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Second National Infrastructure Assessment: Call for Evidence
National Infrastructure Commission
By email

4 February 2022

Dear Sir / Madam

I am pleased to send Northumbrian Water Limited's response to the above call for evidence.

Northumbrian Water Limited (NWL) operates in the north east of England, where it trades as Northumbrian Water, and in the south east of England, where it trades as Essex & Suffolk Water. NWL supplies water to just under 4.4 million people across both areas, and sewerage services to 2.5 million people in our north east operating area.

We have focused our response on:

Challenge 5: *Asset management and resilience – the Commission will consider how asset management can support resilience, barriers to investment, and the use of data and technology to improve the way assets are maintained.*

Question 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.*

We would like to highlight the following key points in response to this call for evidence:

- Northumbrian water (NWL) provides highly essential services to our customers and the essential maintenance and operation of our asset base is therefore crucial to the delivery of those services. Since privatisation the sector and NWL has invested significantly to improve service levels to customers with significant successes, such as significant improvements in customer services, more resilient water services and better environmental outcomes and all in the context of bills being flat or falling before inflation for the fifteen years to 2025.
- Asset management is a complex area that presents a challenge for both water companies and regulators. The evidence suggests on the one hand that current levels of asset replacement are not sustainable in the long-run and on the other that current asset related performance is improving.
- The current approach creates a risk of under investment. The current replacement rates are driven by the interaction between water companies' approach to determining the right level of maintenance and Ofwat's approach to setting cost allowances. We consider that water companies have been good at managing improved service delivery through effective operational and low-cost measures, which is good asset management practice. However, there is a risk that we will also need to increase replacement rates in the medium term as average asset lives reach their engineering limits.

- The optimal level of future investment is higher than for historical investment. But even just considering whether the current level of investment is right to maintain current levels of service in the long term is not enough. We are asking more of our assets across a range of different measures.
- The framework needs to change to support greater investment. In the longer-term a bottom-up approach to allowing funding for capital maintenance could address the shortcomings in the framework. In the meantime, the current framework in theory allows for more investment to be brought forward as enhancement expenditure, but this needs to be supported by Ofwat. The regulator needs to work with the sector to establish what evidence is required to support investment so that they can protect customers through appropriately challenging our plans while enabling us to protect customers by making the investments that are needed.

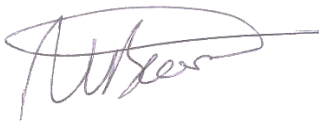
To better address the complex challenges that we have outlined we consider that the National Infrastructure Commission should:

1. Support and encourage the reform of the regulatory framework in the water sector to allow greater investment in capital maintenance and replacement to be made where companies can provide compelling evidence that these investments are essential to maintain the resilience of the essential services they provide and that they will drive benefits to and are supported by customers.
2. Explore the possibility of establishing an independent asset health agency that would be required to independently and expertly assess the asset health and resilience of water companies (and indeed other infrastructure sectors) learning from the model of the independent rating agencies in assessing financial resilience. This would help to hold companies to account in maintaining their assets effectively and provide consistency and independence in a crucial area for the long-term.

Further detailed responses to the questions are set out below.

I trust this response is helpful, but if you require any further information in relation to this please contact our Corporate Communications Consultant, Judith Huffee on Judith.huffee@nwl.co.uk.

Yours sincerely,



Andrew Beaver
Regulation and Assurance Director

NORTHUMBRIAN WATER living water | ESSEX&SUFFOLK WATER living water

THE SECOND NATIONAL INFRASTRUCTURE ASSESSMENT: BASELINE

Northumbrian Water Ltd

Response to Challenge 5

4 February 2022

ASSET MANAGEMENT AND RESILIENCE

Challenge 5: *Asset management and resilience – the Commission will consider how asset management can support resilience, barriers to investment, and the use of data and technology to improve the way assets are maintained.*

Question 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.*

INTRODUCTION

We welcome the National Infrastructure Commission (NIC) examining the issue of asset management and resilience. Northumbrian Water Limited (NWL) is a regional water and wastewater company serving communities in the North East, Essex, Suffolk and three London Boroughs. In total we provide water services to nearly 4.4 million people across our regions. We provide an essential service to the piblic, without them the customers we serve would quickly face significant public health risks, as well as significant economic and environmental impacts. This means that effective management of our assets is critical to maintaining the long-term resilience of the water and wastewater sector to ensure it can meet the challenges of the future. Since privatisation nearly £160 billion has been invested in maintaining and improving these services for customers, addressing growth in the number of customers served and improving environmental outcomes. As a sector we have cut leakage by a third, ensured customers are five times less likely to suffer supply interruption and 100 times less likely to encounter low pressure than they would have been 30 years ago.[1] All this has been achieved in the context of average bills which, by the time of the next price review in 2025, will have been flat or falling before inflation for 15 years.

FIGURE 1: INDUSTRY AVERAGE COMBINED HOUSEHOLD BILL (17-18 PRICES)

Source: NWL analysis.

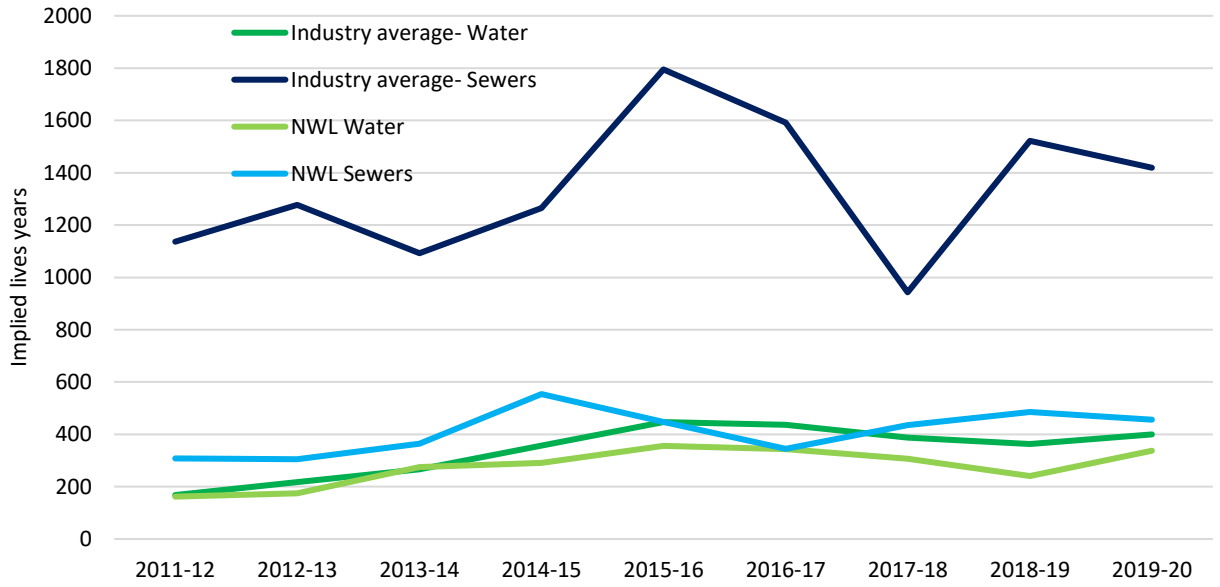
[1] See 30 Years of Progress: Cleaner, Safer, Better Water, Water UK, July 2019.

This is an opportune moment to consider these issues. We are concerned that the sector as a whole is not being enabled to invest sufficiently in maintaining and replacing our existing assets. Moreover, addressing the challenges of the future such as achieving net zero, adapting to climate change impacts (which are already affecting us) and improving services to customers will require fundamental changes to the asset base including the replacement of existing assets with more blue-green infrastructure. The regulatory framework does not currently acknowledge this. Further work is required from both the sector and the regulators to ensure that there is sufficient investment and that the sector can deliver resilience through effective asset management.

ASSET MANAGEMENT IS COMPLEX

Asset management is a complex area that presents a challenge for both water companies and regulators, particularly in the water and wastewater sector which is characterised by extremely long asset lives. The evidence suggests on the one hand that current levels of asset replacement are not sustainable in the long-run and on the other that some elements of current service performance based on lagging indicators is improving. Understanding this seemingly counterintuitive picture and identifying how best to manage risks for our customers, society and the environment will require us to continually improve the data and our understanding of asset health, and so ensure that an appropriate balance of risk is struck in determining the level of asset maintenance expenditure.

FIGURE 2: NWL VERSUS WATER INDUSTRY AVERAGE IMPLIED ASSET LIVES (LAST 10 YEARS)



Source: NWL analysis of audited company APR and JR data

There is a broad range of assets in the water sector from monitoring equipment, which has relatively short lives, through to civil structures, which have long lives. Much of the asset base in the water sector is characterised by very long asset lives – much longer than most other infrastructure sectors. Some water resources assets such as reservoirs for example have asset lives estimated at construction of 80+ years.[2] However, even with these long-lived assets, the replacement rates in the sector do not appear to be sustainable in the long run. The current replacement rates for water sector infrastructure in England and Wales imply asset lives for water mains of 400 years and for sewers of 1,419 years across

[2] The latest new reservoir in England being developed by Portsmouth Water at Havant Thicket for example has been assumed to depreciate over 80 years. '[PR19 final determinations – Havant Thicket appendix]', Ofwat, December 2019, pp.24 – 25.

the sector as shown in Figure 2.[3] Even with innovation to maximise asset lives and to enable early identification of assets most at risk of failure, these replacement rates do not seem tenable in the long run. This implies replacement rates will need to increase at some point.

Simultaneously, performance against Ofwat's outcome measures related to asset health has generally improved over time, with many companies exceeding their performance targets.[4]

TABLE 1: NWL'S PERFORMANCE ON KEY INDUSTRY ASSET HEALTH INDICATORS

Asset Health Metric	Change 2010-20
Water	
Discoloured water complaints	-53%
Mains repairs	-40%
Low pressure	-19%
Wastewater	
Sewer collapses	-45%
Pollutions	-38%

Source: NWL analysis of audited company APR and JR data

This could be viewed as inconsistent with a picture of deteriorating asset health. This implies that in the recent past at least, the replacement rates have not adversely affected current performance. This conclusion should be tempered by the fact that measuring the true health of assets - which must be a long-term measure - in the short term is challenging and the impact of asset health on operational resilience is unclear. While 'lagging' indicators like those seen in Table 1 may be improving, 'leading' indicators may be showing signs of deterioration.

The challenge of how to measure asset health is compounded by the variety of assets involved and the different metrics required to monitor their health. The measurement of asset health can also be at odds with the move towards outcome-based regulation. Measurement and incentivisation of outcome metrics can promote positive change for customers and the environment as it focuses delivery on the things that people care about. But outcome measures can be poor indicators of asset health. For example, Ofwat's unplanned outage measure was not designed in a way that was capable of serving as a measure of asset health. Unplanned outages – as they are generally understood, while recognising that there is some inconsistency in the definition and application – can be caused by a range of events. Only some of these relate to the health of assets (for example, asset failure arising from poor maintenance, age, or overuse). Other causes of unplanned outages such as pollution, algal blooms or turbidity are not directly related to asset health and are not necessarily within management control. Also, outage at a particular asset does not necessarily imply an increased resilience risk for the system or customers, as resilience may be provided by interconnectivity or availability of alternative supply sources. To assume that unplanned outages directly impact on resilience risk fails to take a system-wide approach to the question of resilience.

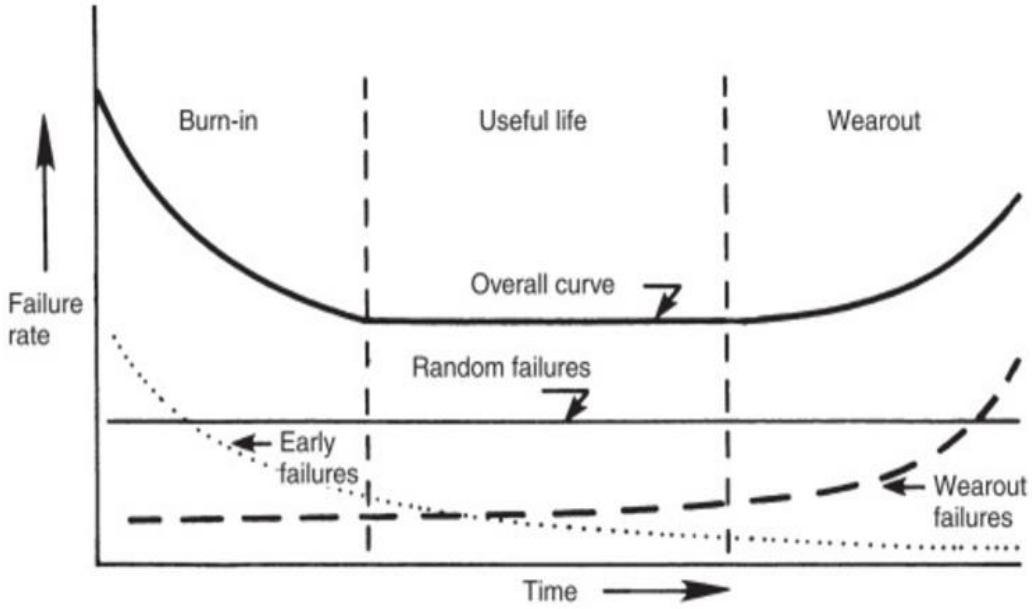
The assessment of asset health and asset resilience can be contrasted with financial resilience where independent rating agencies assess financial resilience in a highly consistent and expert way across all companies in similar sectors facing similar risks. It could be beneficial for the same level of expertise and rigour to be applied by an independent organisation to the question of asset resilience. In the United States of America, the American Society of Civil Engineers (ASCE) performs something akin to this role. Since 1998, ASCE has issued the Report Card for America's Infrastructure and

[3] NWL analysis – sector average for 2019-20.
[4] 'Service delivery report 2020-21', Ofwat, November 2021, p.19.

beginning in 2001, the Report Card has been released every four years. Using a simple A to F school report card format, the 2021 Report Card for America's Infrastructure examines current infrastructure conditions and needs, assigns grades, and makes recommendations for how to improve in 17 categories of infrastructure.[5] Perhaps the NIC or a further independent organisation could be established to perform an equivalent or possibly more detailed assessment for the water sector – and other infrastructure sectors – in the UK. This would help to establish consistent approaches to asset health that companies could adopt, and regulators could use – this would likely be something the water companies and our regulators may find helpful.

Ofwat acknowledges that the historical approach and measures need to evolve and has done work through its "Asset resilience" project to progress thinking in this area.[6] The industry and regulators are working to improve our collective understanding of these measures, for example through the UK Water Industry Research (UKWIR) future asset planning project.[7]

FIGURE 3: ILLUSTRATIVE 'BATHTUB' CURVE SHOWING TYPICAL PATTERN OF ASSET FAILURE RATES OVER TIME



Source: Reliability, Maintainability and Risk: Practical Methods for Engineers, Dr David J. Smith Ninth Edition, 2017, figure 2.7. Accessed via Bathtub Curve - an overview | ScienceDirect Topics

The level of maintenance and replacement investment required to maintain a given level of asset health – and therefore performance – depends on the failure rates of the assets. Figure 3 illustrates how observed failure rates may not always be constant over the life of an asset. Early failures, which may be caused by manufacturing defects for example, tail off, while wear out failures increase with the life of the asset. In a theoretical world in which investment in new assets was constant over time the resulting optimal replacement rate would nevertheless be constant, as each asset would be replaced either at the point of failure or at the point in its life where the cost of replacement was equal to the (known) risk of failure multiplied by the cost of a failure – the efficient asset life. However, as the initial investment in the assets was 'lumpy' – that is to say that the initial investment in infrastructure was made over a period that was shorter than the efficient asset

[5] See Water Infrastructure | ASCE's 2021 Infrastructure Report Card for more information.
[6] See the Asset resilience webpage, Ofwat.
[7] See 'Future Asset Planning', UKWIR RG / 05 / A / 250 – BQ08.

life – the resulting efficient replacement investment will also be lumpy. As it may be impractical or prohibitively expensive to make all this replacement expenditure in one go, it may be beneficial to smooth this over a longer time period, with replacement of some assets before their efficient asset life is reached. Practically this 'early' replacement can be targeted for individual assets with known reliability issues.

The issue created by the age demographic of assets is compounded by the variety of assets involved in the water sector. For example, water pipe materials have changed over time. A large proportion of pipes in the ground in England are cast iron mains, which were largely installed in the 1930s – 1940s. In the 1980s in contrast, PVC pipes made up a significant proportion of installations. Our modelling indicates that PVC pipes have a lower asset life than cast iron mains. This could result in a 'hump' for replacement of these two types of assets if there is overlap between both assets coming to the end of their estimated lives. We therefore need to understand the interactions between the age demographic and life expectancy of different assets to identify the optimal asset maintenance and replacement rates to maintain resilience.

In addition, disentangling investments needed due to asset deterioration from that associated with growth or quality enhancement is difficult – and often overlapping. The asset base is dynamic and subject to change as some assets may become redundant and others may be repurposed or amended. For example, redevelopments that require increased water supplies to an area – and therefore bigger pipes – may result in the replacement of redundant assets that might otherwise had significant life remaining. This makes identifying 'true' asset lives more difficult.

We therefore conclude that we do not know how far off the right balance we currently are, and indeed it is not possible to know for certain because asset management is ultimately about investing our best estimate of the right amount at what we assess to be the right time to manage the risk of asset failure. But the evidence does point towards needing to increase investment in maintenance at some point in the near future. We are doing work to better understand the replacement rate challenge and the potential value of the risks to customers, both internally and in collaboration with the Water Industry Commission for Scotland (WICS), Sydney Water and Scottish Water and Watercare (NZ). We consider that water companies have been good at managing improved service delivery through effective operational and low-cost measures, which is good asset management practice. However, there is a risk that we will also need to increase replacement rates in the medium term as average asset lives reach their engineering limits.

THE STAKES ARE HIGH

What we do know is that the consequences of getting asset maintenance wrong can be far reaching and expensive to rectify. And there are recent international examples that demonstrate what can go wrong, for example in New Zealand.

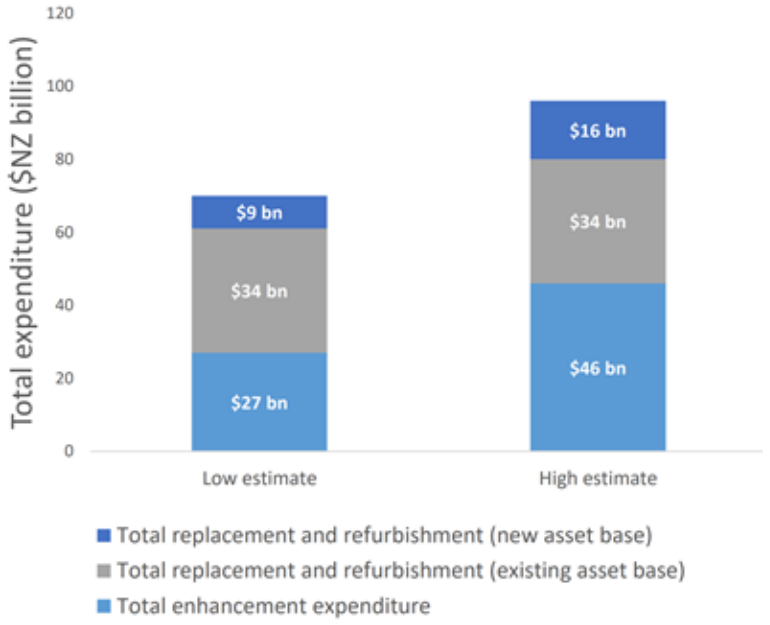
Case study: New Zealand's water crisis

In 2016 four people died and 5,000 fell ill after sheep faeces contaminated Havelock North's water supply. This tragic incident resulted in a government enquiry that identified systemic failure among water suppliers to meet the high standards required for the supply of safe drinking water to the public. The inquiry revealed that 20 percent of water supplies were not "demonstrably safe".[8]

[8] 'Report of the Havelock North drinking water inquiry: stage 2', NZ Department of Internal Affairs, December 2017, p.232, p.244.

As a result, the 'Three Water Review' was commissioned to investigate how to improve the regulation and supply arrangements of drinking water, wastewater and stormwater (the three waters) to better support New Zealand's prosperity, health, safety and environment. The review identified a growing infrastructure deficit across all three areas as shown in Figure 4.

FIGURE 4: ESTIMATED ENHANCEMENT AND EXPENDITURE GROWTH BETWEEN 2020 AND 2050 REQUIRED TO MEET CURRENT STANDARDS IN NEW ZEALAND



Source: Three Water Reform Programme March 2021 Local Government and Iwi/hapū engagement

The required investment in infrastructure amounts to NZ$2.3 billion to NZ$3.2 billion annually or NZ$70 billion to NZ$96 billion over the next 30 years – potentially doubling the required spend relative to the baseline council expenditure of NZ$1.5 billion annually, or NZ$45 billion over the same period.

THE CURRENT FUNDING APPROACH RISKS UNDER INVESTMENT

We consider that we have an effective and evolving approach to asset management. NWL was one of the first companies in the sector to be subject to external independent certification through ISO55000. This is renewed annually with corresponding improvements highlighted and taken forward each year through a structured process. While we have strong processes in place to ensure we identify investment needs, we are constrained by the cost allowances we are set by Ofwat. Replacement rates in the water sector are driven by the interaction between water companies' approach to determining the right level of maintenance and Ofwat's approach to setting cost allowances.[9]

The approach historically used by Ofwat to set allowances for what it calls 'base costs' (including capital maintenance) has been backward facing – that is it has relied on historical expenditure as a predictor for future costs. The resulting cost

[9] Water companies have duties to develop and maintain an efficient and economical system of water supply and wastewater companies to maintain their sewers. In turn, Ofwat has a duty to secure that water companies can finance the proper carrying out of their statutory functions. See Water Industry Act 1991 (amended) Sections 37, 94, 2.

allowances have been set based on upper quartile performance in the sector. So, for example at the last price review the company that was the third or fourth most efficient according to Ofwat's analysis was used to set cost allowances.

This approach is imperfect, but under benign conditions and when the future maintenance needs of assets is likely to be at or below historical levels this approach could have been effective at driving efficiency.

Water companies have responded to the incentives created by the regulatory regime and delivered their statutory and regulatory obligations in an efficient manner. As mentioned previously, this has resulted in an improvement against short term asset health metrics but might still be storing up issues for the future, as has happened in New Zealand.

When future investment requirements are likely to be above historical requirements – as we consider is likely to be the case for the water sector – the risk that this approach will lead to underfunding is compounded. In its redeterminations of the PR19 price controls the Competition and Markets Authority (CMA) recognised that this backward-looking approach may be increasingly problematic, saying:

> *We acknowledge Anglian's and Northumbrian's argument that Ofwat's cost assessment is backward looking and that potential issues with capital maintenance may be forward looking. This is a complex issue, which, going forward, may become more important. We therefore suggest that Ofwat considers developing indicators to track this issue and to enable it to enhance its analysis with a forward-looking element that will assist in triangulating results from its econometric modelling of historic costs.*

Source: 'Anglian Water Services Limited, Bristol Water plc, Northumbrian Water Limited and Yorkshire Water Services Limited price determinations – Final Report', CMA, 17 March 2021, paragraph 4.293

In Ofwat's consultation 'Assessing base costs at PR24', December 2021, Ofwat explore how a forward-looking element could be incorporated into the setting of base cost allowances for PR24. They note:

> *We are also open but cautious about the possibility of including business plan forecasts into our econometric wholesale base cost models if there is strong evidence to suggest that the historical period is not a good reflection of the future.*

Source: 'Assessing base costs at PR24', Ofwat, December 2021, p.18.

We welcome the opportunity to work with Ofwat to ensure that the approach to base cost modelling is effective and efficient. However, Ofwat also consider there is limited evidence to demonstrate why the future is different from the past.[10] We do not consider this is the case, and we explore why future costs may be higher in the next section.

WE ARE ASKING MORE OF OUR FUTURE ASSETS

The challenges faced by the sector will need us to consider how to get the best value from our existing assets alongside employing radically different approaches in some areas that may render some infrastructure redundant.

To meet the UK government's binding net zero targets, we will need to move away from hard 'grey' engineering solutions towards more blue-green infrastructure such as nature-based solutions. Not only will these alternative solutions be needed to avoid emissions from serving a growing population or to meet tighter environmental targets, but we may need to replace

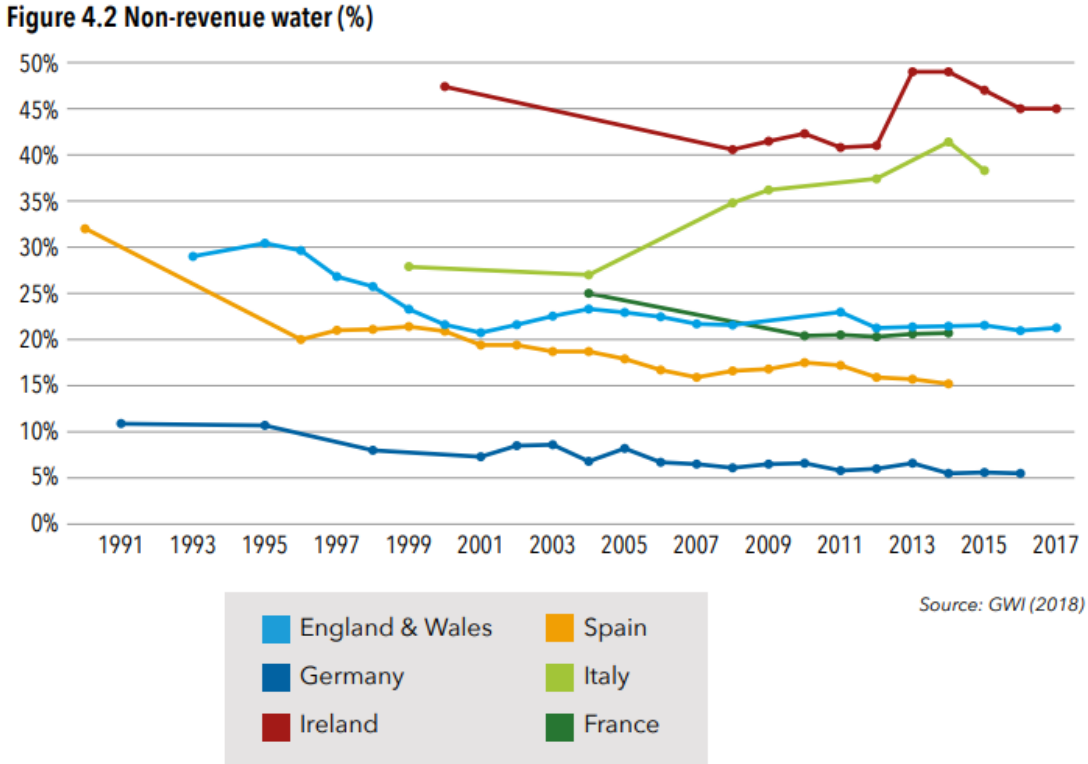
[10] 'Assessing base costs at PR24', Ofwat, December 2021, p.34.

some of the existing asset base before the end of its theoretical life to meet net zero targets. These solutions may have higher costs but lower whole life greenhouse gas emissions.

Similarly, the sector has a target to triple leakage reduction by 2030[11], and to reduce leakage by 50% from 2017-18 levels by 2050.[12] Some studies of the long-term approaches needed to achieve this target have examined how other countries around the world have achieved similar levels of leakage. One of the characteristics of these countries is that their networks are substantially younger, and this might imply that to achieve the target a substantial asset replacement programme would be needed.

A Global Water Intelligence (GWI) market study in 2018[13] looked at the percentage of non-revenue water compared to total distribution input (Figure 5). The England and Wales data is believed to include supply pipe leakage (as this is usual practice) and hence this is not a true comparator. That said England and Wales are similar to France, with Ireland being significantly higher and Germany being at 5%. Germany has invested significantly in its network over the past 70 years and is also assisted by benign soils and favourable water chemistry when compared with the UK.[14]

FIGURE 5: NON-REVENUE WATER COMPARISONS ACROSS EUROPE



Source: 'International Comparisons of Water Sector Performance', GWI, 2018, p.14.

[11] 'Public Interest Commitment' Water UK, April 2019, p.3.
[12] See Leakage, Ofwat website. Water companies committed to the 50% reduction from 2017-18 levels in a letter from Water UK to the Secretary of State on 17/10/2018. The reduction was a recommendation from 'Preparing for a drier future: England's water infrastructure needs', the NIC, April 2018, p.13.
[13] 'International Comparisons of Water Sector Performance', GWI, 2018.
[14] European Environmental Agency. (WQ06) Water use efficiency (in cities): leakage, 2009.

Figures also show that Japan was at 7.3% in 2007[15], with levels as low as 2.2% for Tokyo in 2013[16] on a similar metric. This has reduced from approximately 18% in 1980. Since then, 40% of the network has been replaced and nearly 90% of all the customer supplies. This replacement was driven more by earthquake protection rather than leakage, but it has also had an impact on the leakage levels seen.

On the sewerage side, customer perceptions and the resulting new requirements on the water sector from the Environment Act (2021)[17] are likely to require significant additional investment to be made in relation to sewer overflows and sewer networks.

The future will require more focus on nature-based solutions alongside more traditional engineering solutions, that will require different approaches to permitting from regulators like the Environment Agency and we are happy to continue to work closely with them in this area. Some of these solutions may be more expensive in the short term but ultimately deliver better value, for example through lower whole life costs or greenhouse gas emissions.

These examples show that for some asset classes the future challenges may provide a different driver for asset replacement. If we are to avoid greenhouse gas emissions from chemical use, we will need to replace chemical treatment plants. If we are to meet our ambitious leakage goals, we will need to invest in line with the internationally best performing countries and significantly reduce the average age of our water infrastructure.

THE FUNDING FRAMEWORK NEEDS TO EVOLVE

We therefore consider that the funding framework needs to change to support greater investment. We think the first important step is for there to be clear acknowledgement across the sector and the regulators that past levels of investment are no longer a good predictor of future investment needs.

Once we acknowledge this, we need to consider what the best route is to reform the funding framework. We consider that there should be an element of bottom-up assessment to set funding allowances. The approach WICS is implementing for Scottish Water[18] and the mechanism being proposed by Water UK would enable this. Both approaches have their challenges and the mechanisms for England and Wales will take time to develop.

In the meantime, the current framework in theory allows for more investment to be brought forward. But the need for greater investment and therefore these investment cases need to be supported by Ofwat. The regulator needs to work with the sector to establish what evidence is required to support investment so that they can protect customers through appropriately challenging our plans while enabling us to protect customers by making the investments that are needed.

We recognise that increases in capital maintenance investment could carry a significant price tag for customers and there would need to be a high evidence threshold to justify what could be a significant and ongoing change of approach. We agree with Ofwat that customers 'should not pay twice' for capital maintenance.[19] We note that the sector has generally not underspent its historical capital maintenance allowances and capex efficiencies have generally been delivered from enhancement investments as shown for 2015-20 in Table 2.

TABLE 2: 2015-20 PLAN VERSUS ACTUAL

[15] 'Waterworks technologies in Japan', Ministry of Health, Labour and Welfare, accessed 26 January 2022.
[16] 'The secret to Tokyo's low water leakage rate', Outokumpu, accessed 26 January 2022.
[17] 'Environment Act 2021', UK government, November 2021, Part 5.
[18] 'Asset replacement challenge', WICS, July 2019.
[19] 'PR24 and beyond - Creating tomorrow, together', Ofwat, May 2021, p.37.

2015-20 B Plan v Actual £ million, 17-18 prices			
Capital maintenance	Business plan	Actual	Variance
NWL	877	875	0%
Industry	15,861	16,149	+2%

Source: NWL Analysis.

In the first instance companies should seek to be efficient against Ofwat's cost assessment framework and there may be opportunities to reduce operating costs and replace those reductions with some level of increased capital maintenance while remaining efficient against Ofwat's cost assessment framework. In this instance customers would pay no more.[20]

However, this may not be sufficient to address the gap required. Where it is not companies will need to make a strong case to go further to provide assurance to Ofwat that customers will get benefits from those investments. Given the scale of the investment challenge and the ongoing cost of living crisis we and other water companies need to hold ourselves to high standards both in evidencing the need for asset maintenance investment, but also in ensuring that we can demonstrate our investment will be efficient. In this case we can see some merit in more output-based measures and asymmetric cost sharing rates to ensure that water companies invest the additional allowances in their asset base.

WHAT SHOULD THE NIC DO?

To better address the complex challenges that we have outlined we consider that the NIC should:

1. Support and encourage the reform of the regulatory framework in the water sector to allow greater investment in capital maintenance and replacement to be made where companies can provide compelling evidence that these investments are essential to maintain the resilience of the essential services they provide and that they will drive benefits to and are supported by customers.

2. Explore the possibility of establishing an independent asset health agency that would be required to independently and expertly assess the asset health and resilience of water companies (and indeed other infrastructure sectors) learning from the model of the independent rating agencies in assessing financial resilience. This would help to hold companies to account in maintaining their assets effectively and provide consistency and independence in a crucial area for the long-term.

[20] Companies would need to make a case to adjust pay as you go (PAYG) and regulatory capital value (RCV) run-off rates with customer support to shift the balance in the price review reflecting the efficiencies achieved, but this would allow some additional investment in capital maintenance at no extra cost to customers and is allowed now under the current total expenditure ('totex') framework.