ideas to impact.

CAN INNOVATION PRIZES HELP ADDRESS WATER AND SANITATION CHALLENGES?

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This document is part of a suite of four papers (a guide and three thematic papers) that capture the learning from the first year of the Ideas to Impact programme. More specifically:

Innovation prizes: a guide for use in a developing country context identifies the stages required to define whether an innovation prize is a suitable instrument to help address a given development problem;

SEE OUR **GUIDE**

Can innovation prizes help address water and sanitation challenges? Introduces the concept of innovation prizes and presents a number of areas where they may have application;

SEE OUR **WASH** REPORT

Addressing problems in energy access through the use of Innovation prizes shows how the guide was applied in a specific context and sets out the challenges faced in using innovation prizes to support improved energy access; and

SEE OUR **ENERGY ACCESS** REPORT

A role for innovation prizes to support adaptation to climate change? An analysis of challenges, opportunities and conditions takes a theoretical approach to understanding the effects innovation prizes might have in the climate change adaptation field.

SEE OUR **CLIMATE CHANGE ADAPTATION** REPORT

Where text in this paper makes reference to one of the other papers in this suite, the relevant text will be highlighted and the icon representing the cross-referenced paper will appear in the margin.

At the time of publishing, Ideas to Impact is undertaking the detailed design of five diverse innovation prizes. The team expects to document further findings from this process through follow-up publications that will:

- Extend the Guide to include detailed design;
- Share further learning from experiences across the three themes (thematic papers currently go only as far as Stage 2 of the Guide in their analysis); and
- Provide guidance on how to establish monitoring and evaluation frameworks for innovation prizes.

Visit the Ideas to Impact website **www.ideastoimpact.net** and sign up to the newsletter to receive updates.

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ABSTRACT

This paper helps identify whether innovation prizes can be used to address intractable issues in the Water, Sanitation and Hygiene (WASH) sector and makes recommendations for potential innovation prizes across a number of problem areas. The paper relates to Stage 1 of *Innovation prizes: a guide for use in a developing country context* (henceforth referred to as the Guide), published alongside this paper, identifying WASH challenges for low-income households and considering where innovation prizes could best provide effective interventions. Innovation prizes can be used as an alternative to traditional grant programmes, to stimulate innovative solutions, attract new problem solvers and generate media attention around a particular set of issues. From a donor's point of view, they may provide better value for money than traditional grants, as payments are directly linked to solutions being found and applied. Innovation prizes are a relatively new and untested funding mechanism in the development sector but could hold considerable potential. This paper therefore presents a number of areas where innovation prizes could be considered to either trigger genuine innovation or promote scaling up of existing innovations in the WASH sector.

1

INTRODUCTION

1.1 PAPER OBJECTIVES

This paper helps identify whether innovation prizes can be used to address intractable issues in the Water, Sanitation and Hygiene (WASH) sector and makes recommendations for potential innovation prizes across a number of problem areas. The paper relates to Stage 1 of the Guide, published alongside this paper. It identifies WASH challenges for low-income households and considers where innovation prizes could best provide effective interventions. Innovation prizes can be used as an alternative to traditional grant programmes, to stimulate innovative solutions, attract new problem solvers and generate media attention around a particular set of issues. From a donor's point of view, they may provide better value for money than traditional grants as payments are directly linked to solutions being found and applied.

Innovation prizes have been used widely in the context of research and technology in developed countries. However, using them in developing country contexts to address development challenges represents a novel approach. The UK Department for International Development (DFID) is keen to explore this aspect of their use and has launched Ideas to Impact, an action-research programme, in order to evaluate the potential of using innovation prizes to tackle challenges in climate change adaptation, energy access, and water and sanitation for low-income households. In each thematic area, researchers have aimed to identify issues where the use of innovation prizes could be beneficial. A long list was then narrowed down to establish a diverse programme of innovation prizes that will be designed and launched over the next four years.

Ideas to Impact operates as an action-research programme tracking both the costs and benefits of prizes to provide a basis for evaluating the effectiveness of such instruments and their applicability to development issues. Innovation prizes are by no means a panacea: they cannot address all challenges on their own, and in most cases, would need to be combined with other types of funding or support in order to stimulate lasting change. The geographical location, development partners and surrounding innovation ecosystem of a prize can support or impede its development **impact**. Any innovation needs an enabling environment to scale up successfully in a sustainable manner, so a crucial element in the design of innovation prizes is to understand the environment needed for their success. It is therefore critical to clearly identify what innovation prizes are, what they can and cannot do and how such prizes can be used most strategically to deliver change for the most deprived populations: the Guide aims to support this process.

GUIDE ENERGY ACCESS
Section 3
For more on innovation ecosystems.

This paper explores how innovation prizes could be used to support universal and sustainable access to WASH services, with a particular focus on low-income households. To that end, existing and future challenges in the WASH sector that limit sustainable access to WASH services and which could be overcome through business-led innovation are identified, following **Stage 1** of the Guide.

GUIDE
Stage 1

1.2 IDENTIFYING WHERE INNOVATION IS NEEDED IN THE WASH SECTOR

Despite significant progress achieved over the last few decades, many challenges persist in terms of providing WASH services to all. Access to improved WASH services is only increasing slowly and is not keeping up with population increases. Largely as a result of inadequate WASH services, diarrhoeal diseases continue to be one of the top 10 causes of death, according to the World Health Organization (WHO), killing 1.5 million people in 2012 (WHO 2014).

The Millennium Development Goals (MDGs) aimed to halve the amount of people without access to safe water and sanitation by 2015. The most recent assessment from the UNICEF/WHO Joint Monitoring Programme, which tracks MDG progress, shows that drinking water coverage had increased from 77% in 1990 to 89% by the end of 2011, with 55% enjoying the convenience and associated health benefits of piped water supply on premises (WHO, UNICEF & JMP 2013). While the global target based on the indicator 'use of an improved drinking water source' has been met, this would still leave 547 million people without access to improved drinking water sources in 2015 (if current trends continue) and hundreds of millions more without *sustainable* access to *safe* drinking water.

The MDG targets for sanitation will not be met (Battle 2014). At present, an estimated 2.4 billion people, almost 40% of the world's population, do not have access to improved sanitation. If things continue as they are, the current MDG goal on sanitation will not be achieved before 2026 (WaterAid 2015). The countries that are most off track include India and large tracts of sub-Saharan Africa. Unsafe faecal sludge management, particularly in urban areas, is a significant issue particularly for the urban poor that will need to be addressed going forward, particularly in the context of the Sustainable Development Goals (SDGs), the successors to the MDGs. In recent years, attention has shifted to investing downstream, in wastewater treatment and safe disposal of sludge, to protect the environment but also to protect water resources and minimise water treatment costs. Since the International Year of Sanitation in 2008, we have witnessed a step-change in the level of attention given to the downstream segment of the water service cycle, which is slowly translating into increased funding for the sector. As willingness to pay (and charge) for sanitation is even lower than for water services, such efforts are still largely supported with public funding, mostly from international donors.

According to the current literature, such modest results can be linked to a number of factors, such as:

- Entrenched behaviour and habits that affect demand and limit the adoption of new facilities;
- Limited water resource availability and increased levels of pollution;
- Insufficient technical and management skills, which result in inefficient service providers;
- Lack of secure land tenure, which limit the ability to invest in infrastructure;
- Under prioritisation of WASH services by politicians and institutional blockages;
- High investment requirements and affordability constraints, both at the level of governments and at household level, with a persistent unwillingness to charge (and to pay) for improved services.

Climate change and increasing competition over available water resources will mean that providing access to WASH services in a sustainable manner is only going to become more difficult. The MDGs were successful in creating greater awareness of the fact that improved WASH facilities and services are vital for development. As a result, the development of WASH goals and targets in the Sustainable Development Goals (to be implemented post 2015) is particularly important but will not be sufficient. UN-Water, the umbrella organisation that includes all United Nations agencies active in the water sector, has recommended that a broader water goal be adopted as part of the SDGs, which are to be approved by the United Nations General Assembly in September 2015.

An open working group has been working on providing specific goals and targets for the Sustainable Development Goals. In July 2014, this group announced that Goal 6 would be dedicated to water and sanitation with the aim of 'ensuring availability and suitable management of water and sanitation to all', going much beyond the provision of access to water and sanitation services to include notions of water security, integrated water resources management and the safe management of all wastewater flows. The specifics of this goal have not yet been finalised and details such as the indicators of success still need to be resolved. Thus far, it is expected that target 6.1 will aim to achieve universal and equitable access to safe and affordable drinking water for all by 2030; and that target 6.2 will aim to achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation; paying specific attention to the needs of women and girls, and those in vulnerable situations.

One of the difficulties faced by the WASH sector in developing countries is the inability to scale up or pilot innovative initiatives. The WASH sector has witnessed substantial technical innovation in the last few years, in areas spanning leak-detection systems, smart water systems, point-of-use water treatment technologies and sanitation facilities that support reuse of treated by-products. In developing countries, however, most of these innovations have been deployed on a pilot basis by international NGOs or social entrepreneurs and have yet to be scaled up. Reasons for the inability to scale up these technical innovations include low demand, the lack of a supportive institutional environment and the absence of business models that support deploying those technologies at scale. This has led many sector actors to conclude that "*technical innovation is not what is needed in the sector, what we need is the more mundane business of rolling out technologies so as to deliver sustainable improvements*".

GUIDE
Stage 1

For more on focusing on the problem – the 'F' in FACE.

Rolling out technologies requires, among other things, generating demand for these approaches, securing political will for their adoption, building the capacities of local people to adopt and maintain such technologies and developing financially sustainable business models that can reduce dependency on external handouts. In fact, the water sector has been comparatively more successful in scaling up 'social innovations' such as the Community-Led Total Sanitation (CLTS) approach over the last 10 to 15 years, which has brought in radical new ways to change behaviours and draw attention to the need to end open defecations.

Progress has been relatively slow, however, and the population to be served is rapidly growing. This means that it is becoming increasingly difficult to wait for small, pilot projects to bear fruit. Scalable innovative approaches are needed to address rising challenges of dwindling available water resource per capita and treating increasingly polluted water resources.

In the WASH sector, Ideas to Impact researchers initially identified 14 areas where either genuine innovation or scale-up of existing innovation is urgently needed. This was based on pre-existing sector knowledge combined with extensive consultation with sector stakeholders and additional web-based research where necessary.

Out of these 14 areas, two innovation prizes have been conceptualised further and are now undergoing detailed design in preparation for launch:

- **Dream Pipe:** a prize to incentivise the development of innovative financial and contractual models to reduce non-revenue water (NRW) and expand access to water services to low-income households. NRW is water lost through technical and commercial processes by most water utilities operating in the developing world and is a significant issue for water utilities, which translates into lost revenue, intermittent water supply and the need to seek additional water sources in a context of rising competition over water resources.

- **Clean City:** a prize to incentivise municipalities to develop and implement innovative solutions for city-wide integrated sanitation, which would include planning and implementing sanitation solutions combining sewerage and on-site sanitation solutions that cover the entire value chain of sanitation services, as opposed to the current piecemeal approach.

1.3 WHO SHOULD READ THIS PAPER?

This paper targets primarily WASH sector practitioners. The objective is to provide agencies that are already active in the sector to consider innovation prizes as a possible tool to drive improvements in the water sector. It is primarily aimed at potential prize sponsors, such as government agencies (for example DFID) private and business foundations, and NGOs. The paper can help them identify areas of intervention where an innovation prize might make a difference and how such prizes could be used alongside other financing instruments as part of a larger programme. As such, it can be read in conjunction with the Ideas to Impact Guide, which sets out in more detail the analytical steps that need to be followed in order to assess whether a prize instrument is suitable for a specific development problem or not.

Non-WASH sector audiences may also find this paper useful, particularly potential innovation prize solvers with limited or no prior experience in the WASH sector. A key objective of innovation prizes is to attract new entities with different perspectives or skills so that they can come with fresh ideas to solve problems not addressed by traditional sector actors. The paper provides brief overviews of what identified challenges in the WASH sector are, before delving into more detail on how innovation prizes could be applied to address those challenges. For potential solvers or applicants, the paper can help them better understand the implications of applying for an innovation prize, rather than a grant or recognition award.

1.4 PAPER STRUCTURE

This paper is structured as follows:

- **Section 2 sets out the role that innovation prizes can play in general terms**. It starts with an overview of what innovation prizes are, how they have come about, their advantages and disadvantages and where they fit in among other financial instruments that the public sector can use to stimulate a market response towards social and development challenges.

- **Section 3 discusses how innovation prizes can be used in the WASH sector** and presents a brief presentation of the 14 areas that were identified in the initial scoping exercise.

- **Section 4 introduces the two WASH prizes being taken forward by Ideas to Impact**. It sets out how the prizes are likely to work and discusses key parameters and discussions that have fed into the design of these prizes so far. This is intended to provide additional food for thought to prize designers, recognising that such designs are still work in progress and are therefore likely to evolve up to the prize launch.

- **Section 5 extracts emerging lessons on how innovation prizes can be combined with other approaches as part of an overall programme to achieve maximum effect**. It provides an insight to Stage 3 of the Guide.

In addition, **Annex A** provides a list of key references and **Annex B** maps other prizes that have been used previously in the WASH sector.

2

UNDERSTANDING THE ROLE THAT INNOVATION PRIZES CAN PLAY

This section introduces 'innovation prizes' as a specific type of public sector intervention, which aims to influence a market response to trigger innovation in an area of specific importance to the public at large. It complements the introduction to innovation prizes given in the Guide, which provides a working approach to identifying whether and how an instrument that has predominantly focussed on technological innovation might be applied to such developmental challenges.

This section starts by defining innovation prizes and briefly introduces how they have been used in a range of sectors, with a particular focus on stimulating research and innovation in scientific and technical areas. To date, innovation prizes have played a somewhat lesser role in addressing social and developmental challenges but interest in using them in this area is growing rapidly. Finally, key differences between innovation prizes and other funding instruments are also highlighted.

2.1 WHAT ARE INNOVATION PRIZES?

An innovation prize can be broadly defined as 'a financial incentive that induces change through competition'. To win the prize, solvers need to compete against one another to meet a set of specified criteria, which entitles them to some form of financial reward. The possible range of competition designs and payment structures is large. There can be a single or a small number of winners. The prize may be a lump-sum award or be proportional to results achieved. The competition may take place in one or several stages. Whereas the financial reward is usually a significant incentive for applicants, they are also likely to enter the competition in search of other benefits, such as recognition and increasing their public profile. Innovation prizes require that applicants are able to bear the risks involved in competing for a prize with a probability that they will not **win**. Conversely this presents a benefit to sponsors in that they do not incur costs of trialling innovations that might ultimately fail.

GUIDE
Stage 3
Table 1

'Innovation prizes' aim to stimulate or induce innovation rather than reward good performance ex-post, as a more standard recognition prize (also referred to as 'award') would do. Ex-post awards tend to be more common than innovation prizes: they highlight lead performers in a certain sector and give an incentive to outperform over peers, but not necessarily to bring forward new solutions to a particular problem. Innovation is therefore at the heart of innovation prizes and sets them apart from other types of awards.

Innovation in this context can be understood in a broad sense, as 'renewing, advancing or changing the way things are done' (Everett, 2011). Innovation does not have to be technical but it can involve, for example, a change in behaviour or practice or the design of new business models that can successfully scale up technologies. Innovation can include the adoption of improved or new products, processes, technologies or services that are either new to the world (i.e. completely 'novel'), new to a region or business ('imitative') or that draw inspiration from a different area and are repurposed ('adaptive').

Table 1 below lays out the potential advantages and disadvantages of innovation prizes, from the point of view of prize sponsors (who are organising the prize) and for applicants, also referred to as solvers. The table complements and expands on the summary given in **Stage 4 of the Guide** (see Table 2 in particular), which appraises the overall costs and benefits to all stakeholders in innovation prizes.

GUIDE
Stage 4
Table 2

This table shows that even though innovation prizes have many advantages, such advantages might lie disproportionately with the sponsors rather than with the solvers. From the solvers' point of view, they might not be able to mobilise the necessary financing to identify solutions, particularly if they see it as a riskier process than simply applying for a grant. For example, a competition where there is a single winner ('the winner takes all') may appear very risky from the point of view of solvers, as they would need to invest their own resources in order to develop the solution that they put forward for the uncertain possibility of winning the prize. A key difference with a grant application is that, typically, solvers would need to invest substantially more effort and resources in applying for an innovation prize than in filling in a grant application. However, they may be putting forward an innovation that they have been developing for some time on their own, as they would be less constrained by the parameters of the grant application. Other incentives for solvers include the potential for wide-ranging recognition and exposure for their proposed solutions, beyond the scope of the prize and its sponsors.

The analysis contained in Table 1 shows that innovation prizes cannot be seen as a panacea to stimulate a market response to address all difficult issues. Key to the success of such innovation prizes is their ability to generate a media buzz and to raise awareness over and beyond the financial reward on offer, which provides further incentive for potential applicants to enter the prize competition. For each area that is identified as potentially 'prizeable', it is therefore critical to identify whether a prize instrument can achieve more or better than an alternative public sector instrument to stimulate a market response, such as a traditional input-based grant or more sophisticated forms of 'results-based financing' instruments, as discussed in Section 2.3.

TABLE 1: POTENTIAL ADVANTAGES AND DISADVANTAGES OF INNOVATION PRIZES

Source: authors – adapted from (Everett, 2011)

Potential advantages	Potential disadvantages
For prize sponsors	
• **No need to have all the answers:** can define an overall policy objective without having to predefine an approach so as to maximize innovation.	• **Administration costs:** screening a large number of applications that are not necessarily comparable can increase transaction costs. This can partly be addressed through defining clear selection criteria so as to minimize arbitrary decisions, which also reduces risks for applicants.
• **Pay on results:** no payment is made if pre-defined objective not achieved.	• Embarrassment if no award is made or quality of applications is poor
• **Stimulate investment:** prize applicants will invest resources in solving the problem that can be much higher than the cash reward (and the associated costs of running the prize). • **Raise awareness:** through media buzz, can generate attention for an area of special importance for society. This can increase the pool of potential solvers that will invest in solving the problem, because they have been made aware of the problem and/or because the benefits of solving the problem in terms of recognition increase. This can help highlight alternative ways to solve a problem.	• **Duplication of effort** may result in costs to beneficiaries and wider support networks.
For applicants / solvers	
• **Increased flexibility:** gives more flexibility to solvers with good 'outside-the-box' ideas that do not necessarily conform to pre-defined terms of reference.	• **Pre-financing needs:** as with any results-based financing (RBF) mechanism, a key challenge for applicants is the need to pre-finance their participation. Some potential applicants may be unable to invest or commit working capital to take part in such competitions, particularly if the probability of winning is low.
• **Monetary Benefits:** prize funds can have transformative financing effect. Also smaller prize funds (i.e. from business model competitions) can quickly channel small amounts of money relatively simply and quickly, acting as a life line to young companies or NGOs, which are less familiar with long-winded grant application processes. • **Open a new market for solvers:** solvers that are new to an area can apply their skills in a 'new market'. If the solution is successfully scaled-up, this can open up new market opportunities that can more than compensate the initial costs of applying.	• **Displacement of economic activity.** The prize may draw attention away from core business functions. The costs of entering the prize may have high opportunity costs, particularly for small organisations that are often extremely stretched. • **Significant risk.** The probability of winning the prize can be lower than that of being successful in applying for a grant. However, this can be compensated by the visibility conferred by the media buzz, including for "runner-ups"
• **Non-Monetary Benefits:** Media effects, recognition and branding can enhance visibility and credibility of solvers and potential increase investment potential	

2.2 WHERE AND HOW INNOVATION PRIZES HAVE BEEN USED IN RECENT YEARS?

ENERGY ACCESS
Section 1
For more on the recent use of innovation prizes.

While recognition awards are common, '**innovation prizes**' that aim to induce change are less well known, although not a new concept entirely. The first famous inducement prize was the 'Longitude Prize' launched after an Act of Parliament was passed in England in 1714 (referred to as the 'Longitude Act'), as set out in the Box 1.

Since then, there have been other famous examples of these prizes, such as Napoleon Bonaparte's food preservation prize in the 1800s that resulted in the eventual creation of cans as a preservation mechanism. More recent examples include the Ashden Award, which has been running since 2001 with the aim of finding new sustainable energy solutions. Also National Health Service (NHS) England launched a series of innovation prizes in 2010 aimed at tackling some of the most challenging areas in healthcare. In this case, the focus was not to stimulate new technologies but rather to identify the problems and find better practices to bring about change.

BOX 1: THE LONGITUDE PRIZE (1714), FIRST EVER INNOVATION PRIZE

What was the challenge? Despite centuries of experimentation, it was still not possible to measure longitude while at sea in a reliable manner. The English government had been wrestling with this problem, which had severe human and financial consequences. Shipwrecks were frequent and commercial and military ships were regularly lost at sea, as they were unable to keep track of their position. This in turn significantly reduced the commercial prospects for inter-continental trade. Several potential methods had been proposed to solve the problem but none was deemed sufficiently fool proof.

What was done? In 1714, the English Parliament issued an Act of Parliament that promised a series of rewards for whoever solved this problem, with increasing rewards depending on the level of accuracy of the proposed approach. The top prize (£20,000 at the time, which is equivalent to roughly £2.52 million in 2015) was to be awarded for a method that could determine longitude within 30 minutes. The Act also established the Board of Longitude, a panel of eminent personalities from the fields of science, technology and maritime affairs who would be responsible for awarding the prizes. The Board could also choose to give smaller awards to persons who were making significant contributions to the effort or to provide financial support to those who were working towards a solution. On behalf of the Board, Isaac Newton, lead scientist of the time, was tasked to write a brief on competing approaches that had been put forward, ranging from the design of reliable clocks that would keep the time at sea to measuring the angle between the ship and the moon (the so-called 'lunar distance' method).

What was the outcome of the prize? The prize prompted a flurry of activity all over Europe to try to identify a solution and win the prize. The most reliable solution was developed by a London-based watchmaker, John Harrison, who designed a clock that could reliably keep time at sea and thereby allow calculating longitude. The notable point of the prize is that it resulted in an unexpected solution from an unexpected source. It took over 50 years and numerous grants supporting the development of an effective chronometer, although the prize itself was never officially awarded.

BOX 2: NATIONAL HEALTH SERVICE (NHS) ENGLAND INNOVATION CHALLENGE PRIZES

Launched in 2010, these prizes aimed at finding solutions to some of the most difficult challenges in healthcare. The prizes have varied in what they tackle, with a new set of challenge areas provided each year, including early cancer diagnosis; better management of pregnancy; and reducing avoidable medicine waste. The maximum grant per prize is £100,000. These prizes are oriented towards individuals or groups of people working within the NHS system. The portfolio of prizes won by candidates include among many others:

- The creation of a novel diagnostic pathway to detect significant liver disease in the community – £100,000
- Early intervention dementia service – £35,000
- Web-based screening in the investigation of carpal tunnel syndrome – £50,000
- Creating a cycle response unit – £100,000

These challenge prizes are ongoing with £650,000 available for prizes in 2014. Diabetes, using technology to speed up services and diagnosis, and reducing infection are among the many challenge areas targeted in the 2014 NHS England challenge prizes.

Source: Adapted from (NHS England, n.d.)

Interest in innovation prizes has grown rapidly in the last 15 years. McKinsey (2009) states that over the last decade 'the amount of funds available for prizes have more than tripled to an estimated 1-2 billion dollars… and more than 60 new prizes of more than $100,000 have debuted since 2000.' Such prizes have been used to address a broad range of issues, including inventing new vaccines and new technologies, and developing commercial space travel. For example, the Ansari X prize, launched in 1995, was intended to stimulate the invention of a reusable space craft, by rewarding the invention of the first craft to successfully send three people 100 km into space twice within two weeks. The aim was to develop commercial space travel.

At the start of the 21st century, there was a shift away from recognition prizes towards inducement prizes. McKinsey & Company (2008) states that before 1991, 97% of the prize funds went towards prizes that recognised prior achievement (such as the Pulitzer Prize). However, by 2008, 78% of funds for prizes were focussed on inducement prizes.

Prizes can and have been used in a wide range of areas. Increasingly, prizes have been used to address social challenges, see the examples presented in Box 3. This change occurred around the start of the 21st century. Previously, arts- and humanities-oriented prizes dominated, whereas in 2008 they made up less than 10% and issues such as climate and environment, science and engineering, and aviation and space increased seven-fold as set out below. This shift was linked to a change in the nature of sponsors for such prizes, which started to include corporations, but also NGOs and private foundations (McKinsey&Company, 2008).

However, even though there has been steady growth in the use of prizes for philanthropic purposes, they have rarely been applied to the development sector.

BOX 3: EXAMPLES OF RECENT USES OF INNOVATION PRIZES

NHS Innovation challenge Prizes. In 2010, the NHS launched seven different challenges with the aim of finding new ideas to solve some of healthcare's most challenging issues. The aim was to encourage new practice and change the culture within the NHS rather than stimulate new technology. It is too early to see how cost effective this process was, however winners for the first round of challenges have been identified and new ideas and solutions were found. One example was the challenge to increase independence for those with kidney failure: a process (used by a dialysis team in Manchester) was found that reduced the cost of home dialysis delivery by £12,000 a year.

Euclid Network, UniCredit Foundation and Project Ahead, Naples 2.0. In 2011, this prize was launched to find innovative solutions to persistent social challenges in six areas of Naples. Examples of the challenges were: developing an inclusion plan for Roma youth and developing sustainable business models for non-profit and volunteer organisations.

European Commission 'social innovation competition'. In 2012, this prize was launched to find new solutions for creating more and better work. Around 600 proposals were received and three prizes of EUR 20,000 were given out for social care, job sharing and market access.

2.3 HOW CAN INNOVATION PRIZES BE USED TO ADDRESS DEVELOPMENT CHALLENGES?

Until recently, innovation prizes have been used comparatively little to address burning 'development challenges' in the developing world. This is gradually changing with a growth of interest in these mechanisms in the development arena. Box 4 presents a few recent examples of prizes being used in the development sector.

Examples in the water and sanitation sector are set out in more detail in Annex B. They include the Reinvent the Toilet Challenge (RTTC), launched by the Bill and Melinda Gates Foundation in 2011 (Box 5) and the Stone Family Foundation for innovation and entrepreneurship in the water sector.

Potential reasons for such limited use in the development sector include the fact that, prizes have largely focussed on the 'idea and invention end of the innovation chain, with few examples of prizes focussed on the results end' (Everett, 2011). Introducing a prize for a technological innovation may not be sufficient when donors are looking to achieve results at scale and are not prepared to wait for an invention to move from prototype stage to full scale-up stage.

BOX 4: EXAMPLES OF RECENT PRIZES TO ADDRESS DEVELOPMENT CHALLENGES

The Gates Vaccine Innovation Award: The aim is to find new vaccines that will help immunize children in the poorest parts of the world. These prizes, targeting developing countries, aim for innovation and creativity whether that be simple or complex, big or small, but which ultimately could be implemented in specific countries in the developing world. Two prizes were awarded in 2012 and in 2013.

Africa Prize for Engineering Innovation: This prize is supported by The Shell Centenary Scholarship Fund, Consolidated Contractors Company, ConocoPhillips and the Mo Ibrahim Foundation. It aims to stimulate innovation, new ideas and entrepreneurship in sub-Saharan Africa. Engineers from any sector are being asked to come up with 'scalable solutions to local challenges' focussing on engineering and a method of improving situations. The main winner will win £25,000 and the two runner ups £10,000. At the moment, there is a shortlist of 12 entrants. They will receive 6 months of training after which three finalists will be chosen.

BOX 5: THE REINVENT THE TOILET CHALLENGE, LAUNCHED BY THE BILL AND MELINDA GATES FOUNDATION

The RTTC was a genuine 'innovation prize', as it set a very clear brief for engineers and scientists around the world to invent a 'new' toilet that would meet the following criteria:

- Removes germs from human waste and recovers valuable resources such as energy, clean water, and nutrients;
- Operates 'off the grid' without connections to water, sewer, or electrical lines;
- Costs less than US$.05 cents per user per day;
- Promotes sustainable and financially profitable sanitation services and businesses that operate in poor, urban settings;
- Is a truly aspirational next-generation product that everyone will want to use – in developed as well as developing nations.

(http://www.gatesfoundation.org/What-We-Do/Global-Development/Reinvent-the-Toilet-Challenge)

Although the prize was awarded and there are some promising prototypes, so far this prize has not led to the widespread adoption of these prototypes and has therefore not produced 'results' that matter to donors minded to achieve global goals, such as increasing the number of people with access to improved sanitation.

BOX 6: NIRMAL GRAM PURASKAR EX-POST AWARD IN INDIA

There is prior experience and interest in using prize mechanisms to incentivise actors to change their behaviour in the sanitation sector in India, including for public sector actors. The Nirmal Gran Puraskar (NGP), first initiated in 2003, is a scheme to incentivise Gram Panchayats (GP, i.e. local governments for villages and small towns in rural India) to become fully sanitized and free from open defecation. The NGP is an 'ex-post award' rather than an innovation inducement prize. These incentives have been introduced as part of the Total Sanitation Campaign (which dates back to 1999). The NGP provides one-off monetary rewards (which vary in size depending on the population in each community) from the central government to the qualifying GPs based on a set of criteria that include being 100% open defecation free and achieving 100% sanitation coverage of individual households. Although the NGP has been affected by a number of issues (including 'over-reporting' or the problem of 'short-lived' incentives, with villages failing to maintain open defecation free [ODF] status overtime), it has proved very popular with communities in India.

Innovation prizes can be used with a view to identify scalable solutions and therefore could have a role to play as part of the broader range of results-based financing instruments for development. The interest in innovation prizes to address development challenges is part of a broader change in the way that development interventions are funded. It is part of a shift towards a 'results agenda', which refers to an international effort to make aid more effective, and to link funding more closely to results.

Such a shift builds upon an analysis of the weaknesses (and in some cases failures) of the traditional input-based grant models, in which the implementer of development programmes would typically receive funding up front to carry out a development intervention. Examples of results-based financing instruments include output based aid (OBA), conditional cash transfers (CCTs) and cash-on delivery aid (COD aid), as briefly outlined in Table 2 overleaf. These results-based financing instruments can seek to shift incentives for different types of implementers including government agencies, NGOs, community-based organisations (CBOs), private enterprises or individual households.

TABLE 2: EXAMPLES OF RESULTS-BASED FINANCING (RBF) INSTRUMENTS

Source: adapted by authors from (GPOBA, 2014) with inputs from (Klingebiel, 2012).

Potential advantages	Potential disadvantages
Cash-on delivery aid (COD)	A financing arrangement through which donors offer to pay recipient governments a fixed amount for each additional unit of progress towards a commonly agreed goal. (Birdsall, Savedoff, & Mahgoub, 2010). The payments that are provided once the agreed results have been achieved take the form of general budget support that is paid to the treasury of the partner country (e.g. ministry of finance). Key features include payment for outcomes; a hands-off approach; independent verification; transparency; and a complementary approach to other aid instruments (Klingebiel, 2012).
Programme-for-results lending (P4R)	A specific lending instrument introduced by the World Bank, characterised by providing funding for specific sectoral or sub-sectoral expenditure programmes and disbursing the loan upon the achievement of results and performance indicators, not inputs (Klingebiel, 2012), World Bank;(Gelb & Hashmi, 2014).
Output based aid (OBA)	A mechanism to support the delivery of basic services where policy concerns justify the use of explicit, performance based subsidies. Ex-post targeted subsidies are paid to service providers based on reaching pre-agreed objectives to better serve the poor.
Conditional cash transfers (CCTs)	Programs that transfer cash to poor households that make specified investments in the human capital of their children or change their behaviour to promote the children's welfare.
Vouchers	Scheme that allows end-users to select accredited service providers that are then reimbursed on the basis of services delivered.
Results-based lending	An approach being piloted by the Asian Development Bank over the 6 years from 2013. The distinctive feature of this approach is that disbursement of loan proceeds are directly linked to achievements of programme results (ADB, 2013).

In many ways, innovation prizes can be conceived as an extreme form of results-based financing (RBF), in which the remuneration is fully linked to results, with a high probability for applicants of not being paid if results are not achieved. RBF mechanisms usually leave flexibility to the implementers in order to identify solutions to meet the target outputs. An innovation prize leaves maximum flexibility to the solvers in order to determine the solution and funds are paid solely on results, i.e. based on the target outcome that is sought. This means that the risks are high for the solvers but rewards are potentially very high, both in terms of financial rewards and **recognition**.

GUIDE
Stage 4
For more on the risks to solvers.

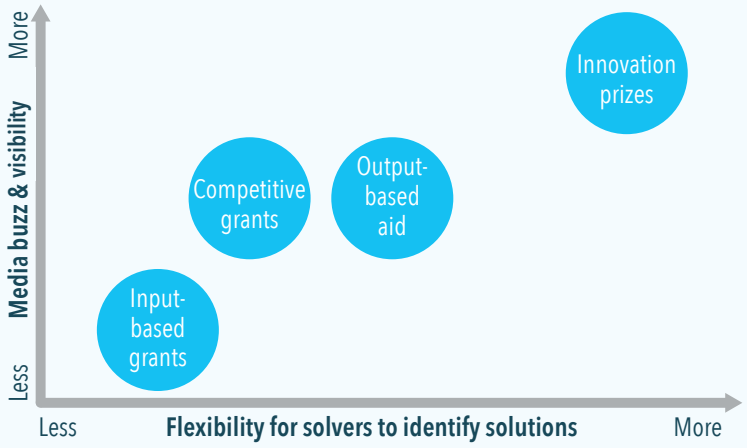
An agent that seeks to influence society and markets but does not necessarily have ready solutions can use innovation prizes to leave maximum flexibility to the solvers in order to identify the most effective way of solving a development challenge. Such instruments are also particularly useful in contexts that are receiving increasing attention from both the **general media and from a range of specialised media outlets**.

GUIDE
Stage 4
For more on media attention.

The way in which innovation prizes compare with other types of development financing instruments is represented in Figure 1, based on the two distinctive features of innovation prizes, i.e. the degree of flexibility left to solvers and the potential to generate visibility for the issue through creating a media buzz. The latter can partially be recreated through the announcement and publicity process around competitive grants (as was done by the European Union Water Facility or the African Water Facility), particularly when such grants are awarded through a series of funding rounds that generate competition between applicants. However, such 'buzz' in the case of grant applications would likely be confined to those parties that are directly interested, i.e. the potential grant applicants, whereas the buzz generated through innovation prizes would usually reach a broader public, provided the communication campaign is well designed and that messages are well communicated. When done well, solvers can gain broader publicity from taking part and particularly from winning the prize.

When this aspect is neglected, the comparative advantage of a prize over a more conventional grant mechanism might be minimal. For example, the Stone Family Foundation organised a prize for innovation and entrepreneurship in water back in 2012. Although the prize process was very well run and received a large number of applications, the publicity that followed the prize award was minimal. This meant that the net benefit from the prize for the WASH community as a whole was low, and probably lower than the overall costs of running the prize (which included the prize value but also associated running costs, for screening and selecting applications).

FIGURE 1: INNOVATION PRIZES VS. OTHER FUNDING INSTRUMENTS



Innovation prizes are therefore applicable only in specific circumstances: they can be used typically as part of broader programmes that use other types of instruments to tackle other market failures.[1] To better understand where and how they can work in a development context, the Ideas to Impact programme investigated their applicability in a range of sectors, including WASH, as discussed in the next section.

3

HOW COULD INNOVATION PRIZES BE USED IN THE WASH SECTOR?

This section discusses how innovation prizes can be used in the WASH sector. It presents the 14 areas that had been identified in the initial scoping exercise for the preparation of the Ideas to Impact programme. One objective of this section is to provide 'food for thought' to other sponsors for the design and implementation of innovation prizes in the WASH sector.

3.1 STAGE 1 PROBLEM IDENTIFICATION

GUIDE
Stage 1
For more on problem identification

GUIDE

To assess where and how innovation prizes could be used in the WASH sector, Ideas to Impact researchers undertook a broad review of the sector to identify unresolved challenges which could potentially be overcome through innovation, and specifically through innovation prizes. This was based on Stage 1 of the Guide. Given that Ideas to Impact's scope also encompasses energy efficiency and climate change, this review examined in particular how the WASH sector can affect or be affected by these two other areas, **as the ability to provide water and sanitation services is likely to be constrained by climate change and rising energy costs**. This lies at the heart of the so-called 'water–energy–food' nexus, which has been attracting increasing attention in recent years. Solutions developed in these areas can achieve multiple objectives, including adapting to climate change (by helping conserve water resources and improving resilience to floods and droughts) and helping with mitigating climate change (by reducing energy use and placing resource recovery at the heart of service delivery).

The analysis was based on prior knowledge of the water sector, an evaluation of current government and donor priorities, consultation with thought leaders in the sector and targeted literature reviews. Many of the sector leaders consulted during the process agreed that the WASH sector is a one in which 'technical fixes' or 'shiny new toys' are not required to achieve lasting change at scale, particularly in the developing world. They thought that the sector suffers from an abundance of 'pilot projects' that have sought to develop new technical fixes, whereas few of these have managed to be successfully scaled-up. In many cases, technical solutions are known, but what is needed is to overcome certain factors that limit their widespread adoption, such as limited demand, affordability constraints or political resistance. As a result, sector experts argued that the WASH sector urgently needs innovation in terms of business and contractual models as well as financing mechanisms. As a result of this consultation, focus was therefore placed on identifying areas where innovation in terms of business and financial models is needed, provided the right type of enabling environment is in place.

3.2 STAGE 2 PRIZE OPTIONS

This rapid scoping exercise allowed us to identify 14 specific problems that limit the ability of low-income households to access sustainable services. This moves the process on to **Stage 2 of the Guide:** identifying whether prizes could be targeted to address any of the problems identified in the Stage 1 analysis.

This list of 'challenges' is by no means exhaustive and does not encompass all challenges that currently affect the WASH sector. These challenges were identified based on the following criteria:

GUIDE
Stage 2

- Problems that, if solved, would have a significant expected impact on low-income households;
- Problems that, if solved, could generate 'multiple gains', particularly to reduce energy consumption or generate renewable energy resources, as a way to mitigate climate change;[2]
- Areas where the **market alone has not produced a satisfactory solution** from the point of view of society as a whole, and is not likely to produce one in the near future, judging by recent market developments. In such situations, a public intervention could make a significant difference to improve outcomes and could potentially take the form of an innovation prize;
- Areas where the 'media buzz' surrounding a prize would be beneficial, i.e. where raising awareness to this particular problem could have an impact beyond the monetary prize itself.

GUIDE
Stage 1
For more on market failure.

2. Energy costs represent a substantial share of operating costs for water service operators (large or small) and for household self-supply, i.e. for abstracting and distributing water (pumping costs to extract water from groundwater resources or to distribute water over the networks, particularly where gravity schemes are not feasible) or for treating wastewater. Going forward, it is essential to identify less energy-hungry solutions for the WASH sector so as to ensure sustainable provision of those services. The growing realisation of this as an issue is increasingly referred to as the WASH-Energy nexus, which is attracting growing interest.

The WASH areas for which potential prizes have been identified following this process can broadly be grouped into six main areas, as shown in Figure 2 and in Table 3 below. Some of these areas are closely related or can be seen as subsets of one another (as in the area of water supply or in the area of sanitation). Section 3 examines each of the six WASH areas in turn so as to provide further detail of how innovation prizes can be designed in the WASH sector. In each area, we provide a brief overview of the challenges that were identified, determine what activities are currently ongoing to address such challenges and what would need to change to achieve maximum impact. This provides a basis for identifying how innovation prizes could make a difference and what type of actors should consider launching such prizes. Across all prizes, a clear strategy for getting innovation to scale, as discussed in **Stage 3 of the Guide**, will need to be in place with related financing.

GUIDE
Stage 3

Based on the problem areas presented in Section 3, two ideas were further developed as part of the Ideas to Impact programme. They were:

- Dream Pipe, a prize to stimulate financial and contractual innovation to reduce NRW and improve water services for the poor.
- Clean City, a prize to stimulate small cities in India to develop and implement city-wide integrated urban sanitation systems.

These are presented in Section 4.

FIGURE 2: POTENTIAL PRIZEABLE AREAS IN THE WASH SECTOR

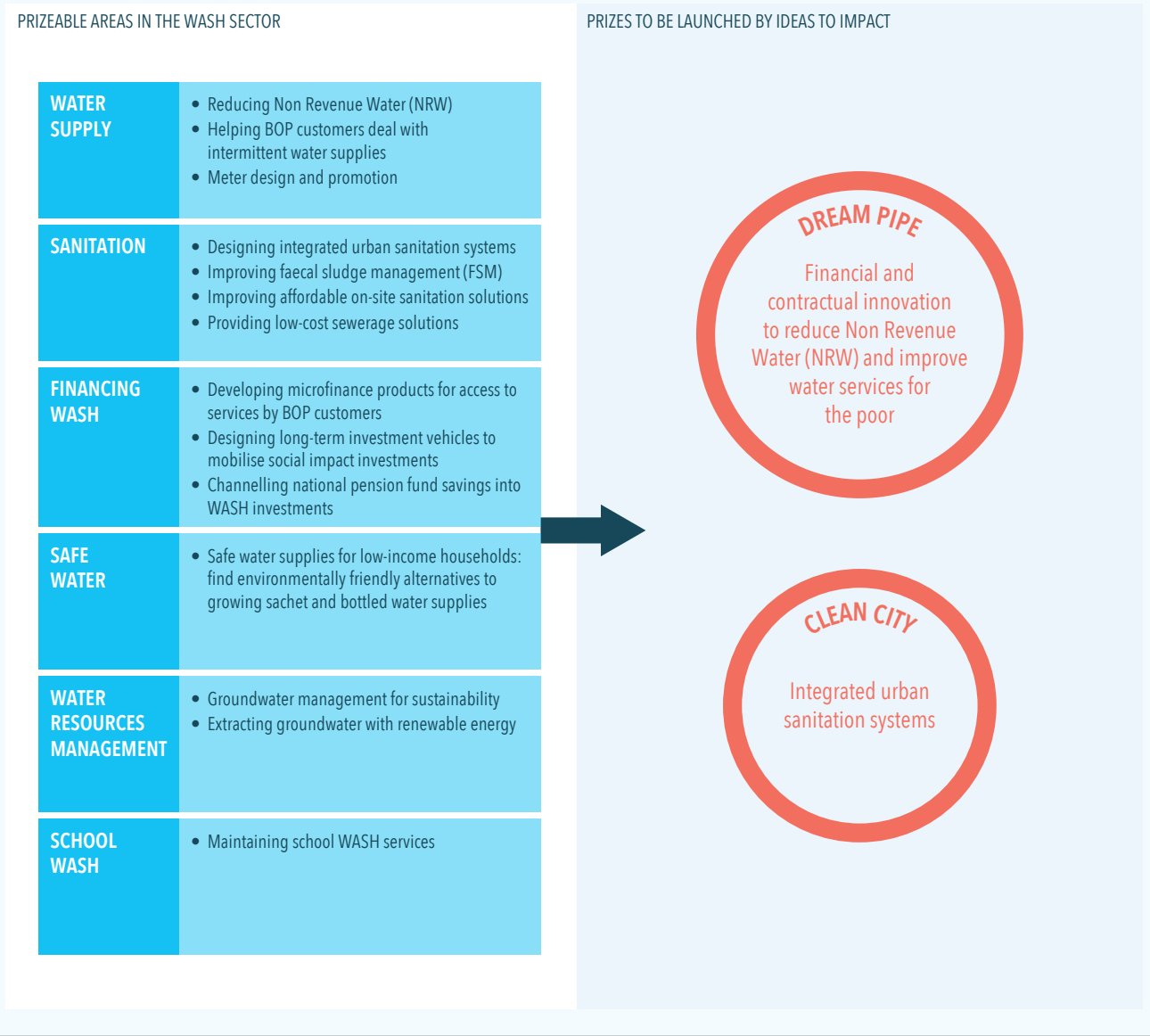


TABLE 3: OVERVIEW OF THE 14 PRIZEABLE PROBLEMS IN 6 AREAS IN THE WASH SECTOR

Rapid description	Identified problem	What could the prize incentivise?	Who? Targeted solver community
Water supply			
Reduce water losses	Technologies to detect and fix leaks are well-known but reducing losses, referred to as Non Revenue Water (NRW), is costly, time-consuming and requires full commitment from utilities. New types of financial and contractual arrangements are needed to do this effectively at scale and to share the benefits of these improvements with poor customers.	Design and roll-out contractual forms to mobilise financing and technical expertise to reduce NRW and share benefits of reducing water losses between utilities, companies that can offer 'leak reduction' services and customers, with a particular focus on poor customers.	Utilities; finance, economic and management consulting firms, engineering firms that provide services to utilities, other unexpected solvers
Help low income households deal with intermittent water supplies	Intermittent water supplies generate a lot of inconvenience for all customers, particularly low income households. They need to store water in roof tanks and manage those tanks, be at home when water comes in and sometimes pump water from the network.	Identify solutions to improve *living conditions* of low income households customers affected by intermittent supplies. An additional benefit would be that it could incentivise utilities to deal with all aspects of water access by those customers so as to improve quality of overall service.	Utilities (North/South partnerships), social entrepreneurs, NGOs
Design smart meters suitable for low income country contexts	Existing water meters on the market cannot cope with intermittent water supplies. This is often cited as a reason for not investing in metering, whereas universal metering would be a key way to encourage water conservation and reduce losses, thereby saving precious resources for all customers.	Design and roll-out low-cost smart water meters that could: (a) function despite intermittent water supplies; (b) allow the adoption of smart water tariffs (to incentivise water conservation); (c) could be used at household level or at a communal water point.	Utilities (North/South partnerships), equipment manufacturers
Sanitation			
Design and roll-out affordable on-site sanitation solutions in rural areas	Locally available on-site sanitation solutions are not 'aspirational goods' for low income customers; improved toilets are too expensive particularly for rural population.	Design and distribute a low-cost, locally acceptable improved toilet solution with associated distribution channels. In areas that are prone to flooding, such solutions would need to be flood-resistant.	Local universities, local entrepreneurs (with assistance from design firms)
Design and roll-out low-cost sewerage solutions	Traditional sewerage networks are over-specified for many developed countries and therefore unaffordable. Even though 'simplified sewerage systems' (also referred to as 'condominial sewers') were developed and have successfully scaled-up in Latin America, they have failed to do so in Sub-Saharan Africa (SSA) or South Asia (SA).	Design and implement a business model to roll-out simplified sewerage systems in SSA countries or in India.	Utilities, engineering firms, social entrepreneurs, unexpected solvers (innovators, tech students, private sector and other)
Improve faecal sludge management	Treatment of faecal sludge collected from on-site solutions is quasi-inexistent in most developing countries. A key trade-off in the choice of treatment solution is between standard energy-hungry solutions and low-cost low-energy solutions that use a lot of space (often not available in dense, rapidly growing cities).	Design and roll-out low-cost faecal sludge treatment and reuse solutions for space-constrained slum environments (with associated business model for organising the collection of faecal sludge, such as franchising, leasing, etc.).	Utilities, research labs, social entrepreneurs Unexpected solvers
Implement city-wide urban sanitation systems	Sanitation services are currently developed in a piecemeal manner, with no foresight and coordination. This results in limited access to sustainable sanitation, with a large percentage of 'shit flows' being discharged indiscriminately into the surrounding environment, resulting in disease and environmental degradation.	Encourage cities to develop integrated visions for the development of their sanitation services, including backbone infrastructure (sewers) and service models to collect, transport, treat and safely dispose of or reuse faecal sludge.	Municipal governments, national governments, utilities, engineering firms

TABLE 3: CONTINUED

Rapid description	Identified problem	What could the prize incentivise?	Who? Targeted solver community
Financing WASH			
Develop microfinance products to facilitate access to services by low income households	Microfinance institutions (MFIs) are not commonly offering products for access to basic services (e.g. building a latrine, getting a solar home system, getting an electricity connection). This might be due to lack of understanding and appreciation of these areas. NGOs trying to offer finance are frequently failing for lack of suitable systems to market financial products.	Design and roll-out microfinance products for WASH with a clear strategy for implementing those at scale. Such models could also be applicable to climate change adaptation or energy efficiency.	Financial institutions, MFIs Unexpected solvers
Channel national pension funds savings into long-term investments	Insufficient funding available for investment in environmental infrastructure (such as for WASH or energy services), both for large-scale (networks) and small-scale investments. Investment needs to be financed over the long-term, preferably in local currency. *National pension funds* need to find opportunities in their country to invest in long-term assets and such opportunities are currently limited – a win–win solution could be identified	Design and issue environmental bonds that would provide an attractive investment vehicle for *local pension funds*. The proceeds of those bonds could go to utilities, municipalities or small projects via microfinance/APEX bank – these investments would need to be low-risk and generate adequate returns.	Financial institutions, investment funds, national pension funds, financial advisers
Design long-term vehicles for social impact investments	Insufficient funding is available for investment in environmental infrastructure (such as for WASH or energy services), both for large (networks) and small-scale investments. *Social investors* may be interested and would be able to behave as 'patient investors' (bearing higher risks) than national pension funds.	Issue Social Impact Bonds that can be sold to *social impact investors* (as social impact bonds), including international investors, wealthy people in the country and expat communities. These could be high risk investments with high social impact, suitable for 'patient investors'.	Financial institutions, investment funds, social impact investors, financial advisers
Safe water			
Deliver safe water supplies for low income households	Bottled water and sachet water are rapidly growing as key methods for all in developing countries (including for low income households) to access drinking water However, there are key issues involved: it is usually a very expensive solution, the hygiene quality of such water may be uncertain, and there are significant negative environmental impacts.	Identify safe, low-cost and environmentally friendly alternatives to bottled water/sachet water that provide similar levels of convenience (e.g. cold water available on the spot) for low income households, which would avoid the pitfalls of existing water filter solutions. This could be a 'reinvent the liquid container' solution.	Soft drink industry, water filter manufacturers, social entrepreneurs, unexpected solvers
Water resource management			
Manage groundwater sustainably in rural areas	20% of the population of sub-Saharan Africa relies on surface waters, which are often unreliable and unsafe. Groundwater use should be encouraged to improve resilience but groundwater management needs to be improved.	Specific technical innovations (such as low-cost sensors on groundwater pumps with mobile communications to report groundwater availability and serviceability) could be identified through a prize mechanism and subsequently rolled out.	Pump and sensor manufacturers, socio-entrepreneurs, unexpected solvers
Extract groundwater with renewable energy	Climate change and rising energy costs will increase pumping costs where diesel pumps are used. Existing attempts to disseminate pumps with renewable energies have not been scaled-up.	Business model to roll-out renewable energy pumps (solar, wind, manual). This could include technical innovations (limited), but also innovations in terms of financial and business models for scaling-up such technologies.	Engineering firms, social entrepreneurs, NGOs
School WASH			
Maintain school WASH services	High percentage of schools (and health centres) in developing countries do not have operating WASH facilities, due to substantial maintenance and funding issues.	Develop business models to build and/or maintain school latrines in working conditions – the same could be done for health centres.	Utilities, social entrepreneurs, NGOs

3.2.1 IMPROVING URBAN WATER SUPPLY IN A CONTEXT OF INCREASINGLY SCARCE WATER RESOURCES

OVERVIEW OF EXISTING CHALLENGES

Water supply services, i.e. the provision of potable water by governments, individuals, private sectors or NGOs is a continuing battle, with many factors hindering the process by which people gain access to water. Inadequate access is an issue that was highlighted by the MDGs. Despite the fact that the water MDG has been reached, approximately 547 million people still lack access to improved water services in 2015 according to latest WHO Joint Monitoring Programme for Water Supply and Sanitation (JMP) figures and many more get inadequate services despite being allegedly 'connected' to the service. In this section, we focus particularly on challenges in urban areas; challenges affecting rural areas are discussed in more detail in Section 3.6 below.

At present, continuity of supply is only a distant dream for substantial parts of the sub-Indian continent and sub-Saharan Africa. The poor are usually at the 'end of the line' and are the ones that suffer most from increased water scarcity, especially in urban environments. This can be due to rationing and intermittent supplies if they are already connected to a network. When they are not connected but use wells or boreholes, difficulties in accessing water can be due to the deterioration of groundwater resources, in turn due to shallow groundwater sources contaminated by inadequate sanitation facilities in the vicinity or increased salinisation of the aquifers. In a context of increasingly scarce water resources, the situation is likely to deteriorate further: it is estimated that almost one fifth of the world's population (about 1.2 million people) live in areas where water is physically scarce.

One main cause of intermittent water supply (IWS) is the lack of water, which is often the result of losses from the system (sometimes very severe). Rationing is used to limit technical losses from the network. In addition, a significant amount of water may be lost due to theft, via illegal connections or due to inadequate metering and billing. When the supply of water is rationed, due to lack of water in the distribution system, the first customers to be cut off are usually those living in poorer areas. As (Marin, 2009) states: *"Rationing is possibly the number one quality challenge for many water utilities in the developing world. Without service continuity, meeting drinking water standards cannot be guaranteed because of the risk of infiltration in pipes. The poor, who often live at the low-pressure ends of distribution networks and cannot afford coping equipment (such as private wells, roof tanks, and filters), are disproportionately affected."*

IWS poses significant health risks to the network's customers, particularly in networks where there are prolonged periods of interruption of supply due to negligible or zero pressures. The sudden increase in pressure that occurs when supply is re-established can increase water losses and cause high levels of contamination from the leaked water, or even sewerage, that may be sucked into the system. This scenario is likely to occur where the water pipes have been installed near sewerage pipes (which could also be leaking). The risk of contamination is exacerbated by the inappropriate storage of water when the system is running.

IWS also negatively impacts labour productivity. Poorer customers, particularly women and girls, who have little means to store the water (with water tanks for example), have to sit at home waiting for the water to come or have to look for water from other sources during prolonged interruption. They may not have enough resources to invest in water storage or point-of-use water treatment solutions, which means that low-income households are primarily affected by intermitted water supplies. The same goes for customers supplied through communal water points, such as kiosks.

Managing water supply and reducing losses through conventional methods (such as metering) is more difficult when service is intermittent, as existing meters do not function adequately: when water is not flowing through the pipe, air flows may affect the accuracy of water readings or grit may corrode water meters.

WHAT WORK IS CURRENTLY GOING ON IN THIS AREA?

Work has been ongoing to address such issues, particularly in terms in NRW reduction. These would typically take the form of investments in network rehabilitation (e.g. pipe replacement), installation of bulk meters, leakage detection and repairs and clamping down on water theft. The technology for such activities has improved considerably in recent years and is now well-known and routinely used in developed and middle-income countries. Funders usually insist on public–private partnerships arrangements to carry out these activities, so as to ensure that higher degrees of professionalism and focus are brought in to reduce losses and improve continuity of supply. But all of these efforts need to be rolled out on a massive scale to address the issue on a global scale. So far, investments in such activities have been fairly limited, for the reasons outlined below.

Development banks or national governments usually fund these initiatives as 'projects': as such, they take a long time to be arranged, they are expensive to monitor and public funding is not sufficient to address problems on a global scale. In addition, loss reduction activities usually represent a small component of a broader investment programme and fail to be prioritised as such. It is only in high or middle-income countries (such as parts of South-East Asia and South Africa) that contracts are signed between the parties (i.e. utilities in need of reducing losses and companies that specialise in reducing losses) without the need for external funding. Such contracts would typically entail profit sharing arrangements between those two types of actors. In low income countries, water loss reduction activities are much less common, for a variety of reasons that may include the following:

water utilities may be politically captured and not focussed on improving performance, they sometimes lack technical capacity or funding to undertake loss reduction activities. In addition, one key issue is that investments in loss reduction activities are often treated as operation and maintenance (O&M) and as such, are not viewed as being 'asset-creating'. As a result, it is typically difficult for utilities to arrange funding for those activities and traditional banks (including development banks) are unwilling to lend because they think that cash-flows associated with those investments are unpredictable and they cannot claim any collateral. Even private sector NRW experts have trouble raising finance through commercial banks.

HOW COULD INNOVATION PRIZES HELP IN THIS AREA?

Finding solutions to existing water supply problems in urban areas would have transformative results, both in terms of augmenting the quantity and quality of water available for the consumers and in reducing the overall cost of delivering water services. **This part of the study follows Stage 2 of the Guide**. As part of the initial scoping study (Stage 1 of the Guide), we identified three potential areas where an innovation prize could make a difference. These innovation areas are closely related to each other: so, it seemed more appropriate to focus on the most significant one as part of the Ideas to Impact programme. Nevertheless, all three areas are relevant and could be the object of future innovation prizes through separate programmes, as discussed below. This is provided that such prizes are undertaken in the right kind of enabling environment, i.e. in the context of broader water sector reforms with a focus on improving performance.

1. Innovative contractual and financial arrangements to reduce NRW. A prize could incentivise utilities to enter into innovative contractual arrangements so as to reduce the amount of water that is lost and work towards a 24 × 7 supply. The research undertaken as part of this programme showed that, rather than technical innovation, there is a greater need to scale up NRW reduction activities is new forms of contractual and financial arrangements that could mobilise funding from a wider range of actors, including from funders that would be prepared to pre-finance NRW reduction activities in a patient manner. This would enable utilities to radically reduce NRW, extend water connections to poor customers and overall, improve utilities' management and operations. From the side of utilities, this could be done through partnering (i.e. entering into a public-public or a public-private contract) with an experienced water loss reduction expert and private operators or NRW experts, which could work collaboratively with a utility to reduce losses and transfer 'know-how' to ensure sustainability of these approaches. The innovation prize approach appeared to be particularly promising and was therefore developed as part of the Ideas to Impact programme under the name of Dream Pipe, as discussed in more detail in Section 4.

2. Solutions to improve living conditions of low-income households affected by intermittent water supplies. Intermittent water supplies generate a lot of inconvenience for all customers, including those who supposedly have access to the network. They need to store water in roof tanks and manage those tanks, be home when water comes in, sometimes pump water from the network. Solutions to improve the living conditions of low income households, who are most affected by these conditions, could be stimulated via an innovation prize aimed at utilities, social entrepreneurs and NGOs. An additional benefit would be that it could incentivise utilities to deal with all aspects of water access by those customers so as to improve overall quality service. Such solutions could include 'smart' information systems to send real-time updates on rationing schedule and water availability, improved roof tank design so as to provide cheap smart solutions (for example, with remote sensors to detect levels within the roof tank). Prizes in this area could be organised at a global level by development agencies or technology providers. Although there is a strong need for such 'coping mechanisms', this was deemed less a priority however when compared to measures that aim to address the root causes of intermittent supplies.

3. Solutions that enable water demand management while water networks functions in conditions of intermittent water supply. As discussed above, technical issues linked to meter design affect the ability to manage water networks in conditions of intermittent water supply. Addressing those issues would require the development of 'smart water systems' that can cope with water scarcity. Solutions that could enable water demand management in intermittent water supply conditions may include:

- Meters that can cope with intermittent service conditions, i.e. that do not get affected by grit or can adequately differentiate between airflows and water flows;
- Smart meters (which can send real-time information on water consumption to the utility or the customers themselves): these are useful in order to introduce differentiated tariffs, in particular to introduce disincentives for consumption in times of high water demand.

Innovative water metering solutions need to be combined with 'smart tariffs' to incentivise water conservation. Even though some of the utilities operating in extremely water-scarce environments (such as in Lima, Peru, or Amman, Jordan) are acutely aware of the need to promote demand management and incentivise water conservation, most tariff structures remain very conventional in their design. At present, utilities have an inherent incentive to sell more water as they charge based on the volumes of water sold. This is an area where innovation is needed, although adopting new water tariffs often remains a political decision (in the absence of adequate regulatory framework). The design and application of innovative tariffs for water conservation would therefore need to be done on a pilot basis where strong water regulators are in place. Innovation prizes in this area would seek to incentivise utilities and equipment manufacturers to design meters that can cope with intermittent supply conditions and enable smarter tariff design.

3.2.2 DELIVERING SUSTAINABLE SANITATION SERVICES

OVERVIEW OF CHALLENGES AND ONGOING WORK

Challenges with respect to sanitation vary quite substantially depending on context, particularly depending on the nature of population settlements: rural areas (where population density is fairly low) or urban and peri-urban areas (where population density is high).

In **rural areas**, interventions to increase access to sanitation in rural areas usually focus on getting people up the 'sanitation ladder', i.e. eliminating open defecation and moving to fixed-point defecation, either using traditional latrines or preferably improved ones. Approaches to increasing access to rural sanitation at scale have gradually developed. Over the last 10 years to 15 years, there has been a shift away from heavily subsidised approaches to a mix of approaches including behaviour change campaigns (with CLTS currently being heavily promoted by most donors including DFID), sanitation marketing, supply side strengthening (with training of latrine builders and development of business skills), and in some rarer cases facilitated access to finance and the provision of incentives to local stakeholders (as in the Total Sanitation Campaign in India, which included the Nirmal Gram Puraskar, i.e. financial incentives to communities that manage to eliminate open defecation).

Such mixed approaches are now being rolled out with some degree of success by Governments (including in India) or international agencies such as UNICEF, the Water and Sanitation Programme (WSP) of the World Bank, the Global Sanitation Fund (GSF) with support from funders such as DFID or the Bill and Melinda Gates Foundation. Although progress has been slower than initially expected, increasing evidence is being gathered on what works and what does not work, in particular regarding the optimal combination and sequencing of these approaches. Experimentation is still ongoing in this area, particularly with respect to approaches to behaviour change. Despite being abundantly promoted, the average success rate for CLTS campaigns is around 30%, which means that approximately 30% of communities 'triggered' eliminate open defecation within a few months. However, such success rates can vary considerably between countries (UNICEF East Asia and Pacific Regional Office, 2013). In addition, no data on the sustainability of ODF status has been reliably gathered to date.

The need for technical innovation appears to be relatively limited in this area, although improvements are needed in terms of latrine design, to produce and distribute at large scale, low-cost, durable latrine products that appeal to the rural population (such as the Easy Latrine developed in Cambodia by IDE with support from WSP). Specific features may include ecological latrines, flood-resilient or disabled-friendly designs. Given cultural and geographical specificities, innovation prizes could be designed at a national level (or at a maximum, at a sub-regional level) to incentivise the design of locally suitable products. In addition, financial innovation is needed to mobilise household-level investment, as sanitation is seen everywhere as a household-responsibility, whereas their willingness and ability to pay for durable improved latrines remains low. Microfinance for latrine acquisition by households has been rolled out with some real success in rural areas in India but to a more limited extent in SSA (including in Kenya or Malawi).

In **urban areas**, the situation is complicated by the need to deal with other aspects of sanitation beyond providing access to improved sanitation facilities. Given higher population densities and lack of space, it is not realistic to expect that a latrine can simply be moved when it fills up. If a latrine is emptied in an unhygienic manner, the health benefits from having contained the waste in the first place is no longer realised. For these reasons, sewerage systems were developed in developed countries in order to deal with the waste in a more cost-efficient and hygienic manner.

For many developing countries, however, sewerage systems are not a realistic option, as investments would be unaffordable and challenging to implement in practice. At present, rapidly expanding cities in the developing world are finding it more and more difficult or are just unable to expand sanitation services to keep up with urban growth – especially in peri-urban areas. Because of the rapid growth and the need to respond quickly to these problems, sanitation systems in new settlements are being developed in a 'piecemeal' manner with poor foresight and coordination. The majority of peri-urban areas of large and smaller cities are served with unimproved on-site sanitation facilities, which are not emptied as frequently as needed and in some cities open defecation is not uncommon and public toilets are in disrepair. For wastewater and faecal sludge that is collected from on-site solutions, treatment is quasi-inexistent in most developing countries.

As a result all of the above has led to **unsustainable sanitation services, with negative consequences for public health and the environment, resulting in substantial economic losses.** Therefore affordable solutions must be found to develop integrated 'sanitation systems' to deal with collection, transport, treatment and reuse of faecal matters and other types of waste, including industrial waste. What is needed is a mix of network and off-network solutions to ensure adequate collection, transport, treatment, reuse or safe disposal of the waste. Although some Asian cities are making progress towards identifying such integrated sanitation solutions (for example in Indonesia, initially with support from WSP (WSP 2011)) such integrated solutions still remain at the level of plans in most SSA cities where needs are acute and rapidly growing in line with the rapid spread of unplanned peri-urban areas. 'Cracking' the urban sanitation problem, particularly in cities with low sewerage coverage rates, is highly relevant for low-income households, who are the most likely to suffer from unsanitary environments created by inadequate sanitation.

A number of actors are currently working actively to improve sanitation systems in SSA cities or elsewhere. Development banks, such as the European Investment Bank, KfW from Germany or the African Development Bank (via its African Water Facility) are moving away from an exclusive focus on funding sewerage networks and wastewater treatment plants to project designs that embrace the complexity of urban sanitation markets in developing countries, as described in the SHARE Sanitation markets Pathfinder (Trémolet 2012).

Developing methods for appropriate faecal sludge management (FSM) is receiving particular attention from international donors and development banks at present. The Bill and Melinda Gates Foundation is leading the way in terms of innovation with its Urban Sanitation Markets Initiative, with substantial efforts ongoing in India as well as in its focus countries in SSA (Senegal, Ghana and Kenya).

This is therefore an area where considerable work is ongoing along each step of the so-called 'sanitation value chain', which runs from collection (capture of liquid waste), transport, treatment and disposal of liquid waste but so far with a lot of unanswered issues, as shown in the table in Annex C

HOW COULD INNOVATION PRIZES HELP IN THIS AREA?

Sanitation is lagging behind the achievements in terms of water supply. The need to improve sanitation systems is vital, as low sanitation levels effects people's health, their safety (especially in the case of women), and educational performance. Innovation prizes could help raise the profile of sanitation to a wider audience and enable identifying solutions that are suitable to specific circumstances. Potential problem areas where an innovation prize could be used include the following:

1. **Design and distribute a low-cost, locally acceptable improved toilet solution with associated distribution channels**. As mentioned above, locally suitable and affordable improved toilet solutions are still missing in a large number of countries. Depending on local factors, the solution may need to be flood-resilient or suitable to local soil types or groundwater conditions. **This type of prize would therefore be best organised at national level and target local universities or local entrepreneurs, possibly with the assistance of external design firms.**

GUIDE
Stage 2
For more on local, grassroots innovation.

2. **Low-cost sewerage solutions**. Although low-cost sewerage solutions appear to be a sensible alternative to conventional sewers, those have so far failed to scale-up. An innovation prize could support the design and implementation of a business model to roll-out simplified sewerage systems in SSA countries or in India. Such a prize could be organised at a national or international level and target utilities, engineering firms or social entrepreneurs. Long-term post prize funding is likely to be needed to get innovation to scale.
3. **Improving faecal sludge management:** space availability is a major constraint for building faecal sludge (FS) treatment and reuse solutions in slum environments. An innovation prize could be organised at national or international level to stimulate the development of innovative technical solutions with associated business models for organising the collection of FS. Targeted solvers would include utilities, research labs or social entrepreneurs. As with above further financial support post prize is likely to be necessary.
4. **Fostering the development of integrated urban sanitation systems:** in most countries, municipal governments are responsible for ensuring that sanitation services are adequately provided. However, municipal governments frequently lack the technical knowledge, vision or political will to plan and develop their sanitation services in a way that takes account of technical feasibility, market forces and affordability for the poor. Frequently, an excessive focus on sewerage networks means that opportunities to provide safe and hygienic sanitation solutions are lost due to the lack of appropriate systems for faecal sludge management. **Innovation prizes in this area could foster municipal governments (and their partners)** to develop and implement sanitation plans that combine both sewerage and on-site sanitation in a sustainable manner.

GUIDE
Stage 2
For more on changing the policy environment.

The first three types of prizes are focussed on identifying technical solutions with associated business models, whereas the latter type is more focussed on fostering a change in approach to sanitation at the level of local governments, who are primarily responsible for delivering improvements in sanitation conditions. A vast majority of countries in the developing world could benefit from such a prize, however solutions to the problem of sanitation services in cities are most likely effected by and specific to the context they are situated in. As a result, it makes more sense to organise such a prize at the level of a single country.

As detailed in Section 4 a prize designed to tackle these issues has been further scoped out by Ideas to Impact. A number of countries where urban sanitation issues are particularly acute and where the local enabling environment could be suitable for the introduction of this kind of prize were explored, including India, Kenya, Ghana or Tanzania. This consultation process generated substantial interest for prize mechanisms at country level. Based on this review, Ghana was selected to pilot the urban sanitation prize concept as detailed further in Section 4.

3.2.3 FINANCING WASH

OVERVIEW OF CHALLENGES

There is currently a critical lack of financing for the WASH sector when compared to the magnitude of needs. Broad estimates by the OECD have identified that developing countries should spend about 2-5% of their annual GDP on WASH sector investments and on keeping existing infrastructure operational. Yet, most developing countries spend 1% of their GDP or less on the WASH sector.

Such a financing gap is due to a variety of factors: the sector is usually regarded as 'risky' by investors, due to a lack of transparency, insufficient information, difficulties with preparing bankable projects and the fact that lots of the areas that need investment do not result in 'asset creation'. In addition, governments are still reluctant to assign significant amounts of public funding to the WASH sector, or at least amounts that would be commensurate with needs. It is therefore critical to attract other forms of funding to the sector, ranging from private sector investors, philanthropists, or long-term investors, which are starting to look at the WASH sector. This requires some degree of financial innovation, however, to limit the perception of risk by investors, achieve economies of scale for WASH sector actors (which tend to be small-scale) and limit the cost of finance for recipients. Despite calls for financial innovation in the sector for well over a decade now, such as through the so-called 'Camdessus Report' presented at the World Water Forum in Kyoto in 2003, such innovation has remained limited so far (Trémolet & Scatasta, 2010).

HOW COULD INNOVATION PRIZES HELP IN THIS AREA?

Not every type of financial innovation need would lend itself to innovation prizes. However, we have identified three main areas where an innovation prize could specifically help identify new ideas and mobilise solvers from different communities, such as social finance innovators.

Potential innovation prizes in this area could include prizes aimed at stimulating, for example, the design and roll-out microfinance products for WASH with a clear strategy for at-scale implementation. At present, microfinance institutions (MFIs) are not commonly offering products for access to basic services (e.g. building a latrine, getting a Solar Home System or getting an electricity connection). This might be due to a lack of understanding on the part of MFIs for these areas, while NGOs trying to offer finance are frequently failing for lack of suitable systems to market financial products. Such development activities have been financed through technical assistance grants but an innovation prize could potentially raise the profile of this market segment. Target institutions for such a prize, which could be launched either at the national or international level, would include financial institutions, including commercial banks, MFIs and NGOs.

Alternatively, innovation prizes could seek to mobilise funds for large-scale investments, which is where funding is genuinely needed in the sector. The objective of such innovation would be to mobilise funds from long-term investors in search of low but steady returns (such as national pension funds, for example) or from social investors in developing countries, which might be willing to act as 'patient investors'. An example of a financial innovation that has the potential to attract such investors to the sector are the Development Impact Bonds (DIBs), which have recently attracted a lot of interest in the development community (as described in Box below) but have so far not been considered for the WASH sector.

In the WASH sector, DIBs could be used to fund reductions in water losses, eliminating ODF or to increase the percentage of wastewater and faecal sludge generated (although this is very difficult to measure with precision). **An innovation prize could focus on incentivising financial intermediaries and consultants to develop DIBs for those sectors**. For example, CGD/Social Finance (2013) recommended the establishment of a 'DIB outcome fund' stating: "*The Fund could be set up as a challenge fund, from which DIB intermediaries and other potential project implementers compete for funds, leading to innovation in design and the channelling of funds to the best-designed DIB proposals*". A prize would mobilise the community of investment bankers and social investment advisers to work and consider these sectors that they may not previously have considered, it would leverage social finance for these sectors, mobilise funding from donors interested in such innovative financing mechanisms (e.g. DFID) and develop a pipeline of new projects to finance (either through DIBs or in different ways).

Learning from the Dream Pipe prize presented in Section 4 will usefully inform future development of innovation prizes for financial mechanisms.

CLIMATE CHANGE ADAPTATION
Section 4.1
For more on how prizes can leverage funds.

BOX 7: DEVELOPMENT IMPACT BONDS (DIBS) – AN EXAMPLE OF FINANCIAL INNOVATION APPLICABLE TO THE WASH SECTOR?

DIBs aim to leverage social investments by raising social investment to fully or partly pay for services that improve social outcomes and reduce long-term costs for society. Governments sets priorities and pay for results that benefit society, while the social enterprise and/or investors get returns after achieving the results. This allows implementing partners and service providers to innovate and deliver flexible, high quality services that meet social needs.

DIBs build on the example of Social Impact Bonds (SIBs), with the primary difference between the two being that the 'outcome funder' is an external agency (i.e. development partner) for the DIBs as opposed to a domestic government agency for SIBs. The SIBs was launched in the UK in 2010 to fund One Service working with short-sentence prisoners discharged from Her Majesty's Prison Peterborough in England and it raised £5m to reduce reoffending rates among short-sentence prisoners in the UK. Since then various models of SIB/DIBs have been instigated in the UK, US and other countries. As of July 2013, there were 14 SIBs up and running in the UK to tackle various social issues such as rough sleeping, children care, employment, criminal justice and substance misuse.

The model of DIBs has recently generated some attention from developing circles. The Centre for Global Development (CGD) published a paper in October 2013 setting out DIBs as a concept with six possible applications, mostly in health and education with one example focussing on energy efficiency. DFID has also initiated the first ever DIB in April 2014, focussed on fighting sleeping sickness in Uganda. However, the baseline for this project is still ongoing and many questions remain unanswered such as who will be the social investors and how interested will they be in DIBs. So far, none of the proposed DIBs have been launched so it is still early days to conclude that this is an innovation that could bring substantial new funding for development.

Sources: (Social Finance; Centre for Global Development, 2012)

3.2.4. PROVIDING SAFE WATER SUPPLIES

OVERVIEW OF CHALLENGES

Water safety is an area that has received considerable attention in recent years. WHO has defined water safety standards that have pretty much been adopted everywhere, although implementation remains patchy.

Although access to 'safe' drinking water is an integral part of the MDG definition, global monitoring of drinking water quality is not carried out at present. Water quality is particularly problematic when water is collected from groundwater sources (particularly in areas where the content in noxious natural substances, such as arsenic or fluoride is high or if these sources are inadequately protected) or from contaminated surface sources.

Health experts have been debating whether it is water quantity or quality that matters most in terms of driving health benefits. On the one hand, Cairncross and Valdmanis (2006) estimate that most of the benefits from water supply are attributable to improved convenience of access to water in terms of quantity. This supports their argument that the impact of water provision is highly dependent on the distance between the house and the water point, as this determines the total amount of water that can be used: they estimate that acquiring a household connection (in the house or in the yard) can double or even triple the volume of water consumed, from an average of 20 litres per capita per day to 60 litres. Water quantity is indeed critical for hygiene, as individuals are more likely to wash their hands at critical time if water is plentiful and accessible. Cairncross and Feachem (1993) showed that water consumption almost triples when house connections are provided and there are strong reasons to believe that much of the additional consumption is used for hygiene purposes. Other experts argue that water quality is a critical determinant driving health benefits. Waddington (2009)[3] points out that while water supply interventions appear ineffective – averaging a negligible and insignificant impact on diarrhoea morbidity compared to control groups – water quality interventions on average lead to a 42% relative reduction in child diarrhoea morbidity (with a 95% confidence interval). Prüss et. al. (2002) state that point-of-use treatment solutions can significantly improve the impact of water supply interventions, with an estimated 45% reduction in diarrhoea rates. Such authors argue that treatment at point of use is more efficient than treatment at the point of source given that there are many opportunities for treated water to become unsafe alongside the transportation process.

While point-of-use water (POU) quality interventions appear to be highly effective by some accounts (IEG, 2008), some experts have argued that widespread promotion of household water treatments is still premature given the uncertainty about their sustainability (Waddington, 2009; Schmidt and Cairncross, 2008). Water quality interventions conducted over longer periods tend to show smaller effectiveness, while impact appears to fall markedly over time. For example, Cairncross points out that it may be cheaper to invest in treatment facilities at source rather than to conduct social marketing of POU treatment facilities. The viability and scalability of POU water treatment solutions therefore still needs to be demonstrated.

3. This is a meta-analysis based on 71 interventions in 35 countries across Africa, Asia and Latin America.

WHAT WORK IS CURRENTLY GOING ON IN THIS AREA?

Where network supplies are not available on a sustainable basis (as in peri-urban slums or rural areas), various point-of-use water treatment methods have been promoted as a second-best alternative to treated piped water. POU water treatment is also promoted in areas that are served with treated piped water due to perception issues about poor water quality of this piped water. POU water treatment methods are usually promoted on the grounds that they would be cheaper and more resource efficient than existing coping strategies used by different groups in the developing world, such as being exposed to getting sick (the most common coping strategy for the poor), boiling water, buying treated water for drinking in plastic bottles or plastic sachets or using household-level water treatment systems, such as reverse osmosis (for the most affluent households).

Several approaches to POU water treatment have been promoted over the years, including water filters, ceramic water purifiers, sand biofilters and chlorine dispensers. Recent efforts have focussed on improving product design so as to improve convenience and facilitate adoption and on identifying the best distribution channels for such products. For example, Dispensers for Safe Water, the recipient of the Stone Family Foundation (SFF) Prize in 2012, provides access to safe water through a low-cost chlorine dispenser system placed near water points. In fact, the majority of the water entrepreneurs short-listed for the SFF prize were proposing methods for POU water treatment.

Changing behaviours so that people start to routinely use these POU water treatment methods has proven to be particularly hard, however, despite considerable efforts. Significant activity has taken place in this area in recent years, both with donor funds and with commercial funding. For example, Tata Industry and Unilever have invested to develop POU water treatment solutions on a commercial basis, with considerable investment. The 'Pureit' product, initially developed by Unilever in Hindustan, claims to be the largest selling water purifier in the world but still has not significantly scaled up beyond India.

HOW COULD INNOVATION PRIZES HELP IN THIS AREA?

As POU water treatment is an area where considerable activity is already taking place (with donor funding as well as private investments), the added contribution from a prize in this area is not immediately clear. We would therefore not recommend that an innovation prize be put forward to stimulate further investment in the development of POU water treatment solutions.

By contrast, one related area that has received comparatively less attention is the rapidly emerging practice of buying bottled or sachet water in the developing world, including by poorer customers. This appears to be due to a number of factors:

- Bottled (or sachet) water is widely seen as an 'aspirational good', due to its convenience, perceived safety and as a marker of wealth. Low-income households are particularly attracted to sachet water, which is sold in small quantities and therefore cheaper than larger bottles (although much more expensive than treated piped water). Low-income households particularly value the convenience of sachet water, as they can buy one sachet of cold water anywhere on the street when they are thirsty or buy sachets in bulk and bring them home;
- Private water companies have invested substantially in product promotion and are widely distributing their products in different types of containers so as to best meet their clients' needs.

Although it can be a source of significant income for water bottling companies, the uncontrolled development of this industry can be very costly from society's point of view:

- The cost of buying water in sachet or bottled containers is significantly higher than any other alternative. Low-income consumers, who buy it in small containers (such as plastic sachets), are hit particularly hard;
- In many SSA countries, the bottled water industry is insufficiently regulated. As this is a relatively recent phenomenon, there is not always a clear business category for licenses, even though the number of private entrepreneurs entering this market is rapidly growing. There are no price controls and fierce competition is driving prices down usually at the expense of quality;
- There are no or limited controls about water quality. Recent articles in the African press have pointed to the lack of hygiene in production lines. The water used in the sachet either comes from piped water or from privately managed wells, with limited treatment. At the higher end of the market (particularly for bottled water), companies use reverse osmosis processes for added treatment, which are wasteful in terms of water and energy use (particularly if small treatment units are used with no ability to capture and reuse water that has evaporated in the process);
- Finally, plastic sachets and bottles are disposed of indiscriminately in the environment, generating a considerable burden. Plastic sachets, in particular, are made of very durable plastic that is not commonly recycled. Although plastic bottles can usually be recycled, collection mechanisms and recycling facilities are critically lacking in many developing countries, even though the economic value of recycled plastic could be high.

Identifying approaches to displace bottled and sachet water through aspirational marketing therefore stands out as an area that could yield substantial results, both in terms of public health and resource conservation. This is an area where an innovation prize could be developed, to 'Reinvent the "drinking container"': the propose prize would stimulate solvers to identify a ubiquitous liquid container that can displace plastic bottles and sachets, thereby eliminating the environmental impact of the latter. This would need to be combined with a safe water distribution network, which could either be the standard water distribution network (if campaigns are undertaken to convince users that drinking water safety standards are met) or decentralised ones. Whether or not solutions to this problem exist is not clear at this stage, which is why such an innovation prize is not being taken further as part of the Ideas to Impact programme.

3.2.5. WATER RESOURCE MANAGEMENT: IMPROVING ACCESSIBILITY OF GROUNDWATER RESOURCES

OVERVIEW OF CHALLENGES

In the context of increased water scarcity, rising population, urbanisation and industrialisation, protecting water resources is essential for preserving recent gains in terms of expanding access and reaching universal coverage. The MDGs were defined purely in terms of increased access to water services, as they were seen as a first step to address the most urgent and immediate challenges. Such an emphasis can sometimes lead to unintended consequences. For example, providing access to sanitation via poorly constructed latrines can contaminate the underground aquifer or increase point-source pollution into surface water bodies. Going forward, access to water can no longer be considered in isolation from water resource management and availability but has to be seen as part of the broader framework of protecting water resources at all levels of the water service cycle.

Competition over water resources and increased prevalence and unpredictability of droughts will mean that solutions are needed to adapt to water-scarce environments. In particular, improving water security for rural people calls for improving the management of groundwater supplies, which are more resilient to climate change and less prone to contamination (if the resources are adequately protected) than surface water sources. According to a recent DFID paper, 20% of the rural population in Sub-Saharan Africa relies on surface water sources, whereas this proportion falls to only 2% of the rural population in Southern Asia and 5% of the rural population in South-Eastern Asia (DFID 2014).

Improving groundwater resource management is therefore promoted as a key way to achieve water security in SSA. At present, such sources can be problematic for several reasons:

- Boreholes are expensive to drill. Costs go up significantly when failure rate is high (if hydrogeological knowledge is limited) or when it is necessary to dig deeper and deeper when the groundwater table drops.
- Extracting groundwater requires expending energy, and most groundwater pumps are presently operated with diesel generators that can be expensive to run and maintain; Around the world, groundwater tables are dropping at alarming rates, which means that it becomes necessary to dig deeper and deeper in some geographical areas to secure sufficient water resources.
- Groundwater resources are frequently badly managed and over-exploited (which means that the rate of abstraction exceeds the natural rate of recharge), thereby resulting in depletion (wells dry up) or salinisation (water becomes undrinkable). Improving the management of groundwater resources calls for sophisticated monitoring, stringent regulation (typically via licensing of groundwater abstractions and abstraction charges) and enforcement (which is typically lacking). An alternative to licensing regimes (which allocate set water abstraction rights to different users) is to manage water resources via water markets for tradable water rights, but such regimes are only working effectively so far in developed economies with equally stringent monitoring and enforcement regimes (such as in the American West, Australia or Chile).
- Pumps to extract groundwater, either mechanised or manual, frequently break down. Across rural Sub-Saharan Africa, an average of 36% of hand pumps is non-operational at any given time. In some countries, it is estimated that more than 60% of hand pumps are non-operational (RWSN, 2009)(UNEP/GRID-Arendal)(UNEP/GRID-Arendal, 2000)(Gallen, 2008). Reasons for this are complex and tend to be more institutional and cultural than technical. A significant factor in the majority of rural schemes includes the lack of cost-efficient maintenance and monitoring regimes for rural water points, particularly for those that are community-managed.
- There can also be specific issues with water quality, due to high contents of noxious substances such as arsenic or fluoride. Solutions to these issues have not been found as yet, partly due to a lack of interest for what are seen as 'marginal issues' (except in specific areas, such as Bangladesh).

WHAT WORK IS CURRENTLY GOING ON IN THIS AREA?

New methods have been tried in the area of groundwater resource management in rural areas, particularly seeking to extract water with renewable energy. In addition, innovation has also taken place in the area of water point mapping and the installation of systems to monitor water point functionality on a more reliable basis, either via remote sensors or via SMS-based systems which rely on local users' cooperation.

Up until now, the ability of such innovations to scale-up has been limited, leaving room for a lot more progress and creativity regarding solutions to the existing problems. Limits of innovation up to date include:

- Inadequate technologies: some innovation developed by westerners has proved to be inadequate. For example, the 'playpump', a merry-go-round installed in playgrounds acting as a play equipment in school yards, ultimately failed as the pumps proved to be too heavy to operate and prone to breakage;
- Customer preferences: rural dwellers still would rather use a hand pump or a diesel pump rather than a solar or wind-powered one as they would see them as being more reliable;
- With respect to monitoring functionality, remote sensor technologies may be prone to breakage whereas systems reliant on customers' willingness to send SMS on functionality have had limited sustainability, due to a relatively low number of people willing to collaborate over the long term.

HOW COULD INNOVATION PRIZES HELP IN THIS AREA?

Innovation may be needed in several areas in order to strengthen the reliability of groundwater supplies. First, innovation in pumps that would use less energy (e.g. solar panels, windmills or more efficient motors) could make a decisive contribution to ensuring sustainable access to groundwater resources for many rural dwellers, who tend to be the most disenfranchised with respect to water access. Second, innovation with respect to remote sensors or other means to communicate data on pump functionality would be welcome.

However, access to groundwater resources is a complex issue, which relates to water and land rights (strongly influenced by political and financial power plays) as well as to physical factors, which tend to be highly localised. **For example, it would be essential to simultaneously strengthen the regulatory environment so as to ensure that reduced pumping costs do not lead to over abstraction of groundwater resources.** Innovation prizes may be designed to induce changes in the policy environment

GUIDE
Stage 2
For more on altering the policy environment.

It therefore appeared that an innovation prize in this area would need to be launched as part of a broader support programme, which aims to address these other factors as well. Even though DFID is planning to undertake and fund work in this area, most of DFID-funded work is presently in early stages in the form of action-research projects, such as Unlocking the Potential of Groundwater for the poor – UpGrow, or Improving Water Security for the Poor – IWSP. We therefore recommended that the idea of an innovation prize in this area be further considered, but potentially by other actors that are more active in this field or as part of broader programmes.

GUIDE
Stage 3
For more on using prizes in tandem with broader support programmes.

3.2.6. IMPROVING AVAILABILITY AND MAINTENANCE OF SCHOOL WASH FACILITIES

OVERVIEW OF CHALLENGES

Improving WASH services at schools has a direct impact on children's ability to attend school (because they do not have to worry about the lack of toilet facilities, including gender-separated facilities; because they do not have to cover large distances to get drinking water or because they fall sick less often) and on improving their performance while at school. At present, it is estimated that worms affect approximately 400 million children, which has an impact on their physical growth and intellectual development. High school drop-out or absenteeism rates are observed particularly for girls in schools that lack adequate and gender-friendly sanitation facilities.

The importance of educating children and installing good habits and understanding, when concerning personal hygiene, has been recognised as necessary step towards attaining the MDG targets and later on the Sustainable Development Goals. If children do not have access to water and clean toilets and water, this can affect their school attendance and performance hence hindering their ability to learn important lessons such as personal hygiene. Simply learning to wash hands using a bar of soap could significantly reduce the number of people affected by worms and diarrheal diseases. Schools are a microcosm of the world and the lessons that children learn during their school years have a big impact on what they consider as important or not. Educating children is also a way of reaching their families back at home as the hope would be that they would take the lessons they had learnt at school back to their homes and educating them as well.

However, the potential to educate children about good hygienic practices is limited by the lack of school WASH facilities or their poor level of maintenance. Of the 60 countries that UNICEF surveyed for 'Raising Clean Hands' report (UNICEF 2010), 33 countries provided information concerning water access in schools and only 25 on sanitation data. According to these surveys, almost half of all primary schools in developing countries (that were able to provide data) did not have good access to water facilities and two thirds did not have access to adequate sanitation services.

Even where facilities exist, lack of funding or inadequate management arrangements for maintaining existing facilities mean that they are often in a poor state of disrepair: taps may be there but yield no water, toilets may be in place but they are obstructed and unusable.

In addition, other factors need to be in place in order for available and clean facilities to result in health gains. In their manual on School Sanitation and Hygiene, UNICEF and IRC identified three factors that are needed in order to deliver sustainable progress in hygiene through school sanitation (UNICEF, IRC 1998):

- Predisposing factors: Existing knowledge, attitudes and beliefs;
- Enabling factors: The access one has to things such as latrine facilities and safe water supply (this then allows children to transform the new knowledge, attitudes and beliefs they have acquired into daily habits and behaviour);
- Reinforcing factors: factors that allow children to continue to behave in this new manner, such as support from friends and family and continued encouragement at school.

Similar issues often plague health centres, which is one of the reasons that the Sustainable Development Goals seek to extend beyond household-level services and set targets for WASH services in schools and health centres as well.

WHAT WORK IS CURRENTLY GOING ON IN THIS AREA?

Solutions to build, maintain and regularly empty sanitation facilities in schools and health centres need to be developed, in line with the planned SDGs. Whereas large school WASH programmes have been initiated by implementers such as UNICEF (frequently with DFID support), innovation to improve the management and serviceability of these installations appears to have been limited to a few experiences that have not fully scaled-up. For example, Amanz'Abantu in South Africa has initiated a franchising model, referred to as Impilo yabantu, which was piloted with success in 400 schools in the Eastern Cape Province between 2009 and 2012 with funding from IrishAid. At the time of writing, the model was due to being scaled-up in South Africa with additional funding from the African Water Facility, but so far, replication of this model in other countries has not taken place despite significant dissemination efforts. Another example relates to service quality monitoring: one of the grand prize-winner of the 2013 sanitation Hackathon led by the World Bank (see Section 4 and Annex B) was mschool, a mobile phone app developed by Manobi (a 'value chain optimiser' based in Senegal) to facilitate monitoring of sanitary conditions of school toilets throughout the country.

These isolated efforts show that there is a potential for developing specific solutions to maintain sanitation facilities in schools and health centres in good, serviceable conditions. Other solutions could involve the participation of children in taking part in the change process.

HOW COULD INNOVATION PRIZES HELP IN THIS AREA?

One or several innovation prizes could be developed to attract attention to the need to maintain adequate WASH facilities in schools and health centres, an issue that is not always sufficiently brought to the fore in many countries. Such innovation prizes could be organised by governments or international agencies, either at the global scale or preferably at a national scale, to stimulate utilities, social entrepreneurs or NGOs to propose innovative business models to build and/or maintain school latrines in working conditions. Similarly, this type of competition could be run for health centres. An innovation prize could also aim to include the involvement of children themselves in providing solutions or to take part in the process of bringing about change. Follow on funding to roll out winning innovative ideas will be required.

4

INNOVATION PRIZES IN WASH BEING DEVELOPED UNDER IDEAS TO IMPACT

Following the thorough process of research and consultation set out in Section 3, the Ideas to Impact WASH team decided to take forward two of the 14 potential prize areas to detailed design. This section sets out how each is proposed to work and outlines key decisions which have fed into the design process so far. It should be recognised that these designs are still works in progress and are therefore likely to evolve in the period leading up to prize launch.

4.1 DREAM PIPE: A PROPOSED INNOVATION PRIZE TO HELP REDUCE NON-REVENUE WATER (NRW)

The proposed Dream Pipe prize emerged from the aggregation of two separate problem areas: high levels of NRW are an intractable problem in developing countries, whereas the lack of financial innovation in the WASH sector means that the sector is unable to attract investment at the level that it would need. The providers of repayable finance, particularly those bringing private sector funds (as opposed to development banks) are generally not attracted to the water sector, which they deem to be too risky.

What problem is the prize seeking to address? NRW refers to the difference between the amount of water put into the system and the amount of water billed to customers. This difference is due to physical water losses, from burst and unrepaired pipes or from overflow at storage tanks and commercial water losses, due to incorrect or lack of billing and unauthorised water consumption. It affects all utilities, but is particularly high in utilities in the developing world: it is estimated that half of water losses worldwide are in developing countries. According to the International Benchmarking Network for Water and Sanitation Utilities (IBNET), a database managed by the World Bank, which gathers performance information from a large number of water utilities in low- and middle-income countries, typical NRW levels in developing countries stand at 55% (as in Mozambique) or 30–40%, as in countries such as India, Bangladesh, Kenya or Liberia. NRW figures are likely to be even higher in reality, as many utilities do not have adequate monitoring systems to measure them and because these figures are self-reported. According to (Kingdom, Liemberger, & Marin, 2006), halving the current level of losses in developing countries could generate an estimated additional USD 2.9 billion in cash every year for the water sector (from both increased revenues and reduced costs) and potentially serve an additional 90 million people without any new investments in production facilities or drawing further on scarce water resources.

A high level of NRW usually indicates that a utility is poorly managed, with deteriorating assets and in a weak financial situation. The causes for high levels of NRW are numerous and span a utility's operations. Lack of proper maintenance of physical assets leads to high water losses (which is therefore produced but not sold), while inefficient billing and collection systems (due, for example, to a poor customer database, faulty meter reading, lack of meters, etc.) can generate high commercial losses. In addition, poor customer relations, in particular in lower income areas, encourages water theft – through illegal connections – and asset deterioration (e.g. water meters are damaged or removed). This situation is compounded by the financial losses associated with the expenses required to produce the water, in particular chemicals and energy.

Reducing NRW, which includes reducing both technical and commercial losses, has the potential to generate significant financial gains and save precious water resources. However, this problem tends to be under-prioritised among utilities. Many governments still prefer 'ribbon-cutting' investments, such as treatment plants, while utilities' managers often do not understand the problem (and how to solve it) and lack the managerial focus to properly lead on these activities. NRW reduction requires the capacity to address in a comprehensive manner the various problems that lie at the root of the poor performance of a water utility and to overcome social resistance (particularly in areas where water theft is a significant issue). Not many utilities are willing to undertake such a process.

How is the proposed prize seeking to address the problem? The innovation prize will aim to stimulate the development of innovative contractual and financial arrangements to support NRW reduction activities that will be implemented by water utilities in developing countries. Targeted solvers will include contract designers and financial specialists that can put together a contractual and financial package that will ensure that funds are leveraged for this kind of activity and expertise is mobilised and a substantial proportion of the benefits from loss water reduction are channelled back to poor customers. The prize will aim to attract solvers from a global pool, including social finance specialists who can attract non-traditional financial sources to the sector, such as impact investors. Concepts and implementations will be required to have a focus on the 28 DFID countries of operation. The innovation prize program will consist of two phases:

Phase 1: 'Ideation Awards': This will be an 'Ideation stage', open for submissions for a period of three months, in which applicants will be invited to submit concept notes describing their concepts for innovative NRW financing and contractual mechanisms. Phase 1 will award and showcase innovative 'out of the box' concepts that:

- Propose financial structures that can attract non-traditional funding; and
- Contractual arrangements that will yield the desired technical results and help improve service to the poor.

Phase 2: Implementation Awards: This stage will be open for 18 months and will reward three entries for the best financing and contractual arrangements, which should be ready to move to implementation, whereby:

- The geographical scale where the proposed arrangements are to be applied will have been identified, with an interested utility brought on board;
- Detailed contractual arrangements have been drafted;
- All funders have been identified;
- A memorandum of understanding has been signed between parties or is already in operation; and
- A strategy to reduce NRW is in place.

Any party will be entitled to take part in Stage 2, which means that having taken part in Stage 1 will not be a necessary condition.

Launching such an innovation prize will help place the issue of NRW in the spotlight and get this issue on the agenda of financial innovators. Furthermore, the innovation prize has the potential to bring about 'unexpected' solutions. As opposed to a grant where applications are received following a request for proposals with fully fleshed out terms of reference, the innovation prize will aim at being less prescriptive. In this way, there will be stronger chances of receiving different innovative ideas and implementation plans for NRW strategies. The innovation prize exercise can therefore be a great learning experience, as it will 'test' financial experts' appetite to be involved in the water sector and enquire about 'what's out there' in terms of financing solutions.

CLIMATE CHANGE ADAPTATION
Section 2.1
For more on unexpected solutions.

4.2 CLEAN CITY: FOSTERING INTEGRATED URBAN SANITATION SYSTEMS

What is the problem the prize is seeking to address? Sub-Saharan Africa lags behind in terms of extending sanitation coverage and changing behaviour towards the safe handling of human waste, from its production (with a high incidence of open defecation) to its disposal. Towns and cities in sub-Saharan Africa are rapidly expanding. According recent estimates, 337 million people live in urban areas when urban sanitation systems are vastly inadequate: SSA is home to more than 28 million urban open defecators, whereas only about 8% of the people in urban Africa have access to sewer-based sanitation. Because City authorities are not able to expand sanitation services to keep up with urban growth, especially in small towns and peri-urban areas, it is estimated that 58% of the urban population in SSA is reliant on unimproved sanitation systems. As a result, recent WSP studies estimated that SSA countries are losing between 1 and 2.5% of their GDP due to poor sanitation's negative impact on public health and the environment.

There is currently strong political interest in several SSA countries to address this situation. For example, the Governor of Nakuru in Kenya has already launched a clean city campaign for its city. The Government of Ghana adopted a National Environment Sanitation Strategy and Action Plan (NESSAP) in 2011 and shortly afterwards, a Strategic Environmental Sanitation Investment Plan (SESIP). Responsibilities for delivering sanitation services have usually been decentralised to municipalities but the later are struggling to provide essential services to keep up with population growth. In addition, given that the vast majority of sanitation services in SSA are not sewer-based but include sanitation facilities built by households themselves, city-level governments tend to see this as a low priority, and one where their power to intervene is limited. This is particularly the case in small and medium-sized cities, which tend to receive comparatively less attention from central governments in terms of funding (including from development partners) and technical assistance. Also, in these small and medium-sized cities, extending sewerage networks is less likely to be the solution, which means that it would be necessary to explore the sustainable management of on-site sanitation services.

How an innovation prize could help? Developing integrated sanitation systems that sustainably meet the needs of small and medium-sized cities is urgent and likely to gain political support. Developing on-site systems have the potential to leverage investments from households – who would bear at least some of the costs related to toilet construction – but also from private funds for establishing and operating transport and treatment systems. For larger towns, integrated systems will most likely need to combine sewerage infrastructure and on-site sanitation service to collect and treat faecal sludge. Innovation is also required to develop a range of service delivery models that include all steps of the sanitation value chain, up to reuse. These models could develop solutions to roll-out simplified condominial sewerage systems. They could also include solutions for low-cost faecal sludge treatment and reuse solutions for space-constrained slum environments (with associated business models for organising the collection of FS, such as franchising, leasing, etc.).

An integrated sanitation system requires shifting from 'piecemeal' improvements, with no foresight or coordination, to one that is well planned and involves coordinating many actors. In this integrated planning process, both network and off-network solutions would be considered to meet the needs at city centres as well as peri-urban areas. In addition, such forward-looking planning should consider resource efficient solutions, including energy-efficient solutions. For instance, developing condominial sewerage could help reduce transport of faecal sludge and therefore prove to be more energy-efficient overall. Decentralised wastewater treatment would also be less energy intensive than centralised wastewater treatment.

There are foreseeable disadvantages or risks for the participants linked to the choice of innovation prize over that of a grant. These include the fact that potential applicants may not have up-front financing and resources to formulate integrated sanitation plans (which will restrict the number of participants) and applicants bear the risks of not receiving a financial reward for their efforts to produce sanitation plans and implement them (which may deter potential participants from applying to the challenge). However, applicants will be assisted in a preliminary stage with the identification of partners that can provide them with up-front technical and financial assistance for the preparation and implementation of the plans. The prize will then act as an added incentive to emulate participants to do their best, be innovative and bold in their ambitions.

However the advantages are likely to outweigh the disadvantages. A prize will:

- Emphasise innovative approaches to sanitation service delivery in small cities, including through partnerships;
- Stimulate competition and drive motivation of public and private sector agents;
- Generate media buzz: the innovation prize will put the spotlight on the issues of sanitation in small cities, the need for innovative and integrated approaches as well as publicity for the recipient. Such publicity is likely to be attractive for politicians and stimulate their engagement in this challenge.

Following consultation in several countries, it was decided to initially run the prize in Ghana, where responsibilities for sanitation have been decentralised to the District Assemblies. Whereas water service coverage has noticeably increased in recent years, urban sanitation coverage has remained stubbornly low, as 80% of urban population use unimproved facilities and 6.6 % practice open defecation. The prize will be sponsored by the main authority in charge of sanitation in the country, the Environmental Health Sanitation Department within the Ministry of Local Government and Housing. Depending on results, the prize could later on be replicated in other countries that have expressed interest.

5

INTEGRATING INNOVATION PRIZES INTO BROADER PROGRAMMES

GUIDE
Stage 3

For more on using prizes in tandem with broader support programmes.

This final section sets out a few concluding remarks for the design of prizes in the WASH sector.

CONCLUDING REMARK # 1 - INNOVATION PRIZES ARE NOT A PANACEA: IT IS ABSOLUTELY ESSENTIAL TO WEIGH UP ADVANTAGES AND DISADVANTAGES, FROM THE POINT OF VIEW OF BOTH SPONSORS AND APPLICANTS.

Some of the key financiers in the sector who were interviewed during the consultation phase for prize identification expressed doubts about the applicability of innovation prizes as a funding mechanism for the water sector. This was, in some cases, based on their own experience of attempting to launch this kind of prizes. For example, the World Bank attempted the design of an innovation prize for the water sector but subsequently abandoned the idea after reaching the conclusion that no technology would be 'disruptive' enough to justify the launch of such a prize. They also concluded that, given that all interventions in the water sector are closely interlinked and that it is difficult to attribute impact to specific interventions, the nature of the sector may not lend itself well to such prizes. This was based on their review of earlier attempts at launching prizes that had not been very conclusive in their opinion. For example, a prize initiative led by the American Engineering Association had defined a very narrow problem statement (addressing the issue of arsenic in water), which is only relevant for limited areas (in Bangladesh). This was deemed potentially useful but with a limited 'transformative' potential.[4] The World Bank later redirected their efforts towards the design of hackathon competitions, in partnership with other organisations such as the BMGF or Random Hacks of Kindness for innovation in water in 2011 and in sanitation in 2012, as detailed in Annex B.

Following the present review, we concluded that innovation prizes can definitely play a role to trigger significant change in the sector, particularly if they do not strictly focus on technical innovation. In particular, we point out repeatedly in the present paper to the need for more financial and business model innovation in the sector. In particular, in several problem areas, we have identified the need for financial innovation to tackle limited access to finance in the sector, either at household level (for building sanitation facilities for example) or at the level of utilities themselves (to invest in repairing leaks for example). The WASH sector is traditionally timid in terms of financial innovation. When such innovations have been introduced, they have not been scaled up.

CONCLUDING REMARK # 2. SELECTION CRITERIA FOR THE INNOVATION PRIZES SHOULD BE DESIGNED TO ENSURE SCALE-UP OF THE PROPOSED APPROACH.

As pointed out in the introduction, the WASH sector has seen some innovation on a pilot scale, but many of these have failed to scale-up. In some cases, the 'productification' of existing technologies might be all that is needed in order to achieve impact. Essential strategies that need to form the basis of a sustainable business models include an emphasis on behaviour change (through culturally-appropriate strategies), training and development of technical skills, the adoption of viable financial models that are not overly dependent on external hand-outs and engaging with public institutions, so that a supportive regulatory framework can be established and adequate incentives be provided on an ongoing basis.

4. Hackathon (a combination of the words 'hack' and 'marathon') events started in the mid-2000s. They gather computer programmers and others in the software development field around a specific subject for which they propose innovative software solutions such as mobile phone applications. A key difference between these hackathons and an innovation prize as currently envisaged is that problem statements are crowd-sourced and matched with software developers that are interested in working on this particular challenge.

CONCLUDING REMARK # 3 – INNOVATION PRIZES FOR DEVELOPMENT SHOULD SEEK TO DEVELOP SOLUTIONS THAT CAN BE DEVELOPED AND ADOPTED BY UTILITIES, RATHER THAN BE PRIMARILY FOCUSED ON DECENTRALISED SOLUTIONS.

As we have pointed out repeatedly throughout the paper, developing network-based solutions to some WASH sector challenges can be more efficient and scalable over the long-run than off-network solutions. However, that means that the 'community of solvers' to be mobilised through WASH prizes would need to involve traditional utilities, potentially in partnership with more innovative social entrepreneurs, or via public-private-partnerships (PPPs) or partnership arrangements with more innovative companies. In doing so, however, it will be important to identify solutions that have a direct impact on improving the lives of low-income consumers.

CONCLUDING REMARK # 4 – INNOVATION PRIZES NEED TO BE CONSIDERED AND DEVELOPED IN THE CONTEXT OF BROADER SUPPORT PROGRAMMES.

Given the complex nature of water services, a prize is unlikely to achieve a lot on its own. Although we consider that innovation prizes could be launched to address each of the specific areas highlighted in the paper and probably many more, such prizes would need to be considered in the context of broader support programmes to address other much needed components of reform so as to address the numerous sector challenges.

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ANNEX A: EXAMPLES OF EXISTING PRIZES IN THE WATER AND SANITATION SECTORS

Year started	Name of institution implementing prize	Description of Prize
2011	Bill and Melinda Gates Foundation	Following a landscape analysis in 2008, the BMGF decided to focus its activities in WASH on sanitation and hygiene (as opposed to water), as they thought it would be an area where their activities could be transformative and generate maximum impact. In the sanitation sector, BMGF focusses their grant making activities in five complementary areas: transformative technologies, urban sanitation markets, building demand for sanitation, policy and advocacy, and monitoring and evaluation. The two first areas are more specifically innovative. BMGF has funded research through the Re-invent The Toilet Challenge (RTTC). It aims to develop truly aspirational 'next-generation' toilets that do not require a sewer or water connection or electricity, cost less than 5 cents per user per day, and are designed to meet people's needs. Between 2011 and 2014, there has been three rounds of this challenge and BMGF has awarded 16 RTTC grants to research organisations around the world. According to Jan Willem Rosenboom (Urban Sanitation Markets lead), the competition generated considerable interest from around the world and allowed enlarging the 'solver community' for sanitation problems. Most of the projects use chemical engineering processes for energy and resource recovery from human waste. Prototypes were presented at two 'Toilets Fairs', in Seattle in 2012 and in Delhi in 2014. The latest toilet fair attracted 56 exhibitors. In 2013, they also launched two country-specific RTTC programs in India and China. Both of these programs are designed to harness strong in-country research and capabilities to solve this global challenge.
2012	Stone Family Foundation (SFF) Prize for innovation and entrepreneurship in water	The £100,000 prize aimed to find innovative, entrepreneurial and potentially scalable initiatives in the water sector. They were looking for initiatives based in sub-Saharan Africa or South and South-East Asia that were developing ways to get clean water to people who needed it. The majority of the water entrepreneurs short-listed for the SFF prize were proposing different methods for POU water treatment. Changing behaviours so that people start to routinely use these POU water treatment methods has proven to be particularly hard. The recipient of the prize was Dispensers for Safe Water which provides access to safe water through a low-cost chlorine dispenser system placed near water points.
2011& 2012	World Bank-led water and sanitation hackathons	Hackathon (a combination of the words 'hack' and 'marathon') events started in the mid-2000s. They gather computer programmers and others in the software development field around a specific subject for which they propose innovative software solutions such as mobile phone applications. International organisations, such as the World Bank and others or governments around the world, have used this type of event to mobilise software developers to help address some of the world's pressing social challenges. A key rationale for the World Bank sanitation hackathon was that more people have a mobile than acceptable sanitation facilities, and this is true of many other countries in the developing world such as in India. The principle of the Sanitation Hackathon was to build on this increasing connectivity, through mobile phones, social media and other sites, to develop tools that will help increase access to sanitation. It was followed by a Hackathon competition that led to the identification of three 'grand prize winners'.
2011	Reed Elsevier Environmental Challenge	This is a yearly prize run by Reed Elsevier a world's leading provider of professional informational solutions. The challenge is to provide Innovative proposals to ensure safe water and improved sanitation for at risk communities in developing countries. The projects should be replicable, scalable, and sustainable; have practical applicability; address equity of access; involve and impact a range of stakeholders; have local/ community-level engagement. The first prize was in 2011, the 2014 prize was launched in December 2013 and awarded September 2013 and the 2015 prize was launched in December 2014.
2010	Improving sanitation in low income urban communities	This prize was run by the organisation OpenIDEO and sponsored by Unilever and WSUP (Water & Sanitation for the Urban Poor). The challenge was to generate low-cost, sustainable sanitation solutions (products, services, business models, systems) – focus on low income urban areas in Ghana. There were nine winning ideas which led to one IDEO implemented project (Uniloo).
2013	Sanitation Innovation Design Contest	An Indian non-profit called FINISH (Financial Inclusion Improves Sanitation and Health) ran this prize, with a prize award of $10,000. It was launched in 2013 and a winner was announced March 2014. The challenge was to promote entrepreneurship and small business creation in sanitation activities by seeking designs for sanitation units in one of challenge areas that are backed up by strong business case. There were seven specific challenge areas: 1. New and complete sanitation system for a location in India; 2. Innovate component of superstructure of sanitation system (walls, roof, floor); 3. Innovate toilet slab/seat; 4. Innovate structures for collection of waste; 5. Innovate treatment of waste process; 6. Innovate business model for social business; 7. Innovate inclusion of targeted group.
2014	Blue Bag Water Innovation Award	This prize run by Mercy Corps Indonesia, Ikea Indonesia, Lund University and Sqore is open to Indonesian students or young professionals. The Prize is full scholarship for 2-year Master's program at Lund University in Sweden along with internship with Mercy Corps Indonesia. It was launched in 2014 and the winners were to be announced in January 2015. The challenge was to generate innovative ideas to improve the level of access to clean water, increase sanitation facilities, and reduce water contamination levels for local residents of Jakarta.
2008	Tapping Local Innovation: Unclogging the Water and Sanitation Crisis	Global Water Challenge and Ashoka Changemakers ran this prize. There were three winners who each won $5,000 and went into a separate process to receive part of $1 million grant funding from Coca Cola. The challenge was to search for most innovative projects that, when scaled-up, have the potential to transform the provision of sanitation and water – evaluated based on innovation, social impact, and sustainability.

ANNEX B: IDENTIFYING AREAS WHERE INNOVATION IS NEEDED IN URBAN SANITATION

GUIDE
Stage 1

For more on problem identification.

Segment of the sanitation value chain	Typical situation in countries where the sanitation MDGs have not been met	Areas where innovation are currently taking place	Name of institution implementing prize
Collection			

On-site sanitation	• Poorly constructed traditional latrines: do not adequately protect humans from their own faeces, environmentally damaging (e.g. contaminate groundwater), prone to collapse (particularly in case of flooding), fill up quickly hence the need for organising robust emptying systems (see transport).
	• Shared toilets: between several families (although not considered 'improved').
	• Public toilets, usually badly managed.
	• 'Flying toilets' in slums (i.e. faeces in plastic bags).
	• Open defecation still highly prevalent in some cities (e.g. urban Ghana).
		• Develop improved on-site sanitation solutions:
		  • Septic tanks, which allow partial on-site treatment and can reduce the need for frequent emptying.
		  • Ecosan solutions, with reusable by-products (urine, faecal sludge for biogas, fertiliser or industrial fuel – if treated and dried). Production of reuse by-products can take place on-site or off-site.
		• Convince landlords to improve construction and management of shared toilet solutions.
		• Solutions for space-constrained areas:
		  • Improved public toilets (e.g. Eko toilets in Kenya) with attached shower blocks.
		  • Systems with daily or weekly emptyings (e.g. the Fresh Life toilets installed and emptied by Sanergy).
		  • Improved solutions for emergency disposals (e.g. 'Pee-poo bags').
			• Lack of demand for improved solutions: affordability constraints, lack of space (in densely built areas), behavioural resistance.
			• Behaviour change approaches (e.g. CLTS) are unproven in urban communities.
			• Limited penetration of 'aspirational marketing'.
			• Need for financial innovation: microfinance is promoted to increase household investment but limited penetration: MFIs reluctant to give loans for non-productive assets, households have other priorities.
			• Pilot projects are mostly undertaken at a small-scale and most have not scaled-up so far, although some 'business-led' approaches are making a dent and a 'critical mass' of such projects is gradually building up.

Network-based solutions	• Traditional sewers have very limited coverage in cities (between 0 and 10% of areas served by sewerage in most cities in SSA).	• Investments in 'structuring sewer systems' through development bank loans, limited by low-willingness or ability to borrow • Very limited adoption of 'simplified sewerage solutions' despite widespread success in Latin America and donor efforts.	• Limited innovation ongoing with traditional sewerage technologies. • Simplified sewerage encounters technical issues (poor design, wastewater leakage, poor-quality of material), financial issues (underestimation of recurring operating costs, too few connections, low collection rate of the sanitation fee , etc.), management issues and institutional issues (absence of contracts, monitoring).
Transport	• Small private businesses (typically one-truck company) carry out mechanical emptying of on-site facilities. Trucks are old, inefficient (e.g. high fuel consumption) and pumps are unable to suck out all pit content (e.g. nutrient-rich solid content solidifies and remains at the bottom). • Large trucks cannot enter densely built slum areas (no access). • Manual emptying is most commonly used (this varies from city to city), either done by households themselves or by individual entrepreneurs.	• Improve the efficiency and regulation of emptying services (through licensing or franchising), give incentives to emptiers to bring pit waste to safe disposal point. This could help make emptying more affordable and encourage more frequent, regular emptying. In turn, this would allow digging shallower pits (reducing the risk of groundwater contamination). • New types of vehicles have been developed to address some of the constraints: e.g. smaller vehicles (so-called gulpers or vacutugs). • BMGF initiated the design of 'omni-ingester' trucks to reduce the liquid content of extracted FS so as to cut on number of trips and associated fuel costs.	• Emptying services are highly unregulated and fragmented at present so improving their organisation is challenging and requires full cooperation from local authorities or utilities. Isolated experiences (e.g. Sanergy in Kenya) have been quite successful. • Adoption of smaller vehicles has failed to scale-up so far despite a decade of efforts, including support to small-scale entrepreneurs. Factors slowing down scale-up include limited access to finance to purchase the vehicles, weak business structures and, in some cases, destructive competition (which keeps activity levels for each entrepreneur too low).
Treatment	• Wastewater treatment plants have been constructed with donor support, using conventional 'first-world' technologies that are energy intensive (e.g. anaerobic digestion) and high maintenance. • Faecal sludge treatment plants (to treat solid pit contents) either do not exist or are very limited in numbers, resulting in high transport costs (and congestion) for vehicles to bring waste to safe disposal / treatment point.	• Promotion of less energy-hungry, decentralised wastewater treatment solutions, including faecal sludge drying beds or DEWATS (promoted by BORDA and tested with support from WSP). • Financial support mobilised for the construction of additional sludge treatment plants and transfer stations (to reduce distances to be covered by pit emptiers).	• Substantial investment needs to build additional treatment capacities. Politicians need to see wastewater and faecal sludge treatment as a priority and mobilise necessary funding. • Lack of available space, encroachment and 'NIMBY-type' resistance means that 'natural treatment' method which require space can be difficult to introduce at scale. Some technologies exist that are more compact (e.g. Biobolsa, a Mexican technology soon to be tested by WSUP in Kumasi, Ghana) but these are still at pilot stage in SSA. WSUP is looking to identify and test technologies to provide compact and low-energy use treatment solutions suitable for peri-urban areas.
Reuse	• Reuse has been practiced in some countries for centuries in agriculture, although carries a social stigma or is legally forbidden in other places. Reuse practices are very limited in urban areas in SSA, except for market gardens.	• Reuse has been promoted for several years but has remained limited in scale. Reuse either takes place on-site (with Ecosan toilets producing fertiliser or biogas) or off-site (e.g. fertiliser, biogas, dried sludge used as fuel for industry, aquaculture).	• Although frequently justified on financial grounds (e.g. savings on chemical fertiliser costs), viability still to be demonstrated. • Scaling-up calls for improving efficiency along the entire value chain to produce reuse products in marketable quantities.

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