize.

The Saltire Prize also highlights the importance of the external environment. The prize is just one part of a broad package of stimulus activities aimed to both push and pull innovation. This includes grant funding<sup>56</sup>, academic partnerships<sup>57</sup>, and provision of high quality testing facilities<sup>58</sup> (push), and the establishment of a highly favourable operating environment (pull), including feed in tariffs and Renewable Obligation Certificates (ROCs) set higher than elsewhere in Europe, with favourable terms for the leasing of the sea bed through the Crown Estate. Without the broader stimulus to the marine sector in Scotland, it is arguable that the prize would be impractical and fail to pull in the investment required. As explained by an industry insider, it is the commitment by Government that is the most important driver in securing investment. The purpose of the prize in this case was to promote and draw attention to the wider stimulus package.

**Time Frame:** Pressure on the Grainger Prize to achieve tangible results within a 4 year prize time frame meant that no new technology was developed, it came “off the shelf”; the winning entrant had already distributed 25,000 filters before the prize was advertised. The Ansari X PRIZE and Orteig

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<sup>54</sup> See Rogers Diffusion of Innovation.

<sup>55</sup> Morgan 2009.

<sup>56</sup> The Wave and Tidal Energy: Research, Development and Demonstration (WATERS) fund has recently made £13 million available to support wave and tidal energy projects in Scotland.

<sup>57</sup> The Energy Technology Partnership (ETP) Europe's “largest energy research partnership” which has linked together over 250 academics and 650 researchers, across ten universities in Scotland.

<sup>58</sup> The European Marine Energy Centre (EMEC) provides world leading test and demonstration facilities in Stromness, Orkney.

Prizes were awarded 8 years after first being published. Campbell's (2011) analysis of the PIAXP expands on this:

*“the exploration time at the beginning of PIACP, the broad and flexible rules, the competition stages with a low barrier to entry, and institutional support such as technical feedback, all allowed for teams who had not necessarily fully developed their ideas or built prototypes to participate in the competition and compete on a level playing field”.*

## Market Transformation Programmes

The broad package of support surrounding the Saltire prize is clearly critical to the development of the marine renewables sector. A couple of good examples of other prize programmes, operating as part of a package of support, include the US Super Efficient Refrigerator Programme (SERP) and the China Energy Efficient Refrigerator Project (CEERP). Although debate still exists about how successful SERP was, there is documented evidence of a positive return on investment for both prizes. The prize component of CEERP was only a small but critical part of a much broader package of support. The programme is estimated to have exceeded its programme goal by a factor of 2 in half the time, and that if sales had continued at the same rate it would have exceeded its goal by a factor of 3 and reduced carbon emissions by a factor of 6.3 against its original targets<sup>59</sup>. The CEERP clearly demonstrates that its incentive component offered considerably better value for money than rebates (the project expenditure divided by the high number of energy efficient refrigerators sold would provide a rebate of less than \$1 per refrigerator) or grants, with over \$30 million in R&D funding leveraged towards the attainment of the prize against an incentive outlay of \$3.5 million.

We can conclude that Market Stimulation projects can be highly effective in a number of ways. They deliver impressive value for money where future commercial markets are perceived if designed correctly with long enough time frames and low barriers to entry. For public goods, which may or may not include low carbon technologies depending on the nature of the technology, CEERP demonstrates that a programmatic approach tackling push and pull elements can be very effective and deliver considerable value for money.

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<sup>59</sup> GEF Independent impact assessment.



## PRIZES AS A TOOL TO ENCOURAGE INNOVATION IN ENVIRONMENTAL TECHNOLOGIES FOR DEVELOPMENT

*“There is considerable evidence that technology prizes have a role to play in the portfolio of inducement mechanisms available to spur climate change related technological advances”* (Newell and Wilson 2005); this statement is supported by our case study research which demonstrates the positive potential of Innovation Awards, Open Innovation and Market Stimulation Prizes for spurring technological development at the idea and invention side of the Innovation Chain. Prizes are particularly useful for environmental technologies as they help to address market failures that form barriers to innovation. Environmental technologies are often hampered because their benefits (for example reductions in CO<sub>2</sub> emissions) do not accrue to the discoverer but rather spill over to others. Because developers cannot capture benefits there is little incentive to invest in new environmental technologies; prizes can help redress this problem.

Adler (2010) proposes that prizes can be particularly important to spur investment in technological innovations that would be of primary benefit to low income consumers and people in developing nations. Few profit-seeking firms are likely to make significant investments in serving such markets. Not many firms see massive profit opportunities in developing low-carbon energy options for developing countries, yet the welfare benefits from improved energy efficiency and a less carbon-intensive development path in much of the world could be substantial.

The problems associated with value capture have also been observed in the agricultural context, where neither governments nor private firms have invested significantly in developing technologies or techniques of use to widely-dispersed, low-income consumers in developing nations. Masters (2008), Kremer and Zwane (2002) and Elliot (2010) all consider prizes to help stimulate research and development for African agriculture, where the limitation of existing funding mechanisms have left the productivity levels of African agriculture well below those of other regions<sup>60</sup>. Research and development in agriculture suffers from the researcher not being able to hold patents or recoup their costs, primarily because of the self-pollinating nature of crops. The lack of finance in the developing world results in private investment into R&D in developing countries being recorded as low as 2% in 2000. Just 5% of global R&D is in developing countries.<sup>61</sup>

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<sup>60</sup> Masters 2008.

<sup>61</sup> Elliot 2010 Pulling Agricultural Innovation in to the Market, Centre for Global Development.

African agriculture presents particular problems for research and development as the performance of an improved crop variety, for example, is unknown until it is actually observed on farms with considerable need for localised adaptation.

Throughout this paper we have paid particular attention to the location of the prize in relation to the attainment of tangible results, defined as the widespread use of the innovation product or process. The majority of prizes focus on innovative ideas and invention with only a few on upscale and adoption. The Case Studies indicate there is potential to use prizes to help with diffusion and adoption of new technologies, processes and behaviours, though it is an untested area. We are able to draw out four key points when considering prizes for the developing world:

- Integration: prizes do not have to sit alone and can be used in conjunction with a range of other measures
- Upscale and Adoption: prizes may be used to best advantage in a number of as yet un-trialled ways
- Application: prizes need to carefully consider and reflect the needs of the developing world
- Identification of developing world innovators: prizes have the potential to draw out previously overlooked innovators from the developing world

**Integration:** Kay (2010), Davis (2004) and Kieff (2001) point out that winning the prize provides no guarantee that the invention will ever be applied or reach the market. Evidence from our Case Studies has also demonstrated that support to technological innovation alone can have limited impact. The development of off-grid illumination devices through a prize process has had limited take up in the developing world (other than through donation schemes), despite considerable social benefits, due to a lack of ability to pay by those it intends to benefit. The same problem has been experienced by the Grainger Prize winner. Another example that proves the point is penicillin, Fleming's unpatented discovery went undeveloped and unimproved for years, despite its enormous social value.

Davis (2004) suggests that to guarantee that a winning innovation is commercialised the prize sponsor must either specify a marketing goal as a prize criterion, allow the invention to be patented, or otherwise support the winner. We go a step further to suggest that prize processes, in particular in the developing world or other situations where there are market failures and social goods involved, should be integrated into broader programmes of support. Integrated support could include finance and credit schemes, capacity building, support to input markets and the development of appropriate policy frameworks. It could also include other forms of prize processes,

such as social prizes to encourage uptake and behavioural change or Advance Market Commitments which are discussed in more detail below.

**Upscale and Adoption:** the extent to which prizes can address scale up and adoption issues is at present unknown, alternative prize designs could be used to address this particular challenge. Masters (2008) identifies the difference between prizes where value capture is easy, such as open innovation contests run by the commercial sector, and those where value capture is more difficult, and are more typically funded by philanthropic or public funders. Focusing on the latter he has developed a typology of prizes that locates two new prize types, staged prizes such as Advanced Market Commitments (AMCs) and Proportional Prizes.

Advance Market Commitments, for example, offer a fixed price to purchase a fixed number of a specified technology. AMCs were suggested as a suitable alternative to the Grainger Prize by Abul Hussam to further the uptake and use of his Sono water filter; they are currently being trialled for the development of vaccines<sup>62</sup>.

A proportional prize<sup>63</sup>, as proposed by Masters (2008), pays out in proportion to success, where success is defined as a level of impact. For example a prize could be paid out to educators in proportion to the number of school children that achieve certain test levels, thus rewarding the most successful techniques. In agricultural research a proportional prize would pay out in proportion to yields achieved on farms in different locations, thus focusing on overcoming localised adaptation hurdles.

The proportional prize approach, as with Results Based Financing, differs from Results Based Aid and Cash on Delivery<sup>64</sup> mechanisms. The latter tend to be inter-agency arrangements between donors and partner governments, whereas the former are open to a wider diversity of participants, including service delivery agents and beneficiaries<sup>65</sup>.

**Reflecting the needs of the developing world.** Insufficient evidence exists to enable us to identify the extent to which prize based solutions (often coming from more advanced technology markets) meet the specific needs of the developing world. The Solar Task Lights developed under the

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<sup>62</sup> On 12 June, 2009, the Finance Ministers of Italy, the United Kingdom, Canada, Russia, Norway and the Bill & Melinda Gates Foundation together with GAVI Alliance partners World Bank, UNICEF and the World Health Organisation, formally activated the Advance Market Commitment (AMC) pilot project against pneumococcal disease.

<sup>63</sup> As yet untried.

<sup>64</sup> Developed by the Centre for Global Development

<sup>65</sup> Pearson 2011 HLSP Institute Results based aid and results based financing: What are they? Have they delivered results?

Rockefeller InnoCentive Initiative have proven application, other prizes have not<sup>66</sup>; prize design will clearly be a critical determining factor. Due to the under-developed state of rural markets in many poor countries, donors will have to pay very careful attention to supply chain issues and distribution channels. Also, due to the smaller private sector, at least in Africa, donors may need to encompass public research institutions, and certainly maintain healthy levels of grant funding; up front liquidity poses a particular constraint in the African context and could lower participation.<sup>67</sup>

**Identifying developing world innovators.** Discussions with entrepreneurs from Kenya and Ghana as part of this research have indicated that prize processes have the potential to help identify, and thus invest in, overlooked innovators from the developing world.

**Incentives in a developing world context.** There is strong evidence to suggest that the incentive mechanisms surrounding prizes are effective in BRIC (Brazil, Russia, India and China) nations, where technology markets are more advanced and a potentially large pool of would-be innovators<sup>68</sup> and entrepreneurs exists. There is scant data that prizes can be effective more widely, either outside major cities or in less developed countries. There are examples, such as in Ghana, where Innovation Awards have been proved to work but not enough evidence to suggest if this is an exception.

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<sup>66</sup> Low cost housing ventures

[www.nytimes.com/2011/06/01/opinion/01srivastava.html\\_r=1&nl=todaysheadlines&emc+tha212](http://www.nytimes.com/2011/06/01/opinion/01srivastava.html_r=1&nl=todaysheadlines&emc+tha212)

<sup>67</sup> Newell and Wilson 2005 Technology Prizes for Climate Change Mitigation.

<sup>68</sup> all of the BRIC nations are represented in the top 20 solvers on InnoCentive.

## CONCLUSION

The optimal level of investment in prizes is not clear. It is surely much larger than at present<sup>69</sup> and the potential payoffs of adding new mechanisms to a toolkit for encouraging innovation are immense<sup>70</sup>. In all our case studies the prize approach has been demonstrated to be effective at achieving a set of intended benefits. Questions as to whether the prize approach is better (and therefore offers good value for money) are more difficult to assess due to a lack of data in the prize market and because few have measured the Return on Investment of other traditional methods.<sup>71</sup>

Common tools and approaches to measuring the effectiveness of prizes are needed. Many organisations, and government agencies worldwide, fund programmes to find and stimulate innovation in various forms every year, using a combination of various tools (such as competitions, grants, patents, subsidies and venture capital funds) but neglect to measure the success of these programmes. Which tools fit best to certain innovation gaps in order to achieve the highest impact? A common methodology to measure effectiveness and value for money across the prize industry will help ensure the most effective outcomes to the growth of the prize industry. OmniCompete who run the Global Security Challenge together with the London Business School will examine four prize competitions, which could form the basis for developing an international index.

Value for money from prize programmes is evident across the prize types presented but the extent of value obtained is often dependent on externalities and other initiatives. Prizes are not exclusive; they can be coupled with, and add strength to, existing programmes and used as part of a broad package of support. Prizes do not have to be limited to types already trialled; opportunities exist to take the main strengths associated with open sourcing of innovators, incentives and publicity, and apply them in new ways. Examples include proportional prizes proposed by Masters or prizes to influence the way governments and institutions operate introduced by Butterworth<sup>72</sup>.

Social and Market Stimulation Prizes have the potential to have the greatest impact but come with the biggest investment and the highest risk. Important lessons from prizes need to be learnt – an understanding of the innovation chain from ideas to tangible results, as well as all the external forces at play on it (legislation, governance, credit, culture etc.), is critical. Identified weaknesses in the chain need to be tackled through both prize design and associated support programmes, and appropriate policies need to be in place to ensure an enabling environment.

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<sup>69</sup> The Brookings Institution, 2006 The Hamilton Project, Prizes for technological innovation.

<sup>70</sup> Kremer 2009 Incentivising innovation: adding to the toolkit.

<sup>71</sup> Prize summit: Summary of key debates.

<sup>72</sup> Butterworth 2006 Facilitate Institutional Development, Win a Prize! How the World Bank and Other Donors Could Help Overcome Barriers to Growth.



**ANNEX 1: Key informants:**

**GENERAL**

**William Masters** Professor at Tufts University, Peer Review  
**Erika Wagner** Led X Prize Lab at MIT, now works for the X Prize (Senior Director, Exploration Prize Development X PRIZE)  
**Jaison Morgan** Consultant Advisor and lecturer on prizes - ex X Prize employee  
**Frank Piller** Technology & Innovation Management Group at RWTH Aachen University

**INNOVATION AWARDS:**

**Josh Middleton** Ashoka ChangeMakers  
**Jenny Marsden** Shell Springboard  
**Todd Breauther** TSWG Global Security Challenge  
**Richard Stubbs** NHS Challenges  
**Shell Springboard Winners 2009** Bio Energy; Alert me, **Pilgrim Beard**; Luminanz Limited, **Neil Haigh**; Connaught Engineering, **Tony Martindale**; Ocean Flow, **Graeme Mackie**.  
**Global Security Challenge 2009:** High Tech USA, **Keith Napelpka**; Thoca Limited, **Steve**; Secureref, **Joanne Kelleher**  
**Bright Simmons**, MPedigree  
**Simon Schneider** OmniCompete  
**Marco Zappalorto** OmniCompete  
**Tim Abbot** Winner Cyber Security Challenge,  
**Dave Ravel** Head of the Entrepreneur Fast Track at The Carbon Trust

**OPEN INNOVATION**

**Amanda Severied** Rockefeller Foundation  
**Lisa Reinold** InnoCentive  
**Britt Lake** Global Giving  
**Mark Bent** Sun Night Solar, Prize promoter  
**Kathy Plazak**, InnoCentive, Global Good Campaign  
**Anne Garwood** Green Empowerment  
**Allan Mwembe** Health and Water Foundation, Kenya  
**Reuben Kibegwa** Health and Water Foundation and Uwezekano Initiatives

**SOCIAL PRIZES**

**Vicki Purewal** NESTA  
**Kumar Nityanand** Dept. of Drinking Water and Sanitation, Government of India  
**Jayne Cox** Evaluation Consultant at BrookLyndhurst

**MARKET STIMULATION**

**Claire Smith** Senior Policy Advisor at Saltire Prize  
**Proctor Reid** National Academy of Engineering  
**Ray Philips** China Refrigeration Programme  
**Laura Carse** Pelamis Wave Power, applicant to Saltire  
**Douglas Watson** Scottish Power Renewables, applicant to Saltire  
**Professor Abul Hussam** Winner of Grainger Prize  
**Alex Reid** Off-Shore Renewables Team, Scottish Government (Saltire Prize)  
**Michael Berry** Scottish Government media and communications  
**Lee Buchanan** DARPA  
**Sue Barr** Open Hydro





## ANNEX 2: Bibliography

### 2011

- Wale Adekunle, Joachim Binam and Judith Oduol “**Impact of IAR4D on poverty and food security in the Lake Kivu Pilot Learning Site (PLS)**” Forum for Agricultural Research in Africa
- Luciano Kay “**Managing Innovation Prizes in Government**” School of Public Policy, Georgia Institute of Technology

### 2010

- Kimberly Ann Elliott, Senior Fellow, Assisted by Matt Hoffman **Pulling Agricultural Innovation Into The Market**; Centre for Global Development
- The Case Foundation “**Promoting Innovation: Prizes, Challenges and Open Grant making**”
- Jonathan H. Adler “**Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization.**” *Harvard Environmental Law Review*
- Luciano Kay “**Modelling incentives, R&D activities, and outcomes in innovation inducement prizes**” School of Public Policy, Georgia Institute of Technology

### 2009

- McKinsey and Company “**And the winner is...?**”
- Michael Kremer “**Incentivising Innovation; Adding to the toolkit**” Harvard University, Brookings Institution
- Jaison Morgan “**Inducing Innovation through Prizes**”

### 2008

- Masters, WA & Delbeqc, B “**Accelerating Innovation with Prize Rewards, History and Typology of Technology Prizes and a New Contest Design for Innovation in African Agriculture**”
- Liam Brunt, Norwegian Business School (NHH) and CEPR Josh Lerner, Harvard Business School Tom Nicholas, Harvard Business School “**Inducement Prizes And Innovation**”

### 2006

- William Masters “**Prizes for innovation in African agriculture: A framework document**”
- Thomas Kalil “**Prizes for Technological Innovation**” The Hamilton Project
- William M. Butterfield “**Facilitate Institutional Development, Win a Prize! How the World Bank and Other Donors Could Help Overcome Barriers to Growth.**” Paper for the 2006 Public Choice Society Annual Meeting
- Juri Saar. “**Prizes: The Neglected Innovation Incentive.**”
- ESST: The European Inter-University Association on Society, Science and Technology

### 2005

- Richard Newell and Nathan Wilson “**Technology Prizes for Climate Change Mitigation.**” Resources for the Future Discussion Paper 05-33.
- Enterplan “**Rates of Return to Research A literature Review and Critique**” for DFID

### 2004

- Alex Schroeder “**The Application and Administration of Inducement Prizes in Technology.**” *Independence Institute Research Paper.*
- Lee Davis and Jerome Davis Elsinore “**How Effective Are Prizes as Incentives to Innovation? Evidence from Three 20th Century Contests.**” Paper for the DRUID Summer Conference on Industrial Dynamics, Innovation and Development., Denmark

### 2003

## ANNEX 2: BIBLIOGRAPHY

- William A. Masters **“Research prizes: a new kind of incentive for innovation in African agriculture”**

### Older

- Wright Brian D 1983 **“The Economics of Innovation incentives: Patents , Prizes and Research Contracts”**

# **Evidence Review – Environmental Innovation Prizes for Development (Stimulating Innovation in Low Carbon and Adaptation Technologies)**

## **THE CASE STUDIES**

### **Innovation Awards**

Changemakers  
NHS Innovation Challenges  
Shell Springboard  
Global Security Challenge  
Ashden Awards

### **Open Innovation**

InnoCentive and NineSigma  
Rockefeller / InnoCentive Initiatives

### **Social Prizes**

NESTA's Big Green Challenge  
The Nirmal Gram Pursakar

### **Market Stimulation Prizes**

The Ansari X Prize  
The Orteig Prize  
The Longitude Prize  
The Saltire Prize  
The Grainger Prize  
The Super Efficient Refrigerator Programme (SERP)  
The China Energy Efficient Refrigerator Programme



# Innovation Awards

- ✓ Generate Media Buzz for promoters and applicants
- ✓ Identify new and diverse problem solvers/innovators
- ✓ Help Lever investment funds
- ✓ Get funds quickly and easily to small start up companies
- ! Integration of the awards into broader programmes of support could further positive outcomes

## The Case Studies

**Changemakers**

**NHS Innovation Challenges**

**Shell Springboard**

**Global Security Challenge**

**Ashden Awards**





Ashoka's Changemakers<sup>1</sup>

**Intended benefits:** Networks and Partnerships; New Ideas and Solutions

This is a web based portal developed in order to build a community of practice; it is used by leading corporations and foundations to source innovations to solve social problems. The initial premise of the site was to follow an eBay crowd sourcing approach to social problems; it started off putting up awards of up to \$5,000 to identify innovative approaches to tackle social problems. Prize promoters were benefited with a range of novel and grassroots based ideas (critically the Changemakers community is made up of individuals from the development and NGO community, by people with practical hands-on experience of the social problems to be addressed). Applicants benefited from exposure which could lead to funding, and of course the potential to win the prize.

As Nancy Barrand of the Robert Wood Johnson Foundation's Pioneer Fund put it: *"The Changemakers open source competition model let us shorten our three-to four-year Call for Proposals process for identifying investment-grade opportunities to three or four months, while delivering an equivalent number of quality projects."* Changemakers has a community of over 150,000 registered users globally. In the six years it has been operational it has sourced over 12,000 innovations and distributed approximately \$80 million in awards for over fifty organisations. Organisations using the site typically have long standing relationships with Changemakers running repeat awards. They include International Foundations (Rockefeller, G20, Global Alliance for Improved Nutrition, The Hewlett Foundation) and the CSR departments of large corporations (eBay, Carnegie Corporation, National Geographic, Exxon Mobile, Condé Nast Traveller).

In the past few years there has been a greater demand to link the relationship between awards and social impact. This has resulted in a shifting focus from the funding of small idea based prizes of up to \$5,000, to much larger scale awards with awardees needing to demonstrate a track record and the ability to implement the winning idea. This is most recently demonstrated by the G20 competition, awarding half a billion dollars in financing, with the prize distributed between 14 different organisations. In this case the prize purse is in the form of tied financing. These types of prizes in effect are an alternative, open source, process for identifying suitable financing opportunities that take advantage of one of the key benefits of prizes - getting unexpected solutions from unexpected sources - while retaining control by the prize promoter to influence impact.

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<sup>1</sup> Interview with Josh Middleman, Ashoka's Changemakers 20 May 2011





## NHS Innovation Challenge Prizes

The UK's National Health Service (NHS) launched its first Innovation Challenge Prizes in December 2010, running 7 different challenges concurrently to recognise and reward ideas that tackle some of the most challenging areas of healthcare. "The Challenge Prizes aim to support innovation in the NHS, encouraging the development and spread of new ideas that will deliver better patient outcomes".

The aim of the challenges are oriented to identifying best practice rather than stimulating new technology. The critical element of the prize process is the definition of the problem, leaving the path to the solution open to solvers - the prize specifies the intended outcome not the route to it.

This type of challenge takes advantage of crowd sourcing to identify best practice from both within and outside the healthcare profession, but has other important benefits. The most important benefit identified by the Prize Promoter is the chance to change the culture within the NHS to one that better rewards innovation. Not only is the innovation financially rewarded but the prize process provides opportunity to publicly demonstrate achievements that can be replicated and scaled up. The Innovation Challenge Prizes are also intended as a vehicle to promote dialogue among senior health professionals and raise challenging questions on how to best promote and support innovation.

It is too early in the prize process to do an in-depth value-for-money assessment, however, the winners of the first round of the challenges have been identified and the solutions have successfully uncovered new processes.

One of the challenges - to increase independence for those with Kidney Failure - has uncovered a process used by a dialysis team in Manchester that reduces the cost of home delivered dialysis per patient by £12,000 per year. **A rough cost<sup>2</sup> benefit analysis indicates that it would take only 10 dialysis patients requiring home delivered dialysis before the prize offered good value for money.**

A second Challenge has yielded savings for the NHS of roughly £13,000 per month, giving a highly positive return on investment.<sup>3</sup>

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<sup>2</sup> We are unable to publish detailed cost figures at this time

<sup>3</sup> Press release June 2011



### ***What are the Shell Springboard Awards?***

Shell Springboard is a social investment (or corporate social responsibility) initiative fully funded and managed by Shell. It is a prize programme that provides a financial boost to innovative, low carbon business ideas from across the UK by providing 8 awards of £40,000 through 3 separate regional UK events per annum. Each region has a maximum number of awards it can give, but no minimum. The actual number of awards made, and the level of each award, is at the judges' discretion. Judging is carried out by panels of independent experts at the 3 events.

Up to 2 businesses from each of the 3 events will then meet a national judging panel prior to the announcement of an overall UK winner.

The judges are looking for business plans for a product or service which:

- will lead to greenhouse gas emissions reductions
- is commercially viable
- is innovative

The Shell Springboard awards aim to provide a leg up to existing ideas and innovations that have been researched and are ready to be commercialised.

### ***The Intended and actual benefits<sup>4</sup>***

Shell runs Shell Springboard as a social investment programme to benefit the UK. The aim is to support new technologies and business ideas to address the ever increasing energy challenge. Demand for energy is likely to double by 2050 and at the same time there is a need to significantly reduce CO2 emissions. There are two main benefits to Shell in running the prize – Reputational and Philanthropic. Shell recognises the need to socially invest in the countries in which it is working in order to ensure the sustainability of its business in those countries. The intended philanthropic benefit of the prize is the stimulation of the low carbon technology market place; a tidy fit for an energy company like Shell.

Shell has been running the programme since 2005 and considers it highly successful. It has awarded £1.98 million in no-strings-attached prizes and generated some significant media attention.

In the first month after the 2011 awards the prizes generated 92 pieces of coverage in one month, reaching an audience of 24 Million for 10 winners. Coverage included local, regional and national broad sheet press and trade publications as well as a lot of activity on twitter. Not all articles made reference to Shell Springboard, as the winning technology and company often took centre stage.

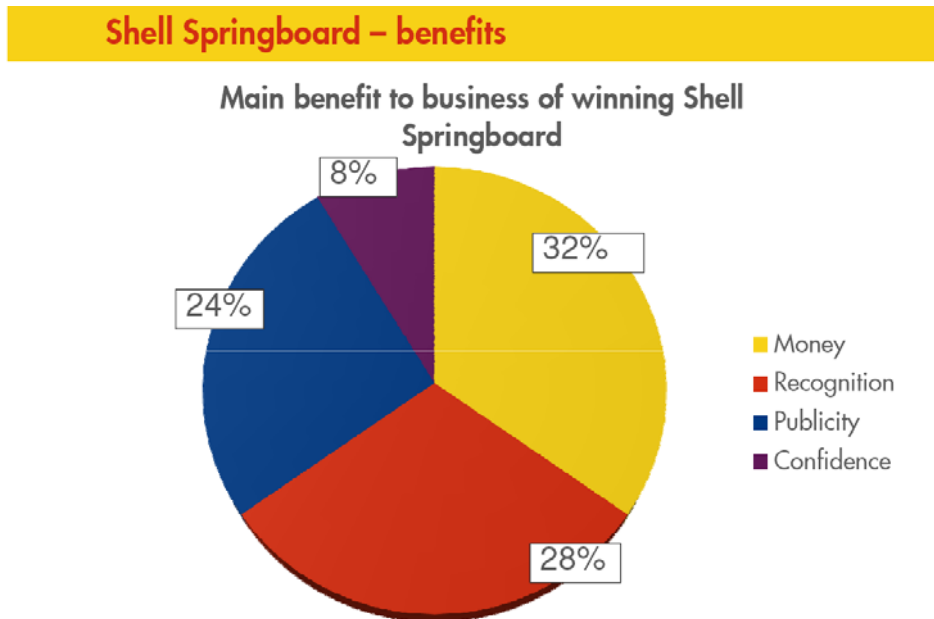
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<sup>4</sup> Jenny Marsden, Shell SpringBoard

According to statistics prepared by Shell following interviews with 26 winners since 2005, there has been an average increase in employee numbers among winning firms by a factor of 7.4, with the average employee size of 16 staff; a total of £27,432,000 investment was secured.

### ***The applicants' motivations<sup>5</sup>***

Shell undertook an interview of applicants and found that the motivations were fairly evenly spread between reputation, publicity and the cash award, as demonstrated in Figure 5.



### ***The Costs***

The total prize purse since 2005 has been £1.98 Million. Shell was unable to share any information regarding the costs associated with running the prize.

### ***Value for money***

In order to calculate value for money we need to put a value on benefits attained:

Reputational Benefit: We have been advised that the cost of running an advertising campaign that aims to achieve 90 plus pieces of coverage and an audience of 24 million would be in the region of £497,000<sup>6</sup>.

Philanthropic benefit: This can be defined as the extent of the market stimulation, calculated by Shell to be £27.4 Million.

<sup>5</sup> Presentation by Jenny Marsden, Shell Springboard, April 2011

<sup>6</sup> PRV figure provided by Shell Springboard

Environmental benefit: We have not included benefits associated with carbon savings as they would require the forecasting of the future sales revenues and CO<sub>2</sub> savings compared to other products on the market place in the future which will be too tenuous to forecast.

We do not have any running costs for Shell, however we have estimated a Benefit Cost Ratio of between 8.93 and 9.36 depending on the discount rate applied<sup>7</sup>. This figure assumes that all the investments achieved by the finalists are attributable to participating in Shell Springboard. No common standard currently exists to define what level of attribution is appropriate, a level of attribution as low as 20% still returns a positive B/C Ratio of around 2.

We interviewed 5 winners from 2009 who identified a number of key advantages of the Shell Springboard:

**Prestige.** Being associated with an award from the Shell brand name helped provide credibility to their start up or SME, this was particularly relevant for those businesses with non traditional ideas.

**Publicity.** As one interviewee said, “it went viral in the press”. Though the extent of media coverage is partly down to how effective the winner is at harnessing and working with media agencies - a runner up in 2009 securing greater media coverage than the National winner.

**Leverage.** Not all respondents were able to accredit new funding as a result of Shell Springboard, either because it did not generate interest or, in more than once case, because they were not institutionally ready to respond to the opportunities presented. However, those that did associated highly significant returns, for example one respondent had potentially 4 multi-million pound contracts in the pipeline for all of which he had been directly approached.

**Quick and easy.** All respondents commented that the relatively low award amount was offset by the ease of application and the speed of assessment and award. The award amount does not necessarily change the business but it can provide a useful lifeline. As one respondent stated they had several opportunities in the pipeline but no money to pay salaries that month. The award took 3 weeks from application to receipt of funds and literally saved the business from going under.

**No Strings attached.** The nature of the prize allowed winners to use the funding in any way they chose and allowed them to adapt their technologies post award should they so wish. One respondent stated that he had adapted the technology four times since the award in order to fit

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<sup>7</sup> The UK government standard is 3.5% but generally considered too low, a common standard for Benefit cost analysis is usually around 10%

market demand and questioned whether this would have been possible under any other funding scheme.

**Post Prize Support.** There was unanimous agreement that the post prize support provided by Shell was extremely helpful in terms of making connections, sharing ideas, getting moral support and promoting the business.

When asked to compare the Innovation Award approach with grants, the advantage of not requiring match funding was a key benefit to Finalists. They also noted that the due diligence required by public grants such as the European Framework required significantly higher investment to put in the application. This was often followed up by complicated post award monitoring, and in some cases required the establishment of partnerships with organisations that they otherwise would not have chosen to make.

It was pointed out that grant schemes are often only possible for larger firms who have resources to invest in developing and managing applications, and to match the funding available. For really small start up companies, where cash is typically the major constraint, prizes provide easy access to ready cash in a way no other mechanisms do.

Another programme that aims to stimulate innovation in the low carbon sector is the Government Funded Carbon Trust (CT) Entrepreneurs Fast Track (EFT). This scheme provides a customised package of expert commercial advice, networking opportunities and grant funding to small enterprises that are developing low carbon technologies in the UK. The Scheme has supported over 300 SME and start up companies, and leveraged £130million in private funding<sup>8</sup> for those businesses, representing a return on investment (ROI) of £13 for every £1 spent.<sup>9</sup> The Carbon Trust has considered the question of attribution and applies a yes/no standard so that either all private funding is included when calculating the ROI or none, depending upon a reflection by managers of the role EFT played in securing the funding. The high return on investment is most likely attributable to the strength of the infrastructure provided by CT to help companies grow which includes up to £70,000 of expert commercial support per applicant. Grant funding for research and development is also provided but requires match funding of at least 40% because of UK Government rules related to State Aid. The EFT has focused on simplifying the application process, so the often cited benefit of prizes versus grants – that the application is much simpler – is negated in this particular case.

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<sup>8</sup> Post support Venture Capital, Sales, Licence deals, Joint Development Agreements and Acquisitions.

<sup>9</sup> Dave Ravel, Head of Entrepreneur Fast Track at the Carbon Trust, May 2011

Another stated mechanism which has helped a Shell Springboard winner is Research and Development tax credits; these have helped return vital cash into the start up company. However, these only work if the company already pays corporation tax (ie makes a profit), or pays income tax and NI to its employees and can wait until the year end to get its money back. It is therefore of no value to very small companies.

There is a distinct difference between large grant awards and multiple small prizes. The first require integration with public policy and considerable investment and have correspondingly good returns whilst the latter (and most certainly in the case of Shell Springboard) provide a relatively cheap way to positively support SMEs and gain considerable PR advantage. The branding associated with Shell Springboard is of considerable benefit to applicants.

**The EFT application process:**

As a first step, would-be applicants call the EFT and are run through basic application criteria, those that meet the criteria are then provided with 1 hour of value-adding mentoring advice after which they are advised whether or not to apply. The application form is 5 pages long and is followed up with a 45 minute telephone interview.

***Lessons learnt***

Critical to the operation of the Innovation Awards has been the respect of the applicant's intellectual property; Shell Springboard ensure that only 2 people within the organisation see the applications, and Shell as a company does not benefit from the ideas that are put forward.

Ensuring the legitimacy of ideas is also a challenge, stringent checking to ensure that ideas are not "stolen" is important and often difficult, given that there are lots of people dealing with the same low carbon challenges. Sufficient resources need to be applied to carry out legitimacy checks.

The credibility of the award is also tantamount; high profile independent judges are essential for the awards to have meaning in the investor community and enable the success of winning businesses.







### ***What is the Global Security Challenge (GSC)***

The GSC “seeks to discover the creative capabilities of innovators in young companies, including university spin-offs that address public security needs. This includes hardware or software solutions that help (a) protect people, critical infrastructure, facilities and data/electronic systems against terrorist attacks or other criminal acts and natural disasters or (b) help governments, businesses and communities prevent, defend against, investigate/prosecute, cope with or recover from such incidents”<sup>10</sup>.

The prize has been running for five years and principally looks for technology that has gone beyond the idea stage but is not necessarily fully developed; the scope is relatively broad.

The US public sector Technical Support Working Group<sup>11</sup> (TSWG) first participated as a judge but saw enough value in it, that they have provided the prize purse for the last five years.

### ***Actual and intended benefits***

During year 1 the TSWG judged the competition and saw that they were getting “dramatically” broader submissions, both internationally and organisationally, to the GSC than they did to their Annual Solicitation process, which is the mechanism they use to hand out grants. The prize typically receives 200 submissions annually and 80% of the companies have not previously submitted to the TSWG standard annual procurement solicitation. However, after participating in the prize, non winners subsequently do submit to the Annual Solicitation. Applicants, in particular international ones, are quoted as feeling prior to competing in the prize that the Annual Solicitation process was not meant for them. Whereas the prize appeared more open, particularly when English was not a first language.

The broader range of applicants also includes “dramatically greater international responses” both in terms of greater numbers of submissions from other countries and also from countries that do not normally submit. It is this breadth of submissions that provides the internal justification for funding the prize which is now in its fifth year.

Spill over benefits have included impressive figures for the stimulation of the market, with a quoted figure of \$104 million having come from private sector investments over five years, along with a noted improvement in the quality of submissions over time, particularly from international suppliers.

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<sup>10</sup> <http://www.omnicompete.com/security,competition-21>

<sup>11</sup> The US’s National Interagency Research and Development Program for Combating Terrorism Requirements at Home and Abroad

TSWG also benefits from “royalty free” (preferential) pricing for winning technologies.

Reputation is not perceived as a benefit; the organisation deliberately keeps a low profile.

### Summary of benefits

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>• Dramatically broader submissions both internationally and organisationally</li> <li>• 80% of entrants new to TSWG</li> <li>• Dramatically greater international responses</li> <li>• Improved quality of submissions</li> <li>• New additions to Annual Solicitation</li> </ul>	<ul style="list-style-type: none"> <li>• \$ 104 Million in private sector investments over 5 years</li> <li>• Preferential pricing for winning technologies (no data available)</li> </ul>

### Costs

The costs of administering the prize are covered by OmniCompete and private sector sponsors, and are estimated at about \$100,000 per annum, of which 50% is staff time, the rest are costs associated with PR and events.

TSWG provide the majority of the prize and one person-month of time to participate in judging and associated events. The prize has the value of \$500,000 per annum, and typically includes high-level mentorship from partner organisations. The prize fund is divided as follows:

**Prize 1: SME= value of \$ 300,000**

**Prize 2: Start-ups: value of \$ 200,000**

Costs	\$
Administration by the prize platform (OmniCompete)	\$100,000
Senior manager at TSWG for one month (estimated)	15,000
Prize Purse	500,000
Total Annual Cost	615,000
Total Cost over 5 years	3,075,000

### Value for Money

We do not have values for the qualitative benefits listed above, nor do we have data related to preferential pricing benefits. Simple calculations of Return on Investment (ROI) considering just the leveraging of private sector investment are attached; a significant ROI of 32.47 is achieved at a discount rate of 10%. It is not possible to define what degree of subsequent investment is attributable to winning the prize; the table attached provides different ROI calculations assuming different levels of attribution at 20, 50 and 80%. Even at the lowest level of attribution and highest discount rate, the ROI is 6.49.

As an alternative to funding the prize competition, TSWG conducted research to identify innovators outside of the US and encouraged them to submit to the Annual Solicitation. The response rate was very low and that effort has been suspended. We can conclude that the prize is cost effective and appears to demonstrate value for money versus other initiatives when trying to solicit new organisations, particularly internationally. The TSWG is said to be “very satisfied with prize process”.

***Additional Lessons learnt:***

Publicly posting the winning presentation helped to provide educational benefits to companies not used to dealing with the prize promoter.

*Sources: expert that has supported the GSC for the last five years and Simon Schneider, OmniCompete.*

**Name of Prize:** Global Security Challenge

Unit: \$'000

Costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Prize money		500	500	500	500	500
Operational costs*		100	100	100	100	100
Set-up costs	100					
<b>Sub-total costs:</b>	<b>100</b>	<b>600</b>	<b>600</b>	<b>600</b>	<b>600</b>	<b>600</b>

**Assumptions:**

\$500,000 per annum

\$100K per annum advised by OmniCompete (50% staff time, 50% events and PR)

Assume some start-up costs, incl. promotion of prize

Benefits	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Market stimulation (philanthropic benefit)		11556	23111	23111	23111	23111
Reputation enhancement (equivalent advertising)						
Cost savings on internal resources (e.g. research)						
Access to networks of experts (cost avoidance)						
<b>sub-total benefits</b>	<b>0</b>	<b>11556</b>	<b>23111</b>	<b>23111</b>	<b>23111</b>	<b>23111</b>

Calculated by OmniCompete at 104m in June 2011 after 5 challenges (assume benefits only start to accrue six months from first award)

<b>Benefits less Costs</b>	<b>-100</b>	<b>10956</b>	<b>22511</b>	<b>22511</b>	<b>22511</b>	<b>22511</b>
----------------------------	-------------	--------------	--------------	--------------	--------------	--------------

	at 3.5%	at 8%	at 10%
<b>NPV</b>	90374	79081	74730
<b>PV benefits</b>	93183	81576	77104
<b>PV costs</b>	2809	2496	2374
<b>B/C ratio</b>	<b>33.17</b>	<b>32.69</b>	<b>32.47</b>
<b>IRR</b>	11059%		

Does not include benefits that may occur in the future

<b>Difference in B/C ratio based on different levels of attribution to the prize</b>			
<b>20% attribution</b>	6.63	6.54	6.49
<b>50% attribution</b>	16.59	16.34	16.24
<b>80% attribution</b>	26.54	26.15	25.98



## What are the Ashden Awards?

The Ashden Awards have been running since 2001 to identify and give recognition to sustainable energy solutions in the UK and developing world, with the aim of promoting wide scale adoption.

Up to 12 awards are made annually from over 200 entries. The Awards are funded by a number of philanthropic and corporate foundations.

Winners are rewarded with:

- cash prizes of £10,000 and £20,000 for UK winners and £20,000 and £40,000 for International winners
- a trip to London to receive the prize which includes speaking at the Ashden Conference, being provided with speaker and media training, and having meetings with potential funders (e.g E+Co, Ark Finance, Climate Care). In addition all winners have a private audience and picture with HRH The Prince of Wales, the Awards Patron
- media exposure including a short broadcast quality film about the winning work and interviews with BBC World television BBC World service and other media
- a substantial package of post prize support which includes being introduced to potential funders and being given access to business, technical, or organisational support to enable scale-up of their work.

Recent winners include micro-hydro schemes bringing power to remote areas in Brazil and Peru; businesses selling solar home systems and lanterns from Nicaragua to Africa and India; and biogas programmes building domestic and institutional digesters in Vietnam, Kenya and India. The 2011 gold winner is a scheme for clean cookstoves in Ghana and Nigeria.

## The intended and actual benefits

The intended benefit of the awards is the promotion and scale up of sustainable energy solutions in the UK and developing world. The Awards identified that there was a lack of awareness of the achievements of entrepreneurs working in clean energy. In particular:

- Limited growth potential with little access to finance - unwillingness of banks to lend to SME's in entrepreneurial activities being the single biggest problem
- Lack of recognition of their achievements. Lack of understanding of the benefits local sustainable energy can bring to communities (health, education, livelihoods etc.)
- Little voice amongst policy makers.

Their aim of the Awards is to see 1 billion more people have access to clean energy by 2020. This is to be achieved through:

- Using the prize approach to identify excellence from new and diverse applicants
- The provision of significant public relations (PR) support through media and promotion around the award of the prize, a key element in this is strength of the Ashden Award “brand”
- Providing a significant package of post award support to help strengthen and grow winning applicants’ operations both through capacity building and the identification of funding opportunities and encouraging replication
- Acting as an advocate for local sustainable energy to relevant audiences, both in the UK and internationally e.g. India.

The Awards have started to gather data on outcomes for the last 3 years. During this time winners have:

- Leveraged\* in excess of £8 Million in additional finance - a basic RoI of 7.4
- saved 3 million tonnes of carbon
- improved the lives of 23 Million people - at a cost of £0.34 per person

\*The finance levered is based on finance directly and wholly attributable to post award support provide by the Ashden Awards.

The prize process is not the only method used to attract and identify a broad range of diverse applicants; approximately 200 applicants are received each year (100 UK and 100 international). The Ashden Awards also solicit and use their networks to encourage applications; although the Awards receive many applications through publicity, experience has shown that there is no substitute for on-the-ground knowledge and personal recommendation in ensuring the best-quality of applicants.

The media and PR benefits of the Ashden Awards are very evident. One of the Ashden Award winners was greeted off the plane on his return from getting the award by the president of his home country Namibia. Quotes from past winners regarding the PR value of the Award include:

*“The press exposure we have received from the awards has been incredible. Our website traffic has jumped up substantially and we have had visitors from across the world. We have had a massive surge in distributor inquiries, and almost all of them heard about us through our interviews with the BBC.”* Ned Tozun, D.light Design, 2010 Gold Award winner



*“The Ashden Awards of 2005 and 2007, propelled SELCO INDIA to a different league.”* Harish Hande, SELCO Solar Ltd, India

*“Publicity has helped immensely with the company, with Kensa being talked about in the national and local press. It has meant our reputation has been enhanced and a number of companies now seek our advice and technical expertise.”* Kensa Engineering - UK - 2008

Post Prize support has been seen to provide an opportunity to add considerable value to the prize processes by helping winners secure additional financing and through the provision of capacity building support. Examples of post prize support given to winners are detailed in the box.

### Winners and Post Prize Support

#### **Zara Solar:**

Tanzania has one of the lowest rates of electrification in the world. Only 10% of the population have access to the electricity grid - in rural areas only 2%. The Ashden Awards supported Zara Solar in developing a business plan and the international profile of being an Award winner helped them obtain bulk supplies of PV modules (by guaranteeing a bank loan). The international profile from the Award has led to Zara receiving a World Bank Lighting Africa Award.

*“The 2007 Ashden Award took us to a new level that made it necessary for us to take steps that we never thought we would take when we started in 2005.”* – Mohamed Parpia, MD Zara Solar.

#### **Grameen Shakti:**

won an Ashden Award in 2006 for providing photovoltaic solar-home-systems to 65,000 households in Bangladesh. In the two years up to 2008, thanks to support from the Awards and their raised profile, this grew to 150,000 solar-home-systems. Also, as a direct result of winning an Award (they saw the examples whilst at the Ceremony in London and decided to try them themselves), Grameen Shakti produced and sold 14,000 cheap, efficient cooking stoves and 3,000 biogas plants.

#### **The Mwanza Rural Housing Programme (MRHP):**

MRHP is an NGO in Tanzania that has trained villagers in northern Tanzania to set up enterprises making high-quality bricks from local clay, fired with agricultural residues rather than wood. This has enabled over 50 brick-making businesses to make sufficient bricks to construct over 100,000 homes with greatly improved comfort and durability, in 70 villages. At the time of winning the Awards, one of the biggest challenges faced by MRHP was its reliance on grant funding. Ashden Awards helped MRHP develop a strategy for a spin-out social enterprise, create a business plan and raise the investment finance needed to start up the new company. Nyumba Bora Brick Company has been in operation since June 2009.

#### **SKG Sangha:**

SKG Sangha manufactures and distributes biogas plants which use cow dung to produce cooking gas and a residue which is made into an effective fertilizer. To date SKGS have installed 80,000 biogas plants enriching the lives of some 500,000 people, and saving over 350,000 tonnes of CO<sub>2</sub> a year.

The Ashden Awards provided technical support to help SKG Sangha to develop more efficient units. The Awards also helped them develop a business plan and secure interest from a carbon finance investor. Since then, they have installed over 70,000 new biogas plants, benefiting more than 350,000 people, begun processing a carbon finance deal and expanded their work into Kenya, Uganda and Ghana through the links created with other Ashden winners.

## The Costs

It cost the Ashden Awards approximately £60,000 per award given, or £360,000 per year based on 6 awards per annum. 33% of the costs relates to prize award and approximately 33% to after award business support costs.

## Value for Money

The purpose of this case study research is to identify the value for money of the prize process. In this case it is difficult to differentiate between the effects of using a prize approach to identify “winners” to whom to provide ongoing support, compared to other methods such as grant procurement processes because the outcomes detailed are attributable to both the prize process and the additional package of support provided. It is unclear to what extent winning entrants would have levered additional funding without the post prize support, though considerable media and PR value is evident. It is clear that the **programme** of support provided by the Ashden Awards provides good value for money; the extent to which the prizes process contributes to this value is not clear. It is also worth noting that the funding leveraged is typically in the form of private sector investment, bank loans or carbon finance.

A report commissioned by DFID analysing 10 Ashden Award winners has shown that there is potential for small and medium enterprises (SMEs), both for-profit and not-for-profit, to provide low-carbon energy access to poor households at significant scale. This implies that there is potential to further attribute substantial value.

## Lessons Learnt

There has been a notable increase in post prize support provided by the Ashden Awards over the years; it has become evident that these additional resources and support can add significant value to the prize process. This supports the findings of other case studies that prizes can be effective as part of a broader package of support. In addition post prize support has been provided in some cases over several years indicating the importance of the longevity of the Awards and support programme.

The external environment is also important; a recent IPPR report “From Policy to Practice” highlights the importance of policy on increasing the scale and scope of sustainable energy in the UK. *“While a number of policies have successfully enabled growth in the low carbon sector others have failed to meet the needs of Award winners; funding – the amount and consistency of it – was cited as the key barrier by 80 per cent of respondents, making it difficult to plan work and meet expectations. The stop-start nature of some policies has been particularly problematic.”*

*“Some Award winners have experienced difficulties in securing financing for their own projects. Others fear that business may dry up as clients are unable to access finance or shift their focus away from environmental concerns. Other barriers included planning permission and recruiting technical skills.”*

Award winners were keen to see a continuous funding mechanism, along with funding dedicated to capacity building and training, and greater policy coherence.

The report concludes on the importance of government, and indeed all political parties, committing to a long-term strategy offering predictable funding flows. *“Awards winners of the Ashden Awards have to work around a lack of resources and support, largely because the key policy instruments have not been tailored to their needs but rather to those of the large energy suppliers. This makes it difficult for them to plan and develop sustainable energy to the communities they work with in a predictable way.”*

The awards promoters undertake a rigorous process of assessment of short listed applications before deciding on winners. This process of due diligence is vital for ensuring the validity of the award “brand”.



# Open Innovation

- ✓ A positive return on investment compared to grant funding
- ✓ A good rate of problem resolution
- ✓ Identification of new and diverse solvers
- ! There is no evidence to suggest any link between the solution and the widespread use and adoption of the technology

## The Case Studies

**InnoCentive**

**NineSigma**

**The Rockefeller / InnoCentive Initiative**



## OPEN INNOVATION: INNOCENTIVE AND NINESIGMA

### **InnoCentive and NineSigma**

Two main platforms that command the market for open innovation in the United States are InnoCentive and NineSigma.

The NineSigma approach focuses on establishing partnerships for the resolution of high value, strategic and complex problems where an environment that protects the solver and seeker intellectual property is critical. NineSigma challenges solve problems in every technical discipline and industry. Due to an increased industry and government focus on sustainability in recent years, 73% of all NineSigma challenges are related to sustainability issues. Solvers come from industry, academia, research institutes, government and private laboratories, as well as individual inventors. NineSigma's network of solution providers respond to an open publication of a specific problem. The problem statement is provided in its purest form, engaging solvers who may be from a different sector or application, but who may have addressed the problem from a different perspective. The Challenge sometimes identifies the Seeker and other times the Seeker is anonymous. Since the strategic and monetary value of the solution and the related intellectual property is often high, the outcomes can be a financial reward ranging from US\$50,000-\$500,000 which often results in a partnership or ongoing collaboration rather than the transfer of a finite answer to a problem. Started in 2010, NineSigma has completed over 2,000 projects, received over 22,000 proposals and engaged with over 2 million Solution Providers. With locations in the US, Europe, and Japan, NineSigma clients include the largest global multinationals, such as Procter and Gamble, Syngenta, Kraft Foods, Unilever, Siemens, Philips, ConocoPhillips, Denka, Osaka Gas, and Dupont.

InnoCentive focus more on the identification of ideas or the resolution of specific problems either theoretically or by proven prototypes. InnoCentive run around 200 challenges a year<sup>12</sup>. 90% of their challenges are for commercial organisations such as Procter and Gamble, Syngenta and Roche who have been clients for many years. They have around 250,000 registered solvers and reach to over 12 Million through strategic partnerships. Challenges posted for ideas average 402 submissions; challenges for theoretical and proven solutions (reduction to practice) average 275 submissions. Of their solvers 48% are from the United States, with almost 90% of solvers coming from 20 countries<sup>13</sup>. The average number of theoretical and proven solutions that are awarded is approximately 38%.

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<sup>12</sup> Challenges per year 2006: 107, 2007: 148, 2008: 205; 2009: 200; 2010: 188

<sup>13</sup> United States, China, India, United Kingdom, Russia, Germany, Canada, Brazil, Italy, Spain, Australia, France, Netherlands, Mexico, Korea South, Switzerland, Turkey, Colombia, Israel and South Africa





### The Rockefeller InnoCentive Initiative (2007 – 2008)

The Rockefeller Foundation undertook an 18 month partnership with InnoCentive (2007-2008) in which 10 challenges were posted and 6 were awarded (a 60% resolution rate against a 38% InnoCentive average). The most successful was the Dual Use - Off Grid - Illumination Device, a \$20,000 award given for a written proposal for the design of an affordable dual purpose, interior, self-contained, off-grid lighting device. The problem was posted by Mark Bent of SunNight Solar (SNS) based in the US. The prize and InnoCentive's costs were met by Rockefeller for a total sum of \$58,750, not including the staff time of Rockefeller or SNS. Mark Bent was delighted with the solution which came from a New Zealand scientist; he says, "without trying we invented the world's best flashlight" and cites a number of benefits of using the prize process:

- ✓ He got the best solution, using a non-traditional approach
- ✓ The solution came from an unknown source
- ✓ He did not have to pay for research and development or retain R&D staff, and had no obligation to the inventor
- ✓ He got to understand the technology
- ✓ SunNight Solar and the light got credibility and visibility

The difficulty associated with the prize was the amount of time it took to go through all the applications, though at the same time this process provided a fantastic learning opportunity.

### Value for Money

It is difficult to compare the open innovation process with a grant; a key advantage of using open innovation demonstrated here was that the solution came from an unknown source, something that grants are less able to achieve. If we take as a ballpark figure an annual grant contract value of \$100,000<sup>14</sup>, the cost of running the prize process demonstrates a 42% saving, representing good value for money *if* the intended benefits are simply a technical solution to a problem.

The lights have a number of human<sup>15</sup> (see box), financial and environmental benefits that are only realised when the lights are actively in use.

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<sup>14</sup> A ball park average for grant contracts under DFID's Renewable Natural Resources Research Programme was £70,000 per annum they usually ran for 3 years, exchange rate £/US\$ in 2007 averages 0.5

<sup>15</sup> "Solar Task Light, Fugnido Refugee Camp" Report by UNHCR sub Office October 2006

For open innovation prizes the stimulation of the market, commercialisation of the product and its ultimate adoption lie outside the prize framework and rest with the prize promoter. In the case of the Rockefeller initiative the prize promoters were either not-for-profit organisations or start ups like SunNight Solar that lack the financial and human resources to develop and market the solution. SunNight Solar was able to lever some funds to commercialise the flash light, the biggest cost was the moulding at approximately \$40,000. The light has sold well within the US, where they sell through hardware stores and the internet to a western consumer market that has the ability to pay. This is in direct contrast with the market in Kenya where research by SunNight Solar identified that women in the slums of Nairobi are paying \$5 a month for kerosene, if sold at cost the lights can be distributed for as little as \$15 per light; however, the women of the slums do not have sufficient credit to buy the lights despite the 3 month payback and its associated benefits.

#### Human Benefits of the Sun Night Solar Lights:

A study on the impact of 50 lights in the Fugnido Refugee Camp identified a number of benefits from improved lighting provided, these include:

- Security (particularly for women in the camp)
- Education (providing the ability to study at night)
- Health (lighting at night for emergency care, particularly the delivery of babies)

The study concludes *“the use of the light will undoubtedly bring*

By establishing philanthropic programmes in the US, such as “buy one give one free”, SunNight Solar has been able to distribute 300,000 lights to Haiti and other disaster zones. However, the extent to which the lights would have benefited the developing world, without the commercial market in the US propping up the business, is questionable.

A second solution from the initiative is a Dry Based Bio-Latrine (which contributes to efforts to improve sanitation and water preservation in parts of Africa struggling with increased demand for safe water). The Kenyan Non Governmental Organization (NGO)<sup>16</sup> who posted the problem has been unable to secure any funding to implement the solution. A separate community based organisation linked to the NGO has managed to mobilise resources to put in 5 bio-latrines in its community at a cost of \$1500, a third of which was spent sensitizing the community and overcoming cultural barriers to use.

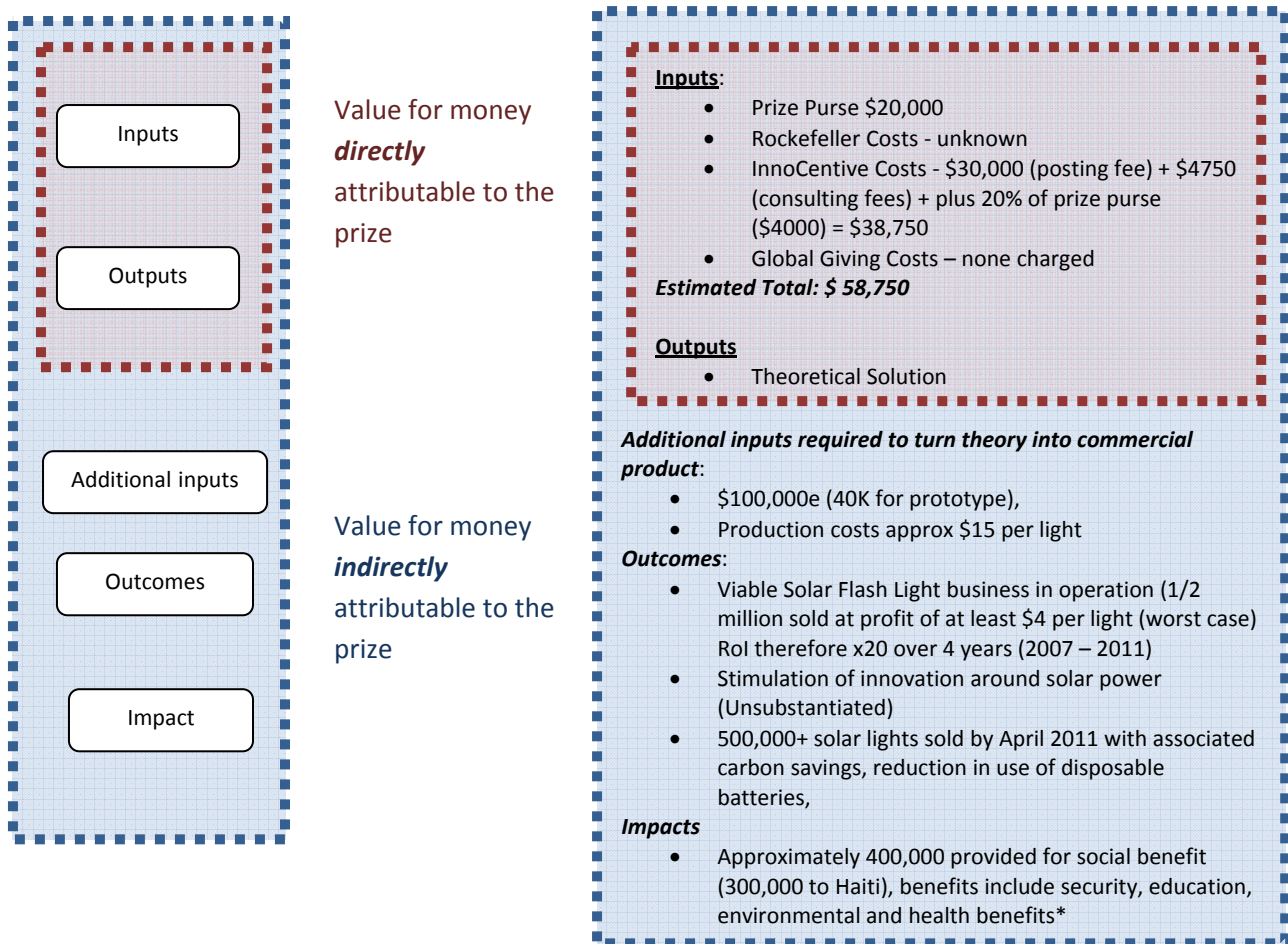
The costs and benefits of the SunNight Solar Challenge in relation to the prize structure are represented in Figure 1 below:

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<sup>16</sup> Health and Water Foundation, Kenya

## Defining Value for Money

**Figure 1: Value for Money Analysis Sun Night Solar: Dual Use - Off Grid - Illumination Device<sup>17</sup>**



\*An evaluation report by UNHCR Sub Office Gambella reported in 2006 that the 50 Solar Task Lights (STLs) trialled in the Fugnido Refugee Camp in Ethiopia “had improved the living condition of the refugee community especially the student Group”. UNHCR Gambella “believes that the use of Solar Task Light will undoubtedly bring tremendous positive effect in the lives of refugees precluding environmental destruction by illuminating the after dark life.” It concludes that “more STLs will play a great role in promoting education and enhancing the security of the refugees.”

### Comparing VfM against other methods to achieve the same aim

The technology utilised in the final solution is an alternative to the most common solar battery recharging technology in the market place. Mark Bent from SunNight Solar tells us that he has received adverse criticism from the battery industry for the technology employed, despite the obvious success of the product. It can be assumed that a grant processes to improve solar

<sup>17</sup> Data from interview with Mark Bent Sun Night Solar on 16 May, CFAR Report “An Evaluation of the Partnership between Rockefeller Foundation and InnoCentive”

technology are likely to have followed the perceived industry wisdom of the time, and therefore unlikely to have resulted in the solution found through the prize process. It is not possible to know what outcome such a research grant of the same value would have achieved, other than it would not have been the same as the winning solution. This demonstrates one of the main advantages of prizes – that, by defining the problem not the solution, it is possible to access a much broader range of innovation.

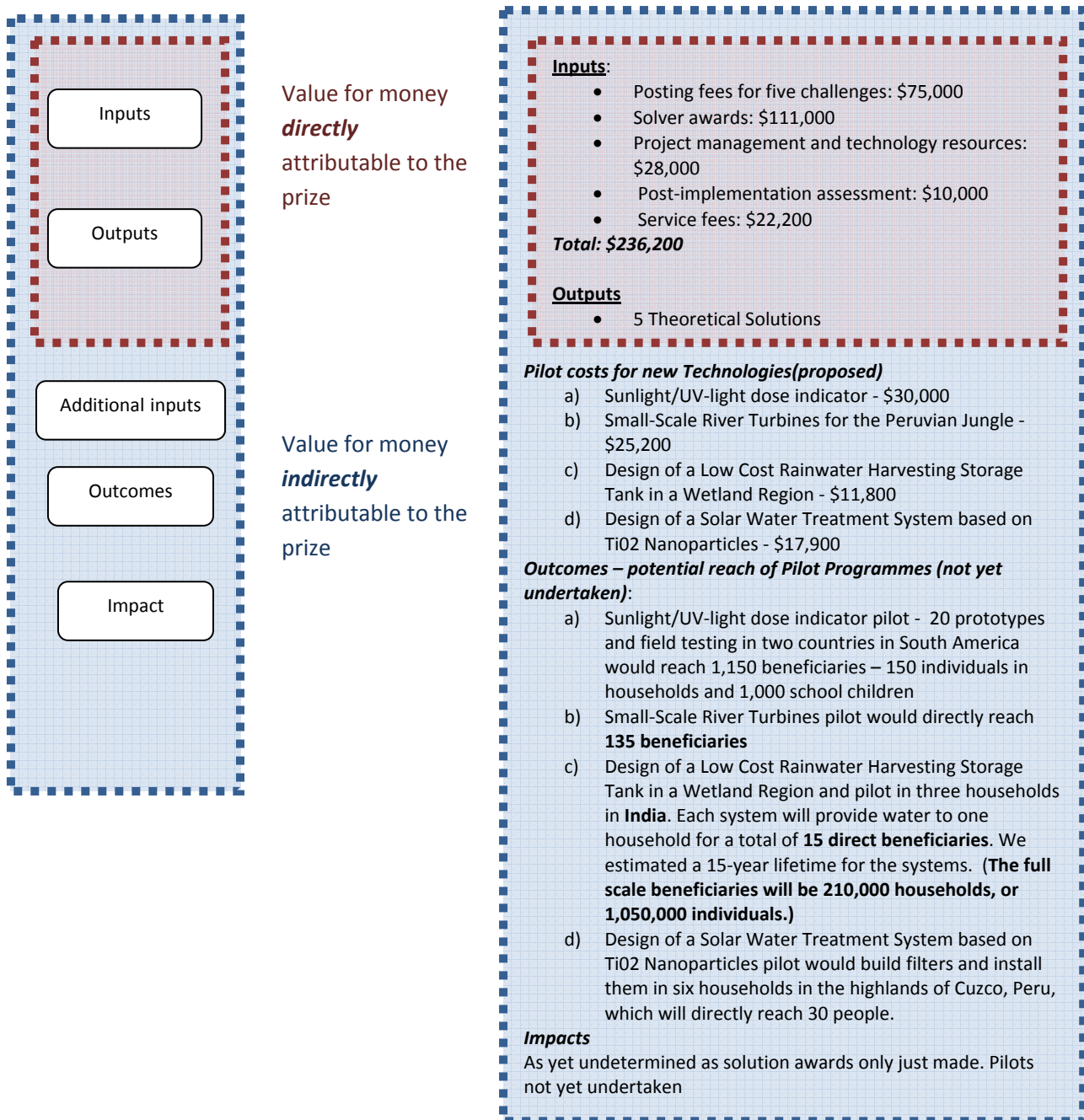
In an interview Mark Bent considered the prize process very good value for money. He was able to tap into a global pool of expertise (he received responses from India, US, and countries of the old Soviet Union; none from Africa or Europe; a New Zealander won the prize) to develop an innovative technology on which he now makes a profit. Additional benefits he identified include credibility and visibility, not having to retain research and development staff or pay for research and development or maintain any commitments to the inventor. While unable to use non-winning technologies, the range of responses provided a considerable educational benefit to him, he “got to understand the technology”.

It is likely that he would not have been able to put up the prize purse himself and that the role Rockefeller played in paying for the cost of running and awarding the prize was critical.

#### **Rockefeller InnoCentive Initiative 2010 – 2011**

Building on this experience Rockefeller has initiated a second round of challenges with InnoCentive managed by Global Giving, who, once solutions are found, will use their donor matching initiative to match funders with solutions. In addition, proposing NGOs have made a financial commitment to pilot the solutions. Five challenges were posted and all five awarded prizes (a 100% resolution rate). They are now at the stage of piloting the winning solutions. The average cost per solution is \$47,240. The costs and benefits of these challenges in relation to the prize structure are represented in Figure 2 below:

Figure 2: Value for Money Analysis, Rockefeller InnoCentive Initiative 2010 -2011<sup>18</sup>



As yet it is too early to know if the Global Giving arrangement will help lever finance to pilot the solutions, or if the prize process will help with that leverage. Global Giving cited that the main advantages of the prize were the bringing of attention to a specific problem and the receiving of potential solutions from the developing world. This backs findings from other Innovation Awards.

However, feedback obtained from one of the problem posting NGOs for the second round was to the effect that they found the process very time consuming, and they were concerned about having

<sup>18</sup> Data provided by Global Giving

made a commitment to pilot the solution while having no funding to do so. A significant amount of time was also spent specifying the problem (which required translation between locally based engineers already working on the problem and InnoCentive) and evaluating the submissions. In this particular case, given that locally based engineers were already working on the problem, it is possible that a grant may have been a suitable alternative to open innovation or, ideally, a combination of open innovation to bring new expertise with a grant to help local designers build and develop the technology. The input of the prize-winning ideas brought a fresh perspective and new engineering designs which will, hopefully, improve the design. However, since the prototype has not yet been installed and tested due to financial limitations, it remains to be seen how the prototype efficiency, cost and durability will compare to other models being locally developed. Another route to achieve the same aim might have been cross-learning between the locally based engineers and others working on the same problem in the region or other parts of the world.

# Social Prizes

- ✓ Attract new participants
- ✓ Generate creative, ambitious and innovative ideas
- ✓ Provide flexibility for communities to respond to challenges
- ✓ Leverage other support to community issues
- ✓ Incentivises mass behavioural change
- ✓ Benefit the most marginalised communities
- ✓ Popular with communities
- ! Work better when supported by other initiatives
- ! Present challenges for monitoring and verification

## The Case Studies

**NESTA's Big Green Challenge**

**The Nirmal Gram Purnakar**





### What is the Big Green Challenge (BGC)?

The BGC was a £1 Million challenge prize, devised and run by NESTA<sup>19</sup> and designed to achieve measurable CO<sub>2</sub> reduction through community led innovation. The challenge was posted to explore how far an outcome based prize, which rewards results not activity, could stimulate innovation in communities while encouraging the drive and focus needed to achieve measurable change. The challenge was run over 2 years and aimed to:

- Share evidence on the effectiveness of the prize process for social innovation
- Galvanise people and inspire responses to climate change
- Provide measurable and lasting CO<sub>2</sub> reduction
- Leave a lasting legacy of a capacity to innovate
- Develop insights into community-led innovation

The prize attracted 355 initial applications during stage one. Stage two filtered down to 100 entrants who were able to participate in workshops and were given up to one day's worth of 1-to-1 advice from social business experts. 10 Finalists were given up to 20 days of 1-to-1 support and a grant of £20,000 to kick start their idea.

Because of the first aim (to share evidence on the effectiveness of the prize process), there is excellent documentation about the effectiveness and impact of BGC. Key documents include:

- The Big Green Challenge, Final Evaluation – A report for NESTA, Brook Lyndhurst 2010
- Using Social Challenge Prizes to support people-powered innovation – Based on lesson from the Big Green Challenge, NESTA Dec 2010
- People Powered responses to climate change, mapping community-led proposals to NESTA's Big Green Challenge
- The Big Green Challenge Impact of a prize – reflections one year on. A briefing paper for NESTA (draft published date unknown).

A summary of the findings of these documents and interviews with NESTA and Brook Lyndhurst are given below.

### Benefits

The prize attracted more than 350 community groups from across the UK. The applicants differed from organisations traditionally attracted to national government programmes. A significant number were informal groups (some constituted, some not). A high proportion of groups originated from

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<sup>19</sup> National Endowment for Science, Technology and the Arts - an independent body with a mission to make the UK more innovative

within their own communities and did not have an environmental focus, with only just over 20% having an energy focus. The projects proposed demonstrated creativity and diversity in their approaches to delivery and were highly collaborative and built on strong network relationships. The prize approach allowed the funder to back unproven organisations and highly innovative approaches that would be unlikely to be considered under traditional grant funding schemes. For example, one of the BGC winners, The Green Valleys, was an un-constituted group of individuals at the start with a grand idea to make the Brecon Beacons a net energy exporter by 2025.

There were 10 finalists resulting in 3 winners each receiving £300,000 and a runner up who received £100,000.

The award of the prize was based on results, which is tricky to do. Applicants tended to make up their own minds about how the prize should and would be split; some assuming it would go to all 10 Finalists, others to just 1. Careful management of expectations is required.

The BGC winners were

- The Green Valleys, Brecon
- Isle of Eigg, Green Island
- Household Energy Service, Ludlow

The runner up was

- Low Carbon , West Oxford

NESTA has been widely praised for giving communities an opportunity to be creative and ambitious. Most finalists interviewed a year later said they were glad to have been involved and all but one of those interviewed would take part again if the reporting demands could be reduced. The reporting mechanisms were said, both at the time and a year later, to have been too burdensome and most finalists had abandoned carbon monitoring within a year.

*“all it needs is the likes of NESTA finding the likes of us.. and say ‘we believe in you’... and people can do amazing things if they’re supported. It’s not necessarily financial.”*

The pace and demands of the prize were found not to be sustainable and after the award the pace slowed down to that of steady progress. The award of the prize was found to be breathing space from chasing grants, allowing winners to plan and organise their next steps. Non-winning finalists found that their fears of not winning stalling their initiatives proved largely unfounded. The lack of constraint on what winners could do with the prize money has allowed them to adapt and be flexible so that their work is well targeted to their communities.

The prize provided a focus and stimulus for new ideas and was effective in selecting both driven leaders and initiatives that stood a good chance of success.

A change in the political landscape during the BGC increased the focus on community climate change action. As a result a further £600,000 in funding from DECC<sup>20</sup> was awarded among some of the top

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<sup>20</sup> Department of Energy and Climate Change

100 groups who applied to BGC. In addition, a number of finalists have secured funds or loan facilities in excess of £100,000<sup>21</sup> since their association with the BGC.

Qualitative Benefits	Quantitative Benefits
<p>Directly related to prize process</p> <ul style="list-style-type: none"> <li>• Diversity of applicants</li> <li>• Creative and ambitious project designs</li> <li>• Identification of strong leaders and initiatives</li> <li>• Sustainability</li> <li>• Flexibility of funding</li> </ul> <p>Indirectly related from project activities</p> <ul style="list-style-type: none"> <li>• Social Cohesion</li> <li>• Social Inclusion</li> <li>• Personal skills and capacity</li> <li>• Social capital – consolidation of multiple local skills</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction in CO<sub>2</sub> emissions</li> <li>• Number of new applicants to government funded schemes</li> <li>• Leverage of additional funding for community based initiatives</li> <li>• Financial benefits</li> </ul>

### Limitations

The BGC has not resulted in mass mobilisation yet. While finalists remain ambitious they also face considerable barriers, including managing to recruit and retain volunteers, attracting grant funding or private and social finance, and negotiating regulatory and planning regimes. Limited diffusion of the process has taken place, reinforcing the view that such activities need to be supported financially. Significant questions remain about the speed at which community-led carbon reduction activity can reach a substantial scale.

### Costs

Costs were higher than they might otherwise have been both because it was the first time such a process was run by NESTA but also because of the emphasis on sharing learning. Operational costs are estimated to be in the region of 1.25 Million<sup>22</sup>, giving a total cost, including the prize purse, of £2.25 million.

### Value for Money

The range of qualitative benefits resulting from the prize process, as well as lack of values for quantitative benefits, makes financial calculations of value-for-money difficult.

When questioning whether the prize process is better than alternative methods to achieve the same aim, we can draw out the key benefits as opposed to traditional grant processes, as provided in the

<sup>21</sup> One got £800k and others more than £100k

<sup>22</sup> NESTA Interview May 2011

table of benefits above, and ask in what other ways we might have achieved these same aims. An industry insider who evaluated the BGC as well as other government funded community led initiatives suggested that there was not enough evidence to indicate that one approach was significantly better than the other. Much of the benefits to both are a function of the programme design. Arguably there is a range of programme designs, including elements of both prizes and grants, which could have achieved the same results.

### **Lessons**

The BGC worked best where finalists also had access to other pots of funding so that they could be ambitious and invest in the community.

The BGC highlighted the difficulty of developing a generic monitoring system; within a year most finalists had abandoned the BGC carbon monitoring system opting for their own.

Project and business planning support to BGC finalists played an important role in helping the projects deliver and is also likely to have helped with the sustainability of community initiatives.

Managing expectations in regards to how the prize purse will be split is difficult for results based programmes.

The prize approach was very demanding for applicants, and personal sacrifices made by the many who take part should not be underestimated. It has been suggested that some kind of trophy or memento for all finalists might be appropriate.



### **What is the Nirmal Gram<sup>23</sup> Puraskar**

In 1999 a demand-driven and people-centred sanitation programme was initiated in India called the Total Sanitation Campaign (TSC), it followed a previous programme that had limited community participation and achievements.

To help stimulate the TSC, in June 2003, the Government of India initiated an incentive scheme for fully sanitised and open defecation free Gram Panchayats<sup>24</sup>, Blocks and Districts called the 'Nirmal Gram Pursakar'.

Under this scheme Gram Panchayats, Blocks and Districts which achieve 100% sanitation coverage (see box) receive a financial reward of between Rs 50,000 and Rs 500,000<sup>25</sup>, depending on population size. The incentive awarded can be used for improving and maintaining sanitation facilities in their respective areas.

Sanitation coverage required to attain NGP

- a) 100% sanitation coverage of individual households,
- b) 100% school sanitation coverage
- c) free from open defecation and
- d) clean environment maintenance.

A total of 25,321 Awards have been made. Figures vary<sup>26</sup> but this is estimated to be approximately 10% of the total number of Gram Panchayats.

### **The Intended and actual benefits<sup>27</sup>**

*The objectives of the NGP are:*

- To bring the topic of sanitation to the forefront of the social and political agenda in rural India
- To develop open defecation free and clean villages which will act as models for others to emulate
- To give incentive to PRIs<sup>28</sup> to sustain the initiatives taken by them to eliminate the practice of open defecation from their respective geographical areas by way of full sanitation coverage
- To increase social mobilisation in TSC implementation by recognising the catalytic role played by organisations in attaining universal sanitation coverage.

<sup>23</sup> A "Nirmal Gram" is an "Open Defecation Free" village where all houses, Schools and Anganwadis have sanitary toilets and there is awareness amongst the community on the importance of maintaining personal and community hygiene and clean environment.

<sup>24</sup> local self-governments at the village or small town level in India

<sup>25</sup> Equivalent to between £680 and £6800 using June 2011 exchange rates

<sup>26</sup> Impact report says 6%, <http://panchayatdirectory.gov.in/home.asp> reports the total number of GPs at 240661, giving a figure of 10%

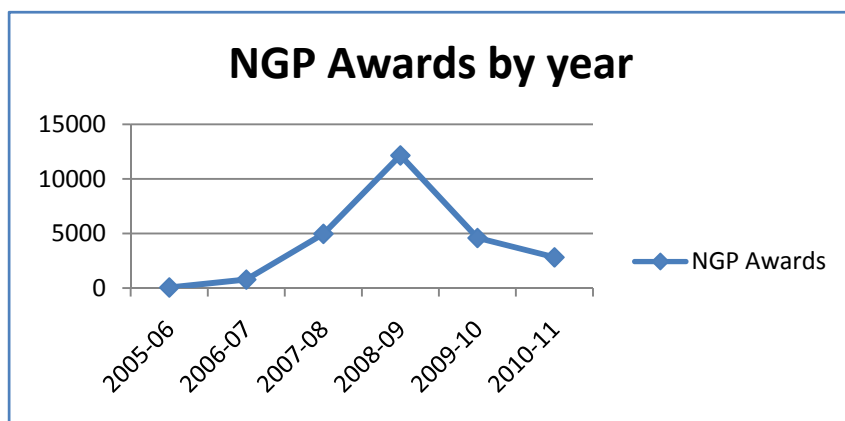
<sup>27</sup> Kumar Nityanand, Dept. of Drinking Water and Sanitation

<sup>28</sup> Panchayati Raj Institutions, (local government)

## Outcomes:

The prize was hugely popular. It was validated and given immense kudos by the president of India addressing the award ceremony held in Delhi. By 2008 the award numbers were so high they had to hire out a stadium to run the award ceremony, after which the programme was decentralised.

An NGP official advised “NGP has helped create demand for sanitation services at a grassroots level; demand may have existed before but was blocked by community inertia and the attitudes of officials... the prestige attached to the prize is huge, and has acted as a catalyst in the TSC.”



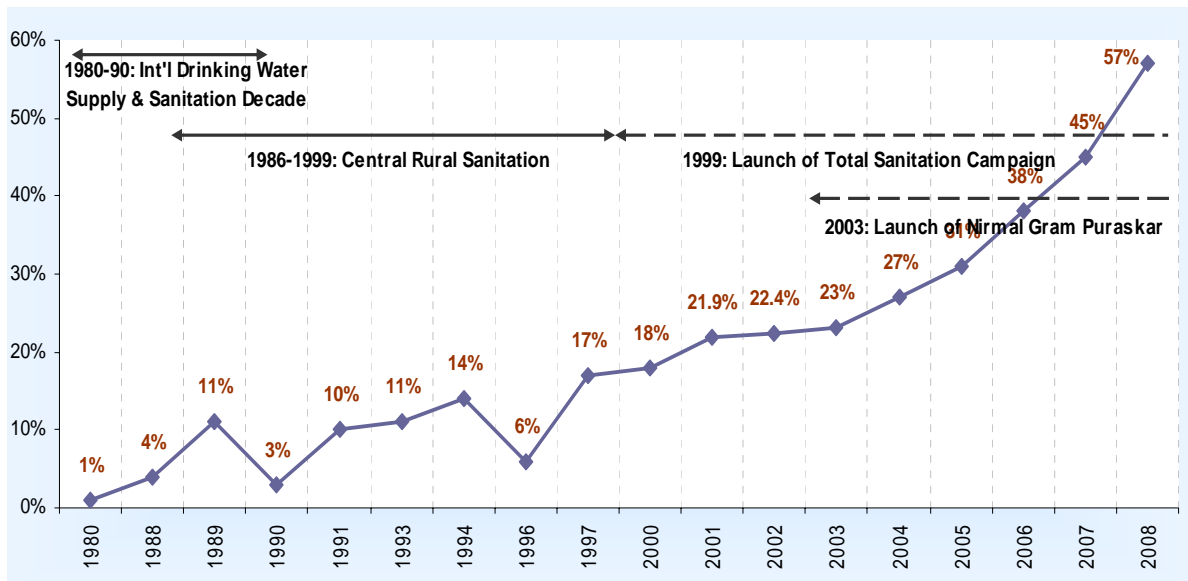
The graph on the left shows the rapid rise in the number of awards to 2008-2009, the fall away after 2009 is a result of tightening of the criteria, and so, while application numbers remained as high, the rigour of testing validity of the applications resulted in a reduced numbers of awards.

## Some key facts and data

- According to the Census of India 2001 rural sanitation coverage in India was 21%, the Nirmal Gram Puraskar (NGP) was launched in 2003 and first awards given in 2005. Rural sanitation coverage now stands at 68.84% (January, 2011)<sup>29</sup>.

<sup>29</sup> Part of a Government of India Report provided by NGP

## Sanitation Coverage by Year



- The graph demonstrates the rapid increase in sanitation after the introduction of the NGP. In the first 5 years of the TSC the increase in sanitation coverage was approximately 10% (2000/01 – 2005/06); in the five years after the first awards of the NGP (2005/06 – 2010/11) sanitation coverage increased by 35%.
- After TSC was launched in 1999, average coverage between 2001 and 2004 rose to 3% annually. After NGP was launched in 2004 the average coverage is now increasing by about 7-8% annually.

A recent impact assessment credits the NGP with the surge in the number of villages attaining 100% toilet coverage and giving sanitation issue the attention it deserves.

Some have criticised the prize for being little more than a status symbol with limited behavioural impact, though this seems unfounded. A recent impact study (2011<sup>30</sup>) asked households that had built latrines before the NGP was launched, if the household pattern of usage had improved; 66% responded positively implying further behavioural change since the onset of the NGP. More than 5% of Gram Panchayats who were awarded the prize were found to have sustained total open defecation free status, 43% were found to have less than 20% of households not maintaining defecation free status.

A number of human health benefits have been reported:

- 51% of households report a reduction in the number of days children suffer diarrhoea
- 74% of health workers report a visible reduction in household disease

<sup>30</sup> Author and title information not available.

- 92% of health workers stated householders’ understanding of water and excreta related diseases had improved
- 84% of health workers reported a decrease in infant mortality.

It has been found that those households that have been exposed to a wider range of social mobilisation processes (discussions, group formations, household visits etc.) had lower levels of open defecation. Policy and NGO environments were also found to have an impact; those with strong policies of community based planning and targeting of marginalised groups were found to be more effective at achieving 100% coverage or “the last mile”. This indicates the importance of additional activities to the success of the NGP.

In a survey of stakeholders<sup>31</sup>, the majority rated the NGP as being successful to either a “great” or “reasonable” extent; 97% of government officials and 87% of PRI respondents said the NGP should be continued. Almost all opinions converged on the idea that NGP is very effective in “filling in the last gaps”, though problems of misuse of the award and slippage into open defecation after the award remain as challenges.

A spill-over benefit from running the award has been the intensive data collection by the prize verification teams that have undertaken a huge survey and household data collection process.

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>• Reduction in incidence of diarrhoea</li> <li>• Reduction in household disease</li> <li>• Improved understanding of water and excreta related diseases</li> <li>• Reduction in infant mortality</li> <li>• Improved local governance</li> </ul>	<ul style="list-style-type: none"> <li>• No of GPs achieving “Nirmal Gram”</li> <li>• National sanitation coverage</li> <li>• Sanitation coverage for Below Poverty Line (BPL) households</li> <li>• Extensive household survey data</li> </ul>

### **The Costs**

**Administrative costs** – the programme does not have dedicated staff and is run as part of the daily functions of centrally located government staff, so actual staff time is difficult to assess. Estimated figures have been given of around 400 person-days in total at the centre level - this includes seeking applications, scrutiny of applications and scrutiny of survey work of independent agency, finalisation of list and holding of the award ceremony.

Other costs, budgeted at Rs 100 Crore for 2011<sup>32</sup> are made up of:

<sup>31</sup> Concerned officials, PRI members, village level groups and health workers.

<sup>32</sup> £13.6 Million



- **Award ceremony costs** – these were expensive when the awards were in Delhi but now that they are decentralised the cost has gone down
- **Prize purse**
- **Validation surveys** – since 2008 all Gram Panchayats are now independently verified before the award is given. The cost of the verification survey is between Rs4000 and Rs7000 per GP<sup>33</sup>.

### ***Value for money***

A meaningful value for money assessment requires further in-depth research. However, it is possible to estimate that, given that approximately 10% of GPs have been awarded the NGP, the reach is equivalent to 10% of the population of India<sup>34</sup>, or 121 Million people. The cost of the NGP for 2011 is approximately £13.6 million; if this is multiplied by the number of years it has been running it gives a total cost of £81 Million. It is likely that this is an over valuation as the budget in 2011 on which it is based is likely to be higher than preceding years when less effort was spent on validation. Based on this very rough calculation we can estimate the cost of the NGP to be approximately 1 US dollar per beneficiary. It should be noted that this does not include the costs of the Total Sanitation Campaign which is the building block for achieving the NGP award.

### ***Lessons learnt***

- There are large numbers of false applications; the first independent verification found that more than 70% of applications did not meet the NGP criteria, with the majority not meeting basic eligibility criteria. Districts and State Administration departments lack the resources to filter applications
- The costs and requirements of verifying applications have been significant and very time consuming, but have also resulted in a highly useful data set
- Verification agencies were unable to meet timelines, leading to long delays. Many did not follow the Terms of Reference (TOR) of the assignment accurately, leading to incomplete samples and errors in reporting in “many cases”. “The quality of data collected was not satisfactory in many cases”
- The feasibility of reporting and verification systems need to be carefully considered
- The incentives can provide the wrong motives at a political level and some social conflicts, (one example has been officials only going for the award if it falls within their tenure).

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<sup>33</sup> £50 - £100

<sup>34</sup> 1.24 Billion according to 2011 census

The Assessment study of impact and sustainability of NGP suggests that process criteria should be built in, and proposes that a staggered and weighted award system might be more appropriate to focus attention on the “last mile”. It also suggests that awareness should be timed to coincide with key events such as the onset of the rainy season as this would go a long way to improving the effectiveness of the NGP.

# Market Stimulation Prizes

- ✓ Generate Media Buzz for promoters and applicants
- ✓ Identify new and diverse problem solvers/innovators
- ✓ Help Lever investment funds
- ✓ Get funds quickly and easily to small start up companies
- ! Integration of the awards into broader programmes of support could further positive outcomes

## The Case Studies

**The Ansari X Prize**

**The Orteig Prize**

**The Longitude Prize**

**The Saltire Prize**

**The Grainger Prize**

**The Super Efficient Refrigerator Programme**

**The China Energy Efficient Refrigerator Programme**





The Ansari X PRIZE offered a 10 million dollar prize in 1996 for the first non-governmental team to launch a re-usable manned spacecraft into space twice within two weeks; the prize was awarded in 2004 and is credited with launching the commercial space flight industry in the United States.

By July 2004 the Ansari X prize had registered 3 billion print impressions of its name in newspapers journals and websites<sup>35</sup>.

26 different teams competed for the Ansari X prize. The key to competing was the gathering of all the parts needed – human resources and finance. The competition is credited with attracting \$100 million<sup>36</sup> in research and development finance to achieve the prize. The commercial space flight industry is worth in excess of \$900<sup>37</sup> million today. Of the 26 competing teams at least 7 are still in operation today; with many of the others team members still in the industry in some form or other. The team leader of the Da Vinci Project, one of the competing teams, credits the X prize with *“inspiring an entirely new industry of would be entrepreneurs”* and cites 2 key advantages of the prize process:

- ✓ **Recognition.** The PR value of competing for the X prize was considerable
- ✓ **Attracting resources.** Financial and human; people wanted to work on the prize, large and proactive teams were easy to establish, people were willing to offer their services for free or cheaply to be associated with the brand.

***“The prize has been 99% effective in putting us where I am today”***

**Benefits Ansari X PRIZE**

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>• Attributable growth in the market post prize</li> <li>• Solutions from unexpected sources</li> <li>• Partnerships and networks</li> <li>• Promotion and PR</li> <li>• Consolidation of expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Research and Development Investment</li> <li>• Attainment of prize goal</li> </ul>

<sup>35</sup> This figures was stated by Peter Diamandis of the X prize quoted in Schroeder 2004, the Application and administration of inducement prizes in technology.

<sup>36</sup> This figure was stated by Peter Diamantis of the X prize and is repeatedly quoted in the prize literature, our own rough calculations show that this is probably realistic if you include the value of team members’ time.

<sup>37</sup> Virgin Galactic was valued at \$900 million in 2009, there are at least 6 other firms working in commercial space flights in 2011

Of the 26 original teams the following are still in operation:

- ArcaSpace
- Armadillo Space
- Dream space ( a new company of da Vinci Project)
- Inter orbital
- Scaled composites
- Star Chaser
- TGV Rockets

New entrants “**inspired directly by the prize**” include among others<sup>38</sup>:

- Masten Space systems
- XCOR
- Virgin Galactic
- Blue Origin

### **Value for money**

Schroeder (2004) estimates the return on investment at between 1600 and 4000%<sup>39</sup> respectively for the Orteig and Ansari X prize, considering only the leverage on research and development funding.

The X Prize Foundation commonly quotes the cost of running a prize as equal to the prize purse, if we therefore assume the costs to be \$20 Million, and the prize leveraged \$100Million in research and investment, this gives a Benefit Cost Ratio of 5 before we have valued the numerous spill over benefits not least the continuing stimulation of the market post prize.

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<sup>38</sup> Brian Feeney- Team leader of the Da Vinci Project at the Ansari X Prize Competition

<sup>39</sup> Schroeder (2004)The Application and Administration of Inducement Prizes in Technology

## THE ORTEIG PRIZE

**The Orteig Prize** (1919 - 1927) offered in 1919 and finally won in 1927 by Charles Lindberg was for the first aviator to fly non-stop from New York City to Paris or vice-versa.

### *The Intended and actual benefits*

The prize was funded by a philanthropist, Raymond Orteig driven by a desire to improve Franco-American friendship and looking forward to the day that the two countries were linked by air. He was also strongly inspired by contact with French pilots who were sent to the US during World War I to help the USA build the US Air Force.

As with many grand challenges, the mission was to prove that it was possible and to lay the ground for commercialised flight between the US and France, and that it did.

The extent to which the Orteig prize stimulated the market is debatable. In the 1920's the air flight industry was flourishing, as documented by Davis (2004)<sup>40</sup>. World War 1 played a colossal role in the development of the commercial airline industry; in addition during the 1920's governments provided large subsidies to establish national airlines such as Imperial Airways (UK), Air France and KLM. In addition, in the US, the introduction of airmail services required the establishment of a nationwide airport system. The Orteig prize was also not alone. A number of prizes were running in Europe at the beginning of the century, such as the Deutsch prize for the first person to fly around the Eiffel tower within half an hour. This was won by a Brazilian, Santos Dumont, in 1901. There was also the Daily Mail prize for the first person to fly across the English Channel.

However, some attribution is possible as documented by Morgan (2008)<sup>41</sup>. Within a year of Lindberg crossing the Atlantic, applications for pilot's licenses in the U.S increased by 300 per cent and the number of licensed aircraft grew by 400 per cent. Morgan also states that over \$400,000 of investment was stimulated by the \$25,000 prize.

The Orteig prize provides further validation that prizes offer the benefit of finding solutions from unconventional sources. According to Kalil (2006)<sup>42</sup> "the conventional wisdom of the day was that such a transatlantic flight would require a heavy, multi-engine plane with a large crew. Lindberg successfully completed the first transatlantic flight solo in a single engine plane", and Lindbergh himself was a 25-year-old U.S. Air Mail pilot who emerged from virtual obscurity.

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<sup>40</sup> How Effective are Prizes as Incentives to Innovation? Evidence from three 20<sup>th</sup> Century contests, Paper presented at the DRUID summer Conference on Industrial dynamics, Innovation and Development (2004)

<sup>41</sup> Inducing Innovation through Prizes Jason Morgan (2008)

<sup>42</sup> Prizes for Technological Innovation, The Hamilton Project, Thomas Kalil, the Brookings Institute (2006)

The huge reputation benefits from the prize are still visible today, Lindbergh remains a figure of historical fame and the Ortieg Prize well documented in the annuals of aviation history.

### ***The applicants and motivations***

No data.

### ***The Costs***

Prize purse was \$25,000. There is no other information on costs.

### ***The external Environment***

It is evident that the external environment, as discussed above, played an influencing role both in the development of the technology and in its ultimate commercialisation and uptake.

### ***Value for money***

A full analysis of all the different costs and benefits of the Ortieg prize is not possible, although if it is correct that the prize leveraged over \$400,00 worth of investment into transatlantic aviation, it is quite simple to conclude that the prize demonstrated good value for money.

### ***The alternatives/counterfactual***

Given that yet again the solution was unexpected (a single engine plane rather than a heavy one) it is possible to infer that grant funding would not have achieved the result with the same level of funding.

### ***Lessons learnt***

Prizes offer particular value when it is not known where the best solution will come from.



## THE LONGITUDE PRIZE

**The Longitude Prize** (1714) was a reward offered by the British government for a simple and practical method for the precise determination of a ship's longitude while at sea. The technology was finally proven 1764.

### ***The Intended and actual benefits***

The technology emerged from an unexpected quarter. One of the major cited advantages of using prizes over traditional grant funding is the potential prizes offer for bringing in solutions from a field one may not have considered. This was certainly the case for the Longitude prize. Conventional wisdom at the time was that the answer lay in the stars. The final prize was awarded to John Harrison who solved the problem by improved measurement of time - for every 15° that one travels Eastward, the local time moves one hour ahead. Similarly, travelling West, the local time moves back one hour for every 15° of longitude; therefore, if the local times at two points on Earth is known, it is possible to use the difference between them to calculate how far apart those places are in longitude, east or west.

The technology developed is still in use today.

The prize also stimulated technology development; the prize resulted in 10 different awards being made for different advances related to technological breakthroughs in chronometers and ways to measure lunar distance, although it is unclear to what extent the prize spurred these innovations and whether the prize resulted in faster technological development than would otherwise have happened.

The reputational benefit of the prize is most evident, almost dramatically so, even over 250 years later the prize is still talked about, a best seller, "Longitude" by Sobel, charts the progress of the prize with a film adaptation released in 2000.

### ***The applicants and motivations***

No data.

### ***The Costs***

We do not know the cost of running the prize, though we do know that parliament paid out a total of £38, 097 in awards to various inventors, Harrison receiving a total of £23,065 of this. The costs of running the prize are likely to have been high given the very long duration of the prize process and the documented lengthy disputes that took place over the technology, with many traditionalists not believing in the validity of the technology.

### ***The external Environment***

The prize took place during the 18<sup>th</sup> Century at a time when Britain ruled the seas. Trade and exploration were the foundations of national growth. The need to define longitude was critical for the safety of the British fleets and the continuing economic growth of the nation.

### ***Value for money***

While economic value for money calculations are not possible due to the historic nature of the prize, a couple of key points provide clear evidence that the prize process did offer value for money. Firstly, the technology is still in use today, if one were to accrue today's value to the technology there would be no debate about its value versus costs. However, it could be rightly argued that the technology would have been developed at some point and the prize's true value rests with how much quicker the technology was developed. It is not possible to estimate whether Harrison would have achieved the measurement of longitude in his life time without the prize (he was in his 70's by the time the solution was agreed). However it is documented that many people believed that the longitude problem simply could not be solved and was the pursuit of lunatics<sup>43</sup>, which would imply that resolution of the problem was a long way off.

Secondly, given the historical evidence that the solution was hotly contested because the Longitude Board did not believe the answer was in measuring time but lay in astrology, we can comfortably assume that any amount of grant funding would have been given to astrologers and not to Harrison, which would not have achieved the same result.

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<sup>43</sup> <http://www.nmm.ac.uk/harrison>



### ***What is the Saltire Prize***

The Saltire Prize is a £10 million prize that will be awarded to “the team that can demonstrate in Scottish waters, a commercially viable wave or tidal stream energy technology that achieves the greatest volume of electrical output over the set minimum hurdle of 100 GWh over a continuous 2 year period using only the power of the sea”.

The prize is typical of a Market Stimulation Prize which aims to both develop a specific technology and also significantly build the market (demand, supply and investment) for the industry.

### ***The Intended and actual benefits***

The prize is funded and run by the Scottish Government in partnership with The National Geographic Society who help to promote the prize. The prize is overseen by an International Challenge Committee (11 members) and an International Technical Advisory Board (9 members). All members give of time free, travel and subsistence is reimbursed by the Scottish Government.

The prize has two main aims:

1. To build the reputation of Scotland and promote it internationally in relation to climate change and renewable technology. Scotland is a small country with a population of 5.3 million, which typically would not receive particular recognition in international debate and discussion on climate change and renewable technology. The prize is intended to mark Scotland as a key player in debates and discussions at the highest level within the international arena, and to tell the world of Scotland’s ambition to become the leading force in clean, green marine energy.
2. To stimulate the marine technology market by both moving forward technology development and establishing a positive legislative and operational environment for marine technology. The prize forms a central part of Scotland’s strategy to build a substantial green export industry by attracting significant private sector investment.

Setting the standard – at the time the prize was first promoted there was a 50-50 split in the market between those who felt it was achievable and those who did not.

The prize was announced in 2008 and will run until 2017.



Throughout the prize timeline Scottish Development International (international arm of the Scottish Government) are working to promote the prize, engage with potential applicants and use the prize as an opportunity to shout internationally about Scotland’s ambitions.

We have interviewed a number of key informants<sup>44</sup>; the findings are as follows:

In talking to the prize promoters they felt that running the prize had already achieved one of its broad objectives – to influence public perception, building the reputation of Scotland as a leader in renewable energy. The Scottish Government and Scottish Development International (SDI) promote both the prize and the marine sector in Scotland. Neither have systems in place by which they monitor or evaluate media or reputational gains, however, the prize has operated as a platform from which they have engaged directly with companies, industry and academia globally and they believe that they have, in the 3 years since they launched the prize, established international recognition within the energy industry and academia.

The partnership with The National Geographic Society has also had a tremendous profile building effect; The National Geographic Magazine has run a number of articles and reaches an audience of 400 million readers worldwide.

### **Competition features**

- Simplicity of challenge design
- Message that is easy to communicate
- Process that leads to improvements in commercially deployable devices
- Competition that is open to all – global competitors

<sup>44</sup> Sue Barr, Open Hydro, industry expert; Alex Reid, Off Shore Marine Team, Scottish Government; Claire Smith, Saltire Prize; Michael Berry, Media and Communications, Scottish Government; Douglas Watson, Scottish Renewable Power (applicant); Laura Carse, Pelamis (applicant);

- Transparent judging environment
- Creating publicity for entrants

It is commonly understood that the £10 million prize purse is not the motivator for prize applicants; it is estimated that they will need to spend several times that to achieve the prize goal. Motivations rest firmly with long term commercial incentives and reputational gain. Over 30 applicants from across the globe have registered interest. Three applicants have confirmed they are going for the prize. SDI is keen to increase further the number of applicants and will be investing in additional promotion internationally in the coming months.

Critical to the structure of this prize is the broader set of market stimulation activities undertaken by the Scottish government and SDI. The prize is not a single project but part of a broad package of stimulus activities that both push and pull innovation.

These include on the push side:

- grant funding<sup>45</sup>
- academic funding<sup>46</sup>
- provision of high quality testing facilities<sup>47</sup>

On the pull side the Government have established a highly favourable operating environment including:

- feed in tariffs and Renewable Obligation Certificates (ROCs) set higher than elsewhere in Europe
- favourable terms for the leasing of the sea bed through the Crown Estate.

The prize sits between the push and pull factors as a stepping stone to help overcome the major financial hurdle between a functioning prototype and the establishment of a commercial array. This is represented in figure 1.

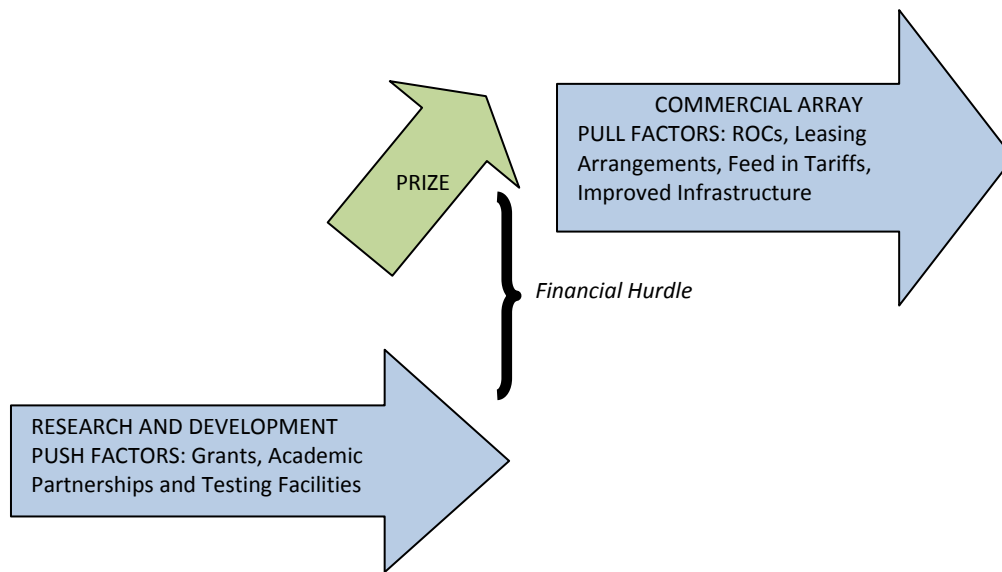
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<sup>45</sup> the Wave and Tidal Energy: Research, Development and Demonstration (WATERS) fund has recently made £13 million available to support wave and tidal energy projects in Scotland

<sup>46</sup> The Energy Technology Partnership (ETP) Europe's largest energy research partnership" which has linked together over 250 academics and 650 researchers, across ten universities in Scotland

<sup>47</sup> The European Marine Energy Centre (EMEC) provides world leading test and demonstration facilities in Stromness, Orkney

**Figure 1: Programme of Market Stimulus:**



As one industry insider explained, the visible commitment from the Government provided by such a comprehensive package of support has a greater impact on the industry than any other single factor. This has been further backed up by interviews with applicants:

*“Scottish Power Renewables strongly welcomes the Scottish Government’s Saltire Prize initiative. It sends a strong signal to the sector that Scotland is serious in its ambition to develop a world leading marine renewable industry. The renewables industry encourages all support that helps companies to push ahead with plans to develop wave and tidal projects, and to kick start the growth of the industry and the jobs and economic benefit it will bring”.*

Qualitative Benefits	Quantitative Benefits
<ul style="list-style-type: none"> <li>• Diversity of applicants</li> <li>• Influencing public perception</li> <li>• Identifying excellence</li> <li>• Focusing a community on specific innovations</li> <li>• Build Skills and Educate</li> </ul>	<ul style="list-style-type: none"> <li>• Leverage of investment funds</li> <li>• Media Buzz</li> </ul>

Given the broad stimulus package it is difficult to assign value to just the prize. Speaking to two applicants both said they would be pursuing marine renewable energy with or without the prize, but felt that the prize will accelerate innovation though the extent depends on how many other applicants join the race in the next few months.

One applicant said that they hoped the prize would help them hook investors from unorthodox sectors, and that it had already demonstrated a benefit to them. The applicants were keen to see more participants join the race, feeling that more applicants gave greater validity to the prize and helped stimulate the market to their benefit, even if it lowered their chances of winning.

The positive media attention surrounding the prize has helped play a role in positively engaging with the local community where the applicants are setting up site. The prize is seen by local communities as having a positive economic and social benefit in some remote coastal areas of Scotland.

When asked about prizes versus grants, neither applicant felt in a position to compare, partly waiting for the outcome of the Saltire and partly because they are both relatively small components within the industry as a whole, a few tools in the box, with different uses and benefits.

### ***The Costs***

The cost of running the prize to date has been £400,000, which is significantly lower than private prize companies have suggested the costs of running such a prize would be. Typically private organisations quote the cost of running a market stimulation prize to be more-or-less equal to the value of the prize. The prize has been run in-house using Scottish Government officials (one full time Project Manager who pulled in additional resources when needed) that had no prior experience in running international prizes. As a result 50% of the expenditure to date has been spent on consultancy support in designing the prize and its guidelines. Should the Scottish Government run a second prize programme the associated costs would be far lower given that they now have in-house expertise. There is some expectation that costs may rise in the next year or two as additional effort is put into encouraging more international applications. SDI have been able to take advantage of their existing international networks to promote the prize as part of their on-going portfolio of activities aimed at promoting Scotland, keeping the marginal cost of promoting the prize and engaging with international competitors low. These marginal costs of international promotion are included in the £400,000 figure.

### ***Value for money***

As the prize process is still underway, it is too early to give an overall analysis of the value for money that it provides. However as at May 2011, 3 years into the prize process, the Scottish Government is able to state that the reputational and promotional value obtained by the prize is in excess of the costs of £400,000 and provides very good value for money. To put this into perspective, the price of a one page spread in the global edition of the National Geographic Magazine is around \$290,000<sup>48</sup> or

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<sup>48</sup> 2011 Rates published by the National Geographic

£178,000. The prize has received 3 years of publicity through National Geographic, the broadsheet media (both national and international), scientific press, websites and has undertaken a number of talks, built links with academia and industry and ultimately raised Scotland's profile for a cost equivalent to 3 one page articles in the National Geographic.

Whether the prize has provided value for money in relation to the prize's second aim - to stimulate the marine energy market in Scotland - will have to wait until after 2017 and the hopeful award of the prize. However, the prize purse has been set at a level that will be recouped in value should the technological breakthrough be achieved - the benefit of electrical output of 100 gWh over a continuous two year period using only the power of the sea has already been calculated by the Scottish Government to exceed the £10 million prize purse.

Specific figures for Scotland are not available but a report by the Carbon Trust has estimated "that marine energy in the UK could create 68,000 jobs and pump £76 billion into the economy by 2050". Should this be achieved and even if only partly attributable to the prize, a clear value for money has been obtained. The Carbon Trust goes on to say that "by building on their existing lead in the industry, UK companies could secure almost a quarter of the global marine energy market and develop a capacity of 27.5 gigawatts, capable of supplying over a fifth of the UK's energy needs. British companies could also benefit from a growth in export markets with countries like Chile, Korea, the United States and a number of European countries looking to exploit their own marine energy capacity. The Carbon Trust highlighted the need for constant innovation in the industry, a reduction in costs and increasing the appeal of renewable energy to a wider audience if Britain is to remain at the forefront of the industry."

Benj Sykes of the Carbon Trust said: *"Marine energy could be a major 'made in Britain' success. By cementing our early mover advantage, the UK could develop a significant export market, generate thousands of jobs and meet our own demand for clean, home-grown electricity.....To maintain our world-leading position, we must continue to drive innovation within the industry and turn our competitive advantage in constructing and operating marine technology into sustained green growth."*

If the prize does help boost marine energy in the UK towards these estimated values, it will most certainly have achieved value for money. We shall have to wait until 2017 and beyond to evaluate its true impact.

### ***The alternatives/counterfactual***

It is difficult to identify other methods that could be employed to achieve the same aims as the prize.



We have demonstrated above that from a promotional point of view the prize has achieved value for money. In terms of the other mechanisms to overcome the financial hurdle demonstrated in figure 1, we have limited means of comparison. The £42 million Marine Renewables Deployment fund<sup>49</sup> offered by the UK government was phased out last year after 5 years and having only disbursed £2,275,000. An industry insider advised that the criteria required to access the fund was too difficult for much of the industry to achieve. The fund has subsequently been replaced by a Marine Renewables Proving Fund of £22m to help marine power companies reach the stage where they would be eligible for MRDF money.

### ***Lessons learnt***

- **Public Funds:** legislation related to State Aid is unclear regarding the award of the prize and no clear agreement has been met as yet. The commission is very supportive of the initiative as it is in line with community climate change objectives and is important in fostering competition in the marine sector. An agreement is expected shortly.
- **Negative press around prize award time frame** – some political opponents have criticised the 7 years time frame; however, it is most important to get it right, and this outweighs any desire to do it quickly.
- **Budget limitations-** political opponents and some areas of the press have at times focused negatively on costs of international flights to bring prize advisers into the country. The collective costs of travel and subsistence over the full period amounts to less than one of the members' daily consultancy fees. The Technical Advisory Board, which has 9 members, and the Challenge Committee, which has 11 members, give their time freely.

**Lack of expertise-** officials were inexperienced in managing an international innovation prize. However, expertise has improved and there is now limited need for external consultancy.

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<sup>49</sup> <http://www.businessgreen.com/bg/news/2030078/barker-promises-wave-support-marine-energy-projects>  
<http://www.theyworkforyou.com/wrans/?id=2010-03-16a.320305.h>  
<http://www.guardian.co.uk/business/2009/jul/19/utilities-energy-marine-power-uk>  
<http://www.timesonline.co.uk/tol/news/environment/article3345968.ece>  
<http://webarchive.nationalarchives.gov.uk/+http://www.berr.gov.uk/energy/environment/etf/marine/page19419.html>  
[http://www.google.co.uk/search?sourceid=navclient&ie=UTF-8&rlz=1T4SKPB\\_enGB332GB333&q=Marine+Renewables+Deployment+Fund+](http://www.google.co.uk/search?sourceid=navclient&ie=UTF-8&rlz=1T4SKPB_enGB332GB333&q=Marine+Renewables+Deployment+Fund+)  
<http://www.carbontrust.co.uk/emerging-technologies/current-focus-areas/marine-renewables-proving-fund/pages/default.aspx>



### **What was the Grainger Prize**<sup>50</sup>

A \$1 Million Challenge was posted in 2005 for “The development of a community- or household-scale water treatment system to remove arsenic from the contaminated groundwater found in many developing countries. The system must have a low life-cycle cost; must be technically robust, reliable, maintainable, socially acceptable, and affordable; must be manufactured and serviced in a developing country; and must not degrade other water quality characteristics.”

The Prize was available only to a U.S. citizen or team led by a U.S. citizen. Efforts to solve the problem had been under way for a decade but no single solution had been implemented on a large scale. In 2007 Professor Abul Hussam was awarded the \$1 Million prize for his SONO Filter. Second and third place were awarded to an academic-industry research team affiliated with the non-profit Water for People, established specifically for the prize, who were awarded \$200,000, and the Children's Safe Drinking Water Program at Procter & Gamble Co. which was awarded \$100,000.

### **The intended and actual benefits**

The prize was supported by two organisations, the Grainger Foundation, which provided the prize purse and financial resources to administer the prize and the National Academy of Engineering (NAE), which organised and ran the competition. The prize competition had objectives beyond the direct attainment prize criteria that were shared by NAE and the Grainger Foundation:

- engage US engineers/students in solving a major global humanitarian challenge,
- inspire next generation engineers with grand challenges of this type,
- educate and engage the broader public in the humanitarian problem and the role of engineers and engineering in solving it.

The NAE used the prize to engage with the public and generate excitement among US based engineers, students, faculty and practitioners from private and public sectors in solving a pressing humanitarian challenge. The Grainger Foundation was motivated by the desire to solve the problem for social good in developing countries; selection criteria included comparative assessment of the life-cycle costs, and other proxies of commercial viability of different entries, as well as the “manufacturability in country<sup>51</sup>” of the entries. The prize committee placed a lot of weight on low life cycle cost and did their best to assess comparatively the viability of production and distribution plans for each entry. The aim was to drive the unit price and maintenance costs low enough to enable widespread use (whether paid for directly by the user, host governments or by the

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<sup>50</sup> Case Study based on Interviews with the National Academy of Engineering and the winner Professor Abul Hussam

<sup>51</sup> Bangladesh and West Bengal were the test sites

international aid organisations or others). The prize did not line up a guaranteed buyer but it selected the winners based largely on technical performance/effectiveness and economic viability/marketability.

The prize promoters wanted to solicit new ideas to solve the problem but also wanted to demonstrate economic viability and scale up within a four year time frame. This timescale was too short to allow the development and field testing of new ideas. As a result most of the entries and all of the prize-winners put forward technologies that were already in existence. There was some disappointment that something “new” had not been developed. Professor Abul Hussam, who won the prize, had already, by the time of the prize, distributed 25,000 filters - all made in Bangladesh. Dr Hussam had developed the technology in 1999 but not published the detail due to patent issues, the patent is owned by George Mason University who have given Professor Hussam the distribution rights in India, Bangladesh, Nepal and Egypt.

The prize effectively solicited a range of responses including many from “new entrants” but the extent of comparison between grant and prize is uncertain. It accelerated the work of others and the technology has subsequently advanced, small filters are now tested in California, and South America is interested in licencing.

There were no strings attached to the prize monies awarded. Of his own volition Dr Hussam used \$650,000 of his \$1 million prize to develop manufacture and distribution infrastructure. Materials were (in line with the prize criteria) sourced and built locally; all but the plastic was sourced within Bangladesh. The filter was very difficult to get into production and required approval from the Bangladesh Environmental Technology Verification-Support to Arsenic Mitigation project (a bilateral project between the Governments of Bangladesh and Canada which field tests arsenic removal technologies). Winning a high profile prize helped to get the technology passed through legislative systems and, recognised by Governments; it also helped to lever funds to NGOs for distribution though actual figures for this are not available.

Despite the careful design parameters of the prize, adoption of the technology is only 1-2% of what is required. For technologies with the potential for high commercial value, such as air travel and space flight (per flight sales of suborbital flights are showing interest<sup>52</sup>), the development of the technology to commercialisation can be left to the market. The water filter, while having significant human benefits, lacks a strong commercial market; those who need it have limited ability to pay. The technology has positively impacted on over 1 million people thanks to continuing philanthropy. Currently around 200 Sono Filters are distributed every day, providing more than 1million people with safe drinking water. Production is not a limitation (the warehouses are stocked) but there is

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<sup>52</sup> Morgan 2009

insufficient purchasing power. A filter costs \$42. It should be recognised that barriers between the development of the technology and its ultimate adoption cannot be fully addressed by a prize alone. A system of production and distribution by local NGOs was trialled which proved difficult because of the technical nature of the solution; this demonstrates the need for innovators of some technologies to remain involved in their upscale.

### Benefits of the Grainger Prize

Qualitative Benefits	Quantitative Benefits
<p><i>Directly attributable to the prize</i></p> <ul style="list-style-type: none"> <li>• Facilitation of technology through legislative hurdles</li> <li>• Increased interest in engineering among US population</li> <li>• Advancement of low cost filter technology</li> <li>• Profile raising of filter technology</li> </ul> <p><i>Indirectly attributable to the prize</i></p> <ul style="list-style-type: none"> <li>• Health benefits to 1 million people</li> </ul>	<p><i>Directly attributable to the prize</i></p> <ul style="list-style-type: none"> <li>• Leverage of funds to NGOs for distribution</li> <li>• Research and Development by prize applicants</li> </ul> <p><i>Indirectly attributable to the prize</i></p> <ul style="list-style-type: none"> <li>• By 2011 250,000 filter in Bangladesh, Nepal and India</li> <li>• Continuing distribution of approximately 200 filters distributed a day</li> </ul>

### Costs

NAE underestimated the resources needed to administer the prize which included:

- specifying the objective of a “doable” challenge competition
- defining the criteria for selection
- publicising the prize throughout the US engineering community and in the general public
- administering the competition
- co-ordinating the technical testing and other assessments of prize entries
- celebrating the prize winners and publicising their achievements

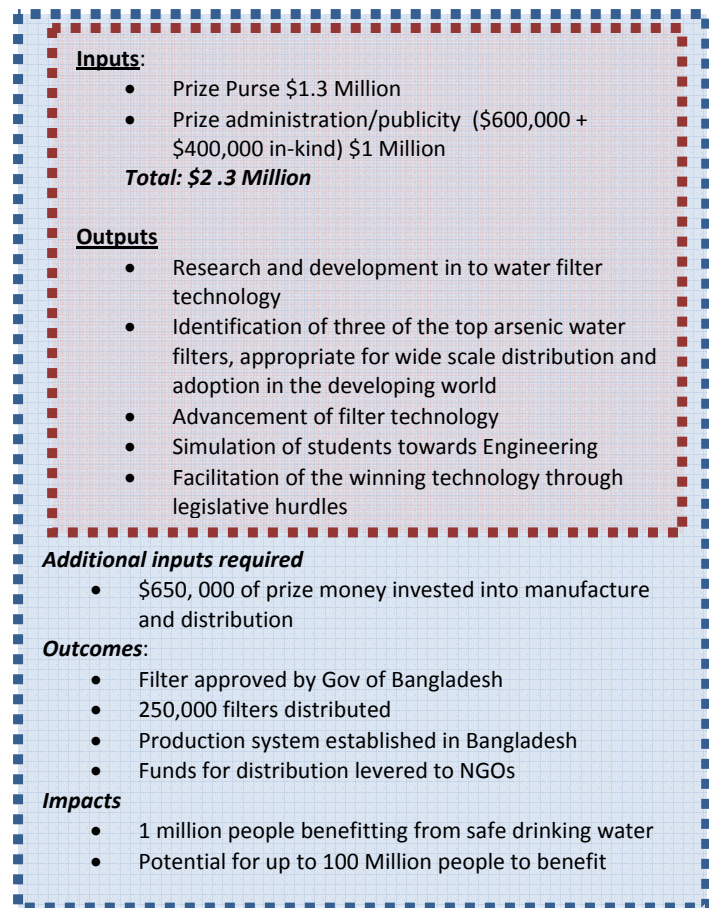
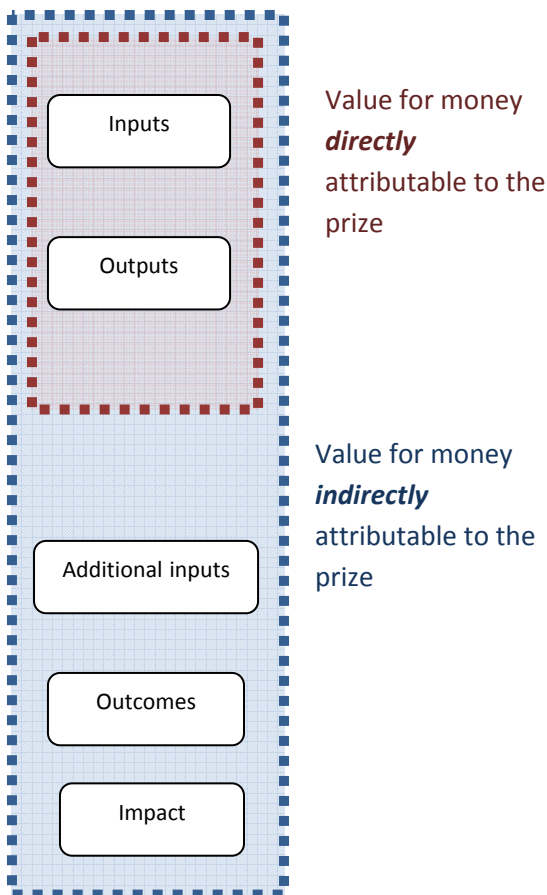
They estimate \$600K in costs plus another \$400,000 or so of contributions in kind (time of experts), giving a total of \$1million for operational costs.

Financial budgets were set at the outset, consequently the higher than expected operational costs limited the resources available for post prize award outreach and education.

### Value for money

No figures are available for how much research and development time was leveraged by the prize. Attribution to the prize is also difficult; the prize had no strings attached so post prize distribution is a function of the philanthropy of the prize winner and not the prize. This is demonstrated in the figure below.

### Assigning Value for money



So far 1 million people have benefited from the Sono water filter at a prize cost of \$2.3 million - a cost of \$2.3 per beneficiary. If we wish to consider benefits into the future, the total population that could benefit from this technology is between 50 – 100 million; **if** the filter market develops sufficiently and distribution reaches maximum penetration, and this is attributed to the prize (a rather over-reaching set of assumptions), then the prize will have cost around 2 cents per beneficiary.

Dr Hussam believes that if he had been given a \$1million grant he would have had the same output – if a grant finder had found him, but ultimately he thinks that an Advance Market Commitment (AMC) to purchase the water filters may have been a better method to achieve the same aims.

#### Lessons learnt

- Time frame is really important
- A prize cannot substitute market forces, even the most appropriate criteria cannot ensure wide scale adoption
- Prize approach can inspire and engage with young
- Sufficient financial resources are required to run a prize programme and ensure post prize follow up

- Passing the technology on to local NGOs to manage production and distribution was not very successful, in this case the technical nature of the solution required ongoing solver participation for manufacture and distribution
- The need for development of water filter technology is not over - further research to develop a smaller and cheaper one that can be distributed by small community shops could be beneficial.





## THE SUPER EFFICIENT REFRIGERATOR PROGRAMME (SERP)

**The Super Efficient Refrigerator Programme**<sup>5354</sup> was one of the first so-called “Golden Carrot Programmes” that took place in the US in the 1990s.

The desire by utility companies to reduce energy consumption coincided with the phasing out of CFCs from refrigerators, stimulating a group of utility companies to come together to offer a \$30 million incentive. The award was to be made to the manufacturer who could develop CFC free units of specified sizes that used at least 25% less electricity, while committing to a market price of no more than other similar units on the market. Winning criteria gave weight to applicants that could mass produce and distribute the units.

Fourteen manufacturers submitted bids in response to a request for proposals. In December 1992 Frigidaire and Whirlpool were announced as finalists and both were required to submit prototypes for testing. Ultimately, Whirlpool was selected as the winner offering 3 different sized units with energy efficiency savings of 29.7% to 41%, and committed to distributing 250,000 units.

A preliminary Impact and Market Transformation Assessment undertaken by Lee and Conger in 1996 identified that substantially fewer than the 250,000 units proposed were sold. Exact numbers are not available but by the end of April 1997, fewer than 100,000 had been purchased nationwide. This has led to some debate regarding its success. An early and tentative impact assessment by Lee and Conger (1996) suggests a broad range of spill-over benefits:

### **Accelerated Technology Production:**

Whirlpool was able to accelerate the introduction of several new energy-efficient technologies as a result of SERP; many of the technologies incorporated were already under development but the programme spurred the company into production much earlier than planned. Frigidaire suggested it cut in half the normal 18 month product development process. Across the market the programme demonstrated that energy saving and CFC elimination could be met.

### **Speeded up market penetration of energy efficient models:**

SERP appears to have been responsible for much of the increase in the overall efficiency levels of Whirlpool's side-by-side units in the years following the launch of SERP, as well as a modest increase in the efficiency levels of other brands (Lee and Conger 1996). Also, federal efficiency standards generally increased over the 1993 levels by roughly the same percentage improvement SERP achieved, although opinions differ concerning the correlation. One of the principals involved in the development of those standards stated that the SERP refrigerators had an impact on the standards.

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<sup>53</sup> Davis 2004 How Effective are Prizes as Incentives to innovation? Evidence from Three 20<sup>th</sup> Century Contests

<sup>54</sup> Lee Conger 1996 Super-Efficient Refrigerator Programme (Serp) Evaluation Volume 2: Preliminary Impact And Market Transformation Assessment

Yet a Whirlpool representative reported that the similarity between SERP efficiency levels and the new standards was a “coincidence” (Sandahl et al. 1996). When CFC phase out came into effect over 75 of the CFC free models from different manufactures were at least 25% more efficient than the standards.

### **Energy Efficiency**

According to the assessment by Lee and Conger, SERP can be credited with:

- energy savings of 25% in Whirlpool SERP units
- some of the energy savings in all Whirlpool products
- the continued offering of numerous higher efficiency units after the programme ends, as many of the efficiency savings have been integrated into product lines.

### **Changes in the market**

Under normal circumstances the decision to commercialise a specific technology is based on cost reductions from R&D; the SERP incentive off-set the added cost so Whirlpool was able to integrate new technologies into the SERP models. Two thirds of utility companies said SERP had speeded up the phase out of CFCs in multiple ways: CFC Free requirement in bid, presence of CFC free in market, demonstration of energy efficiency and CFC free.

### **Cost Benefit**

The problems associated with attributing benefits to incentives programmes that are affected by considerable external forces is clearly demonstrated here. Lee and Conger undertook an assessment of the costs and benefits of SERP based on limited data availability. Their initial assessment provides a baseline Benefit Cost Ratio of each SERP unit of 2.73 and 1.87 at discount rates of 5% and 10%.

If efficiency improvements in non-SERP refrigerators during the life of the programme are included the benefit /cost ratio could increase by nearly 25%. This is further increased if efficiency savings into the future are added. These figures are based only on electricity cost and do not attribute benefits associated with carbon savings.

A number of spill-over benefits are identified:

- Increases in the efficiency of Whirlpools non-SERP models
- Increases in efficiency of other brands prompted by SERP
- Energy savings from high efficiency models after SERP ends.

Taking these spill-over benefits into consideration the cost benefit ratio increases to 6.7.

It is quite possible that further significant impact is possible if spill-over to non-SERP utilities is included, given that only 20% of households were in SERP areas.





## China CFC-Free Energy-Efficient Refrigerator Project

### ***What is the China Energy Efficient Refrigerator Project<sup>55</sup>***

This project funded under the Global Environment Fund (GEF) comprised multiple components aiming to reduce green-house gas (GHG) emissions in China by removing barriers to the widespread commercialisation of energy-efficient refrigerators. The project addressed key market, technological, social and commercial barriers, both to the adoption of high-efficiency refrigerator technology by Chinese manufacturers and to the acceptance of high-efficient refrigerators by Chinese consumers.

Activities included:

- technical assistance and training for compressor and refrigerator manufacturers,
- prize incentives for energy efficient product design or modification and conversion of factory production lines,
- national efficiency standards,
- a national labelling programme,
- consumer education and outreach,
- dealer and manufacturer incentive programmes, and a consumer buyback/recycling programme.

As evidenced, the prize component of the project was one small part in a wider programmatic approach targeting both push and pull factors to get energy efficiency into the market place.

The project ran from December 1999 to Dec 2005.

### ***The Intended and actual benefits***

The project goals established before the project estimated that in the ten years following implementation of the project, energy efficient refrigerators in China could reduce electricity consumption by about 120 billion kWh. If this electricity was all from coal it would result in emissions reductions of 143 million tonnes of CO<sub>2</sub>.

An independent evaluation commissioned by GEF<sup>56</sup> calculated that the project goal had been exceeded by a factor of two in about half the time, and that if sales continued at the same level the project goal will have been exceeded by a factor of three, cutting CO<sub>2</sub> emissions by a 630 million tonnes and exceeding the original project target by a factor of 6.3.

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<sup>55</sup> GEF Project Brief

<sup>56</sup> China Energy Efficient Refrigerator Project, Project Evaluation Report

### ***Incentives***

An interview with the Projects Chief Technical Advisor<sup>57</sup> suggested that the manufacturers were incentivised by a sense of challenge, many knowing that they would not win the award. A total of 18 manufacturers joined the challenge (over the estimated target of 12), although the top 3 had a considerable advantage. 16 companies were given basic awards to cover the incremental costs of project participation. The results between the top two manufacturers were very close and led to unpleasantness; the prize was finally split between them.

### ***Process***

The programme involved several components that were all critical to the programme as a whole. These included:

**Activities to Push Technology Development:** Compressor Design Training and technical support, Energy Efficiency Standards, manufacturer incentive programmes (prizes)

**Activities to (Pull) increase demand:** Labelling Programme, Retail Training, Retail incentive programme (prize)

### ***The Costs***

GEF fund “incremental costs” was just \$9.6 million but co-financing of \$31.3 million was provided, giving a total project cost of \$40.9 million.

This funding was approved after “rigorous cost benefit analysis”<sup>58</sup>, though values are not provided.

### ***Value for money***

The project clearly demonstrated value for money as it exceeded its goals.

### ***The alternatives/counterfactual***

The CEERP clearly demonstrates that its incentive component offered considerably better value for money than:

- Rebates - the project expenditure (\$9.6 million) divided by the high number of energy efficient refrigerators (also 9.6 million<sup>59</sup>) sold would provided a subsidy of \$1 per refrigerator; not enough to offer a significant consumer incentive

or

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<sup>57</sup> Ray Phillips

<sup>58</sup> Project document

<sup>59</sup> life production of energy efficient refrigerators went from about 1 million in 1999 to 10.6 million in 2005

- grants, with over \$30 million<sup>60</sup> in R&D funding leveraged towards the attainment of the prize against an incentive outlay of \$3.5 million.

Incentive schemes with stores and sales people resulted in a cost to the programme of \$7 per refrigerator sold, significantly lower than comparable rebate programmes in other countries<sup>61</sup>.

Levels of government procurements were not high enough to consider Advance Market Commitments.

### ***Lessons learnt***

- According to the Programme's Chief Technical Advisor, the success of the project was based on the programmatic nature of the design. Single measure projects had previously had limited impact. The timing of each element in relation to the others was critical. The project design identified 8 principal barriers which the programme addressed.
- Working with the manufacturers was key. Although GEF were initially criticised for funding commercial entities, the incentive (prize) element levered approximately \$30 million in corporate finance against a total investment by GEF of \$10 million. The prize is also credited with levering greater energy efficiency than expected due to its competitive nature; the winning manufacturer was 40% more efficient than the base line and 30% more efficient than required.
- The project is now being replicated with GEF funding for the air conditioning industry in China.

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<sup>60</sup> Cited by Chief Technical Advisor

<sup>61</sup> GEF Impact Assessment