



National Infrastructure Commission's second National Infrastructure Assessment

Thames Water submission, February 2022

Questions 3, 4, 6, 8, 11, 12, 15, 16 and 17 have deliberately been left unanswered.

1. Do the nine challenges identified by the Commission cover the most pressing issues that economic infrastructure will face over the next 30 years? If not, what other challenges should the Commission consider?

We welcome the Commission's recognition of the particular challenge posed by the increasing risk of surface water flooding, and the impact of climate change on approaches to asset management.

We recognise that the need to address challenges spanning the range of sectors on which the Commission is active constrains the number that can be included in the National Infrastructure Assessment. While the first National Infrastructure Assessment and the NIC's *Preparing for a drier future* clearly set out the need for action to improve the resilience of water supplies, we are disappointed not to see any reference to water supply in the challenges, given its fundamental role in underpinning the health and wellbeing of society and operation of all other infrastructure and the economy more broadly.

The recent publication of the first regional water resources plans sets out the scale of the challenge in the south east, with a potential 1 billion litre per day shortfall in water supplies within the next 15 years, rising to up to 2.6 billion litres per day by 2060. Water Resources in the South East has identified that the combination of climate change, population growth, the need to provide higher levels of protection to the water environment and increasing the resilience of the region's supplies to drought could require a long-term programme of investment of around £8 billion to avoid a shortfall in supplies. This could rise to £17 billion by 2060.

2. What changes to funding policy help address the Commission's nine challenges and what evidence is there to support this? Your response can cover any number of the Commission's challenges.

The Government Strategic Policy Statement (SPS) sets out the need for the sector to improve environmental performance and customer service, which we support. Three of the Commission's challenges are directly relevant to the achievement of these goals, i.e:

- Good asset management will be crucial as the effects of climate change increase
- Action is needed to improve surface water management as flood risk increases
- The waste sector must support the move to a circular economy

The actions needed to realise these ambitions and challenges will require sustained, high levels of investment that require changes to funding policy if they are to be successfully addressed. In particular we suggest that the following need to be considered:

- Incentives inherent in the water industry price control to minimise expenditure
- The way large, complex projects are regulated and financed
- The focus on minimising average bills for customers

Incentives inherent in the water industry price control to minimise expenditure

In the last price control for water (PR19) there were a number of features that encouraged companies to submit a business plan with the lowest level of expenditure possible for the next five years:

- In the Initial Assessment of Plans it was important to match expenditure levels to Ofwat's view of efficient totex.
- The bulk of expenditure was modelled based on past expenditure and with undue weight placed on the performance of the lowest spending companies.
- Incentives rates encouraged companies to underspend their allowances.
- Evidential hurdle levels for enhancement and cost adjustment claims were set very high.

These features have been established to encourage cost efficiency, which is a critical success factor. However, the impact is to minimise expenditure, which is not the same as cost efficiency or even least whole life cost. At a time of significant challenge from climate change, population growth and ageing assets this risks being counter-productive. It is unlikely that the industry replacement rates of 0.2% for sewers and 0.6% for water mains per annum (implying it will take 500 years and 167 years respectively to replace existing assets) are sustainable, yet this is broadly the level across the whole industry, suggesting it is the result of the incentives inherent in the regulatory framework.

A number of features should be recognised in the funding framework for PR24:

- Past levels of capital maintenance may not provide good indicators of future need given the demands of climate change and need for increased resilience and improved environmental outcomes.
- Expenditure for which there is clear customer support or need should be supported by Ofwat – for example, the desire to reach operational net zero carbon by 2030 ahead of the Government’s minimum timescale.
- Recognition that new ways of working to achieve better environmental outcomes, for example through nature-based solutions, may be more expensive and/or less certain to deliver the expected outcome than traditional approaches.

There is a big opportunity to consider new approaches for capital maintenance, which we consider should be assessed separately to complement the botex approach. This is not a new topic, and a 2003 paper published by UKWIR stated:

“There is a need to consider the impact of differences between future and historical periods in estimating future capital maintenance needs, with particular regard to historical investment cycles and the requirements of large or unusual assets; the structure of this analysis is not well defined, and yet is critical if future service problems are to be averted”.

We recognise it is not a simple job to resolve but with the increased focus on the longer-term and resilience, now is the time to devote significant effort to progressing this issue, which is of critical importance to customers. Separate modelling would help deal with the issue of ‘lumpy’ or uneven capital maintenance spend and for tipping points that might come from, for example, climate change or the cumulative impact of population growth and development.

There are also some features of the proposed PR24 cost assessment framework that will not enable the progress that is needed. For example, cost adjustment claims are an important element of any cost assessment process as econometric models cannot accommodate all areas of company-specific costs. In PR19 the materiality and evidential hurdle was already very high, and in PR24 this appears to be even higher through the requirement for symmetrical adjustments that will ensure industry botex does not exceed the modelled amount. This is important because companies need to be properly funded if they are to provide the investment needed to improve services for customers, communities and the environment.

In addition, bearing down on the allowed cost of equity will not support investment nor provide financial resilience, which is essential if large sums of capital need to be raised. Economic regulation is fundamentally about the allocation of risk and return. It is right that Ofwat should seek to allocate risk to whoever is best placed to manage it, as this will incentivise the most efficient solution. But it is imperative that Ofwat’s price controls allow investors a reasonable return, which appropriately compensates them for the risk that they will bear. The effects of too low a cost of capital will be negative for everyone and perhaps mostly for customers, communities and the environment as – over time – investors will place their money elsewhere. The current scale and nature of the investment the sector requires to meet future challenges makes this especially undesirable. It is worth noting that Thames Water’s current shareholders have not taken an external dividend for four years.

In the CMA water redeterminations, the CMA addressed this issue through “aiming-up” in part to encourage investment. It is important that the next water industry price review (PR24) and future reviews provide a suitable cost of capital that reflects the need for substantial investment across the industry.

The way large, complex projects are regulated and financed

The government has called on industry and Ofwat to explore the “full-range of market-based tools” to finance large projects. At present for large projects in the water industry companies have to consider whether the project is suitable for Direct Procurement for Customers (DPC) or in exceptional cases Water Industry (Specified Infrastructure Projects) Regulations (SIPR).

Ofwat have made some proposals to make DPC more attractive for incumbent investors and we support changes to SIPR to reduce the threshold and allow more large and complex projects to have their own licence, similar to Thames Tideway Tunnel. However, we are concerned that the current arrangements may not be sufficient for these projects that are ‘lumpy’, complex and high-cost. The allocation of cost and risk needs serious consideration and while Ofwat can only consider the allocation of risk between customers and companies, there is also a taxpayer dimension. For the very large and complex projects it may be appropriate that some of the risk and/or cost is borne by the taxpayers, as was the case for the Thames Tideway Tunnel.

We have been giving the approach further consideration with consultants Economic Insight. Economic Insight’s analysis suggests two potential approaches that are not mutually exclusive:

- A phased price control model; or
- An integrated open competition model

In the phased price control model, the incumbent remains responsible for identifying needs and options; design; construction; and operation. However, the ‘asset’ in question is subject to a separate price control (and, optionally, separate

price controls may apply to each 'phase' – i.e. construction; operation etc). Under this option, overall risk is mitigated by setting overall 'limits' on the rate of return that can be earned (both minimum and maximum thresholds).

In the integrated open competition model, a single competition is run in relation to the design; build; and operation of the assets (including financing costs). Overall risk is limited through the application of 'equity tramlines' (an enhanced 'fair bet' framework), whereby the 'winner' of the competition initially levies prices in line with their tender – but if returns fall outside of the agreed tramlines, prices can be adjusted up or down (but only sufficient to return within the tramlines). Companies may adjust prices voluntarily where this occurs; or, if not, face the threat that Ofwat may mandate they do so. Approaches similar to this in wholesale fixed telecoms provided the clarity on the expected return that allowed BT to plan to make upwards of £15bn investment in new fibre networks by 2026. We would be happy to share a copy of Economic Insight's report with the NIC, if helpful.

The focus on minimising average bills for customers

In recent price reviews there has been a strong desire to maintain low average bills for affordability purposes. If this approach continues it will place a significant constraint on the ability of companies to propose investment levels that would be affordable using these criteria and place a considerable constraint on Ofwat's ability to support plans that would meet government's aims and the service levels our customers support. We believe it is now time to look at how costs can be recovered in a more progressive way, focusing on the financially vulnerable rather than the average bill payer, and considering more innovative charging structures. In the meantime, we will continue to offer a social tariff that reduces a £400 bill by up to half for those in greatest need.

With the increase in availability of smart meter data there is an opportunity to better understand water consumption and enable the introduction of more progressive tariffs while those in vulnerable circumstances are protected. This would support the substantial investment needed in the future to provide climate change resilience and improve river quality. The National Infrastructure Commission's own analysis suggests that £21bn of new investment would be required to address the supply demand imbalance in water resources. More recently, there has been significant focus on the need to invest to improve river quality, including through reducing water abstraction and reducing the harm from combined sewer overflows. In addition, Water UK has estimated that achieving Net Zero suggests some £2-4bn of investment will also be required. Existing tariffs would require the most vulnerable in society to fund an unacceptably large proportion of these costs.

5. What are the main opportunities in terms of governance, policy, regulation and market mechanisms that may help solve any of the Commission's nine challenges for the Next Assessment? What are the main barriers? Your response can cover any number of the Commission's challenges.

We see a number of opportunities to address the Commission's challenges in relation to, first, improving surface water management as flood risk increases and, second, good asset management to address the increasing impacts of climate change. These are addressed in turn below.

Challenge: Action is needed to improve surface water management as flood risk increases

We strongly welcome the Commission's focus on this area. All the evidence we see points to a high and pressing need to develop greater resilience to climate change, while at the same time the complex nature of drainage systems and number of different organisations and agencies involved makes it one of the most challenging to effectively address.

The flooding in London on the 12 and 25 July last year highlighted the severe and unacceptable damage and disruption for our customers surface water flooding can cause. The risk of such events is increasing. By the middle of the century, the probability of a rainstorm of an intensity likely to overcome the drainage system will have increased from a 1 in 30 (3.3%) chance to a 1 in 13 (7.7%) chance in any one year¹. Alongside this, we are seeing a continued trend to reduce the green and brown surfaces that provide a natural sponge to manage the impact of increasingly intense storms. In urban areas, even where there are separate foul and surface water systems, the flows arriving at our sewage works can increase seven-fold in less than an hour as a result.

Sea levels are increasing in the Thames Estuary and could rise by as much as 1.15 metres by 2100 under the higher climate change scenario and, with a drainage system that ultimately leads to the river, we need to look upstream for solutions rather than attempting to build our way out of the problem. To do this we are calling for:

- A ban on wet wipes that are a major cause of flooding and reduce drainage capacity when we need more, not less. Half of all asset failures that could harm the environment are caused by blockages, and 85% of the 75,000 blockages we clear annually are caused by unflushables.

¹ London Sustainable Drainage Action Plan

- Local authorities to enforce both building regulations and the requirement for corrective work that is needed by homeowners when wrongly-connected household drains fill foul sewers with rainwater. In a severe storm, a misconnected 6sqm patio will discharge surface water into sewers at a rate equivalent to the average daily flow of wastewater from 100 residential homes.
- Given the pressure on local authority budgets overall, and the funding needs in other critically important areas for which they are responsible, we see the need to ringfence funding for the activities needed to meet their drainage responsibilities.
- The removal of the existing automatic right to connect to the sewer network. We strongly welcome Government's announcement that it will review the case for activating Schedule 3 of the Floods and Water Management Act 2010. Strengthening the legal framework around sustainable drainage by enacting Schedule 3 will reduce flood risk and the impact of surface water on sewage overflows. Organisations designated SuDS Approval Bodies under Schedule 3 would need to be adequately funded to adopt and maintain approved SuDS systems.
- A requirement to use sustainable drainage not just in new developments but in paving over existing driveways, given the volumes of water they can direct into the sewers and increase in flood risk that creates. There is an average loss of vegetated garden area equivalent to 2.5 Hyde Parks each year in London.

We have commissioned an independent review that will look at our network's performance in detail to see what lessons can be learned, and this will inform our investment plans to reduce flood risk. The review will also identify wider implications for London's drainage infrastructure and make recommendations to all authorities with surface water management responsibilities to increase resilience across the capital. The review's findings may provide a helpful input to the Commission's work and we would be happy to put Commission officials in touch with the review team.

Turning to the now-statutory Drainage and Wastewater Management Plans that the sector is developing we welcome the recognition in the Government's Strategic Policy Statement of the need for Ofwat's active involvement in the process of developing DWMPs by supporting collaboration to develop them. Ofwat also have a critical role to play in ensuring that DWMPs, once approved, are adequately funded through the price review process.

The government can further support the success of DWMPs by progressing its commitment to update the Flood and Water Management Act to require Lead Local Flood Authorities to participate in their development.

Challenge: Good asset management will be crucial as the effects of climate change increase

We see this challenge as encompassing the approach the sector adopts to developing its business plans for future investment cycles, and have considered the governance, policy, regulation and market mechanisms that surround it when answering this question. In particular, we look at the approach set out in the draft Strategic Policy Statement (SPS).

Long-term approach

Arguably the single most important change to policy and regulation that can support the water sector in managing their assets as the effects of climate change increase is a move to a longer-term approach when making decisions about future investment programmes.

This change to a longer-term approach will offer two important benefits. The first is that it will open up a more realistic suite of investment options, considering not just what takes place in the next five-year cycle, but what happens during that period and beyond. The second is that a longer-term view of cost recovery and risk allocation will reduce regulatory risk and enable more efficient financing of some of the major investments that will be needed. The benefits of a longer-term approach are discussed in our response to question 13 on asset management practice.

Affordability

Much has changed since the last formal guidance to the sector was published in the Strategic Policy Statement for PR19. We know more about the expected impacts of climate change, and there is now a stronger imperative to work more urgently to decarbonise and meet our 2030 Net Zero ambition. We will also need to adapt to the impacts of climate change and improve the resilience of our services to the changes it is causing.

At the same time, expectations to protect and improve river water quality have increased, and we recognise the role we must play in meeting them. This is alongside the continued challenges of improving the service we provide with an old and ageing infrastructure, and the increasing demand population growth is placing on our services.

We are addressing opportunities to be more efficient and exploring how we can unlock new innovation and systems-based solutions that support improvements while keeping bills down. This includes working in collaboration with partner organisations, particularly where there are shared responsibilities, such as on river catchments and flooding.

However, we are concerned that the SPS does not more directly and fully address the question of affordability and the tension created by upward pressures on investment. As our response to question 2 sets out, a need to maintain low average bills would place a considerable constraint on Ofwat's ability to support plans that would meet government's aims and our ambitions for the service we provide to our customers. This is why we believe it is time to look at how costs can be recovered in a more progressive way, focusing on the financially vulnerable rather than the average bill payer, and considering more innovative charging structures.

Alignment between regulators & plans

To meet government's aim of ensuring that investment in water supply achieves value for money, it will be important that government, Ofwat, other regulators and companies work closely to create a coordinated approach to policy, regulation and delivery, including ensuring alignment in priorities.

There is a risk that companies will not be funded to exceed the requirements of environmental legislation, where supported by customers, as they are asked to do. There is also a risk that companies may not have the funding fully to meet the requirements of the Water Industry Strategic Environmental Requirements (WISER).

Ofwat is required to act in accordance with the SPS, which says that water companies should look to exceed the requirements of environmental legislation, where supported by customers. However, it does not go on to address the question of how Ofwat should interpret and accommodate this within the Price Review or provide direction on how to address the trade-off between increasing investment in this way and the upward pressure it would put on customers' bills.

Treatment of nature-based solutions

We support the call in the SPS for SuDS and nature-based solutions to be part of a broad strategy to better manage surface water and reduce the risk of flooding. Government should encourage Ofwat to ensure that its regulation enables and encourages such solutions, including removing any disincentive from the treatment of their cost and the extent to which they deliver risk mitigation.

In the recent PR19 redeterminations, the Competitions and Markets Authority amended the WACC, in part to compensate investors for an Outcome Delivery Incentive (ODI) regime that is significantly skewed to the downside. Ofwat has said that it will not 'aim up' in PR24 but will address the problem at source. However, without a symmetrical ODI regime and a WACC that better incentivises investors there is a very real risk that the cost of capital is too low. Moreover, the uncertainty inherent in nature-based solutions makes them more skewed to the downside than assumed in the ODI structure overall, exacerbating this effect for solutions of this sort and making it harder and less likely for the sector to adopt their more widespread use.

To allow the variable effectiveness of nature-based solutions to be fully understood companies need to build partnerships with other organisations to trial their use. By focusing on how effectively an approach has been delivered, and recognising the learning that has been secured, companies would be more likely to explore novel options. While such solutions may be less certain to succeed, they will take forward the innovation necessary to support the development and, ultimately, the wider adoption of nature-based techniques.

Direct Procurement for Customers

We welcome the government's call for industry and Ofwat to explore the "full range of market-based tools" and believe that Direct Procurement for Customers (DPC) could be an effective option. Water companies could compete with third parties to deliver DPC projects, incentivising better prices and service for customers. This is also explored in question 2.

7. What barriers exist that are preventing the widescale adoption and application of these new digital services and technologies to deliver better infrastructure services? And how might they be addressed? Your response can cover any number of the Commission's sectors outside digital (energy, water, flood resilience, waste, transport).

A twin-track approach to reducing demand and increasing supply is essential for future security of water supply. Thames Water is rolling out a Government-approved compulsory water metering programme as the primary demand reduction mechanism, and was the first UK water company to start the rollout of advanced metering infrastructure (AMI) with smart water meters. It is a compulsory meter rollout, similar to Southern, South East and Affinity Water companies, but our meters provide us and our customers with hourly usage data – crucial for making a much needed step-change in water conservation.

The data from smart water meters offers greater leakage and customer usage reduction potential. Both of these reduce the energy consumption associated with water abstraction, water treatment and pumping, and wastewater processing. Reductions in water consumption, specifically hot water, in homes and commercial premises, reduces the energy use and carbon emissions associated with heating water in buildings.

At present, compulsory metering is permitted for regions that meet certain water-stress criteria. There are some regions within England that do not have the ability to roll out full metering across their household customer base. The introduction of smart water metering is demonstrating that greater water use reductions are possible beyond older, more traditional meter technologies. The introduction of a stronger focus on smart water metering in homes and businesses could deliver significant benefits to the energy efficiency agenda.

Along with the need for new water policy to fast-track smart meter introduction, the current regulatory environment could be better aligned to drive smart meter coverage to a future target. The payback period through improved performance extends beyond the current 5-year regulatory cycle and therefore needs to be passed on to customers through future price reviews. This impedes the ability to invest, with large smart meter spend competing within price review boundaries against other essential infrastructure development and maintenance spend. The regulatory framework could be evolved to allow better cost recovery of the actual costs involved for new technology, instead of being assessed using cost models built on historic information. This cost model approach can constrain new smart meter infrastructure ambition, assessing the additional cost as inefficiency.

9. What evidence do you have on the barriers to converting the existing gas grid to hydrogen, installing heat pumps in different types of properties, or rolling out low carbon heat networks? What are the potential solutions to these barriers?

We have been working with Local Authorities (LAs), developers, and existing heat network operators to determine the feasibility of recovering heat from sewer and waste-water treatment works effluent using heat pumps as the primary heat source for low carbon heat networks. Over the last six years we have completed nearly 50 feasibility studies – but to date none of the feasibility studies has led to an operational scheme, even though we estimate that up to 10TWh/year of heat could be available from our network - enough to heat up to 1,800,000 homes.

The following comments relate solely to low-carbon heat networks using heat pumps. While we are considering the potential of the hydrogen market it is too early to provide any well-founded evidence.

In addition to our involvement in 50 feasibility studies we have been conducting an in-depth evaluation of the heat network market over the last ten months. Through this we have identified six key barriers to widescale deployment of heat pumps as part of low-carbon heat networks. Many of the barriers relate to the immaturity of the UK market for effluent heat recovery-based heat networks. Although these schemes have been operational for over 40 years in mainland Europe, none are operational in England² and a handful of small-scale projects are operating in Scotland, under a different regulatory regime. This exacerbates the immaturity of heat networks generally in the UK, with the UK having a lower proportion of residential and commercial heat demand served by heat networks than either Italy or Greece³. The specific barriers and potential solutions are as follows:

High First Of A Kind (FOAK) capital costs

As a result of the market immaturity each scheme is effectively a FOAK. This increases both the equipment and 'soft' costs of proposed effluent-based schemes. This is a key factor in the higher capital cost of these schemes compared with conventional options such as natural gas combined heat and power systems.

Grants are, therefore, needed to pump-prime the market and build up the supply chain; standardise technical and commercial procedures and increase the confidence of stakeholders. This would erode the FOAK affect and thereby reduce capital costs and increase scheme viability. We believe consideration should be given to a follow-up scheme to or extension of the Green Heat Networks Fund (GHNF) if insufficient traction occurs within the current GHNF fund envelope. Grants to cover a higher percentage of the capital costs should be considered for more innovative schemes that have the potential to deliver greater efficiency and carbon savings.

High development costs

At present effluent heat recovery schemes have a high development cost to reach financial close and move into construction. Effluent heat recovery schemes have a particularly lengthy and complex development process. In addition to the demand-side development (typically covering master planning, pre-feasibility, feasibility and final business case) a similar development process is required on the heat supply side. Other factors are also at play, including the relatively small number

² Excluding the Anglian Water scheme which supplies greenhouses rather than buildings and is supported by the RHI.

³ BEIS / Vivid Economics. 'International Comparisons of Heating, Cooling and Heat Decarbonisation Policies', November 2017

of consultants with the required skills and experience to advise these projects and the stop / go nature of the development process driven by stage-by-stage funding. These result in loss of momentum, delays, loss of knowledge and experience as advisors change (due to bidding rules), poor quality engineering, unnecessary rework and hence increased costs.

A partnership approach between LAs, developers and advisors could be developed whereby BEIS agrees to fund a project from early stage to financial close, subject to the project meeting agreed milestones and benchmark advisory costs. Partner organisations such as water companies who may give access rights for effluent heat extraction should also be included in the development funding envelope. Finally, BEIS should consider allocating funding to develop new, potentially material heat sources such as reservoirs or bore-holes.

Inexperienced project sponsors

Projects are often sponsored and led by local authorities (LAs). LAs generally have understandably little experience with low carbon heat networks, which can create challenges in progressing the technical and commercial planning, execution and operation of low carbon heat networks. The experience of Sutton Decentralised Energy Network provides one such example⁴.

This could be addressed by central government incentives for new market entrants to sponsor and develop low carbon heat networks, bringing the right technical and commercial skills to develop these complex projects.

Potentially conflicting regulatory frameworks

Throughout the low carbon heat network value chain there are organisations working under different regulatory frameworks that may have conflicting priorities. Heat network operators will be regulated by Ofgem whereas water companies, as possible providers of heat extraction access rights, are regulated by Ofwat.

One regulatory issue has already arisen. Some heat network developers have requested availability guarantees from water companies. This is a condition that a water company cannot agree to, largely as a result of the economic regulation in water which states, broadly, that water companies cannot accept risks from non-core activities (such as heat) which may lead to losses eventually borne by water customers.

This points to the need for co-ordination across regulators and Government departments to ensure that these barriers are addressed, and approaches aligned to unlock the potential that exists. BEIS has started work in this area.

Low demand for low carbon heat

One of the key barriers to developing heat networks, and especially low carbon heat networks, is a lack of demand for low carbon heat. This means it is difficult for developers to gain enough anchor heat load to take projects to financial close. This has been one of the main causes of scheme delay / failure to proceed in our experience. There are a number of possible, complimentary solutions:

- Giving scheme developers access to low-cost borrowing, meaning that less anchor load is needed to make a low carbon heat network investment viable.
- Underwriting some of the demand risks at financial close would enhance the viability of low carbon heat networks investment.
- The rapid, widespread and effective implementation of zoning, compelling developers of new buildings and operators of existing buildings to connect to a low carbon heat network.

Lack of incentive to provide access to low carbon heat

Water companies could provide access to material quantities of low carbon heat from sewer effluent, waste-water treatment works effluent, bore-holes and reservoirs. At present there is little to no economic incentive for water companies to get involved as the value of heat extracted is very modest and the costs of development, monitoring and administration are high. One way of providing an incentive is around carbon saving. Currently the carbon saved by a low carbon heat network is apportioned to the end user, with no mechanism for the carbon benefit to be shared throughout the low-carbon heat network value chain. We would welcome Government working with industry bodies such as UKWIR to develop guidance to share the carbon benefits between the different organisations that make up the low-carbon heat network value chain.

In addition, Ofwat could explore providing outcome delivery incentives for low carbon heat networks within its current regulatory framework.

⁴ See <https://moderngov.sutton.gov.uk/documents/b13686/SR%20Supplement%20-%20SDEN%20Review%2001st-Nov-2021%2019.30%20Strategy%20and%20Resources%20Committee.pdf?T=9>

10. What evidence do you have of the barriers and potential solutions to deploying energy efficiency in the English building stock?

We support the focus on building stock energy efficiency and suggest that water efficiency should be treated in parallel. Given that hot water usage within English housing stock contributes to around 20% of the total domestic energy consumption, the focus on water efficiency should not be excluded from the energy efficiency and carbon reduction agenda. Energy and water are often used together at the same time, often through the same device/appliance and consumer behaviour.

We have embedded energy efficiency and carbon reduction content in our customer-facing water efficiency communications since 2014. Our sector-leading online Water Calculator tool quantifies household energy use and potential energy savings that would be achieved through simple water efficiency device and behaviour improvements, bespoke to each customer: <https://www.thameswater.co.uk/help/water-saving/water-saving-calculator>.

We recently launched an online Business Water Calculator tool, available free for use by every UK business and water retailer. The tool also quantifies the energy savings that could be achieved through improvements in water use performance: www.thameswater.co.uk/businesscalculator.

We are continuing to roll out a compulsory water meter installation programme, with >570k Advanced Meter Infrastructure (AMI) smart meters installed since 2015. This programme aims to install a further c.2.5m smart water meters by 2035. The insight captured to date is game-changing for the water sector, the environment and customer base. Some headline findings from our smart meter rollout could support energy efficiency on building stock, including:

- About a quarter of all homes use more than 500 litres/day, with some using more than 5,000 litres. Using this insight, we changed our water efficiency programme to solely focus on these big water users. Since this change, our Smarter Homes Visit initiative (in-house device retrofits and personalised behaviour advice) has doubled their water conservation savings by helping homes with simple water saving installations and wastage leaks. These water efficiency visits are reducing consumption by an average of 10 per cent. Many of these water savings will have a hot water and energy savings benefits. Focusing future energy efficiency programmes on high energy/water users could yield greater savings per intervention.
- The water consumption savings (including some hot water reductions) from our in-home retrofitting and advice visits are so far being sustained to beyond 3 years after the intervention. We will continue monitoring these savings levels through smart meter data. As these hot water savings as so far being sustained, it could support the inclusion of water efficiency device improvements and behaviour advice into energy efficiency retrofitting programmes.
- The water performance of new build homes aims to meet targets for either 125 litres/person/day or 110 litres/person/day outlined in Part G of Buildings Regulations. Analysis of our smart water meter data is showing that actual water consumption (depending on what occupancy values are available and used) actually ranges between 119 to 179 litres/person/day. These water-use levels are significantly higher than Building Regulation and planning assumptions which affect our water demand forecasting and water resource management planning. These elevated levels of water use on a growing population are likely to also impact energy demand forecasting associated with hot water use in new housing stock.

13. In what ways will current asset management practice need to improve to support better infrastructure resilience? Your response can cover any number of the Commission's sectors.

Securing the right level of infrastructure resilience relies in the first instance on a clear long-term vision. This should set out a shared understanding of the outcomes the environment we rely on needs, and that society wants and is willing to pay for.

During 2021 we prepared a long-term vision that sets out the outcomes our infrastructure will need to support in 2050, and that vision is now starting to inform the trajectory we follow through each of the five-year investment cycles through to 2050.

This approach relies on infrastructure providers like Thames taking a longer-term view but will need to be facilitated by government and regulators providing a framework that helps realise the benefits of looking beyond the relatively short horizons of the five-year price review process.

Thames - and the water sector more widely - will need over the period to 2050 to deliver a number of key programmes (such as water mains renewal in London and the elimination of sewage overflows across the country) that take multiple investment cycles to complete. Agreeing longer-term investment programmes in these areas would provide multiple benefits, including avoiding the costly inefficiency of ramping up and winding down programmes at the start and end of each five-year cycle.

It would also support the development of skills and jobs in infrastructure providers and their wider supply chains; provide more opportunities to innovate in the knowledge that the risks and potential benefits are weighed against a much more significant opportunity and create greater certainty for investors.

Water – and other infrastructure sectors – would also benefit from cross-sector, systems thinking, using mechanisms to identify and help manage critical interdependencies – such as those between power and water. Focussing less on the resilience of assets and more on the resilience of the outcomes for customers and society that our systems provide would produce better overall outcomes. This is particularly the case with flooding, where a range of organisations – including water and wastewater companies; Lead Local Flood Authorities, and the Environment Agency – all have responsibility for managing flood risk. A clearer understanding of the interdependency between the assets, and how this influences the overall performance of the system they are part of, could lead to better information for homeowners about when their home might be exposed to the risk of flooding – supporting them to take steps to protect themselves as well as identifying improvements to infrastructure.

We are seeking to improve our own asset management practice in a number of other ways to support better resilience:

Understanding our assets

We are accelerating work to better understand the condition and performance of our assets to support risk-based decisions about how and where to target investment to ensure the right level of performance.

This includes installing more technology to improve our understanding of our network. By the end of 2020-21 we had installed 500,000 smart meters to reduce water consumption and help find leaks, while the installation of acoustic loggers helped us save more than 68 million litres of water a day over the course of the year.

We have also created a ‘Digital Twin’, which uses artificial intelligence software to provide a virtual model of our network. It collects all our data into a single place and allows us to see what is happening on our water network in real time – detecting leaks, excessive demand, or unexpected changes in pressure. It also suggests improvements we can make to the network to address any issues. This ‘digital water’ approach means that we’re alerted to issues before customers notice them, so we can plan more efficient responses and improve our service to customers overall.

On our wastewater network we are accelerating the roll out of work to install sewer depth monitors that are creating a smarter waste network and helping us detect blockages and clear them before customers’ services or the environment are affected.

Natural solutions and partnership working

We see very significant potential in catchment management approaches that seek to address issues upstream, often harnessing natural processes, rather than ‘end of pipe’ solutions that typically rely on hard engineering.

Catchment approaches can offer better value and greater benefits than more traditional concrete and steel solutions. However, they have historically been restricted to an individual organisation working to address a single issue, such as pesticide run-off from agricultural land into local rivers. We believe we can achieve more by taking a systems-based view of the environment, collectively addressing multiple challenges and co-delivering solutions that make the most of opportunities on an even bigger scale. This is the premise of our ‘smarter water catchments’ initiative.

We are putting this approach into practice in three pilot schemes in the River Crane (west London); River Chess (Buckinghamshire) and River Evenlode (Gloucestershire). We have co-created ten-year catchment plans with key stakeholders who either operate within this environment and/or have a vested interest in protecting and enhancing it. Between 2020 and 2025, we will use a bespoke performance commitment to measure our progress with our regulator Ofwat. To be as transparent as possible, we’ll provide annual updates on our progress and share any benefits we achieve.

These ten-year plans, which have been written in partnership with our stakeholders, outline our approach and set out the actions which we will collectively deliver over a 10-year time period.

We see these pioneering schemes as marking the start of a transition towards a greater emphasis on catchment approaches in the way we manage our own assets. They have the potential to reduce the need for built solutions, providing both environmental and economic benefits, as costs avoided can be used to support investment elsewhere.

The smarter water catchments approach is underpinned by partnership working to co-create the plans in the individual river catchments. We see this model as being critically important in the work needed to improve river health and to tackle sewer flooding, which are influenced by factors that water companies will need to work with others to address. These include the

activities of other sectors, including agriculture, and the approach of other organisations with responsibilities for addressing flood risk, including the Environment Agency and Lead Local Flood Authorities.

Balancing short and longer-term approaches

As we develop a more comprehensive picture of the condition of our assets, we expect to accelerate a transition from the current focus of managing the performance of our water supply network through short-term interventions and towards longer-term approaches.

Our focus for our water supply network during the current five years is addressing inefficiencies in the operation of the network through a programme to calm fluctuating pressures and improve the system level performance. These are starting to bear fruit, reducing burst rates in affected systems by changing our operating approach through investment in technology. This is helping in the short term – but we will need in the longer term to place a greater emphasis on renewing ageing parts of the system.

Our average mains age is 71 (83 in London) while London's trunk mains average 100, with 14% over 150 years old. By 2030 an additional 1,500km of our network will be over 150 years old, including a further 179km of trunk mains.

The current rate of trunk main replacement would require c.450 years to renew our network, and we are developing a case to halve this at the next price review to move to a more sustainable approach. We are starting to make this transition through the £300m investment programme that forms part of a conditional allowance set by Ofwat at PR19, and which we aim to learn from and sustain through subsequent investment cycles.

14. What are the barriers to and solutions for expanding recycling capacity, both now and in the future to deliver environmental and net zero targets?

Asides from the potential for expanding recycling capacity, the current interpretation of Farming Rules for Water (FRfW) – which governs the application of biosolids on agricultural land – risks causing the disappearance of a highly valuable existing recycling route, and the associated market. In its recent written evidence to the EFRA Select Committee, Water UK set out companies' concerns about this emerging issue. We fully support their submission, which explains that farmers are customers for the water industry's biosolids - 8,500 tonnes of which are manufactured every day in England as part of the wastewater treatment process, and then used as crop nutrients and organic matter to improve soil health.

We (and the other companies) support FRfW's intention and the need for action to improve river water quality, and recognise the risks posed by the application of nutrients to farmland. However, as Water UK's evidence sets out:

“Unfortunately, FRfW is now being interpreted in a way that conflicts with its original stated goals. The current interpretation of Rule One of FRfW risks causing the unintentional collapse of England's bioresource market, so ending most of the supply of an affordable and high-quality soil conditioner.

“The results are likely to be environmentally irrational. They are likely to include the construction of large numbers of incinerators to burn a material that would otherwise be recycled. This would harm agriculture, the environment and bill payers, who would foot the cost of unnecessary investment that could run into the £billions. It would also significantly increase the sector's carbon and energy use at a time when the water industry has ambitious plans to reduce these.

More effective alternative policies to protect rivers include developing the Biosolids Assurance Scheme, which is run by a not-for-profit company created by the water industry and employs an independent certification body to audit compliance across the treatment, transport, storage and recycling of biosolids to agricultural land. Water UK explains that it “is built around legislative requirements, best practice, sustainability and transparency and could be further strengthened and modified to address any concerns and further embed best practice. This would allow a risk-assessed approach to be adopted that took into account the nature of the product, the receiving land and the local watercourses.”

Proceeding with the current interpretation of Rule One of FrFW would require incineration capacity likely to take a decade to create, with years of stop-gap solutions that would themselves have environmental impacts in communities across England.

