

OFWAT'S EMERGING
STRATEGY: DRIVING
TRANSFORMATIONAL
INNOVATION IN THE
SECTOR – AECOM
Response

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Quality information

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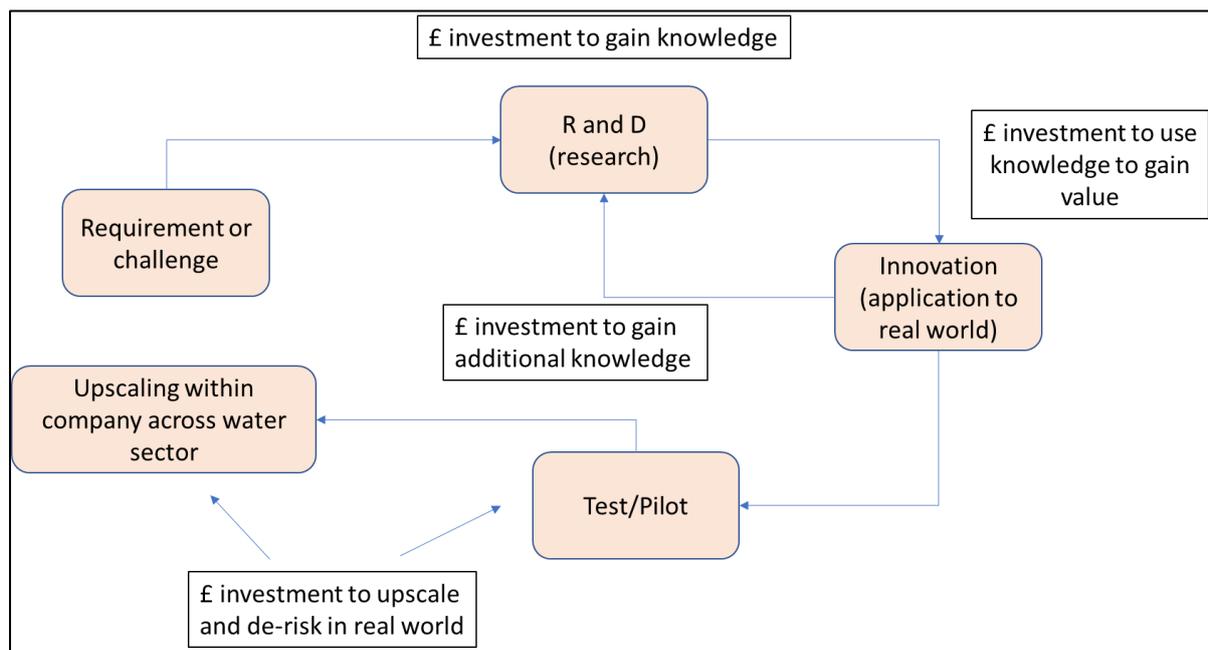
Introduction

The following responses have been collated from across water and innovation specialists in the AECOM UK&I Civil Infrastructure and Environment businesses. They reflect the views of the individuals who responded, based on their experiences in the water industry and national innovation programmes in a range of sectors, and not necessarily AECOM as a whole. We would be happy to provide additional detail or context where necessary. We would appreciate the opportunity to contribute further as the strategy develops. The response is laid out in the order of the 8 questions raised in the Ofwat consultation document "Ofwat's emerging strategy: Driving transformational innovation in the sector".

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

We believe there are a number of different and often interconnected barriers to innovation in the water sector. These are outlined below:

1. Innovation not generally occurring where Benefit Cost Ratio (BCR) is unattractive within the regulatory cycle, due to either:
 - Risks to realising benefits within regulatory cycle are too great, usually as benefits realisation is reliant on third party action(s)
 - The business models of regulated companies do not allow expenditure where there may be failure. The concept of allowable failure is completely unacceptable.
 - Attractive BCR falls outside the time frame of the current AMP
 - Insufficient financial benefits to justify cost which are accrued by other water companies
 - Economic benefits of innovation not being adequately reflected in the settlement
2. There are limited contractual ways to get innovation into and measured in KPI's. Both in terms of companies to Ofwat and the supply chain to companies, as a part of the supply chain.
3. To roll out an innovation on the system may require significant changes to: the specification (even an innovative solution has to meet some specification); methods (it will need to be installed and configured in a consistent way) and procedures (application has to be identified in such a way that it doesn't affect KPIs) and this is not only a cost, but regulated businesses seldom have the extra specialist resource available to rapidly implement the required changes.
4. There is a lack of understanding of the difference between R&D and Innovation (both the companies and Ofwat).
 - For clarity, we define R&D as spending money to gain knowledge and innovation is using knowledge to gain value.



5. The current economic approach to regulation by Ofwat with stretching performance outcomes with rewards and penalties is not conducive to the companies delivering innovation as it drives the wrong cultural response. The response by the companies after each AMP determination is to reduce costs without increasing risk and the path of least resistance has been to squeeze the supply chain and increase financial leverage rather than think of new ways of delivering because the penalties for failure are financial. Innovation has positive outcomes but sometimes outcomes are negative or make no material difference. With some outcomes being linked to innovation, innovation will not succeed. Innovation needs a degree of freedom to thrive.
6. The conflict here is Ofwat as a financial regulator wishes companies to collaborate more, but also needs them to compete against each other whilst looking for opportunities to introduce competition into the market.
7. The companies do not have a clear idea of what problems that they want solutions for and are unable to articulate it to the supply chain.
8. You cannot tell someone to be innovative, it is a cultural approach that needs wide support and is to be embraced. This needs to be achieved via stakeholder engagement and be an integral part of the periodic review process.
9. Water companies in the broadest sense have very little experience of what innovation looks like. It is often siloed in innovation teams, who deliver projects that are not requested or wanted by operators or asset owners. This approach covers off the commitment to innovation activity but is not integral to the operation of the business.
10. Many skills and activities have been outsourced to the supply chain and there is a lack of skills and capacity in many of the companies to accomplish many projects, evaluate proposals or to manage trials etc.
11. Our perception is that there is a general lack of openness both inter and intra water company
12. There are insufficient small innovations undertaken to allow any failure, which makes disruptive innovation far too scary to contemplate.
13. Innovation funds need to be ring fenced from overly influencing outcomes – the risk needs to be recognised and shared. There needs to be some innovation in the regulatory approach. For the needed step change, the investment is needed but price pressures have meant that most traditional R&D departments have been radically downsized or lost entirely.

Q:2 Do you think that the financial support cited in section three is required to stimulate innovation in the sector?

Yes

If so, what do you believe is the appropriate amount of funding and why?

Appropriate amount of funding would be in the range of £200M based on:

- a trajectory of UK R&D investment of circa 1.67% in 2016 and an Industrial Strategy target of 2.4% by 2027
- a low rate of R&D investment in operators

Outline calculation below shows £200M is low as calculation is £245M based on estimated turnover. However, we would suggest OFWAT consider other sources of funding such as universities and the water companies own private funds – which (presumably) the regulator *should* be seeking to encourage.

Year	Target Proportion of GDP	Assumes proportion of operator to total (0.3% vs. 1.69%)	Target proportion, % turnover	Estimated turnover	Target annual funding	Target 2020-2025 fund
2016	1.69	17.75%	0.30%	11,812,000,000	35,436,000.00	
2017	1.75	17.75%	0.31%	12,048,240,000	37,525,179.99	
2018	1.82	17.75%	0.32%	12,289,204,800	39,683,752.78	
2019	1.88	17.75%	0.33%	12,534,988,896	41,913,658.41	
2020	1.95	17.75%	0.35%	12,785,688,674	44,216,886.76	
2021	2.01	17.75%	0.36%	13,041,402,447	46,595,478.78	
2022	2.08	17.75%	0.37%	13,302,230,496	49,051,527.73	245,655,712
2023	2.14	17.75%	0.38%	13,568,275,106	51,587,180.45	
2024	2.21	17.75%	0.39%	13,839,640,608	54,204,638.66	
2025	2.27	17.75%	0.40%	14,116,433,421	56,906,160.33	
2026	2.34	17.75%	0.41%	14,398,762,089	59,694,061.01	
2027	2.40	17.75%	0.43%	14,686,737,331	62,570,715.26	

These figures are based on the following benchmarks:

The BIS report in 2015, titled *What is the relationship between public and private investment in R&D?* which states the following:

'Total R&D expenditure as percentage of GDP in the UK represented 1.6% in 2012. This is slightly below the EU average at 2.1% and less than some notable peers such as Germany or the US, at 2.9% and 2.8% respectively.

The European Commission, as part of its strategy for economic growth – Europa 2020 – has set a 3% objective for R&D intensity.'

The Rail Sector Deal (2018) states the following:

The government wants the UK to be the world's most innovative economy and through the Industrial Strategy has committed to reaching the target of 2.4% of GDP investment in R&D by 2027 (Ref: BEIS, 2018). Total R&D expenditure in the UK in 2016 represented 1.67% of GDP, below the European Union (EU- 28) provisional estimate of 2.03% (Ref: ONS, 2016).

The above R&D intensity may be further sub-divided into different types. For instance, transport has the following range (Wiesenthal et al, 2015):

- Manufacturing: 3.5-6.5%
- Transport service providers: 0.3%

- Construction: 0.3%

References

Department for Business, Energy & Industrial Strategy, The Allocation of Funding for Research and Development (July 2018) assets.

publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/731507/research-innovation-funding-allocation-2017-2021.pdf

ONS, Gross domestic expenditure on research and development, UK: 2016

www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/ukgrossdomesticexpenditureonresearchanddevelopment/2016

Wiesenthal et al, 2015, Innovation in the European transport sector: A review, Transport Policy Vol.42 (2015) pp.86–93.

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

Yes, to a point. However, the effectiveness of such schemes depend greatly on the management of programmes. The detail of the processes implemented will determine whether it will safeguard the interest of customers. The draft principles will generally be enhanced if coupled with training, consultancy, and other complementary support measures to help develop the necessary cultural shift.

A key risk is that processes could be skewed in favour of the water companies or external vendors. Either way could potentially harm the effectiveness of the process. Consideration of how to prevent funding a third party dominant position in the market developing is needed. To mitigate against this, there would need to be:

- Ofgem has mitigated the skew towards companies by having a requirement for demonstrating the benefit to UK plc as a whole in proposals.
- Active SME/ University engagement from within sector and outside sector to stimulate and gather the innovative proposals.
 - University engagement is more important for early TRL (Technology Readiness Levels), and an industry body for higher TRL projects based on our experience.
 - The engagement needs to be managed by a suitably funded resource.
- Assessment by a truly independent panel of experts.
- Targeted incentives for water companies to partner in trials at scale. This may not be an issue, but relies on the right innovations being funded.
- Development of alternative commercial models to facilitate efficient roll out, where the innovative solutions proved successful at trial stage. This should be assessed by experts at the application stage and be a requirement for an innovation to move forward.

Q:4 What are your views on the collectively funded innovation competition model which we describe in section three?

Appears to be a sensible way forward, but need to consider the finer details, listed below.

What other key considerations not highlighted should we take into account in designing/ implementing the competition?

1. Consider partitioning the funding pot to reduce potential bias or skewing of investment through segmentation such as:
 - Split between regional opportunities and national schemes
 - Implementable in either short or long timeframes
 - Split between enabler projects, innovation projects and first of a kind. Ofgem's approach of allowing self-governance for smaller enabler projects should be considered by Ofwat, but the required level of governance should be clearly defined..
 - Targeted competitions around specific themes vs. 'always open' competitions. The risk to having themes is that real game changing ideas are inadvertently blocked.
 - The 'always open' competitions should be partially constrained by a list of sector wide challenge statements.
 - Minimum funding level for all water companies to provide base incentive for them to build internal capability, e.g. Innovation Manager, to respond to innovation competitions (if this funding route is chosen).
2. The companies should be required to collaborate where projects have adjacencies or where it is part of a larger programme. This should be managed by an overarching industry body.
3. The process will need to be regularly independently reviewed to potentially adjust the process to remove any bias or skews that are identified. It is highly unlikely that even with the best of intentions that it will work as intended from the start.
4. The system will need to be adjusted as the level of innovation maturity increases across the sector – as has been seen in the energy sector innovation development.
5. Do Water companies currently have incentive/ capability/ capacity to develop innovation proposals? Evidence from other sectors suggests that an innovation fund will facilitate funded roles and critical mass of innovation within member organisations. Without this cultural change is not possible.
6. Perhaps the Ofwat funding for Innovation should be managed centrally for the industry by an enhanced UKWIR. To generate a step change in investment across the industry as a whole and not by individual companies.
7. How would Intellectual Property be handled? We feel that there is some innovation potential in this space, but the current approach to distinguish between the ownership of foreground and background IP is a good start.
8. We would reiterate the need for as much data as possible to be open and is more important than the IP position.
9. Need to be clear where unspent money would go to – this is a huge potential incentive.
10. Governance process required to set up each competition needs to be established. If this is a regulated matter, then appropriate governance would need to be established and maintained.
11. Need to be clear about the interaction between funding and state aid implications.
12. Competition strategy, i.e. random, or structured around specific asset areas/ challenges?
13. The fundamental reason for driving innovation is to drive benefits to the customers, how will Ofwat and the companies sell the proposed bill increase to customers?

14. Many innovations will have benefits wider than the purely financial benefit – social, environmental etc. How could the process incentivise these wider benefits, which are important to customers?
 - Ofwat should embed customer representation into the expert panel that assesses the innovation proposals, in a similar way to Ofgem.
15. There is insufficient mention of people and culture, without careful thought on the structure of the process the right behaviours will not be developed in the industry. The process could be gamed by the companies to make maximum reward for the lowest effort and the impact of this needs to be mitigated. The funding needs to be sufficient to be attractive but not too large to allow poorly thought through ideas to be submitted or funded.

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?

Key considerations include:

1. This could create unintended outcomes, such as, lack of appetite to spend much of the £200M in preference for accumulating a larger pot for roll-out reward.
2. Portfolio rewards will tend to over emphasis success and hide or downplay failures which will limit the wider learning from failures that may mean repeated investment down a dead-end innovation path.
3. Assessment of Water Companies internal governance processes to ensure there are no significant process issues which would adversely affect Water Company behaviour, e.g. only submitting application for schemes which met certain shareholder criteria.
4. Assessment of existing proven governance system, since a suitable governance system could become so robust, it also causes other intended outcomes.
5. When assessing benefits, it may be useful to consider the export growth from suppliers who can increase exports as a result of having solid demonstrator projects in the UK.
6. The end of period roll-out reward will be better in the longer term when the companies and Ofwat have a higher level of innovation maturity than they currently have.
7. The reward mechanism could be split into different categories depending on how the companies decide to focus their innovation efforts. We already see that the companies have different approaches, especially between the larger WASCs (who have innovation and R&D teams) and the smaller WOCs (who act more as facilitators for 3rd party innovations) For example the reward could be split between implementation and scale up type approaches.
8. Ofwat has a role but innovation needs specific leadership\oversight as it needs to address effectively technological, social and environmental challenges. The financial aspects are just one element so Ofwat cannot influence and develop innovation through finance levers alone. It could become a big stick approach. Ofwat needs to take a creative approach as innovation does not always work. Not all innovation failures should be penalised. Failures (in the right circumstances) needs to be equally rewarded.

Q:6 What other potential alternative mechanisms for funding/ rewarding innovation not discussed do you think we should be considering?

The roll out reward could be used to subsidise the roll out of innovative solutions that offer attractive BCRs, but would be precluded from PR24 due to either:

- Risks to realising benefits within settlement term are too great, usually as benefits realisation is reliant on third party action(s)
- Attractive BCR falls outside the time frame of the current settlement
- Insufficient financial benefits to justify cost are accrued by other water companies
- Economic benefits of innovation not being adequately reflected in the settlement

Which financial support mechanism or combination of mechanisms should we introduce and why?

There should be a blend of support mechanisms to align with existing support mechanisms covering both:

- supply (influencing innovation generation) and
- demand (influencing those requesting, buying or applying innovations).

In addition to providing subsidies for R&D, consideration should be given to other mechanisms such as the wider R&D tax credit system, and credit guarantee schemes.

What would be an appropriate split of available funding/ reward?

We would envisage appropriate ranges to be:

- Direct funding: 60-85%
- Additional support mechanisms: 5-15%
- Reward: 10-25%

Q:7 Do you think the potential industry activities discussed in section four could help drive innovation?

Yes. However, there needs to be careful coordination with existing establishments to optimise resources. Specifically, we believe that the facilities to trial, test and scale innovations may duplicate existing facilities at universities and other establishments which have developed to service this need post-privatisation. How would this align with UK Water Industry Research and British Water? This could go against government policy of maximising private sector R&D funding and activity.

Having a single centre of excellence is counter-productive – innovation is most effective when everyone is engaged. If there is a single centre of excellence it stops everyone thinking that they are responsible for innovation. It would make it harder to build the necessary culture within the companies that do not host the centre. There is no limitation on where good ideas can come from. Each company should be the centre of excellence for part of the water cycle. The centre of excellence should therefore be virtual or distributed, acting as a coordinating hub. Where new facilities are needed these could be constructed at a single location.

The final process should be more specific about the challenges and problems that need solving. Data and information is just one component of this. While it may be a current hot topic and a high potential area for innovation, it is no more or less important than other areas of potential innovation – such as leakage or pollution.

Are there other activities not identified which you think the industry should be considering?

These would include improvements to:

- Client's ability to procure innovative solutions, through building capability and the selective use of novel procurement routes.
- Regulation and standards
- Skills development
- System-wide capabilities, such as the ability to collaborate across the sector. Specifically, around the handling of Intellectual Property.
- There's no mention of people in the joint innovation strategy – who are central to the whole process and necessary for it to be successful.

In addition to the sector innovation strategy, individual companies should be developing and maintaining their individual innovation strategies which encourage innovation in areas that are more appropriate being progressed at an organisational level. This may include:

- Specific back office processes peculiar to one particular organisation.
- Specific innovations that require rapid development and implementation to meet an emerging issue peculiar to one particular organisation.
- Specific innovations that require collaboration with supply chain partners that fall outside the criteria of the Innovation Scheme, examples would include geotechnical innovation that supply chain partners would then go on to use in other markets.

Q:8 Do you think the proposals in section five will help drive innovation?

Yes

Are there other activities not identified which you think Ofwat should be considering?

Consider gaining a Sector Deal between industry and government to help align actions galvanised focus. At the very least, it would be useful to review existing Sector Deals which are pertinent to Water, e.g. Construction to ensure alignment and make best use of all funding available.

We feel that there are lessons to be learnt from the UK Rail Industry's experience with innovation over the past 10 years. While the privatised rail franchising model has provided significant benefits, the UK rail industry has lagged behind other; railways, transport modes and industries, all of which are investing considerably more in innovation. To address this, the FutureRailway programme was initiated in 2013.

The Futurerailway programme is in the process of winding down with activities transferred to other parts of the rail industry. However, AECOM have a number of staff who worked in the programme either in leadership capacities or as part of the supply chain and so have gained working knowledge of these types of national programmes. We would be happy to meet to discuss insights gained in further detail.

The FutureRailway Programme offers support to practical cross-industry demonstrator projects; taking concepts to trial, but also seeking out innovative ideas and proposals from across the industry and other sectors. The FutureRailway Programme develops innovation competitions that are part public funded and matched by the private sector. The level of private sector matched funding reflects the likely short to medium term benefit that the private sector would gain from exploiting the Intellectual Property gained through the Innovation Project and subsequent commercialisation of the technology. Many of the technologies developed have been successfully commercialised in the UK and overseas.

In terms of where The FutureRailway Programme sat within the UK rail industry, the Railway Safety and Standards Board (RSSB) was felt to be the most appropriate. RSSB brings together members from across the mainline railway to support shared decisions, products and services with the aim of driving out unnecessary cost, improving business and safety performance and developing long-term strategy.

While RSSB had an existing R&D programme, the FutureRailway programme sits as a distinctly separate entity with separate reporting lines and financial accountability. The interaction between the existing R&D programme and the FutureRailway programme needs to be carefully managed to ensure effective use of funds. Essentially the R&D programme provides 100% funding to the supply chain with paper-based outputs (publicly available reports) detailing the findings of research and development in a variety of areas. These outputs are used in several ways, for instance:

- Influencing public policy rail policy
- Acting as a catalyst for wholly privately funded innovations.
- Used by the FutureRailway programme to develop the specifications for innovation competitions.

The use of the R&D outputs by the FutureRailway programme was critical as it ensured that public funding was used in the most effective manner and focusing on those areas of the industry where the private sector was not already innovating. These were generally in areas where the pay back was long term or where the costs of innovation were to be met by one entity and the benefits accruing with another entity.

The separation of governance was also key to allow the FutureRailway programme to develop innovations that although provided long term benefits, would present shorter term disruption to the established supply chain. Such disruptive innovation is unlikely to be developed under conventional industry R&D programmes, partly due to stakeholder pressure from the existing supply chain.

We see that an expanded UKWIR could provide a similar service in the Water sector as RSSB in the Rail sector.

We expect that as innovation in the water sector matures over time due to the proposals in the consultation the proposed innovations will become more complex. For example water innovations could have mutual benefits for

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SECTOR

the energy, agriculture and industrial sectors. How these innovations can be supported and encouraged needs to be considered.

