

13th September 2019

Dear Ofwat

RE: Ofwat's emerging strategy: Driving transformational innovation in the sector

Thank you for the opportunity to respond to your consultation on driving transformational innovation in the water sector. We covered many of our thoughts related to this topic in our July response to Ofwat's emerging vision and strategy. Our overall observation in response to that strategy, namely that Ofwat's vision was overly focused on narrow matters of how the water sector is regulated, rather than a compelling vision of what the transformation of the water sector might mean from a customer, stakeholder and employee perspective, is amplified in this consultation.

We feel the consultation jumps straight to one solution, without sufficient evidence and analysis as to what challenge this solves, or whether that challenge requires solving. Whilst it should always be the job of a regulator to challenge and reform, this is such a major change with potentially far reaching consequences that if we are going to go down this route, we have to get it right. Not least as water companies will need to explain to their customers and stakeholders as to why they should pay for an innovation fund.

Our key observations on the overall strategy relevant to this consultation are, in summary:

- The water sector fundamentally remains a local public service. It has and continues to operate within national and international frameworks, but most innovations will continue to develop bottom up to address local needs. We think the approach to sector innovation strategy should reflect this.
- The challenges society faces are complex, and to deliver public value we think cross-sector and cross-utility approaches are likely to be the most efficient and effective. We would encourage Ofwat to consider how it encourages innovation that has wider impact across different sectors, and work with stakeholders and other regulators to enable such opportunities. We think this is likely to produce better outcomes than more intense focus on water sector transformation in isolation of the rest of the system we operate within.
- Financial incentives within the water sector have great power and deliver significant improvements for customers, without dictating how services are delivered. These have often developed by starting with reputational incentives, and then considering what regulatory and market framework that evidence supports. Ofwat should retain confidence in this approach. An increase in Board level dialogue on company strategy and performance with Ofwat, both good and bad equally, is our main suggestion to shape the future regulatory framework in a way that focuses on purpose and public value. This dialogue should include how innovation may best be financed.

At a time when we are concerned that Ofwat are targeting and incentivising companies to achieve both upper quartile levels of efficiency and service, with strong incentives based on comparisons, more than what customers have engaged on and supported, it feels odd to offset the bill reductions that arise with a central innovation fund that is customer funded. This is at the same time as Ofwat licence fees are increasing to fund a central resource to enable strategic national water transfers, even where there is not an obvious benefit to the customers within our region. This national top-down and centralised focus does not feel innovative to us, or may not achieve dynamic change. It assumes that one solution, centrally planned, is the way forward. Companies are being challenged based on national, top-down comparisons and whether this is

appropriate or not is a matter of judgement, but the strength of this incentive will inevitably be a significant focus for company innovation.

In this context, any expenditure proposals and new incentives need to be considered carefully. This may require something far more visionary. For instance, a key innovation for the sector would be to reduce consumption through re-thinking the role of the developer services market, and the potential to allow developers to offer retrofit to consumers. This would require Ofwat to reconsider where incentives are used, and could be a good focus for how innovation, reduced and better regulation within markets, fits together. However, the assumptions made in the consultation (that innovation is a function of regulation or risk appetite) are not proven, and therefore the solution could equally miss some of the opportunities. Of course, we recognise the options are not mutually exclusive.

Who finances the innovations is important. Innovation financing normally focuses on where there are big potential markets for a supply chain, particularly for exports. This is an aspect where academic and water companies can and do come together to support. Commercial opportunities should stand on their own two feet – that reduces risk to customers, and there are plenty of incentives for the right solutions to be implemented to benefit customers already. The impact of the consultation proposals do not appear to have been adequately considered – is there a potential export market, and for those who believe a centralised innovation fund should be the solution, have they tried this financing route already?

We have carefully reviewed Ofwat's emerging strategy: Driving transformational innovation in the sector, and it provoked our thinking further. We support the premise that *"adoption of innovative approaches are key to long-term resilience"* – in our long term ambition document, "Bristol Water...Clearly" we called out the importance of this relationship, recognising that we must continue to plan for the long-term and find new ways of doing things.¹

As a company with a long, innovative history, this has been driven by necessity. Collaboration still happens, without the need for a central innovation fund. Indeed, we believe such a fund is likely, on the balance of probabilities, to crowd out other innovation in the water sector, and disrupt the focus of innovation from how it occurs in the industry. On balance, we are not convinced this will prove to be a positive development, as we are not clear on either the problem or the proposed solutions. Financing of innovation is always challenging as early stage innovation carries a lot of risk where solutions are not fully developed, tried and tested, meaning more investment is needed with uncertain returns dependent on the effectiveness of the solution. This can be at tension with delivering performance improvements at the lowest possible cost. We think there is a challenge with an industry focused on outcomes and productive efficiency, and exploring where innovation requires earlier investment to allow for greater potential dynamic efficiencies in the future. We think an industry strategy that reflects local ideas and initiatives that can be used to support local engagement would be helpful. As stated in our initial response to Ofwat's emerging strategy:

- We do not believe that financial incentives will be the right approach to address long-term challenges. This risks complicating the regulatory framework, as outcomes would need to be clearly defined to avoid conflicting with existing incentives. Experience suggests this may increase the regulatory burden overall and may shift focus away from their own

¹ [Bristol Water...Clearly](#)

purpose to the regulatory framework. Where there is a cross-sector or potential benefit outside of the regulatory framework (e.g. overseas), then there is a much stronger case for financial incentives for innovation. We would welcome Ofwat revisiting this potential to target it at cross-sector innovations (or across different types of water sector participants such as retailers and developers).

- Ofwat should not impose additional costs through customer bills for an innovation levy without research that customers support this option compared to local innovation and investment. Experience in the energy sector of an increasing burden of national policy levies suggest that all alternatives should be explored, and that customer views on this should consider the context of other national and local levies such as for major water resource schemes and social tariffs. Customer trust and legitimacy in the energy sector has not increased from that experience, as far as we can tell.

We demonstrate through evidence that by having a clear social purpose, growing local innovation partnerships, supporting innovative start-ups, and driving high levels of internal engagement, innovation is not stifled or confined to small pockets of the organisation.

Our Innovation Framework ensures we put the right building blocks in place to steer and monitor innovation. It also ensures that we foster an innovative corporate culture from the ground up. This framework is also an example of our approach to systems thinking. It ensures that we manage innovation holistically across internal boundaries, company boundaries and industry boundaries, in order to drive new ways of working. It recognises that innovation does not happen in an industry bubble but in a much larger collaborative ecosystem of academics, entrepreneurs, internal innovators and through our supply chain. Our innovation approach starts with people and culture, and goes outside the water sector. We provide an update in Appendix 2 to demonstrate how dynamic this is.

The city of Bristol is recognised as a leading technology and innovation cluster in the UK. Bristol Water operates as a pro-active member of this scene in order to access the plethora of innovations available locally that will enable our customer outcomes, as well as support our [social contract](#) and contribution to Bristol City Council's "One City" Plan.

Our business incubator - [The Workshop](#) – is one way that we tap into the wider Bristol innovation scene. This is a mechanism for us to make our business estate open to early stage innovators, in order to accelerate the development and our adoption of their solutions. We incubate businesses that can support the innovation challenges published on our website; these are aimed at enhancing the product, service and experience that we can offer our customers. The business incubator is not something we do alone and have partnered with Business West, The West of England Growth Hub and Enterprise Europe Network in order to support us in attracting and supporting the most promising start-up businesses. We have healthy academic partnerships with a range of institutions and our rarely working in isolation of other companies. Our work with the University of the West of England and the largest water efficiency test site in Europe is an example of the benefits that have arisen from this approach. But we struggle to see how this approach would work within Ofwat's proposed innovation framework, and why our customers would support paying for this.

We think Ofwat's vision should reflect the importance to both trust and innovation that locally generated and agreed solutions can have, and recognise the power for these to become national. We have good examples of this (e.g. the Refill campaign), and many potential new ideas that arise out of our social contract and business incubator platforms.



Having shared our over-arching view here, we answer the specific questions raised in Ofwat's emerging strategy: Driving transformational innovation in the sector in the appendix to this letter. These responses aim to be more specific on the mechanics of the proposed innovation fund rather than the overall conceptual challenge that we make that we have outlined here.

We would welcome further discussion and exploration of these topics.

Yours sincerely,



Iain McGuffog

Director of Strategy and Regulation

APPENDIX 1: SPECIFIC RESPONSES TO QUESTIONS RAISED IN “OFWAT’S EMERGING STRATEGY: DRIVING TRANSFORMATIONAL INNOVATION IN THE SECTOR”

Q:1 What are the main barriers to innovation in the sector and why?

Ofwat suggests that the sector may have a low risk appetite because of public health and environment obligations. That should be true in terms of those responsibilities, but no evidence is provided for that as a barrier or resulting in a shortfall in innovation. The example then used that risk can then be collectivised is highly inappropriate to this risk appetite – this conflates a risk based approach to public health (which enables innovation because it is mitigating the impact of an uncertain world, and does this in a disaggregated way for individual sources of water, treatment, chemical sources, environmental risks), to risk appetite for innovation. The last thing the water sector should be doing is collectivising public health and environmental risk – that is not our legal obligation. Innovation reduces risk in these obligations, in particular if it is part of a forward looking strategy – this is the basis of a risk-based approach to regulating the public water supply and the water environment in England. Further costs are not embedded when an acceptable level of risk is achieved, to allow for time to innovate to find a long-term solution for the future, such as the challenge of long-term lead pipe replacement. The risk that we are avoiding is to individual consumers or water sources.

We provide evidence that appropriate collectivisation of risk happens already, with collaboration. Often at Bristol Water we are able to take more risk than our partners experience elsewhere in the industry, because of the greater network knowledge that a small company has. An example of this is the “calm DMA” approach, where we were early adopters in partnership with Cla-Val and Imperial College, which enabled scaling up with larger companies on the basis of the “proof of concept” that we had delivered. There are examples the other way around, and in our innovation framework we are explicit in justifying our risk appetite. But this provides no evidence that there is a challenge from risk average that should be addressed, in the way set out in the consultation.

The best approach regulation can take is to allow companies to continue to identify what innovations they require, and work in partnership with others, including within the water sector, to enable this to happen. We see cross-sector innovations as something that Ofwat could, in partnership with other regulators and government, do more to understand the potential and enable. Ofwat will need to de-regulate in some areas, or provide headroom that allows for more risk to be taken, in order to do so. The main challenge we see to the water sector is whether it is quick and dynamic enough to adapt to change, and this is where innovation has a role to play. So in our view, the main risk/barrier to innovation could come from over-prescriptive, top-down central interventions, which will hinder rather than enable future innovations to develop. We do not believe there are any innovations in the water sector that did not start from purposeful people or companies that changed the regulatory framework through evidencing, through innovation, that change was justified. This also applies wider than the water sector.

We recognise that innovation requires financing and investment and from our work with entrepreneurs within our business incubator, we see a few challenges to bring innovation forward to the industry where the need for short-term productive efficiency is at tension with future potential opportunities:

- **Investing in ‘high risk’ emerging solutions:** Technologies/new solutions require investment to develop. Early stage innovation carries a high risk as solutions are not fully developed, tried and tested, meaning more investment is needed and there is no guarantee

the solution will be successful. Generally, we find it most efficient to support development activity and applied research through benefits in kind. We operate a business incubator that 'opens' our business to support start-ups and aids us to adopt their solutions.

Examples of what we offer through this model includes providing space, offering business advice and mentoring, and providing access to our physical and information assets to trial solutions. This has allowed us to set up test rigs that detect early stage faults in pipework, trial Artificial Intelligence decision-support tools in our control room, implement Robotic Process Automation projects across the business, and explore ways to support for vertical farming solutions that can dramatically reduce water consumption in comparison to traditional methods. Additionally we support applied research with universities by providing expertise and access to assets to trial solutions on through activities such as our [Field Lab](#) and [Water Use study](#). Whilst this is an efficient means for us to operate and promote innovation, at an industry level, it would not provide start-ups sufficient revenue to be financially secure in their early phases. They would become very dependent on investors.

- **Financing from Investors:** The alternative to obtaining sufficient funding from water companies is from investors who specialise in funding innovation. At this point water innovations are competing with innovations from other industries that are often more liquid and/or lucrative. Investors favour innovations that enable re-occurring revenues e.g. subscription models. This model does not often lend itself to the development of engineering assets with long lives and hence do not receive the support of investors. This can be seen in the large investment made into digital solutions where reoccurring revenue models are abundant and the addressable market is large. It can also be seen in the number of engineering solutions attempting to sell their products through imaginative subscription approaches. A common example of this is in purchasing solar power: many providers prefer to offer power purchase agreements (i.e. provision of secure energy) rather than selling the solar panels. Despite this change in product offering, water companies, as asset operators, will still compare power purchase agreements against the benefits of purchasing the solar panels themselves and thus the provider's reoccurring revenue model may be avoided, leading to a lack of interest from investors.
- **Sector scale and value:** The water sector is a global market, and there are international investors in innovation, with the UK a relatively small player in terms of manufacturing, moderate in terms of water technology, but large in terms of academic and the range of consulting innovations. Government support has historically been limited because of a modest potential for an export market, as the water sector has limited scope for standardised innovation, in part because standards and requirements vary to reflect local conditions. The UK therefore focuses on consulting services and technical expertise as strategic strengths, based on partnerships in many cases with the water sector and its supply chain.

Outside of financing challenges, there are practical constraints that the businesses have to navigate:

- **Bandwidth:** In order to keep our resource costs as low as possible, the majority of research and development work is outsourced (to universities or start-ups). These outsourced projects require subject matter experts from our different business-as-usual (BAU) departments to oversee them. The reliance on experts from within BAU departments creates a tension between urgent BAU activities and longer term innovation activities. Prioritising innovation over BAU requirements becomes a challenge and progress can be hampered. An innovation framework helps to overcome this challenge, which is common across the water sector. A barrier could therefore be over-reliance on cost or short term outcome incentives in water regulation, compared to other jurisdictions that take a longer-

term perspective. However, the best companies in the water sector help the others to overcome this, and we see no reason why this should not continue to be the case.

- **First mover risk:** In some areas, failure is unacceptable e.g. water quality. Therefore, being the first company to trial a technology at scale that is yet to be proven is unattractive. Last year we began implementation of Aquaadvanced Energy, innovative software for pump optimisation to reduce energy expenditure, which few water companies had adopted. Despite being an early adopter, to roll out a solution at such scale required another proven business case of scale that demonstrated the security of such an investment. We comment further on how this could be addressed in response to question 5 under “creating an innovation environment”.

Q:2 Do you think that the financial support cited in section three is required to stimulate innovation in the sector? If so, what do you believe is the appropriate amount of funding and why?

We do not believe that financial incentives will necessarily be the right approach to address long-term challenges to innovation. These risk complicating the regulatory framework, as outcomes would need to be clearly defined to avoid conflicting with existing incentives. Ofwat recognise this in the consultation, quoting that *“we will need to help ensure projects funded are not already funded or incentivised through the price review framework”*. This requires a highly prescriptive framework, which could potentially stifle innovation. This is further complicated by the need to develop our own frameworks to underpin the innovation competition. We suspect, without a detailed study into the proposal, that the bureaucratic cost of the proposal could outweigh the benefit or the available funds.

We also ask why £200m? No evidence presented as to why this is appropriate, other than the statement that it is an *“initial view... [it] strikes the right balance between driving company behaviour and delivering for customers”*. We see no evidence to support this proposition, and we think some degree of evaluation is required before assessing the case for the proposal. We do not consider that the PR19 regional strategic water resource solutions or the other examples stated are precedents at all – no evidence is presented as to what the precedent is. A statement is made that *“making additional funding available is not without risks”*. First, this is not necessarily additional funding – it may crowd out other innovation. Second, the risks are not explored, and neither are the benefits or the principles.

Experience suggests this may increase the regulatory burden overall and may shift focus away from a company ownership of innovation, to even increased focus on the regulatory framework. For the supply chain, there would be increased dependency on the regulatory cycle (i.e. funding not being applied, and then highly uncertain about what would be distributed or what the future funding would be, until PR24 – where is the money collected from customers going in the meantime – the approach was not clear?). Where there is a cross-sector or potential benefit outside of the regulatory framework (e.g. overseas), then there could be a much stronger case for financial incentives for innovation, without the risks, and a way of calculating what the potential benefit could be. For instance, the amount of any fund could consider what matched funding or cross-sector benefits could be realised. This also reduces the risk that we cannot identify any innovation that isn't already part of the water sector incentives or activities.

Customer research conducted for our business plan suggested customers want us to do more for less, which implies we need to be innovative to meet these requirements within the existing regulatory model. Customers only support this if it lowers their bill (or improves services quicker rather than a lower bill) – they do not see innovation as a sufficient purpose in itself. Whether the

application of the future regulatory framework places weight on customer priorities, or provides sufficient headroom through incentives for innovation, is outside of this consultation's scope.

We feel that Ofwat should not impose additional costs through customer bills for an innovation levy without explicit research that customers support this option compared to local innovation and investment. This research should demonstrate:

1. Is there compelling evidence that the level of customer money available (£200m) is necessary for the proposed use?
2. Is there compelling evidence that there are benefits that adequately compensate customers for the increased cost?
3. Is there compelling evidence of customer support for the proposals?

At present, due to the lack of evidence included in the consultation, this financial support proposal would not pass these assessments:

Experience in the energy sector of an increasing burden of national policy levies suggest that all alternatives should be explored, and that customer views on this should consider the context of other national and local levies such as for major water resource schemes and social tariffs. The increasing fixed cost of transmission is driving customers off grid, which then reduces network benefits. The risks or centrally driven policy costs are lower in water, but they still exist.

We can demonstrate that there is a need for funding innovation, but with effective collaboration this can be achieved, especially through access to funding that universities have, without the need for customer levies. A great example of that at Bristol Water is our Field Lab in conjunction with Imperial College:

A "field lab" operated by Bristol Water was implemented in 2012 to test the principles of adaptive networks. The "field lab" includes three dynamically adaptive DMAs, 7900 customer connections and 59km of mains. This has enabled optimised network connectivity and hydraulic conditions, which mean we can better control pressure, reduce the risk of burst mains, reduce the risk of water quality incidents, as well as manage leakage. Over the last 6 years, the total funding obtained to progress our Field Lab has included c.£180k of equipment in the network, and we are a key utility partner in a £3.5M research project (the predominant fund being EPSRC). Our financial contribution to that has been around £23k. This demonstrates real value and efficiency for customers. Without the university collaboration we would not have been able to fund such a large scale trial. In this context, we would far prefer to use customers' money for innovation within our own business, and be accountable for the results. This option does not appear to have been considered in the consultation, and there is still the potential for this to be considered at PR19.

Q:3 Do you agree that our proposed draft principles for additional financial support will effectively safeguard the interests of customers?

In general, without further consultation, we do not feel that it is possible to assess customer interests. Therefore we do not feel that Ofwat should impose additional costs through customer bills for an innovation levy without research that customers support this option compared to local innovation and investment.

There is mention of involving an "expert entity" in the decision process, to help ensure that projects that are not already funded or incentivised through the price review framework are not funded. This

may be a new barrier to innovation – it encourages less innovation day to day (we would note that all spend is incentivised through the price review framework – outcomes are not generally “funded” through price setting). What would an “expert entities” judgement been on something so groundbreaking, and even for incremental investment can it be neutral? We are not convinced that the term “funded” is appropriate – it may be better to refer to “financed”, as we are concerned here with the how innovation is financed in the sector, and incentivised. Companies are determined sufficient revenue to efficiently deliver an agreed set out outcomes, this is often described incorrectly as “funded”, when what is meant is that they “finance” these activities. We think the consultation objective is to seek the best way to “finance” innovation activities that would otherwise not occur within the normal financing and incentivisation of the regulated water sector.

This formulation provides a much clearer distinction as to the role that an innovation framework may have. Companies still have to innovate to deliver and finance regulated activities, but that is not what this consultation wants to interfere with. What we then struggle to understand is what examples are there that would not already be covered, somewhere in the sector, and without collaboration on innovation. The Ofwat strategy rightly highlights the public value companies add (e.g. the Refill campaign – Bristol Water were never “funded” to support this, and financial motivations, certainly not in the short term, were not the driver for this). However we did contribute to the financing of City to Sea at a time when they were at an early stage of innovating. The benefit to both parties can be seen (e.g. long term sustainable financing for one organisation, through collaboration, and a public value benefit to the water company from the awareness of the value and quality of drinking water, as well as a social contribution to plastic reduction).

Having said this, our further thoughts on the specific principles put forward are as follows:

Failure - The mechanism (albeit undefined) for clawing back funding for failed projects feels in contradiction to the principle of driving transformational innovation - the more transformational the innovation being pursued, the higher the likelihood of failure. By clawing back the funding this risk is just deferred as opposed to mitigated and hence there is little incentive to push for large transformation. Therefore it will be important to define this mechanism clearly in order to preserve the incentive for involvement.

Open by default limitations- Some bids may involve collaborations with start-ups that have applicable solutions for the water industry. These collaborations will only succeed if the start-ups know that their IP will be protected. Therefore, it will be possible for the water companies to be open with their data, methodologies and results; however, the IP will need to remain protected for those private start-ups developing the new solutions. What is the interaction with innovation elements of companies Bid Assessment Frameworks? How do market developments (e.g. for water resources, or Direct Procurement) sit with this approach? We do not know, but we are not convinced that unless there is a clear focus for the proposal (e.g. perhaps cross-sector as we propose), and then the level of appropriate funding is consulted on and designed based on a specific proposition, that the approach will add value. The criteria we set out above should be a high hurdle because of these questions.

Collaboration – It is unclear how collaborations that stretch outside of the water sector would be treated. For example, we currently collaborate with energy and waste companies around efficient resource use: Resource West. Similarly we have also partnered with the University of West of England to understand how we can maintain community resilience across the Water-Energy-Food nexus. If another project, which collaborated across energy, waste or water industry boundaries were proposed, how would that fare given that money from water industry bills would be supporting benefits to energy / waste customers? We expand on this further in question 4.

Timelines and progress - Some innovations take a long time and there should be provision to acknowledge this and enable work to start on solutions that are compelling, but may not complete by the end of 2025. For example, we have undertaken a long-term collaboration with Imperial College on the hydraulic operation of our smart grid in the field lab. This has been a significant undertaking that began 7 years ago and has led to the development of dynamic, self-powered valves for large water mains, the development of hydraulic models and the ongoing maturing of this has led to one of the more sophisticated smart grids in the country capable of operating in different states (e.g. event mode / network calming mode).

Q:4 What are your views on the collectively funded innovation competition model which we describe in section three? What other key considerations not highlighted should we take into account in designing/ implementing the competition?

Beyond our general views, outlined at the beginning of this letter, an area that has not been considered under the proposals is how cross-sector collaboration would be justified with our customers. We recognise that a co-ordinated approach is the best way to tackle pressures associated with the increased use resources such as water and energy. The region we serve has a strong sense of identity, which we are proud to support and contribute to, and has led to organisations such as Bristol Water, Bristol Waste, Bristol Energy, the University of the West of England and the West of England Combined Authority to come together in a new partnership known as Resource West. The group aims to explore the economic and social benefits of efficient resource use and its role in facilitating regional growth. Bringing together shared knowledge and capacity of these organisations can deliver greater gains for local communities in issues such as water efficiency, energy efficiency, and local resilience.

Another cross-collaboration project we are involved in is SUNEX (Sustainable Urban Food-water-Energy Nexus). The study aims to develop efficient solutions for the shared issues around energy, food and water. This is a unique multi-disciplinary collaboration.

A nexus assessment seeks to describe the interactions of water, food, energy, environmental and social systems, to identify the interdependencies and trade-offs between these systems. The SUNEX project aims to provide a modelling framework to assess the FWE components addressing both supply and demand side. The applicability of SUNEX will be tested in 4 case study city-regions, namely Berlin, Bristol, Doha and Vienna.

This is a valuable opportunity to develop efficient solutions for the shared issues around energy, food and water. The ultimate goal is to provide efficient solutions and policy recommendations for sustainable development in urban regions. This goes beyond water company boundaries and energy sectors, looking at a global level how these systems interact.

Both of these collaborations provide really valuable relationships that we would encourage others to pursue, however when thinking about the competition model Ofwat has suggested, it becomes unclear how this type of collaboration (i.e. outside of the water sector) would be processed. If a project were to be pursued around efficient resource usage, how would that fare, given money from water industry bills would effectively be supporting benefits to energy customers.

In practice, we do not think the innovation competition will allow small companies access to a larger pot of funding than if it was directly from our customer base. The evidence suggests the contrary. We access a larger pot of funding now, by using our innovation framework and close partnerships with academic institutions – relationships carefully built up over time that allow innovations. Other companies adopt this, and usually for us the benefits are relationships (and the

next innovation), reflecting that customers do not finance much, if anything, to enable this to happen. In other circumstances, it is our supply chain links that give us a chance to apply proven innovations. We provided Ofwat in the December 2017 innovation consultation a wide range of examples of the history of this (such as “ice-pigging” which rolled out to food, oil and other sectors).

Our concerns are that an innovation competition undermines this innovation approach – companies may wait for the competition, which could strangle the existing industry framework. They may view innovation as something that Ofwat now determines, as that may effectively be the outcome. This is clearly not Ofwat’s intention, but the amount of regulation of the process to prevent this is unlikely to be efficient, unless there is a really clear definition of what types of projects this could address. Ofwat state it in general terms – to “*drive innovation in the sector*”, but also state it is not for “funding” or “incentivising” already within the regulatory framework. We want to be positive about this genuine attempt to encourage more innovation – but do not see practically how this will work in practice, unless very carefully defined before this is agreed. Perhaps a workshop to explore this potential further is required?

The consultation appears to assume that “the companies” would jointly develop the competition framework’s detail – this assumes that there is a group or organisation that should do this, on behalf of Ofwat. No requirement is set out, other than the reputational incentive (presumably from Ofwat) of not doing so. Is this a requirement as a result of the consultation? What happens if a company does not want to do this, perhaps because customers do not support it? Are Ofwat unlikely to use participation in this as a criteria at PR24 – we doubt it and we expect it will be very difficult not to see this as something that is mandated in practice. We do not suggest this should be the outcome, even if Ofwat choose to proceed. Ofwat retaining strategic control or oversight appears to be the main proposal, without considering the burden of this approach and the potential negative impact it would have on innovation. It risks being Ofwat’s opinion on what is in customers’ interests, without consulting on the purpose sufficiently up-front, without assessing the burden on those expected (or obligated?) to participate. We doubt Ofwat will allow the levy to fund this burden, and even if it is, we suspect the reporting and monitoring in itself would constrain innovation and swallow up the amount raised.

Q:5 What are your views on the end-of-period innovation roll-out reward we describe in section three? What other key considerations not highlighted (e.g. whether it should be collectively funded or individually funded) should we take into account in designing/ implementing the reward?

As previously stated, we do not feel that that an industry innovation fund is appropriate due to:

- The need to consult with customers on alternatives such as local and cross-sector alternatives.
- Adding further complexity and focus on regulation into the regulatory regime.

An end of period innovation roll-out carries less risk than a competition in terms of crowding out current industry innovation, and therefore we prefer this approach. We would still consider there may be concerns whether whether ex-post is a suitable way to reward innovation, given it does not address how risk should be financed.

If this was defined as being financing support to roll out an idea, we see no reason why this couldn’t be part of company business planning processes and incentivised through ex-ante

outcomes. The problem with end-of-period rewards, compared to a competition, is that they risk distorting what is a competitive market for innovation already. What risks are there to the innovation hub or new technology start-up that does not have access to this funding? It is harder to manage this risk in the same way as through a bidding process (although whether companies can collectively address this problem is of concern, but it requires a large degree of transparency which Ofwat will need anyway, which comes at a significant overhead). It is surprising that Ofwat as a competition authority does not address this point in the consultation, at least so it can be debated.

The challenge comes back to what happens with the money collected from customers under either option, in between PR19 final determinations, and the competition outcome / PR24 end-of-period roll out?

We make an alternative suggestion. Ofwat can structure the PR19 final determinations so that each company can (between 2020 and 2025, although practically an earlier date could be set) propose additional outcome incentives that provide for reward payments, and penalties based on an element of the underperformance incentive for any financing sought, should an innovative and collaborative (and we believe outside of the sector) framework develop, that meets the criteria we set out earlier. At that point the financing from across the industry could be sought, and the fund created that would allow for this outcome to be financed, rather than from the customers of the company itself. Alternatively, this could be an end of period adjustment at PR24, given effectively this appears the practical impact of the consultation, if we have understood it correctly.

The companies concerned would, after Ofwat scrutiny, put this proposal to public consultation. Other companies may then join in, particularly if they have something to offer (such as they have already delivered something similar that their customers are paying for in bills), as well as raising any concerns. The criteria can be consulted on, but we would need to discuss what examples of projects may qualify. Evidence would drive future decisions, based on pilots. For us, there are similarities to Direct Procurement, strategic water resource schemes, the on-time delivery of the business retail market etc. with this approach – a pragmatic way of collaboration that works with and can be seen as positive development of the sector. This approach also avoids the challenge as to whether Ofwat can get cross-sector solutions working – Ofwat may be able to facilitate this, but companies may seize this opportunity with the supply chain, if they feel this is a better approach than what they are already doing. The incentives will shine a light on what the potential is, rather than debating if there is a problem and what it may be. We would be happy, with a longer time-frame, to work with Ofwat and others to explore this alternative suggestion further.

In any case of the financing/reward mechanism, regarding the problem the approach aims to address of incentivising roll out at scale, we believe the industry is effective at this currently: all companies operate a rigorous investment process and this can accommodate proven innovations. Last year we began implementation on Aquaadvanced Energy, innovative software for pump optimisation to reduce energy expenditure, which only a few water companies had adopted, and none had fully utilised yet.

Aquaadvanced had a few robust case studies and as a result we were able to take on the position of a fast follower rolling the solution out across our whole network (see the evidence from our innovation framework in Appendix 2 of what this has achieved recently). The challenge lies in being the first company to deploy a new solution at scale and provide one of those case studies.

If the fund were to be utilised for scaled roll out, it should be on the premise of providing a suitable case study to justify fast following adoption from the rest of the industry. This would easier fit with defining an outcome incentive, rather than in an ex-post governance framework that did not provide any certainty to companies. For instance what happens if companies do not adopt an

innovation because they have different challenges, or are basically less good at rolling out innovations. Should the innovator be penalised for other company failings by Ofwat? With this in mind we have detailed a few considerations:

Creating an innovation environment: Innovation necessitates failure (if it is to be transformational in its magnitude). Whilst some areas this is unacceptable e.g. water quality, in others it may be more tolerable: e.g. low pressure. Given that there are no test bed environments that can represent the scale of utility service provision and therefore innovations have to be developed on live systems, consideration could be given to ring fencing those areas where an innovation is being scaled so that, within certain parameters, variation in performance against ODIs is not reported i.e. penalties and rewards are not applied. This could be built into a roll out incentive ex-ante, to Ofwat's satisfaction and scrutiny.

OJEU restrictions: There is a risk that a technology to be funded for development at scale is not possible due to procurement constraints. i.e. spend over a certain threshold must be undertaken through a competitive procurement process. The outcome of this objective process may entail that an alternative option should be progressed (e.g. because of price). This alternative option, whilst positive to have identified, may not be equally applicable for the innovation funding and therefore the work is stopped (with risk of a legal dispute around the withdrawal of a commercial contract). This is less of an issue with a competition than end-of period roll-over reward – but the question is why should innovators be penalised for the failings of subsequent adopters? What perfection in the other adopters is required by Ofwat?

Settlement and risk: if the mechanism is settled in PR24 then the incentive is in arrears as the expense has had to be incurred for roll-out. If there are any conditions upon which the payment is incurred these will need to be clear because if there is a high potential that these conditions will not be met during implementation then the further through the period 2020 - 2025 we progress, the higher the impact of not receiving the funding. Given the high upfront cost of roll out, a tipping point may be reached where accommodating this risk may no longer be viable. Suggesting that the design of an assessment and decision-making approach, and the risk of double-funding, may make our alternative of ex-ante incentive design and ex-post customer adjustments preferable to the ex-ante customer levy and ex-post company reward that the consultation may imply. It is less risky for all in our view.

Q:6 What other potential alternative mechanisms for funding/ rewarding innovation not discussed do you think we should be considering? Which financial support mechanism or combination of mechanisms should we introduce and why? What would be an appropriate split of available funding/ reward?

We set out our main proposal, for ex-ante outcomes set collaboratively (and in our view inevitably with benefits outside of the water sector) with ex-post customer financing adjustments under Qs4 & 5 above, as this helped to illustrate the challenge we tested on the consultation proposals. However, our overall conclusion is that the consultation approach requires reconsideration, and a workshop to test ideas and principles may be a good way forward.

A few areas for exploration are suggested below

Setting social purpose can drive innovation: In our initial response to Ofwat's emerging strategy we highlighted that focus for the future water sector will be on "how we deliver, not just what is delivered". Without companies with a social purpose, innovations and approaches that we see today may never have developed.

A social purpose drives companies to take on a holistic approach, considering the connections and impact of wider health, wellbeing and the community, to wealth and the economy. We have found our social purpose to be a powerful tool - It helps to grow partnerships and collaborations (in and outside the water industry) that are great drivers for innovation and change. We also believe public and private value can be generated through positive aspirations and targets. Examples of how this has worked for us are shown in our initial response to Ofwat's emerging strategy, and include with the opportunities arising out of our social contract, for instance with the Bristol City Mayor, Bristol Waste, Bristol Energy.

We believe that Ofwat can drive more water companies to set out their social purpose, helping to drive innovation through local collaboration, and recognising that locally generated trust and innovation has great power to become national. As shown previously, we have examples of where this has worked, such as the Refill campaign, from which other companies have followed suit – we now see water fountain programmes and water bar spin-offs appearing across the country. Our [social contract](#) will continue to provide a platform for new ideas and collaborations for innovation. A cross-sector approach, with innovation linked to wider public value, could be a way forward as a focus for this consultation. It will be far easier to explain, both to customers and against the consultation criteria, what is different from this innovation incentive that should not be already incentivised. A similar approach, for innovations with export potential could operate, but the argument for customer funding is far weaker in these circumstances (financing export and growth sectors being a matter for the Government, and not specifically stated in the SPS). A pilot to explore this potential however could qualify.

One example of how our social purpose is driving innovation is our recent work with Baringa. Following their presentation on research into customer perceptions of water shortages at our innovation workshop we have been working together to create the potential to set standards and support for landlords and local housing authorities to help a segment of our customer population who use the most water with resource efficiency. We have found that this segment's engagement with central bodies and utility companies can be low. This could be due to a number of factors including poor quality rental accommodation and restrictive tenancy rights. This project is still in its infancy but is an example of the potential for multi-party collaboration on resource efficiency.

Addressing investment competition: We stated earlier, that one barrier to innovation is that investment in water industry solutions may not be as attractive as other industries. If funding is to be explored in isolation then an area to consider would be to review innovations that were technically very promising but which failed on commercial grounds. Specific financial support may be able to prevent this failure by matching investor funding to encourage investor support or by providing sufficient security (i.e. cash flow) to remove the reasons for commercial failure. An approach where rejected innovations in the sector, could be collectively reviewed and incentives to overcome the barriers identified. This again would allow for pilots. It would also be evidenced based – let all those who feel their innovations are neglected come forward and have a platform to explore why this is the case. If collectivisation does reduce risk as Ofwat state, the risk appetite or other barriers can be tested. This would identify barriers, and provide an incentive to resolve them, rather than assuming they exist.

Barriers to innovation will exist, it is just if we knew for certain what they were, or where they were, innovation itself would have avoided them. We maintain that the barrier to catchment management was regulation until companies and others piloted and demonstrated that it should be enabled. As an example of good water sector innovation to address a shared challenge which may not have a parallel in other sectors, there is an important point here that should not be neglected.

Q:7 Do you think the potential industry activities discussed in section four could help drive innovation? Are there other activities not identified which you think the industry should be considering?

We share our thoughts on the 3 areas of activity presented below:

Sector-wide strategy: Many organisations already provide centralised thought leadership to support a unified approach to problem solving (e.g. UKWIR, WRC, Institute of Water, British Water etc.). There will be a range of views on the degree to which this is effective, depending on your perspective. All have value with their remits, and a merger is both impractical and inappropriate. It is up to the industry, defined not as the sector Ofwat regulates, but including supply chain partners or professional bodies, as well as having roles in standards, rather than innovation necessarily. If a joint innovation strategy has value, and UKWIR has one already, then what problem is it Ofwat think needs to be solved? Whilst this may need to change, on its own it is unlikely to lead to the desired action without being coupled with another initiative such as the Centre of Excellence. Additionally, it may inadvertently miss the opportunity exploit local strengths that different regions hold e.g. Bristol is recognised as one of the UK's technology clusters and hence innovations with a technical focus would be well placed to occur from here

Centre of Excellence: We feel a model for a centralised centre of excellence could be a positive thing, but the question is why - where these have existed before internationally, they often do not thrive. And there are many existing academic and non-academic centres of excellence (CoE). Do Ofwat believe there should just be one, and why would that be within Ofwat's remit to determine (or for customers to finance)? This is because we are in a competitive global market for water innovations, which is active. In the UK, a number of existing bodies operate to support such work, including UKWIR. These aid central research and in some examples, applied research (e.g. WRCs work on meter testing or 'fine to flush' research).

However, a gap exists that supports innovators that are incentivised to bring the new solutions to market in a rapid fashion. A water industry accelerator could be considered as a centralised equivalent to the Bristol Water business incubator, the United Utilities innovation lab or WaterTAP (a publically funded accelerator in Canada. Note this closed operation earlier in the year). We have seen great benefit in operating a business incubator allowing us to adopt innovations where markets do not yet exist. Recent successes for us have be that we have developed a capability in robotic process automation (at the time, robotic process automation was not commercially viable for companies of our SME scale), we are trialling bespoke machine learning applications, we are trialling continuous (as opposed to static) pump efficiency monitoring with equipment not yet available on the market.

The consultation makes reference to the possibility of a CoE having incubation facilities. We would recommend instead that if a CoE approach were taken, that incubation activities be outsourced to the different water companies. The reason for this is to aid adoption. Where companies have been involved in trials and developments, employees have had to overcome the 'change curve' (i.e. increased their openness to a new solution / adjust corporate processes and systems to work with the new solution etc.) This therefore accelerates adoption but also builds credibility in the industry where a solution has been deployed by a utility as opposed to a centrally funded centre.

The question remains though whether it is Ofwat's role to decide this. There are academic and commercial organisations such as WRC who have centres of excellence for individual areas of water supply. It would be, as in other countries, a choice of public funding, or of private organisations (but note our earlier concern on competition rules), in order to develop a centre of excellence. Perhaps this is because water skills are rarely limited to the water sector, and those

that are (such as water quality compliance) are in areas of heavy regulation for good reason. Companies have every incentive to share expertise, and UKWIR have provided this service for many years, successfully. The water sector is diverse, we wonder if there will be a good way of defining what a centre of excellence should cover that is as wide as a water sector total innovation strategy.

We would suggest a cross-sector centre of excellence would be one option, and re-shaping the approach as a way of testing barriers for non-adopted or rejected innovations could also be of interest. In any case though, we are not sure whether customers are willing or should be expected to finance innovation in the absence of specific evidence, but a pilot could be worthwhile.

Greater Insights: We believe this is happening to good effect and is continuing to grow (e.g. Wessex market place, Anglian Water innovation network and shop window, United Utilities innovation Lab, Bristol Water's Workshop and the potential for social contract collaboration, Northumbrian Water innovation festival, Water UK Public Interest Commitments) so regulatory incentives are not required. It is the increasing complexity in the water economic regulation framework that is our main concern, and the increasing burden of regulation that we think is most likely to limit insight.

Q:8 Do you think the proposals in section five will help drive innovation? Are there other activities not identified which you think Ofwat should be considering?

We set out many of our views in response to other consultation questions. We would certainly encourage more dialogue on this topic, as a written consultation may not be the best way to reach a shared understanding of the problem.

Cross sector collaboration: Some cross sector collaboration on regulation may be beneficial for customers where issues do not exist in isolation particularly across energy-water-agriculture. By regulating on cross-industry issues, we may be able to offer better outcomes for our customers and environment e.g. hot water as an energy and water use issue. We have found that combining our efforts on resource efficiency messages with other companies such as energy and waste has benefit (our Resource West initiative) and it could be that regulatory incentives reflect that, particularly where joint innovations are pursued (so that we are clear on how money from water bills are shared with money from energy / waste bills in pursuit of a common goal)

Cross border collaboration: one potential avenue for encouraging a potential source for innovation and for preventing an inward looking framework is to encourage greater participation in cross-border projects and for Ofwat to increase its liaison with organisations outside the UK

One example of this approach is participation in the European Benchmarking Cooperation (EBC) project. The EBC is an industry-based, not-for-profit benchmarking exercise on costs, performance and asset base data. Bristol Water is participating in this benchmarking exercise for the fourth time during 2019. Collaboration is found via an annual workshop, 'knowledge picnics' and bilateral staff exchanges. UK participation has declined over time, and there could be a role for an innovation fund in the current climate to explore this potential for trade as well as water sector learning.

The annual workshop hosts rotate every year; the 2018 event was hosted in Athens, Greece by EYDAP (a water and sewerage company which serves 4.3m people with drinking water and 3.5m with sewerage services). There were a total of 68 attendees, including representatives from EurEau (the European federation of national water services), the European Investment Bank (EIB)

and ABF Research. The format of the workshop is plenary discussions with all attendees, followed by a number of breakout discussions on specific areas of the data and key topics of interest.

Attendance at the workshop allows for discussion of the factors which have impacted each company's performance during the year, as well as identification of other factors such as reporting approaches and operating circumstances. A number of workshop sessions are intended to identify areas of best practise and innovation used to improve performance. We have found involvement in these workshops to be useful learning and development exercises and added significant value to our understanding of our relative performance.

'Knowledge picnics' are either bilateral discussions or involve multiple participants on specific topics. The EBC act as facilitators at such events and assist in co-ordination and logistics. Bilateral staff exchanges meanwhile offer the opportunity to visit similar-sized companies. Such meetings help individuals and teams understand and learn best practises or new technologies employed by other companies.

Cross-sector collaboration linked to wider public value: our social contract will continue to provide a platform for new ideas and collaborations for innovation. A cross-sector approach, with innovation linked to wider public value, could be a way forward as a focus for this consultation and we would welcome further discussion and exploration of how this can be achieved.

Concluding point

We have raised a large number of issues with this consultation, but this should not in any way be considered a criticism of Ofwat for considering this. We have thought carefully about how to respond, as the concerns we raise, we hope, will prove to be misplaced. Whatever the outcome of the consultation, we will be keen to make it work in practice. It feels to us that the outcome is a major change to the direction of the regulation of the water sector, and there were some significant challenges that required careful consideration.. We are concerned that a full impact assessment may be required – given the risk that this proposal could be considered as a new form of taxation on water customers. Ofwat do not state whether an impact assessment is required in the consultation, or whether this has been considered. That is reasonable for this stage of consultation, but that may depend on the next steps that arise from the outcome. Given the National Audit Office's recent concerns that economic regulators have not been sufficiently robust in setting out the measurable outcomes for customers from their activities, and given the concerns that this is customer money being driven into a central pot, we think that a full impact assessment may be advisable in any case for this proposal. We provide an alternative which is within the existing regulatory framework that may help as an interim step in this direction, and also make a clear distinction to what cross-sector innovation (ie outside the water sector), that may also make the outcome clear enough so that we avoid many of the potential risks.

APPENDIX 2: PROGRESS AGAINST OUR INNOVATION FRAMEWORK

Our Innovation Framework ensures we put the right building blocks in place to steer and monitor innovation. It also ensures that we foster an innovative corporate culture from the ground up.

We steer and monitor innovation by:

- Maintaining clear priorities;
- Maintaining proactive awareness of innovative ideas by, for example:
 - Conducting market scouting against our technology needs assessments
 - Relationships with industry bodies such as UKWIR, membership on the GDF Suez Technical Committee
 - Utilising open innovation mechanisms and events
- Overcoming barriers to innovation; and
- Ensuring leadership oversight of progress.

Collectively, these activities help us identify where innovative solutions are required, to invite internal and external ideas and to pilot potential solutions.

We foster a culture of innovation through:

- Partnerships with research organisations, supply chain partners and academics;
- Ensuring that staff have the resources and support to convert innovation into action;
- A network of innovation champions;
- The sharing of our successes; and
- Embedding the customer voice throughout our business, so that innovation focus is responsive to their priorities.

A key part of the innovation framework is our Open Innovation program openly sharing key challenges with this wider ecosystem rather than limiting solution development to just our own research and development capabilities. Our Business Improvement and Innovation team facilitate the strategic focus on the future innovations we pursue through Open Innovation. Our Innovation Challenges (Figure 1) add focus to this process and reflect a combination of our four strategic objectives published in [Bristol Water... Clearly](#), and our Technology Needs. Our Technology Needs are assessed through a series of workshops with our asset management teams, to explore where we would most benefit from innovation.

Innovation exists in the big and small and it is therefore hard to define the limits of it. We use the Gartner Hype Cycle to assess our activities across the spectrum of 'maturity'. Early stage innovation costs are minimised by offering benefits in kind, collaborating with universities to deliver research projects and conducting pilots with growing start-ups. This approach is depicted in Figure 2.



Figure 1: Our innovation challenges

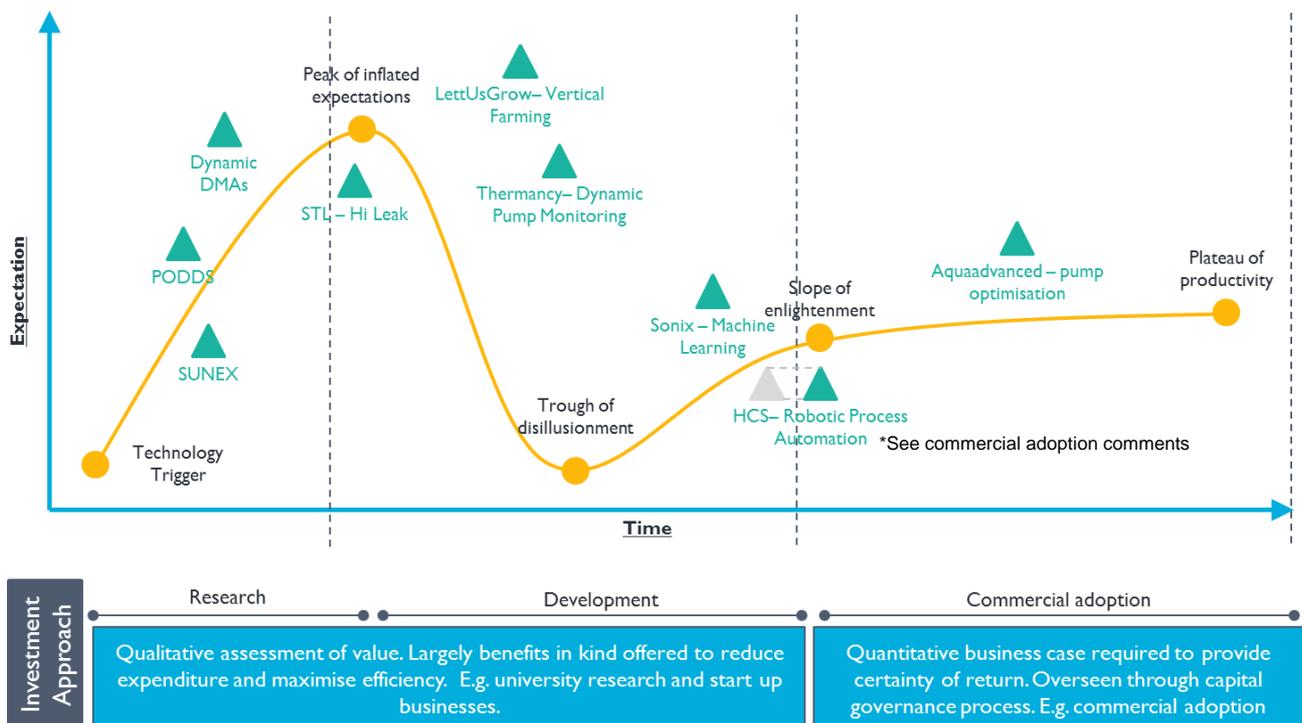


Figure 2: Gartner Hype Cycle - project mapping and our innovation investment approach

We have broken down our innovation activities into three areas: Research, development, and commercial adoption. These align to the Gartner Hype Cycle and give us a sense of the scale of our ambition, as well as allowing us to track progress against our innovation framework. Within each of these areas we can demonstrate good progress against activities, as well as new initiatives that are driving progress against our innovation challenges:

1. Research

We are working with universities to develop research and solutions to some of our key challenges. This work enables us to gather information at scale, gives us access to extra resource to carry out investigations and analysis, and helps us to grow our innovation partnerships in the community and beyond. At the early research phase we partner in a benefits in kind model. Finance is sought through the access to funding that universities have. This enables us to work on a wide range of projects that address challenges and targets, including: mains bursts, per capita consumption, customer contacts, and leakage.

Projects include:

- Dynamically Adaptive DMAs
- Prediction and Of Discolouration in Distribution Systems (PODDS)
- SUNEX project

The project of Dynamically Adaptive DMAs has been a long-term collaboration between Bristol Water, a technology company with extensive experience in pressure control (Cla-Val) and leading research-led university (Imperial College London).

A “field lab” operated by BW was implemented in 2012 to test the principles of adaptive networks. The “field lab” includes three dynamically adaptive DMAs, 7900 customer connections and 59km of mains. Optimised network connectivity and hydraulic conditions means we can better control pressure, reduce the risk of burst mains, reduce the risk of water quality incidents, as well as manage leakage.

Early achievements include the development of a new dynamic valve, capable of powering high pressure pipes using a small turbine (delivered with Cla-Val).

The next iteration of the field lab, that will include means to manage water quality in the hydraulic model, is being developed with Imperial College. Building on our initial achievements, the project has now gathered further involvement and input from other water companies including United Utilities and Anglian Water. We are seeing a strong pull from other companies in the industry, demonstrating the opportunity we have to make dynamically adaptive networks a widely adopted method. This outcome has been seen previously with other activities, including ice-pigging and water refill initiatives, which are now widely adopted across the industry following our early development work.

Benefit for University:

- live environment testing of products
- real data and information for analysis

Benefit for BW:

- Better understanding of network
- Free trialling of products
- Data and information for analysis
- Improvement in resilience for the field lab during major incidents
- Reduction in bursts
- Reduction in water quality discolouration complaints

We continue to work with Sheffield University on the "Prediction and Of Discolouration in Distribution Systems" project. The project uses operational and management techniques to minimise discolouration, rather than expensive re-lining options.

As the single biggest source of customer contacts related to drinking water quality, discolouration studies undertaken exclusively at the University of Sheffield has developed, validated and applied a novel conceptual approach to understand the causes. This has led to new operational and management strategies and has seen the development of the PODDS model for the Prediction and Of Discolouration in Distribution Systems.

The Chelvey to Portishead TM system was selected as BW's pilot scheme for PODDs trials as an alternative solution to a relining scheme.

The project has improved our resilience (increased options for transferring water between service zones, without causing discolouration issues and ultimately customer contacts), and we have achieved a 250% increase in the volume of (safely) transferable water from Chelvey northwards (into Portishead, Avonmouth and Pill zones).

Benefit for University:

- live environment testing
- real data and information for analysis

Benefit for BW:

- Resilience through options for transferring water between service zones,
- Achieved a 250% increase in the volume of (safely) transferable water from Chelvey northwards
- Improved water quality
- Cost savings over traditional rehabilitation methods

Further to these university engagements, we continue to encourage a reduction in water consumption, by combining resource efficiency messages to drive increased engagement, e.g. the nexus between energy and water.

The SUNEX project (Sustainable Urban Nexus) is a unique multi-disciplinary collaboration. A nexus assessment seeks to describe the interactions of water, food, energy, environmental and social systems to identify the interdependencies and trade-offs between these systems. The SUNEX project aims to provide a modelling framework to assess the FWE components addressing both supply and demand side. The applicability of SUNEX will be tested in 4 case study city-regions, namely Berlin, Bristol, Doha and Vienna..

The study aims to develop efficient solutions for the shared issues around energy, food and water. The ultimate goal is to provide efficient solutions and policy recommendations for sustainable development in urban regions.

This project enabled us access to a £50,000 research grant to aid progress in this area.

2. Development

Through our open innovation framework we are attracting start-ups at the forefront of some of the most pressing challenges we face as an industry. In general, we adopt a 'benefits in kind' model to ensure we maximise our innovation efficiency, in contrast to other models which take on the financial risk of this early phase in an innovation's development.

A key initiative this year has been establishing our business incubator, The Workshop, to support start-up businesses that provide solutions which address our innovation challenges. All innovation requires investment, but not all innovations are monetary, and this mechanism provides an effective route for the business to benefit from innovation whilst also contributing to our local economy. It is also an environment that enables failure a minimises penalty, where monetary investments inherently carry more risk and can thereby reduce the opportunity for exploration in pursuit of a return on investment for customers and shareholders.

This is a mechanism for us to make our business estate open to early stage innovators in order to accelerate the development and our adoption of their solutions. We incubate businesses that can support the innovation challenges published on our website. The business incubator is not something we do alone and have partnered with Business West, The West of England Growth Hub and Enterprise Europe Network in order to support us in attracting and supporting the most promising start-up businesses.

We run this initiative entirely in-house, where others have outsourced the expertise. The incubator exploits existing functions and capabilities so it can run at no additional cost, e.g. business mentoring from existing staff.

Our approach ensures that:

- Each relationship is assessed by the relevant SMEs from within the business and those deemed to be high potential receive a tailored service agreement.
- We can offer a range of benefits, including providing space, offering business advice and mentoring, and providing access to our physical and information assets to trial solutions.
- We can give further benefits to our incubated businesses, through local partnerships, and ensure that we remain attractive to new companies and their associated innovations.

The initiative began with Robotic Process Automation (RPA) to automate repetitive tasks across our business. We began working with Hackett Consulting Services (HCS) in 2018 through the incubator to solve the problem of how small-medium enterprises (SME) can benefit from this technology as it was only proving economically viable for much larger enterprises at the time. In developing the correct delivery model with HCS we have been able to adopt the technology ahead of the SME market and have undertaken 10 projects, covering areas including, leakage, streetworks, finance, customer, and networks. This has given us greater visibility of our processes, allowed us to be more proactive, given back valuable time to our employees to focus on more important work, and has avoided the need to recruit additional resource in some areas. As we have matured this function and proved the value of automation, we have been able to turn to developing

our own in-house capability. RPA has now shifted into the right side of the Gartner Hype Cycle (productivity) and we have entered commercial adoption of this technology. We have since begun working with another company - Sonix – to identify how artificial intelligence could enhance the journey we have achieved with HCS. Sonix have been onsite since April 2019, working with the Business Improvement and Innovation Team on potential applications for AI across the business – a pilot has been started within the control room to provide a decision support tool to staff.

Over the last 18 months we have grown the workshop further, with an event to attract more interest and find the latest innovators that could join Bristol Water. More information about the event can be seen in subsequent sections of this document. Throughout this Appendix we have included a ‘stamp’ to highlight where our innovation event has led to an innovation outcome for us – Figure 3.



Figure 3 – The Workshop innovation event, outcome stamp

Examples of our recent innovations from the incubator include:



- **Development of fault detection techniques.** Following our Innovation Event in April 2019, we successfully began working with STL Tech as part of the Incubator programme. STL Tech is a technology development company focused on supporting innovation in advanced engineering industries. They have been developing ‘HiLeak’, a low-cost system for continuous monitoring of above ground and buried water pipelines. The system will monitor the structural health of plastic pipelines. In August we successfully set up a test rig in Clevedon, comprising of a 6m section of above-ground pipe.



- **Machine learning** with Sonix – since the event, we have initiated a project working with local teams to develop machine learning techniques that can aid early identification of issues within the control room. The project will initially focus on the Alderley and Alverston area.



- A trial to deploy technology, not yet available on the market, to test **dynamic pump monitoring** (an approach not widely adopted in the industry) and reduce energy usage. We have identified a site and Thermancy (start-up) are developing their work plans. This is due to go-live at the end of September 2019.



- Support for **vertical farming solutions** that can dramatically reduce water consumption in comparison to tradition agriculture. We are now setting up training sessions for “working with water at scale”.

As with all innovation, we have also ‘failed fast’ on potential areas from the incubator, such as the use of algae in the water treatment process, and supporting the development of predictive maintenance solutions.

3. Commercial Adoption

We invest commercially in solutions when they are viable and they are taken through our financial governance process. This is a formalised process and is subject to scrutiny of directors and heads of. It ensures that we are investing in the right solutions, at the right price. An example of an innovative solution that has been through this process is the Network Optimisation programme -

Last year we began implementation on Aquaadvanced Energy, innovative software for pump optimisation to reduce energy expenditure. Our capital governance gateway process is shown in Figure 4.

As mentioned above, we have now entered commercial arrangements with HCS – this demonstrates the end to end journey, from early incubation and project maturity, to in-house capability and commercial adoption. This is a great example of how the Workshop programme is designed to grow innovation within Bristol Water.

Gateway Process (2019)

		Planning phases (Asset Mgmt)		Execution (Delivery Teams)				Operations	
		Design and Delivery Planning				Delivery and Handover			
Stage	Pre-programme / Inception	0 BUSINESS CASE for Investment	1 Outline Design and Delivery Planning	Detailed Design and Delivery Planning	Tender Report	2 Delivery	Handover	3 Closeout	4
Outcome	Prioritised list of risks from the Asset Risk Management Process is validated to ensure that the validated set of risks is considered for solutions development. Risk management strategy (capes/opes/ balance)	A number of options are identified that can meet the needs, informed by desktop surveys and high-level analysis. Feasibility assessment. Cost-benefit analysis will be undertaken of these options to determine the preferred solution.	This stage will involve the high-level functional and technical design of the project. Technical, geographic, and time constraints will be considered with any mitigating actions.	This will include detailed component design, and layout drawings. Selection of location, materials and construction methods. Opportunity for efficiencies to be identified through design, construction method and delivery route.	Outcome of procurement process. Evaluation of tenders and contractor proposals. Form of contract and consideration of changes to standard T&Cs. This gate may be combined with gates 2 or 3 depending on the procurement strategy for the project.	Selected deliveries construct the asset in conformance with all relevant standards and specifications. Then commissioning should take place and all relevant tests be passed. Relevant stakeholders briefed.	Review to assure project has been delivered to specification. All commissioning tests have been passed to satisfaction. Handover documentation complete and stored in specified manner. Operations accept new asset and training is completed. Reviews, discussion and decision on any anomalies occurring preventing delivery or handover.	Have outcomes been delivered. Ensure no contractual discrepancies for resolution. Lessons learned	
Analysis	<ul style="list-style-type: none"> Risk description and definition Risk evaluation and prioritisation Root cause analysis Recommended delivery route 	<ul style="list-style-type: none"> Business case Intervention objective/aim Options generation and evaluation Scope definition Requirements Statement of benefits Benefits plan for delivery and measurement Risk register Issue register Assumptions register Cost estimate Stakeholder engagement Design review and challenge log High level delivery schedule / Milestones 	<ul style="list-style-type: none"> Risk register Issues register Assumptions register Cost estimate Schedule / Milestone plan Resource plan Role and responsibilities Stakeholder engagement Design review and challenge log Change log Benefits plan 	<ul style="list-style-type: none"> Updated business case Project management / delivery plan Risk register CDM design risk assessment Issues register Assumptions register Scope definition Requirements Benefits plan Sensitivity analysis Schedule / Milestone plan Resource plan Cost plan / profile Roles and responsibilities Stakeholder engagement Design review and challenge log Change log 	<ul style="list-style-type: none"> Report on procurement activities and evaluation Report on contract T&Cs and changes to standard forms Recommended supplier(s) 	<ul style="list-style-type: none"> Commissioning report Performance test results 	<ul style="list-style-type: none"> Handover report Training Ops Manuals Lessons learned Follow-on action register 	<ul style="list-style-type: none"> Post project report Financial close out Lessons learned Benefits assessment Risk closure 	

Figure 4: Capital governance, gateway process

Underpinning our scale of ambition with innovation, and a key part of our innovation framework, is fostering a culture of innovation. We believe innovation and creative thinking is a mindset, it isn't always new technology or a new gadget. We encourage this across all our staff.

There are 3 areas of focus for us: Internal engagement, external collaboration and our supply chain.

- Internal engagement

We have high levels of engagement with innovation internally, with >20% of employees contributing to our Idea forum – Brainwaves – last year.

Brainwaves has been a long running success for us. It is the platform we use to transform many of our ideas into customer benefits. It is a forum for all employees to suggest ideas to make Bristol Water better - more efficient, more focused on our community, a safer environment to work in, a more engaged team, and a better place to work.

Brainwaves is run without constraint; ideas cover staff wellbeing, corporate social responsibility, asset optimisation, health and safety, and customer campaigns. Brainwaves rewards are focused

on calibre and intent of the idea, not just whether it is implemented. This ensures that we celebrate any attempt to improve our company.

In the 2018/19 period to date, Brainwaves received 166 ideas from 120 individuals. For a company of c. 500 people, this is a very high engagement level. This is also an increase on the 2017/18 period where we saw 122 ideas across the whole year.

We see ideas from all areas of the business, field and office staff alike. In previous years we have seen ideas ranging from simple solutions such as implementing different coloured lanyards for our first aiders, to complex ideas such as biobullet use at our treatment works to help control invasive zebra mussel species.

Brainwaves continues to provide a source of big and small innovations across every area of business. Examples of innovation recently mobilised from Brainwaves are:

- **Ultrasonic buoys.** This technology uses ultrasound on a floating buoy to minimise algae blooms on our slow sand filters. The buoys disrupt the algae in order to minimise their growth. The trials are continuing at Cheddar WTW with the ultrasonic unit. This is installed in a slow sand filter and its operation is being compared to a control filter and a covered filter. In our last update the trial results demonstrated that the ultrasonic device was providing a beneficial impact to the operation of the filter during an algal bloom. Recent results have enabled us to believe that the benefit of the ultrasonic unit is better realised when in partnership with a fully matured schmutzdecke ((active biological layer at the surface of the sand). We are continuing trials to better understand this relationship.
- **Tagging Meters** – to identify Bristol Water ownership and prevent unauthorised removal of internal meters. Our Metering team have designed and sourced a tamper resistant sticker for our internal plumbers to attach once a new meter has been installed. We recognised that there was an issue with private plumbers removing meters with no knowledge of who they belonged to. It is hoped, that this will, in the long run reduce unauthorised removals and the associated costs and inconvenience of installing a replacement both to BW and the customer.

Last year we ran our first Brainwaves event; to celebrate everyone who has been involved, either through submitting an idea, being part of the Awards Team, or supporting investigation and implementation of ideas. At our latest awards ceremony in April 2019, the Lord Mayor of Bristol presented the awards – this highlights the importance we place on employee ideas, and ensures the forum remains a prominent feature of our innovation agenda.

- **External collaboration**

As well as progress internally, we have driven external innovation engagement through our open innovation approach, and this has given us good links within the local innovation cluster - The city of Bristol is recognised as a leading technology and innovation cluster in the UK. Bristol Water operates as a pro-active member of this scene in order to access the plethora of innovations available locally that will enable our customer outcomes as well as support the company's social contract and contribution to the One City Plan.

Our recent open innovation event held in April 2019 brought together a range of stakeholders across the Bristol innovation cluster for a day of collaboration. This included talks, workshops and networking to formally launch our business incubator (Figure 5).



Figure 5: The Workshop Innovation Event



One output from the working sessions at the event is that we are now working with Baringa Partners to research and explore how to get resource efficiency and vulnerable support services to the 20-35 age generations and how we engage with landlords in order to support this process.

This rationale for this project reflects the significant challenge which future citizens face in housing – in particular for the next generation who may not own their own home. Vulnerability moves from water affordability, towards time and place. If you are renting rather than owning your own home, it is harder to make your lifestyle resource efficient – you may not be able to change your use of water and energy. The outputs from our Youth Board confirm that this is a new area of vulnerability that requires further exploration, beyond the traditional areas considered “hard to reach” where support is currently targeted.

The innovation event itself was centred around our business incubator and as a result of the interest we have driven to the incubator, through the event, we are mobilising a number of projects. These include machine learning, dynamic pump monitoring and vertical farming solutions. These are detailed in the development section of this Appendix.

As well as the innovation event and the business incubator, we continue to further drive engagement with our innovation challenges, to source new solutions. We recently undertook a series of interviews with external experts to challenge us on where the industry should head and what the next generation of innovation might look like. We published this as a [podcast series](#) to share the insights and promote engagement with our innovation challenges.



In the first episode of our podcast we spoke with two innovation pioneers, David Ferguson, Head of Digital Innovation at EDF and Jack Lomas, Head of Product at Mott Macdonald Ventures. This was recorded at our inaugural innovation event earlier this year, where both speakers held talks.

The discussion explores many exciting topics including, methods for promoting innovation, prioritising ideas, how innovation can be funded and how to create a positive culture of innovation.

The series is aligned to our innovation challenges, with discussions across the podcast series such as: pursuing efficiency with technology, water treatment and water supply networks.

- Our supply chain

Across our supply chain, this year we have implemented a number of new contracts. In undertaking these, we have taken ensured that they maximise innovation beyond what we may have achieved alone. The table below highlights examples of how innovation is encouraged across them.

Area	Innovation mechanism
Information Services	<p>The contract with Wipro operates a co-innovation framework that allows access to an ‘ecosystem’ of innovation beyond the reach of Bristol Water, for example:</p> <ul style="list-style-type: none"> • Annual BW Leadership visits to Wipro Digital PODs/Innovation Centres. • Use Wipro’s Crowdsourcing platform (Topcoder) for faster & cost effective POCs delivery • Access to Wipro’s Partnerships, Start-ups and Alliances (e.g. Wipro Ventures) • An innovation fund of £20k per year to trial new technologies
Network Maintenance	<p>The new Network Maintenance contracts have been designed with innovation as an intrinsic quality:</p> <ul style="list-style-type: none"> • The suppliers were assessed and selected upon their approach and experience in delivering innovation and improvements • The suppliers are incentivised to outperform by a reward / penalty mechanism that support systems thinking and links to our ODIs • The contract operates a target cost mechanism incentivising contractors to innovate because they share the risk of developing the innovation with us but can benefit if actual costs are reduced through its use • Bristol Water retains in house control of design phases and our design teams benefit from membership to market scouting services such as the Technology Approval Group and our Open Innovation Program which explores new and emerging solutions. • We have setup up Early Contractor Involvement mechanisms whereby we benefit from their knowledge of innovation elsewhere in the industry.

Our Innovation framework is a live example of our approach to systems thinking. It ensures that we manage innovation holistically across internal boundaries, company boundaries and industry boundaries, in order to drive new ways of working. It recognises that innovation does not happen in an industry bubble but in a much larger collaborative ecosystem of academics, entrepreneurs, internal innovators and through our supply chain. Our innovation approach starts with people and culture, and goes outside the water sector.