July 2022

Water Breakthrough Challenge 2 Decision Document

Ofwat

About this document

This document sets out the process we have followed for our Water Breakthrough Challenge 2 innovation competition (Breakthrough 2) and the reasons for our funding decisions.

We opened Breakthrough 2 in October 2021. We invited water companies, in partnership with others, to enter two streams of the competition.

- The **Catalyst Stream** made approximately £5 million available for entries valued between £100,000 and up to £1 million.
- The **Transform Stream** made approximately £34 million available for entries valued between £1 million and up to £10 million.

The Catalyst stream opened on 11 October 2021 and closed for entries on 8 December 2021. We announced the 13 winners on 22 March 2022.

The Transform stream opened on 11 October 2021 and closed for stage 1 entries on 16 November 2021 and closed for stage 2 entries on 8 February 2022. We offered eight entries funding and announced seven of these winners on 28 April 2022.

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1. Background

In our strategy, 'Time to Act, Together' (October 2019), we highlighted that innovation is crucial for meeting the profound challenges the sector faces in a cost-effective and sustainable way. These include climate crisis, more volatile weather, and population growth. Water is critical to every aspect of our lives, and we need to make sure the sector can continue to deliver reliable, resilient and safe water that is affordable for all.

Our price review framework already promotes innovation by setting water companies stretching targets and allowing them the flexibility to adopt innovative means of delivery. And we have been encouraged to see some companies demonstrate real ambition in this space. However, there remain significant untapped opportunities for companies to work with each other, the supply chain and those in other sectors to trial and adopt new practices and technology to transform performance.

Our December 2019 decision document 'Time to act, now: driving transformational innovation in the water sector' highlighted the need for:

- a shift in company culture
- more effective joint working; and
- changing a general perception that the current regulatory framework does not sufficiently encourage innovation, particularly in the context of clear public health and environmental obligations companies must comply with.

We considered that the introduction of innovation funding and innovation competitions can help address these needs, along with other initiatives such as the one-stop-shop innovation advice hub.

We set out our decision to make up to £200 million of additional funding available through an innovation competition for the regulatory period, 2020-2025 in our December 2019 document. Our decision was that funding would be provided through an increase in company revenues as set out in the 2019 price review and would be collected by water companies from their customers. Through the introduction of the innovation fund, our aim is to help the England and Wales water sector grow its capacity to innovate and meet the needs of customers, society and the environment, with funding targeted at tackling key strategic challenges.

By targeting transformative innovation designed to address key strategic challenges and emphasising the need for stronger collaboration and partnerships across the sector and beyond, we believe innovation funding and innovation competitions will help accelerate change. In spring 2020 we consulted on the design and implementation of the innovation fund and in August 2020 we published our decision document.

In November 2020, we announced that we had appointed Challenge Works[1] to lead the innovation fund delivery partner consortium and assist with the delivery of the innovation fund competitions for the pilot period.

In January 2021 we opened the first competition, the Innovation in Water Challenge (IWC). We made approximately £2 million available for entries up to the value of £250,000 each. In April 2021 we announced the 11 winning entries for the competition and awarded £2.1 million.

In May 2021 we opened our second competition, the Water Breakthrough Challenge (Breakthrough 1). This competition made approximately £40 million available for entries valued at between £1 million and £10 million.[2] In September 2021 we announced the nine winning entries for the competition and awarded £36.1 million.

In October 2021 we opened our second round of the Water Breakthrough Challenge (Breakthrough 2). Following feedback from the water sector, we brought together elements from the IWC and Breakthrough 1 to provide a more unified and streamlined process for water companies and their partners to access the fund by creating two streams - the Catalyst stream and the Transform stream:

- The **Catalyst Stream** made approximately £5 million available for entries valued between £100,000 and up to £1 million.
- The **Transform Stream** made approximately £34 million available for entries valued between £1 million and up to £10 million.

The Catalyst stream opened on 11 October 2021 and closed for entries on 8 December 2021. We announced the 13 winners on 22 March 2022.

The Transform stream opened on 11 October 2021 and closed for stage 1 entries on 16 November 2021 and closed for stage 2 entries on 8 February 2022.We offered eight entries funding and announced seven of these winners on 28 April 2022.

1 Previously known as Nesta Challenges

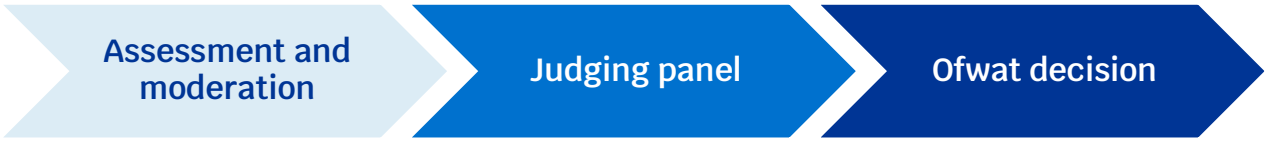
2 Entries with a lower value than £1 million were permitted for smaller water companies and NAVs if requested.

2. Breakthrough 2: Catalyst stream process

The primary aim of the Catalyst stream is to encourage new ways of working that go beyond business-as-usual innovation practices in the water sector, in particular, increasing and improving collaboration and building partnerships from within and outside the water sector.

The Catalyst stream sought all types of entries – for example technology, culture, business practices or commercial models. We were open to initiatives at any stage and sought to encourage the creation of new ideas and partnerships. It was focused on funding initiatives in accordance with the aims of the fund (which include innovation enablers[3]) that deliver innovation in line with the five strategic innovation themes.

For the Breakthrough 2 Catalyst stream, we put in place a one-stage entry and assessment process. Each entry was required to meet the eligibility criteria: that being that the lead entrant is a licenced water company or New Appointment and Variation (NAVs) in England or Wales; all entries must include a minimum 10% financial contribution; entrants agree to abide by the terms and conditions and entrants bid for between £100,000 and £1 million from the Fund.



Assessors reviewed each entry. Entries showing the most innovation potential, when assessed against the assessment criteria, advanced to the judging panel.

The table below shows the areas entries were assessed against at each stage of the process:

Table 1: Breakthrough 2 assessment areas

Assessment criteria areas	Weighting
1. Positive impact for water customers, society, and the environment	
1.1 Address a significant need or opportunity for customers, society and/or the environment	8.33%
1.2 Alignment with one (or more) of Ofwat's five strategic innovation themes	8.33%
1.3 Will, or could, be effective in addressing these problems or opportunities	8.33%
1.4 Set out a realistic reflection of external risks and how the potential benefits to customers, society and the environment outweigh these risks	8.33%
2. Innovation enablers and innovative solutions	
2.1 Use innovative approaches and/or solutions which would not be funded as part of business as usual	11.1%

[3] Innovation enablers include: collaboration, openness, adaptability, innovation risk management, scalability and deployability and long-term view.

2.2 Develop innovative enablers which accelerates practice beyond business-as-usual (BAU)	11.1%
2.3 Set out plans for adoption at scale across the water sector	11.1%
3. Capacity, capability and commitment to deliver	
3.1 Show commitment to the entry	6.66%
3.2 Will be delivered by a team with the relevant skills and experience	6.66%
3.3 Set out a realistic and achievable programme	6.66%
3.4 Demonstrate a realistic and considered costing which provides good use of customer funds	6.66%
3.5 Demonstrate a clear and proportionate approach to addressable risk	6.66%

Each area of assessment was weighted as per the table above and was accompanied by a set of questions that entrants were required to answer (see Entrant Handbook). Guidance was provided to potential entrants about what a successful entry could look like.

Each entry was assessed by three assessors with relevant knowledge and experience. Assessors were selected to ensure there was no conflict of interest with any entry they were assessing.

Entries were reviewed against the assessment areas shown in Table 1 by assessors separately, following which these assessments were moderated (including by reference to scores, qualitative review, and the requirement for a broad portfolio of bids) and a consensus agreed.

We received 19 entries bidding for funding. One entry was found to be ineligible. All 18 eligible entries were advanced to the independent judging panel for consideration.

The judging panel recommended 13 of the 18 entries to Ofwat for funding. Ofwat considered the recommendations of the judging panel and decided that the 13 entries should be funded.

Each entry has been provided with feedback on its submission, and those that are to receive funding were required to sign a winner's agreement prior to receiving funding.

Background intellectual property rights trial

Through the Breakthrough 2 Catalyst stream, we decided to run a trial relaxation to our background Intellectual Property Rights (IPR) policy for the Catalyst stream. The relaxation allowed owners of background IPR to charge a licence fee at a fair, reasonable and non-discriminatory rate for the use of the background IPR solely to the extent necessary for water companies to receive the benefit of the foreground IPR.

Of the 18 entries we received, seven entries chose the background IPR trial option. All of the background trial entries were able to demonstrate that they had thought through how to ensure that their proposed licence fees following the completion of the innovation fund project would be set at a fair, reasonable and non-discriminatory rate.

3. Projects selected for funding: Catalyst stream

We were encouraged by the number, quality and range of entries we received through the Catalyst stream of Breakthrough 2. As detailed above, all entries were assessed against the same criteria.

All the entries that will receive funding have met the eligibility criteria.

In making our decision on which entries should receive funding we have considered the opinions and recommendations of the technical assessors and the independent judging panel. Each of the entries that are to receive funding have met the three overarching criteria (see table 1) against which each of the entries were assessed.

We have considered all the entries received in the round to ensure that a broad portfolio of projects will be funded. The entries that are to receive funding align with our primary objective of Breakthrough 2 by offering a combination of ambitious innovation, and new approaches and ways of working. We consider that these entries best met our assessment criteria and outputs from the projects will help to equip the water sector to address the big challenges facing the sector and offer far-reaching and long-lasting benefits to customers, society and the environment across England and Wales.

We provide details of the 13 entries that will receive a share of £5.2 million funding and the analysis which has enabled this decision below.

Figure 1: Winning entries by innovation theme[4]

Water Breakthrough Challenge
Catalyst stream

	1 Climate change	2 Ecological status of water environments	3 Long-term resilience	4 Public value	5 Open data
HERU	✓		✓		
Catalysing a net-zero future	✓	✓	✓	✓	
Defusing the nitrate timebomb	✓	✓	✓	✓	✓
Designer liner	✓		✓	✓	
Pipebots for rising mains	✓	✓	✓	✓	✓
Support for all				✓	✓
SuPR Loofah	✓	✓	✓		✓
Tap water forensics			✓		✓
Sub-seasonal forecasting	✓	✓	✓	✓	
Community centric rainwater management		✓	✓	✓	
Unlocking bioresource market growth	✓	✓	✓	✓	✓
Unlocking digital twins		✓		✓	✓
Treatment 2 tap			✓		✓

As we outlined in section 3, through the Breakthrough 2 Catalyst stream we ran a trial relaxation to our background IPR policy. See below a summary of the IPR option chosen by the winning entries along with the funding amount.

Table 2: Winning entries by IPR option

	Number of entries	Funding amount
Option 1 - Default IPR	7	£1,909,346
Option 2 - Background IPR trial	6	£3,327,663
Total	**13**	**£5,237,009**

In the entrant handbook we indicated that our intention was to split the Catalyst stream £5m funding pot approximately in half. The IPR option chosen by entrants did not form part of the assessment process outlined above. We have considered all Catalyst stream entries received in the round to ensure that a broad portfolio of projects are funded.

[4] Themes impacted by entries as reported by entrants.

3.1 A HERU for screenings

Overview

This entry proposes a scalable site-based waste solution - the Home Energy Recovery Unit (HERU). The system uses heat pipe technology developed from satellites, turning wastewater screenings (plastic, wipes and other 'unflushables') into energy that can be used for other commercial purposes.

The project requests £198,144 in funding.

Project partners

This entry was **led by Severn Trent Water** with partners including Technical Choice Design, Huddersfield University, Southern Water, Thames Water, Dŵr Cymru and United Utilities.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry clearly articulated the problem it is trying to address and how it supports Government-driven targets to reduce waste. The entry demonstrated a good understanding of the challenges and potential opportunities of reducing screening disposal such as carbon and cost savings to help lower customer bills, while also making a direct link to plastic pollution reduction. The entry's projected outcomes, impacts and benefits to the water sector, customers and the environment were well articulated.

2. Innovation enablers and innovative solutions

The entry presented an innovative concept and provided evidence to demonstrate the proposed solution's feasibility. The project plan demonstrated that the delivery partners intend to leverage their previous individual experience and knowledge to achieve the project outcomes.

3. Capacity, capability, and commitment to deliver

The entry provided evidence of strong senior sponsorship from Severn Trent Water. The structure, roles, responsibilities, skills and experience of the entry delivery team is well described. The responsibilities of the Severn Trent Water team are explained along with the team's capacity to deliver the project outcomes.

The entry provided a detailed timeline of the project activities. There was a good level of detail on how the project will be managed, and what kind of controls will be put in place to monitor

progress and outputs. The entry also included a plan to capture learning and identify fast failures for each phase of the project through go/no-go criteria, which is seen as a benefit. The entry budget was detailed and reasonable but would have been strengthened if further detail was provided on the additional resources required to maintain the project after implementation. The risks and mitigation measures were well articulated.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £198,144 of funding from Breakthrough 2.

3.2 Catalysing a net-zero future

Overview

This entry proposes the testing of a 'biocatalyst' capsule (using microorganisms) to remove ammonia with zero nitrous oxide greenhouse gas emissions and to scale up the process to a wastewater treatment plant.

The project requests £762,447 in funding.

Project partners

This entry was **led by Severn Trent Water** with partners including Microvi Biotechnologies, Cranfield University, Jacobs, Dŵr Cymru, Irish Water, Thames Water, Southern Water, Scottish Water and Anglian Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry clearly described the problem it is trying to address and demonstrated an understanding of the unmet needs across the water sector. The entry demonstrated the need for this project and the innovation. It explained that process emissions are harder to treat than other sources of greenhouse gases (GHGs), particularly nitrous oxide (which the entry notes is 300 times more potent a GHG than carbon), and that there are currently no proven methods/solutions of preventing nitrous oxide emissions from wastewater treatment. It clearly aligned with the sector's net zero's ambitions, delivering a positive impact for society and the environment. The entry provided a compelling case for the project.

2. Innovation enablers and innovative solutions

The technology and approach described in the entry is innovative and is cognisant of the continually changing landscape of understanding in this area of technology. The entry provided evidence of how this project will go beyond business-as-usual by identifying and commercially deploying new strains of bacteria. It outlined a good approach to demonstrate viability and minimise barriers to scaling of an early-stage technology by seeking to develop a retrofittable solution.

3. Capacity, capability, and commitment to deliver

The entry provided evidence of a strong delivery team and advisory board. It provided clear milestones. The entry included a realistic assessment of the barriers to adoption. It identified a comprehensive set of project risks. It demonstrated an effective risk management approach, with stage gates proposed ahead of each capital outlay.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £762,447 of funding from Breakthrough 2.

3.3 Defusing the nitrate timebomb

Overview

This entry proposes the application of a tool to help understand how nitrate pollution in groundwater can be managed and reduced to restore polluted chalk aquifers of the south and east of England, benefitting water company customers through lower costs and diminished risk of pollution by reducing nitrate concentrations.

The project requests £154,800 in funding.

Project partners

This entry is **led by Portsmouth Water** with partners including Wood Group UK Limited, Southern Water, Anglian Water, Wessex Water, South East Water, Affinity Water and Environment Agency.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry addressed the issue of nitrate pollution in groundwater, specifically in the chalk aquifers of the south and east of England. It clearly described the need to monitor and manage nitrate pollution, particularly in the context of increasing agricultural land use and housing development. It explained how this project will benefit the environment by helping to protect chalk water sources and the ecosystems around them. The entry clearly explained the outcomes of the project, how these outcomes will be achieved, and the work required to deliver them. The project outlined its plan to collaborate with external stakeholders to develop the tool, which may enable scale-up and increase uptake of the tool once the project has ended.

The entry outlined the most significant risks that have been considered and clearly explained the mitigations to address them. The entry demonstrated good support from key stakeholders, such as the Environment Agency, which provided confidence in the mitigation measures identified.

2. Innovation enablers and innovative solutions

The entry clearly described the innovative elements of the project and how it will enable new, innovative business practices by sharing knowledge and working together to develop a common solution for the water sector. The entry's regional approach is also innovative in this context. The entry showed good support of the fund innovation enablers by combining expertise and bringing together staff from water companies, regulators (Environmental Agency), nitrate experts and heavy polluters together to work towards addressing a common challenge. The entry described how the solution could be implemented across two regions in England and identified the option to develop the same tool for use in sandstone areas.

Capacity, capability, and commitment to deliver

The entry showed strong support from experienced senior members from the lead and partner organisations. It provided clear descriptions of the structure, roles, and responsibilities for the project team. The entry provided a feasible delivery plan with project steering group workshops at key stages of the project to ensure input and dissemination of the results. The entry identified the key risks and outlined the mitigation measures.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £154,800 of funding from Breakthrough 2.

3.4 Designer liner

Overview

This entry proposes a collaboration of UK water companies and lining experts to document the gap to work and deliver a lining solution for the UK's ageing pipe network. Lining pipes increases the lifespan of assets and decreases rehabilitation costs. It can also provide customer and environmental benefits by reducing leakage and carbon emissions, improving water quality and network resilience, together with reducing the frequency of bursts that cause supply interruption events.

The project requests £173,880 in funding for phase one.

Project partners

This entry was **led by Yorkshire Water** with partners including Affinity Water, Thames Water Utilities, Northumbrian Water, Scottish Water, Dŵr Cymru and SES Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry proposed to address a growing issue in the water sector with ageing asset infrastructure. An effective lining solution could have the potential to extend the lifespan of assets, reduce the cost of maintenance, reduce leakage and reduce supply interruptions. The benefits for customers, society and the environment were well articulated in the entry. This outcome of this project has the potential to be beneficial to the UK water sector and for customers particularly if it can achieve its aspiration for a 50-year liner lifespan.

The outcome of phase one will provide a framework to support the further development of a pipe liner. The entry demonstrated how the project's two-phase approach will allow the project team to develop a well-thought-through phase two project plan, with insight and learning from phase one to reduce risks. The desired outcomes, longer-term impacts, challenges, and benefits of the project were clearly presented. The risks, particularly the external risks such as the UK's robust regulation of drinking water pipelines and the possibility that a solution already exists, were addressed in the entry.

2. Innovation enablers and innovative solutions

Phase one of the project is an enabler to the development of a potentially innovative lining solution as part of phase two. The planned collaboration approach in this entry is ambitious. The entry's approach to bring together four water companies as partners and two further water companies as part of the project steering group increases the potential for its desired

outcomes to be achieved. The collaborative nature of this project has the potential to accelerate the development of a lining solution and increases the likelihood of adoption by others in the sector. It was recognised that this project would be unlikely to be funded as business-as-usual due to its scale.

3. Capacity, capability, and commitment to deliver

This entry provided evidence of a strong delivery team with the relevant capabilities to deliver the project. The milestones and expected delivery time were clearly defined within a realistic two-phase timescale. The project risks and mitigation measures were well presented.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £173,880 of funding from Breakthrough 2.

3.5 Pipebots for rising mains – research and feasibility study

Overview

The long-term objective of this entry is to use in-pipe robots to assess the condition of operational sewer rising mains, greatly reducing the cost of surveying these critical assets. The project plans to build on testing of the feasibility of this technology from petrochemical sector. The project will be testing the feasibility of the technology in the UK water sector for the first time. The project proposes to use in-pipe robotic survey methods in tunnels and gravity sewers for preventative inspection and maintenance.

The project requests £230,930 in funding.

Project partners

This entry was **led by Thames Water** with partners including Wessex Water, Dŵr Cymru, The University of Sheffield and Synthotech Ltd.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry clearly described the problem it aims to address and outlined the work already done to understand the problem. It articulated the importance of surveying rising mains, especially

those used for sewage and demonstrated that there has been limited research conducted so far in the UK water sector. The entry also articulated how this project, if successful, will benefit the whole water sector.

The entry's intended outcomes were clearly explained. The phased project approach proposed lays out how the outcomes will be achieved and provided details on how the project could improve rising mains resilience across the water sector and catalyse the adoption of innovative technologies in the long term.

2. Innovation enablers and innovative solutions

The entry proposed to transfer an approach trialled in the petrochemical sector, and so was recognised as innovative for the water sector. The entry clearly articulated that as this project will be trialling a relatively early-stage technology in the water sector it would not be funded as part of business-as-usual.

The entry clearly considered the role of innovation enablers, it outlined a highly collaborative plan to bring together expertise from within and outside the water sector. The open working environment, approach to sharing intellectual property and knowledge with those in the water sector was seen as evidence that the delivery team were committed to adopting innovative and collaborative ways of working. By involving end-users early in the development of the technology was recognised as a departure from business-as-usual, with the potential to accelerate the adoption of the potential end product. The entry included a clear plan for disseminating and scaling up the technology.

3. Capacity, capability, and commitment to deliver

The entry provided evidence of senior-level commitment, with senior leads identified from each partner organisation. It provided detailed information on the roles each partner would play and how additional resources could be brought in to support project delivery. Clear management structures were outlined to demonstrate oversight of a robust delivery team. The use of a Responsible-Accountable-Consulted-Informed (RACI) framework and steering group provided further confidence in the delivery team's capacity and capability to deliver. The entry clearly articulated the project risks and provided realistic measures of their likelihood and potential impact and proposed reasonable mitigations.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £230,930 of funding from Breakthrough 2.

3.6 Support for All

Overview

This entry is focused on the design of a cross-sector priority service register platform capable of securely hosting and sharing sensitive data across the water sector for vulnerable customers.

The project requests £632,270 in funding.

Project partners

This entry was **led by Northumbrian Water** with partners including Accenture PLC, Consumer Council for Water, Microsoft PLC, Ordinance Survey Limited, UK Power Networks, Cadent Gas Limited, Northern Power Grid, Northern Gas Network and Thames Water Utilities Ltd.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry was well thought through and clearly set out the direct benefits for vulnerable customers. The entry presented a good understanding of what has already been achieved in this area to date and what the associated limitations are. The entry aligned well with the innovation fund themes 4 and 5. It set out how the outcomes will impact and benefit these themes both directly and indirectly. The entry provided evidence of significant consideration of external risks and what measures will be implemented to overcome and minimise them. Further consideration of the issue of digital exclusion would have strengthened the entry.

2. Innovation enablers and innovative solutions

The entry demonstrated that building a secure solution that helps vulnerable customers and is compatible with the needs of multiple different utilities as well as other parties is innovative. The more holistic approach proposed in this entry differs from the single utility priority services register approaches adopted in the past.

The entry identified collaborative cross-sector ways of working that will be used to deliver the expected outcomes. The proposed approach in the entry to build a cloud-based customer relationship management (CRM) system which allows data aggregation with unlimited scope is highly scalable.

3. Capacity, capability, and commitment to deliver

The entry proposed bringing together key experts from the energy, water and IT sectors. Key responsibilities and tasks were well articulated for each partner organisation. It was clear how each task aligns with the goals of each partner involved.

The project timeline is ambitious but the specific activity delivery times and key milestones are clearly described. The budget is detailed and realistic but could have been strengthened by including additional detail on the resources required to maintain the project after implementation. The entry provided information about the key delivery risks and the mitigation measures were well articulated. The entry included a description of the methodology that the delivery team will follow to identify and manage risks and opportunities during the project.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £632,270 of funding from Breakthrough 2.

3.7 SuPR Loofah (sustainable phosphorus recovery)

Overview

This project focuses on maximising phosphorus removal from wastewater using engineered micro-algae. This treatment system will help the water industry as it is not reliant on chemical usage by becoming financially and environmentally sustainable.

The project requests £445,577 in funding.

Project partners

This entry was **led by Northumbrian Water** with partners including The University of Newcastle upon Tyne, University of Northumbria at Newcastle and Dŵr Cymru.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry clearly articulated the problem of phosphorus in wastewater treatment plant effluents, the difficulty of removing this substance and the impact on the environment. It demonstrated a deep understanding of the problem and outlined how its proposed approach could deliver an environmentally and financially sustainable solution that could be applicable

irrespective of the size of treatment site. The entry clearly articulated the short and long-term benefits of the project for customers, society and the environment.

The entry considered the main risks to the project. It would have been strengthened if it had included further consideration of the inherent risk that the technology does not perform as well in the field as expected from initial tests in the lab.

2. Innovation enablers and innovative solutions

The entry explained an innovative approach by combining previous research and proven methodologies microalgae and coating principles to engineer microalgae to maximise phosphorous removal. The circular sustainable phosphorous recovery system proposed could close the loop on the phosphorous cycle and directly challenge the status quo around phosphorus in the water sector.

3.Capacity, capability, and commitment to deliver

The entry demonstrated commitment to the project from the project partners and delivery team. It outlined an experienced team of sponsors and leaders to support the project, with access to required facilities for the delivery team. The entry set out a clear division of tasks across a multidisciplinary delivery team who have previous experience of successful collaborative research projects. The structure, roles and responsibilities for the delivery team were clear for the key phases of the project (lab and pilot phases) and were appropriate for project delivery. The entry referenced the people who have been assigned to lead each task and demonstrated that they have appropriate experience.

The entry provided a clear timeline. The entry provided costs that were clearly presented and seem appropriate. key risks were identified with mitigation measures to reduce their impact provided. The risk management plan to identify new risks and monitor all risks during the project would have benefitted from being more detailed.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £445,577 of funding from Breakthrough 2.

3.8 Tap water forensics

Overview

The entry will use genetic sequencing data (a laboratory method to determine all the bacterial species present in water) to improve the speed and accuracy of water quality investigations. It will also create a standardised process for sampling, analysing and interpreting genetic sequencing data that can be scaled across the industry. This will establish the UK as a leader in genetic sequencing for potable water.

The project requests £371,215 in funding.

Project partners

This entry is **led by Severn Trent Water** with partners including The Centre of Ecology and Hydrology, Anglian Water, United Utilities, Dŵr Cymru, Thames Water, South East Water and Southern Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry was well explained and clearly outlined the overall aims of the project. It highlighted the need for cross-sector collaboration to improve the speed and accuracy of water quality testing. It outlined how an open- source platform to develop genetic sequencing would be an improvement to current processes and systems. The entry builds upon rapid onsite testing techniques already in development and holds the potential to significantly increase the speed, accuracy and granularity of microbiological data generated.

2. Innovation enablers and innovative solutions

The proposed approach in this entry could result in a step change in water quality testing in the UK and has the potential to scale up if successful. The use of genetic sequencing and the collaborative nature of the approach is innovative for the water sector in England and Wales. The entry included details of the delivery partners' intent to share learnings with the wider sector.

3. Capacity, capability, and commitment to deliver

The entry provided evidence of a dedicated and capable list of partners with an experienced team in place to deliver the project. The timeline outlined is reasonable and the budget provided appears realistic. The entry considered a range of potential risks.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £371,215 of funding from Breakthrough 2.

3.9 The use of sub-seasonal forecasting to improve operational decision making

Overview

This entry proposes to build on the Met Office forecasting tool 'Decider' that predicts weather patterns out to 2-4 weeks and scale up for the benefit of nine participating water companies. It will explore wastewater applications for sub-seasonal forecasting and modelling to increase predictability and improve operational management in surface water flooding.

The project requests £678,750 in funding.

Project partners

This entry is **led by Thames Water** with partners including Met Office, Northumbrian Water, United Utilities, Anglian Water, Bristol Water, Southern Water, Severn Trent, Southwest Water and Wessex Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry demonstrated that there is a need for the water sector to improve the accuracy of predicting localised weather patterns to enable more timely and effective operational actions to be taken. It outlined how the project outcomes will deliver benefits for water companies, customers and the environment.

2. Innovation enablers and innovative solutions

The entry clearly outlined the approach it proposes to take. It will build upon the knowledge developed through the European Union Horizon 2020 programme, which demonstrated the feasibility of the project. The entry stated that the approach provides a good opportunity to use the Horizon 2020 learnings to develop bespoke models for each of the nine participating water companies.

The entry stated that it will enable innovation by building new collaborations and nurturing existing partnerships through the project. It articulated how the approach could be implemented at scale and the described pathways to roll-out.

3. Capacity, capability, and commitment to deliver

The entry demonstrated strong commitment from Thames Water and MET office. The roles and capabilities/expertise of the projects leads from Thames Water and MET office were provided, along with the responsibilities of the other partner water company organisations. Additional information on the responsibilities of the two project leads would have been beneficial as well as including more information to demonstrate the commitment and the level of participation from all partner organisations.

The entry specified the different phases, milestones and timeframes for the project and for each partner. It described go/no go stages for each phase of the project. The project plan would have been strengthened by indicating the relationship between the key project control activities and their alignment with the timeline. It would be beneficial to include more detail on how dissemination will be conducted to engage with wider water companies to showcase the scalability of the project and its impact for the water sector. The entry clearly articulated the inherent risks associated with working with weather predictions and how other non-weather parameters need to be considered when interpreting the outputs.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £678,750 of funding from Breakthrough 2.

3.10 Towards incentivisation for community-centric rainwater management

Overview

The entry encourages the widespread community adoption of rainwater capture tools and solutions to reduce uncontrolled discharges to the environment. A web-platform will enable community-led campaigns to be implemented and audited such that the value of rainwater capture installations can be transparently described to overcome adoption barriers.

The project requests £225,000 in funding.

Project partners

This entry was **led by Thames Water** with partners including Indepen Limited, Our Rainwater Limited, Isle Utilities Limited, South West Water, Anglian Water and Wessex Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry demonstrated the need for this project and proposed an interesting alternative to the current pumped / concrete heavy solutions to reduce stormwater runoff. The entry aims to bring together experience and knowledge from other projects to capture stormwater to reduce the need for combined sewer overflows (CSO) and improve resilience to floods and droughts. The entry illustrated the downsides of CSOs and outlined why the current approaches are no longer sufficient or cost effective.

The approach to improve the tools and solutions to provide resilience to heavy rainfall events and droughts in the future demonstrated a clear benefit to customers, the environment and society. If this project can successfully activate communities, it could have a significant impact for customers, the environment, and the sector as a whole by identifying new tools and solutions to reduce stormwater runoff at source. The entry explained clear, achievable goals and provided sufficient explanation of how the project would get there. The project risks and mitigation measures were well articulated. The risk of community disengagement is well addressed and is a core part of the project plan.

2. Innovation enablers and innovative solutions

The proposed rainwater capture techniques in the entry are not unique, but the delivery and community engagement mechanisms are highly innovative. The project proposes to combine already tested individual components from pre-existing applications and to provide communities with the tools to take action at source to manage rainwater runoff. The entry demonstrated that the approach has potential to scale across the UK water sector.

3. Capacity, capability, and commitment to deliver

The entry demonstrated that its delivery team has the appropriate expertise and knowledge required to deliver this project. It outlined how the team will be supported by a steering committee who will provide input, challenge, and feedback throughout the project lifecycle. The key responsibilities and tasks were well articulated. The timelines and budget provided were realistic. The entry explained the risks well and proposed appropriate mitigation measures.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £225,000 of funding from Breakthrough 2.

3.11 Unlocking bioresource market growth using a collaborative decision support tool

Overview

This project aims to enable the development of a bioresources market using a prescriptive decision analytics platform for water and sewerage companies to utilise alternative approaches to displace capital investments and increase resilience of bioresources operations.

The project requests £314,316 in funding.

Project partners

This entry was **led by Anglian Water** with partners including Business Modelling Associates UK Ltd, Thames Water, Yorkshire Water, Northumbrian Water and Southern Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry aims to enable collaboration between water and sewerage companies through the use of an advanced analytics platform to determine the best use of bioresources. The entry demonstrated a clear understanding of the need and why this approach could be significant for the water sector. It explained the current barriers and challenges the project is aiming to address and outlined what has already been done to understand and tackle the problem. The project outcomes, deliverables and direct / indirect benefits for the water sector were well presented.

The entry proposed to disseminate the project outcomes at targeted external events with the intention of gathering feedback to aid roll out. It would have been beneficial to consider a broader range of ways to disseminate the learning, data, and outcomes from this project. The risks and mitigations proposed were well presented in the entry. The complexities associated with a cross-sector project were considered.

2. Innovation enablers and innovative solutions

The entry proposed the use of cloud-based, advanced digital business twin capabilities to generate a multi-water and sewage company bioresources strategic plan. It will re-purpose an existing platform that is already in use by the lead water company and a number of others in the sector, and apply it across several company networks, which is novel. The entry outlined the collaborative nature of the project and the data sharing required. It outlined the technological progression the project is aiming to deliver which should go beyond the capabilities of existing decision support solutions available.

3. Capacity, capability, and commitment to deliver

The entry provided evidence of strong commitment at a senior-level. It provided a clear delivery team structure with roles and responsibilities for some team members. It outlined the additional resources that will be provided to support the project. The entry proposed to identify a data analyst at each of the water company partners and confirmation of the system configuration by BMA after the project was awarded funding - identifying these resources up front would have strengthened the entry.

The costs outlined in the entry seem appropriate. The entry outlined a realistic and achievable delivery plan (12 months) structured in seven phases that clearly highlighted tasks and milestones. The entry identified the key project risks and outlined mitigation measures. It would have been beneficial to provide more detail on the risks linked to barriers to adoption and the mitigation measures that will be put in place to support those who do want to adopt the approach.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £314,316 of funding from Breakthrough 2.

3.12 Unlocking digital twins

Overview

This entry proposes to create a set of water sector data standards for digital twins for the water operational network; a set of recipes for the translation of water company data into the standard digital twin and a set of scripts to enable supported offerings from partners of software as a service (SaaS) solution compliant to the standards.

The project requests £334,800 in funding.

Project partners

This entry is **led by Thames Water** with partners including Severn Trent Water and the National Digital Twin Programme.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry identified an opportunity and a need to develop a consistent set of standards, recipes and scripts for digital twins in the water sector. It clearly outlined the current challenges and the approach it plans to take to address them. It explained why this project is suitable for innovation funding and why it would not be funded as part of business-as-usual.

The entry clearly laid out what the expected outcomes of the project are, how these outcomes will be achieved and the work required to deliver them. The entry provided a good level of detail on the long-term impacts and benefits of the project. A standardised approach to digital twins, as outlined in the entry, could provide the opportunity to scale valuable innovation in future. The entry outlined that the main risk to the project is wider adoption.

2. Innovation enablers and innovative solutions

The entry proposed is an innovation enabler for the water sector. It clearly explained the importance of having a common set of standards in place to enable digital collaboration and future innovation in the sector. The collaborative approach proposed and the team design go beyond business-as-usual. The entry proposed a blended team composed of experienced technical staff from each partner company and a sprint review panel to provide direction, working to agile principles with a central / open repository for data.

The entry proposed to make the findings of the project open-source to allow access for the entire water sector to support adoption, scaling-up and further collaboration.

3. Capacity, capability, and commitment to deliver

The entry provided the names and roles of the senior leaders in the two partner water companies. It detailed the benefits that the project outcomes will bring to their companies and outlined the previous work done by them in this area. The entry provided a clear management structure and a general description of some of the delivery team roles. However, more detail on the individual skills and expertise of the delivery team would have been beneficial.

The entry provided a breakdown of the costs by partner. The additional non-financial resources were identified in the entry however it would have been beneficial to provide more detail on how they will contribute to the project delivery. The entry provided information on the key delivery risks identified at proposal stage, including their quantification and mitigation measures.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £334,800 of funding from Breakthrough 2.

3.13 Water quality as a service treatment 2 tap

Overview

This entry proposes to operate Europe's largest integrated network of water quality, leakage management sensors and analytics software. The new business model aims to connect customers and water companies by providing real-time insights and proactive management of water services. The Teesside demonstration area will supply 90,000 customers and will deliver new open access analytics and operational best practice for the sector.

The project requests £714,880 in funding.

Project partners

This entry was **led by Northumbrian Water** with partners including Siemens, The University of Sheffield, Dŵr Cymru, South East Water, Scottish Water, Anglian Water, Intelisys Ltd, Syrinix Ltd, Advizzo Ltd and Bunt Planet SL.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry was well thought through and clearly described the opportunity to support the "water quality analytics as a service" business model. It explained the need in the water sector to obtain insights with sufficient sensors on the network and for good quality data from treatment works to tap. The entry set out how the intended outcomes will be achieved and the long-term benefits to customers, society and the environment.

The entry provided a realistic overview of the commercial, technical, operational and behavioural risks and the potential for it to reduce costs in the future.

2. Innovation enablers and innovative solutions

The entry demonstrated that it is proposing an innovative solution for the UK water sector. It outlined that nowhere else has developed an integrated sensing network from water treatment works to tap or has been able to assess the relationship between leakage and water quality.

The entry referenced its plans to scale at a very high level. However, it would have been strengthened by providing more detail on the pathway to communicate and disseminate the learnings from this project to enable implementation across the water sector.

3. Capacity, capability, and commitment to deliver

The entry provided evidence of strong commitment at a senior level from the partner organisations and outlined in what capacity they would be involved. The additional resources being provided to support the project were outlined. The entry provided a clear management structure with some roles and responsibilities for the delivery team outlined. Some evidence was provided to demonstrate that the delivery team have the expertise, knowledge, and capabilities to deliver the project. The entry provided a plan with clear phases and milestones. The entry provided a good understanding of the risks and included some strategies to mitigate them.

Ofwat's decision

Feedback has been provided to entry partners that sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £714,880 of funding from Breakthrough 2.

4. Projects not selected for funding

18 eligible entries (totalling approximately £7.7 million in value) were competing for a share of the circa £5 million funding available.

Of the 18 eligible entries received, five did not receive Catalyst stream funding at Breakthrough 2. Feedback has been provided to each entry lead of unsuccessful submissions with suggested areas of improvement should they wish to re-submit their entry to future competition rounds.

5. Breakthrough 2: Transform stream process

The primary aim of the Transform stream is to spark ambitious innovation and enable new approaches and ways of working; equipping the water sector to address the big challenges facing the sector, driving far-reaching and long-lasting benefits to customers, society and the environment across England and Wales now and into the future.

The Transform stream sought all types of projects – for example technology, culture, business practices or commercial models. We were open to initiatives at any stage and sought to encourage the creation of new ideas and partnerships. It was focused on funding initiatives in accordance with the aims of the fund (which include innovation enablers)[5] that deliver innovation in line with the five strategic innovation themes.

For the Transform stream, we had a two-stage entry and assessment process. Each entry was required to meet the eligibility criteria: that the lead entrant is a licenced water company or New Appointment and Variation (NAVs) in England or Wales; all entries must include a minimum 10% financial contribution; entrants agree to abide by the terms and conditions and entrants bid for between £100,000 and £1 million from the Fund.

Assessors reviewed each entry in stage 1. Entries showing the most innovation potential, when assessed against the assessment criteria, advanced to stage two. Entrants were required to provide more information in stage two where further assessment was undertaken.

The table below shows the areas entries were assessed against at each stage of the process:

Table 3: Breakthrough 2 assessment areas

Assessment criteria areas	Stage 1 Weighting	Stage 2 Weighting
1. Positive impact for water customers, society, and the environment		
1.1 Address a significant need or opportunity for customers, society and/or the environment	10%	6.6%
1.2 Alignment with one (or more) of Ofwat's five strategic innovation themes	10%	6.6%
1.3 Will, or could, be effective in addressing these problems or opportunities.	10%	6.6%

[5] The innovation enablers are: collaboration, openness, adaptability, innovation risk management, scalability and deployability and long-term view.

1.4 Set out a realistic reflection of external risks and how the potential benefits to customers, society and the environment outweigh these risks	10%	13.1%
2. Innovation enablers and innovative solutions		
2.1 Use innovative approaches and/or solutions which would not be funded as part of business as usual	13.33%	11.1%
2.2 Develop innovative enablers which accelerates practice beyond business-as-usual (BAU)	13.33%	11.1%
2.3 Set out plans for adoption at scale across the water sector	13.33%	11.1%
3. Capacity, capacity, and commitment to deliver		
3.1 Show commitment to the entry	10%	6.6%
3.2 Will be delivered by a team with the relevant skills and experience	7.5%	6.6%
3.3 Set out a realistic and achievable programme	2.5%	6.6%
3.4 Demonstrate a realistic and considered costing which provides good use of customer funds	n/a	6.6%
3.5 Demonstrate a clear and proportionate approach to addressable risk	n/a	6.6%

Each area of assessment was weighted as per the table above and was accompanied by a set of questions that entrants were required to answer – see Entrant Handbook. Guidance was provided to entrants about what a successful entry could look like.

For both stages 1 and 2, each entry was assessed by three assessors with relevant knowledge and experience. Assessors were selected to ensure there was no conflict of interest with any entry they were assessing.

Entries were reviewed against the assessment areas shown in Table 1 by assessors separately, following which these assessments were moderated (including by reference to scores, qualitative review, and the requirement for a broad portfolio of bids) and a consensus agreed.

At stage one, we received eight entries bidding for funding. Four of the eight eligible entries were advanced to stage two of the process. We invited five entries that reached the judging panel stage at Breakthrough 1 to Breakthrough 2 Transform, and they were offered the opportunity to submit their entries directly to Transform stage 2, noting the potential disadvantage this would have for them without the feedback provided at stage 1. All five of these entries chose to accept. All nine of the eligible stage 2 entries were assessed against the criteria in Table 3 and were advanced to the independent judging panel.

The judging panel recommended eight entries to Ofwat for funding, with recommendations to fund four entries in full and four in part. Ofwat considered the recommendations of the judging panel and decided to fund four entries in full and four entries in part.

Each entry has been provided with feedback on its submission, and those that are to receive funding are required to sign a winner's agreement prior to receiving funding.

6. Projects selected for funding: Transform stream

We were encouraged by the range of entries we received through the Transform stream of Breakthrough 2. As detailed above, all entries have been assessed against the same criteria.

All the entries that will receive funding have met the eligibility criteria.

In making our decision on which entries should receive funding we have considered the opinions and recommendations of the technical assessors and the independent judging panel. Each of the entries that are to receive funding have met the three overarching criteria (see table 3) against which each of the entries were assessed.

We have considered all the entries received in the round to ensure that a broad portfolio of projects will be funded. The entries that are to receive funding align with our primary objective of Breakthrough 2 by offering a combination of ambitious innovation, and new approaches and ways of working. We consider that these entries best met our assessment criteria and outputs from the projects will help to equip the water sector to address the big challenges facing the sector and offer far-reaching and long-lasting benefits to customers, society and the environment across England and Wales.

We provide details of the eight entries that have been offered a share of £20,205,555 funding and the analysis which has enabled this decision below.

Figure 2: Winning entries by innovation theme[6]

Water Breakthrough Challenge
Transform Stream

	1 Climate Change	2 Ecological status of water environments	3 Long-term resilience	4 Public value	5 Open data
CECCU	✓				
NLRTC			✓	✓	✓
Enabling Water Smart Communities	✓	✓	✓	✓	✓
Managing Background Leakage	✓	✓	✓	✓	✓
Hyvalue*	✓			✓	
Stream*					✓
Water4All*	✓	✓	✓	✓	✓
SENECA*	✓	✓	✓	✓	✓

*Entries offered partial funding

[6] Themes impacted by entries as reported by entrants.

6.1 CHP exhaust carbon capture and utilisation (CECCU)

Overview

This project is focused on the delivery of a circular economy initiative which will test technological innovation to remove carbon dioxide (CO2) emissions from Combined Heat and Power (CHP) exhaust at an industrial scale. The carbon captured in the process will be repurposed for a variety of uses. The project plans to develop communities of practice for all water companies in the UK to share techniques and influence carbon capture and resource recovery, as well as to setting up a customer stakeholder group.

The project requests £3,189,550 in funding.

Project partners

This entry was **led by Severn Trent Water** with partners including Brunel University, Clarke Energy, Carbon Capture Machine, Severn Trent Water, Southern Water, United Utilities and Scottish Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

This entry clearly articulated a significant problem for the water industry that needs addressing in line with Innovation themes, explaining how and why the proposed solution would offer a resolution; there was a consensus that CECCU was a particularly strong entry. It was agreed that the project represents a potentially viable and attractive method of decarbonising electricity production from existing infrastructure- combined heat and power (CHP) engines.

The project was especially welcomed for its potentially rapid impact on the water industry's CO2 emissions as it will deliver a relatively simple scheme to assess the performance of carbon capture technology for use with CHPs. In particular, the focus on product status, markets, the life-cycle analysis, and the focus on circularity were positively noted.

2. Innovation enablers and innovative solutions

Overall, it was agreed that there is potential for this project to unlock new ways of making use of waste heat or electricity. It was noted that trialling of the proposed approach to carbon capture requires significant investment that is outside business as usual for the water sector. Despite this, the entry benefited from significant exploration of potential markets which built confidence in it's success.

This initiative's proposed approach was viewed to be adaptable to different exhaust gases and should not be significantly affected by contaminants such as nitrous oxides and sulphur oxides, making wide application technically feasible although not without potential innovation-related risks.

The entry benefited from careful consideration and plans on how the team will work with regulators and industrial end-users to ensure regulatory requirements can be confirmed.

3. Capacity, capability, and commitment to deliver

The entry proposed what was viewed to be a "formidable" team of experts with relevant technical and project management experience, with the inclusion of a dedicated project manager.

The entry documented a comprehensive list of risks with reasonable mitigating actions given the current innovation maturity level of the project. It also provided a strong, appropriately resourced programme for delivering the engineering, with key milestones prepared. The breakdown of costs was considered reasonable for a project of this scale.

Ofwat's decision

Feedback has been provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £3,189,550 of funding from Breakthrough 2.

6.2 Enabling water smart communities

Overview

This project is focused on addressing challenges such as floods, droughts and factors impacting on water quality through Integrated Water Management (IWM), which combines infrastructure, technologies, policies, and behaviour change initiatives to bring benefits to customers, society and the environment. The project will apply an innovative approach to IWM, with an aim to overcome barriers to implementation by rethinking stewardship models, challenging regulatory standards and developing financial models that will underpin affordable IWM.

The project requests £5,535,000 in funding.

Project partners

This entry was **led by Anglian Water** with partners including KWR Water Research Institute, University of East Anglia, University of Manchester, Centre for Local Economic Strategies, Community Land Trust, Royal Horticultural Society, Ove Arup and Partners Limited, London Borough of Tower Hamlets, Suffolk County Council, The Chartered Institute of Water and Environmental Management, Clarion Housing Group, Microsoft, Taylor Wimpey, Thakeham, Vivid Economics, Ox-Cam Arc Integrated Water Management Framework Board, People Powered Homes, Future Homes Hub, Anglian Water, Dŵr Cymru, Southern Water, Thames Water, United Utilities, Cambridge Water Company (South Staffs Water).

Analysis of entry

1. Positive impact for water customers, society, and the environment

It was considered that this entry addressed a really important area where more work is needed with great potential benefits to customers, society, and the environment. The entry reflected the Fund's aims and had a strong alignment to the Funds Strategic Innovation Themes.

2. Innovation enablers and innovative solutions

The entry focused on bringing integrated water management approaches and technologies together; it was viewed that building a demonstration site, as set out in the entry, would be a good way to test this approach. It was agreed that the potential opportunity associated with IWM could be significant.

If successful, the project would represent a clear break from business as usual, and even if it failed, learning from this project would be of value for housing developers. The project may provide an useful evidence base to drive policy changes (e.g., via BEIS) and may even help to provide information on regulatory barriers on new integrated water management-related approaches that may be useful for consideration by Ofwat and other regulators, applying many approaches and technologies within the context of England and Wales for the first time, whilst recognising that many have already been applied elsewhere in the world.

3. Capacity, capability, and commitment to deliver

This entry evidenced significant commitment from several of the project's key stakeholders, as shown by the financial contributions.

The entry provided a clear plan for programme delivery, which was viewed to have appropriate stage gates inclusive of the consideration of benefits. The organogram demonstrated sufficient project governance framework and the project team were viewed to have good experience of the roles in which they are placed, noting that some key hires were outstanding.

The entry took a good view of inflationary and contingency risks, which showed reactivity to the current financial climate. The entry showed evidence of identification of pertinent risks, and suitable mitigation was outlined in the risk register.

Ofwat's decision

Feedback has been provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £5,535,000 of funding from Breakthrough 2.

6.3 National leakage research and test centre (NLRTC)

Overview

This project is focused on the development of a National Leakage Research and Test Centre (the Centre), with a large-scale configurable water test network representative of a live network. The aim of the Centre would be to enable innovators to test new pipeline solutions in a relevant environment, accelerating market readiness before final live network use..

The project requests £5,319,913 in funding.

Project partners

This entry was **led by Northumbrian Water** with partners including Water Research Centre Limited, H R Wallingford, Anglian Water Services Limited, Dwr Cymru Cyf, Irish Water, Northern Ireland Water, Portsmouth Water, Sutton and East Surrey Water PLC, Severn Trent Water Limited, Southern Water Services Limited, South East Water limited, Thames Water Utilities Limited, United Utilities Water Limited, Wessex Water Services Limited, Yorkshire Water Services Limited, Sheffield University, Southampton University, British Water, Isle Utilities.

Analysis of entry

1. Positive impact for water customers, society, and the environment

It was noted that the entry clearly articulated the need for leakage reduction, a recognised problem across the water industry. The need to find ways to work within water safety and regulatory constraints was understood and clearly explained alongside how this would deliver benefits to customers, society and the environment.

The entry aligned well with the Fund's Strategic Innovation Themes, particularly Themes 3 and 4, as it provided opportunities to test new ideas, collect data and improve leak reduction/repair. It was agreed that accelerating the use of new techniques and overcoming inertia to deploying them is an appropriate driver for this initiative.

The provision of a test facility representative of a live network but that did not present a risk to customers was noted as a major strength.

2. Innovation enablers and innovative solutions

It was viewed that the concept of a test and research centre for leakage has the potential to contribute to the development of new and innovative solutions to leakage avoidance, detection and repair.

The entry was considered innovative as it proposed the establishment of a Centre which is currently not available in the UK contect. Its approach to testing pipeline solutions was also considered innovative. The entry has the potential to scale both in terms of

1) its size and configuration and
2) geographic expansion to other licensed facilities elsewhere.

It was noted that the use of bunkers to collect and measure the quantity of water escaping from mains would provide data that is not easily collected and reported.

It was viewed that a single testing location with flexible and repeatable test conditions is unique, and the ability to repeat testing could be a major benefit. The proposed approach offers the opportunity to improve methods of business as usual leakage reduction and could potentially bring these solutions to market in a shorter timescale.

The entry demonstrated and promoted a good level of collaboration in seeking inputs, feedback and buy-in from large water companies and industry authorities.

3. Capacity, capability, and commitment to deliver

The entry evidenced strong backing and commitment, including support from senior leaders at each partner organisation. It was also noted that the entry secured both mandatory and non-mandatory contributions from a large cohort of water companies and other stakeholders. The entry also secured the involvement of a good range of industry experts, including those from academia, with the proposed team evidencing an appropriate range of skills and experience required to deliver the project.

It was viewed that the programme had a reasonable level of detail, and the construction timleine appeared achievable.It was noted favourably that the programme set out a suitable

number of milestones and decision points, which, particularly in the early phases of the project, would allow the viability and feasibility of the scheme to be further assessed and aborted without committing a high level of expenditure, appropriate to the innovation maturity level of the initiative.

The entry evidenced a reasonable approach to addressing risk. A range of risks were considered and mitigations proposed across the project lifecycle.

Ofwat's decision

Feedback has been provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £5,319,913 of funding from Breakthrough 2.

6.4 Managing background leakage

Overview

This project is focused on tackling background leakage using an approach deploying flow, pressure and temperature sensors at an intensity never previously done, coupled with digital-twin network models to localise then pinpoint and repair hidden leaks and other factors contributing to background leakage.

The project requests £2,152,757 in funding.

Project partners

This entry was **led by Welsh Water** with partners including University of Sheffield, Halma Plc, Invenio Systems Ltd, Affinity Water, Anglian Water, Dŵr Cymru / Welsh Water, Severn Trent Water, Portsmouth Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry seeks to directly improve understanding of a known problem within the water industry and to identify cost-effective solutions to diagnose and rectify background leakage.

It was recognised that there is very little work done in this area to date. If the entry's hypothesis could be proven and methodologies developed to efficiently and cost-effectively

identify and repair additional background leakage, the benefits across the water industry to customers, society and the environment were recognised to be potentially significant.

The entry evidenced good alignment with the Fund's Strategic Innovation Themes, particularly Theme 4 (Testing new ways of conducting core activities to deliver wider public value). The entry also has the potential to generate tertiary benefits associated with carbon/environmental improvements from reducing water loss.

2. Innovation enablers and innovative solutions

From a technical perspective, it was agreed that the entry presented evidence to suggest that the innovation is appropriate to address background leakage. This was further strengthened by the high degree of added instrumentation, and the use of data science approaches to interrogate the data properly. The entry identified that this approach has not been implemented anywhere worldwide to the knowledge of technical assessors and judges.

It was considered that the sharing of data and learning could be enhanced to add even more value and as such entrants were required to increase the open publishing of data collected within the initiative. Entrants were provided an uplift to the funding they bid for to support this requirement.

3. Capacity, capability, and commitment to deliver

The entry has evidence of commitment, particularly from water companies involved, alongside clear and appropriate roles for the project team.

The programme was viewed to allow reasonable timescales for the initial selection of DMAs and the following fieldwork, analysis, and leakage reduction repairs. The plan also suitable included checkpoints to review results and adjust approaches, which was viewed favourably.

The entry evidenced satisfactory consideration of project costs. The spending profile was viewed to be reasonable, with major costs when fieldwork commences then tapering down as work becomes more analysis-focussed.

The risk register identified a reasonable summary of the majority of potential risks, particularly in terms of commercial, technical, programme and project outcomes.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward.

This entry will receive £2,363,132 of funding from Breakthrough 2 which is made up of the requested funding of £2,152,757 and an additional £210,375 to enable entrants to meet the condition to publish data collected through the initiative openly

6.5 Hyvalue

Overview

The entry focused on converting sewage-derived-biogas into hydrogen for use in electric vehicles. The entry aimed to design and construct a pilot plant to investigate the hydrogen quality produced from biogas, aiming to evidence that this route of hydrogen production is technologically and commercially viable, providing a route to roll-out across the UK & globally and aiding the water sector to reach its 2030 carbon emissions targets

The project requests £3,393,000 in funding.

Project partners

This entry was **led by Welsh Water** with partners including Costain, University of South Wales.

Analysis of entry

1. Positive impact for water customers, society, and the environment

This entry clearly articulated a significant problem for the water industry that needs addressing, explaining how and why the proposed solution would offer a resolution. Current solutions rely on chemical dosing which does not align with other objectives. Offering a broad exploration of possible removal approaches which includes comparative side-by-side testing (a particular strength of the project) is something that should provide useful results.

2. Innovation enablers and innovative solutions

The entry was considered a potentially transformative initial step toward alternative uses for biogas/bio-hydrogen, delivering benefits beyond the water sector and influencing net-zero pathways. Even if the initiative failed, it was recognised that it would stimulate the conversation around hydrogen in the water sector. The cost and ambitious nature of the project make it unlikely to be funded as part of business as usual.

The entry's innovative approach to collaboration was viewed favourably, as the public sector, local government, and private organisations would share learning from other sectors to benefit customers. The plan for a bio-hydrogen production facility at a sewage work was perceived to be an innovative modification to an established process.

3. Capacity, capability, and commitment to deliver

The entry demonstrated commitment to delivery, with support from senior executives at Costain and Welsh Water. The University of South Wales committed to providing equipment that would significantly reduce the cost and complexity of the project.

Evidence within the entry also demonstrated that the Cardiff Local Authority supported integrating the project into the local plan to move towards a hydrogen-based transport system.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward along with the rationale as to why this entry was not successful in being awarded full funding.

This entry will receive £267,954 of funding from Breakthrough 2 to complete its phase 1 feasibility study.

6.6 Stream: Unlocking innovation through open data

Overview

This entry focused on working with a wide range of collaborators to deliver data-sharing infrastructure and an open data platform with support for external stakeholders to use and create value from data.

The project requests £6,031,152 in funding.

Project partners

This entry was **led by Northumbrian Water** with partners including AWG Group Limited, Thames Water Utilities Limited, Severn Trent Plc, Scottish Water, SES Water Plc, United Utilities Water Ltd, South West Water Limited, Dŵr Cymru, Southern Water Services Limited, Yorkshire Water Services Limited.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry outlined the need for data-sharing infrastructure in the water sector. It proposed to incorporate lessons from other data-sharing initiatives to co-design an Open Data Framework. The lack of data-sharing infrastructure in the water sector and its impact on inhibiting innovation was well-evidenced in the entry. The entry recognised the challenges faced by open data and data-sharing solutions and considered how the project would overcome them. SMART objectives were identified to help achieve the outcomes.

The entry detailed the project risks and proposed clear and sensible mitigation measures supported by engagement with the Open Data Institute. The project was designed using a staged approach, with each stage gate including a deliverable to provide learning outcomes and benefits. The identified risks were significant, however if successful the entry was recognised to potentially deliver very significant benefits for water companies, their customers, society and the environment.

2. Innovation enablers and innovative solutions

The entry is primarily an innovation enabling activity. It effectively explained the overarching benefits of the Open Data Framework and the individual capabilities of the Open Data Platform and demonstrated how they would support innovation in the water sector by providing access to data and fostering collaboration. The entry clearly demonstrated a number of innovative mechanisms and approaches which would be new to the water sector. This list of innovations, and their benefits, were well-articulated, and it was noted that the use of insights from better data analysis presented a potential paradigm shift for the water sector.

The entry proposed to bring external data science talent to a water project which is innovative and that coordination with multiple organisations and cross-sector working would go beyond business as usual. This collaboration across organisations was regarded as fundamental to the success of this project.

3. Capacity, capability, and commitment to deliver

The entry clearly outlined the support from the water companies, all contributing more than the required 10% contribution. It was noted that senior sponsors included the CIO of Northumbrian Water. The entry presented a detailed governance plan, including a dispute resolution process, an organogram providing role definition, leadership and management hierarchy, and a clear plan which set out how decisions would be made at each stage gate.

The entry included a delivery plan which integrated a range of control mechanisms, including sponsors, steering group roundtables, programme leadership groups and a stage gatekeeper. The diversity of expertise in the proposed team, which included technical and innovation experts, was considered a strength of the entry. The roles for the Blueprint stage were well defined, and it was considered that the proposed team would bring a wealth of experience to the initiative.

Ofwat's decision

Feedback has been provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward along with the rationale as to why this entry was not successful in being awarded full funding.

This entry will receive £880,318 of funding from Breakthrough 2 to complete phase 1 which will set out the requirements and acceptance criteria for the open data platform and framework.

6.7 Water4All

Overview

The entry focused on developing a solution to identify and support financially vulnerable water customers using advanced machine learning and statistical modelling techniques. Water companies would use the solution with support from other partners to assist customers in maximising their income, reducing their bills and lowering their carbon footprint through a mixture of resource-saving advice and efficiency measures.

The project requests £7,897,305 in funding.

Project partners

This entry was **led by Southern Water** with partners including Sagacity, Waterwise, Advizzo, Auriga, Equifax, Synectics, Agility Eco, TalkTalk, Together Money, E.ON, National Energy Action and Cadent.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The entry outlined a coordinated multi-disciplinary approach to providing early, targeted advice and support for customers. The entry articulated a clear problem around water poverty, debt, financial vulnerability and data intelligence, providing evidence from a range of sources. It proposed to provide opportunities around open data and collaboration with utilities and other water companies to deliver benefits to customers in vulnerable circumstances. The SMART objectives were considered viable and were targeted at customers and the environment. It was recognised that the project could bring benefits even if the outcomes were not fully achieved.

If successful, this entry was recognised to hold potential to have a tangible impact on vulnerable customers.

2. Innovation enablers and innovative solutions

The entry proposed to bring together several organisations to create an end-to-end service. This would include using artificial intelligence (AI) to identify vulnerable customers and a bespoke platform to link them to existing support mechanisms. The integration of data inputs, data modelling/machine learning and customer engagement was described in detail; it was recognised that this and the collaborative approach to sharing data to tackle the issue would not be considered or funded through business as usual.

The entry included multiple examples of building innovation capability. The combination of new data sets was perceived as an innovative approach to identifying vulnerable customers. It was viewed favourably that the team planned to take an adaptive approach and would seek opportunities to grow the partnership and onboard other water companies.

3. Capacity, capability, and commitment to deliver

The entry presented clear evidence of a robust governance structure and senior-level support across multiple partner organisations. This included buy-in from seven water companies, of which two are providing funding, while others are providing in-kind benefits. Detailed information was presented on both financial and in-kind contributions demonstrating commitment to the project.

The governance structure was outlined and the roles of each group were set out. This included an Essential Service Steering group, bringing in expertise from other sectors.

The entry provided a detailed programme, with tasks clearly assigned to each partner. There was a plan for monitoring the project. It provided a reasonable breakdown of project costs and a detailed risk register with mitigations proposed for each risk.

Ofwat's decision

Feedback has been provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward along with the rationale as to why this entry was not successful in being awarded full funding.

This entry will receive £616,807 of funding from Breakthrough 2 to complete phase 1 which will explore the conceptual design for the tool and to allow for testing of the concept with partners and stakeholders.

6.8 SENECA (Sludge, Energy, Nutrients, Environment, Carbon and Agriculture)

Overview

The entry focused on innovation in sewage sludge management practices and wastewater treatment through three integrated processes, namely Advanced Thermal Conversion (ATC) gasification, carbon dioxide (CO_2) capture to fertiliser and biochar utilisation in order to deliver benefits to customers through cost savings and to the environment through the reduction of the impact of sludge.

The project requests £9,092,870 in funding.

Project partners

This entry was **led by Yorkshire Water** with partners including EnertecGreen Ltd, CCm Technologies Ltd, Queens University Belfast , Isle Utilities, Thames Water Utilities Ltd, Anglian Water, Severn Trent Water, United Utilities Water Ltd, Scottish Water, Northern Ireland Water, Irish Water, Dŵr Cymru, Wessex Water, and Southern Water.

Analysis of entry

1. Positive impact for water customers, society, and the environment

The proposed approach in this entry was viewed as a potentially groundbreaking system for managing biosolids and upcycling a number of waste streams. Overall, the entry set ambitious aims and would serve two markets in the circular economy, i.e. renewable energy and decarbonisation of agriculture. If successful, it could potentially change sludge management in the water sector, providing social, environmental and economic benefits.

2. Innovation enablers and innovative solutions

The entry aimed to trial a range of technologies that are currently unproven in their selected applications which is innovative. It considered developing a circular economy of previously undervalued byproducts from sludge processing and wastewater treatment in a way that has not been done before. The entry approach was complex, multi-faceted and involved significant investment and multiple partners; and so it would not be expected to be delivered as part of business as usual.

Applying carbon capture to the processing of sludge was recognised to have the potential to reduce process carbon emissions, and the use of biochar to remove contaminants such as phosphorous from wastewater was viewed positively.

3. Capacity, capability, and commitment to deliver

The entry showed good support from the entry partners' senior leadership, with significant investment from all parties. Many water companies were represented on the steering group board, which was viewed favourably.

The proposed team would bring together a good range of experience from various relevant sectors. The team appeared to have ample expertise in biosolids management, scientific research and data analysis. Robust technical support was listed, giving confidence that the project infrastructure could be delivered.

Ofwat's decision

Feedback will be provided to entry leads which sets out specific areas of improvement which the project should consider in taking it forward along with the rationale as to why this entry was not successful in being awarded full funding.

This entry has been offered £2,032,881 of funding from Breakthrough 2 to deliver 2 of the 3 workstreams set out in the entry. Entrants have not yet confirmed if they will accept this funding.

7. Projects not selected for funding

In total 13 eligible entries (totalling approximately £62.5 million in value) were competing for a share of the £34 million funding available. Feedback has been provided to each entry lead of unsuccessful submissions with suggested areas of improvement should they wish to re-submit their project to future competition rounds.

Of the nine eligible stage 2 entries (totalling approximately £47 million in value), four did not receive full funding and one did not receive any funding in Breakthrough 2. The four entries offered partial funding were all considered for full funding, as set out in the Transform process above. It was considered that, for full funding to be awarded, further development was required but that the parts of the entries offered funding showed sufficiently high innovation potential, when assessed against the assessment criteria, to be successful.

8. General areas of feedback for all entrants

There were a number of more general areas of feedback identified during the Breakthrough 2 Catalyst and Transform stream processes that we wanted to share with all entrants to support entries (including those previously submitted) into future rounds. Entries could have been stronger if they:

- more clearly evidenced the benefits the project would deliver to customers, society and the environment;
- more explicitly explained the innovative elements of the project and how it goes beyond 'business-as-usual' to offer something transformational for the sector;
- more clearly articulated how the project would offer good value for money in terms of delivering more impact for the amount requested;
- provided more detail on project plans to scale up and roll out across the sector;
- showed clear commitment to sharing learning of the project to the wider sector;
- better articulated the business case to provide more reassurances about the viability of the programme, including cost contingencies;
- provided clearer explanation of the horizon scanning undertaken (including beyond the UK and beyond the water sector) to show how learning from others has been taken on board and will be built upon;
- conducted more stakeholder research / engagement / service design when looking at technology-based solutions to ensure this important stakeholder input was part of the considerations as they developed the solution;
- provided clearer project management plans with stage gates linked to objectives / outcomes of the project particularly for higher risk / innovation maturity projects;
- provided a more detailed approach to risk management, particularly given the amount of funding requested and for lower innovation maturity levels;
- more explicitly articulated what the proposal was aiming to achieve, detailing its objectives and intended outcomes. Entries should have considered why the solution offered was the best answer to the questions posed; and
- showed clear contingency plans to deliver benefits and learning even if the project failed.

Ofwat (The Water Services Regulation Authority) is a non-ministerial government department. We regulate the water sector in England and Wales.

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