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Embedding forward-looking asset risk management in the regulatory framework for water sector infrastructure

Paper prepared for Water UK as part of its response to the Call for Evidence from the Independent Commission on the Water Sector Regulatory System

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Summary and recommendations

This paper has been prepared by Reckon to support Water UK's response to the *Call for Evidence from the Independent Commission on the Water Sector Regulatory System*.

Last year Reckon produced a report on the treatment of capital maintenance expenditure and asset health under Ofwat's regulatory framework and considered potential reforms to improve the regulatory approach in these areas ahead of the PR29 price review. This identified a series of major concerns with Ofwat's approach. Our overall conclusion was that there is a need for a package of complementary reforms across different parts of the regulatory framework.

Ofwat's final determinations for PR24 did not adequately address the concerns identified. There were some positive developments, but the changes Ofwat made to its overall approach in relation to asset health were quite limited, and some of these create additional problems.

This paper provides a narrowly focused follow-up to our earlier work. It draws together some of the themes from the Call for Evidence and the shortlisted policy options from our report from last year. In doing so, we place the Commission's ideas around infrastructure resilience standards, stress testing and scenario analysis within the broader context of a reformed regulatory framework that gives more emphasis to forward-looking risk management and to engineering expertise.

The key points from the paper are as follows:

1. We recommend that the Commission calls for a regulatory framework for the water sector that involves a more proactive role for Ofwat (or any successor regulator) in forward-looking risk management for infrastructure asset health.
2. We are not starting from scratch in developing a new approach. Reckon's report (2024) from the *Infrastructure Health* industry project identifies a shortlisted set of policy options that would enable forward-looking asset risk management by Ofwat. As reflected in that report, there are also useful examples from other sectors, including the water sector in Scotland and the GB energy network sector, both of which involve more forward-looking approaches to asset health.
3. The more proactive role for Ofwat would include establishing regulatory arrangements that involve more explicit and transparent modelling of asset failure risk and of the consequent risks to outcomes from asset failures across water and wastewater systems. This in turn will require a greater role for engineering expertise within Ofwat's team and decision-making processes.
4. As part of these arrangements, resilience standards would be used for long-term planning and risk management purposes (including as planning assumptions on tolerable performance levels over a lengthy time horizon, which can feed into risk modelling and scenario analysis).
5. Drawing on our earlier work, we also recommend that Ofwat's approach to price control cost assessment is reformed, to enable a more forward-looking perspective that can fund effective long-term risk management. The reforms to cost assessment need to go well beyond the type of adjustments that Ofwat made as part of its PR24 price review. There is also a need to remedy other aspects of Ofwat's regulatory approach that favour short-term solutions over efficient long-term investment, by building on the proposals from our report last year.

1: Introduction

This paper has been prepared by Reckon to support Water UK's response to the *Call for Evidence from the Independent Commission on the Water Sector Regulatory System* (February 2025). It is focused on some specific issues relating to asset health and infrastructure resilience standards.

Last year Reckon produced a report on the treatment of capital maintenance expenditure and asset health under Ofwat's regulatory framework and considered potential reforms to improve the regulatory approach in these areas ahead of the PR29 price review.[1] This report was the main deliverable from workstream 2 of a project sponsored by four water companies and involving wider stakeholder engagement (the "Infrastructure Health" project). Water UK played an active role in that project, including as a steering group member. Steering group meetings were also attended by Defra officials and Ofwat (in an observer role). Our report is cited in the Call for Evidence.

That report identified a series of concerns with Ofwat's approach. Our overall conclusion was that there is a need for a package of complementary reforms across different parts of the framework. The report set out shortlisted policy options for improving the regulatory approach to asset health and elaborated on the analytical tools and other initiatives needed to support them.

In addition, Reckon prepared a report for Water UK which reviewed Ofwat's PR24 draft determinations in light of the Infrastructure Health project and considered what steps Ofwat could take in the near-term to improve its approach ahead of the PR24 final determinations.[2]

Ofwat's final determinations for PR24 did not adequately address the concerns we had identified. There were some positive developments (e.g. recognition that modelling of historical costs on its own does not fund appropriate levels of asset health investment, and recognition of the need to collate more information on asset health). But the changes Ofwat made to its overall approach were quite limited, and some aspects of its final determinations create additional problems (e.g. Ofwat has misinterpreted the levels of asset health investment that are implicitly funded from its modelling of historical expenditure).[3] More fundamental reforms are needed.

In the Call for Evidence, the Commission expressed interest in the establishment of infrastructure resilience standards for the water sector, and a potential role for the regulator in relation to stress testing or scenario analysis relating to asset health and capital maintenance expenditure. The Commission also referred to regulatory models in other sectors such as the supervisory role of the Prudential Regulation Authority (PRA). There is considerable overlap between these ideas and some of the key policy options from the Infrastructure Health project, which means that there is opportunity for reforms in the water sector to build on existing work.

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[1] Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report*.

[2] Reckon (2024) *Opportunities for improving Ofwat's approach to asset health following the PR24 draft determinations*.

[3] For instance, Ofwat's approach has overstated the rate of water mains replacement that is funded by its modelling, and it seems to have adopted a view, without evidence, that water companies have been adequately funded to maintain the condition of their assets in previous price control periods. For further information: Northumbrian Water (2025) *Northumbrian Water Limited Statement of Case: PR24 CMA redetermination*, section 4.4 and section 5.4.2.3.

The main aims of this paper are to: (a) help clarify this overlap and (b) draw out some key implications for the Commission. In doing so, we seek to place the Commission's ideas around infrastructure resilience standards, stress testing and scenario analysis within the broader context of a reformed regulatory framework that gives more emphasis to forward-looking risk management.

The remainder of this paper is structured as follows:

- Section 2: Regulatory involvement in forward-looking risk management.
- Section 3: Forward-looking risk management and the call for evidence.
- Section 4: Links to strategies from the Infrastructure Health project.
- Section 5: The potential role of resilience standards.
- Section 6: Implications for price control funding.

2: Regulatory involvement in forward-looking risk management

Ofwat's current regulatory approach considers water companies' influence on the outcomes achieved for customers and the environment. This includes attention to *adverse outcome events* – i.e. shortcomings or deficiencies in the services provided to customers (e.g. water supply interruptions or internal sewer flooding incidents) or in the company's control of its impact on the environment (e.g. pollution incidents or cases of non-compliance with effluent discharge permits).

It is helpful to draw a distinction between two broad types of regulatory approach in this area:

- **Regulatory responses to adverse outturn events**. Under this approach, the regulator would respond to – or create arrangements that respond to – specific types of adverse outcome events that arise. For example, this might involve financial and reputational incentives relating to the frequency of adverse outcome events (e.g. financial penalties or rewards according to particular aspects of a company's performance relative to targets). It can also involve enforcement action where a company's past performance or actions are considered to have breached the company's regulatory obligations.
- **Regulatory involvement in forward-looking risk management**. Under this approach, the regulator would engage in forms of forward-looking risk management to understand and help mitigate future risks, including the risks of adverse outcome events arising in the near-term or longer term. Within this category, there is a range of potential regulatory action, including requirements on companies to assess risks and demonstrate that these are being adequately controlled, through to requirements for companies to do specific things, or operate in certain ways, that are judged by the regulator to be needed for effective risk management.

Under the first category, the regulatory approach may be intended to incentivise regulated companies to engage in forward-looking risk management (but whether effective and efficient risk management behaviour is incentivised in practice would depend on the details of the approach and

the circumstances).[4] Under the second category, the regulator would be proactively involved in forward-looking risk management (e.g. through the supervision or assurance of water companies' own asset risk management activities).

These categories are not necessarily alternatives and in practice regulators are likely to use a mix of the two. But regulatory approaches can differ substantially in terms of the extent of effort, and the sophistication of the regulatory tools applied, across each category.

In relation to asset health, Ofwat's regulatory approach since PR14 has placed emphasis on the first category above with more limited attention to the second. For instance, further to water companies' statutory and licence obligations, Ofwat's regulatory framework places emphasis on setting financial ODIs across a series of common performance commitments, as a means to encourage companies to direct attention and resource to the areas of performance captured by them. Ofwat has engaged in some activities, such as the asset management maturity assessment (AMMA),[5] which fall under the second category above; but these have tended to be on the periphery of the regulatory framework rather than a prominent and integrated part of it.

In contrast, the Call for Evidence highlights the assurance role of the Prudential Regulation Authority which places emphasis on forward-looking risk management. And Ofgem's development over time of the Network Asset Risk Metric (NARM) methodologies means that, in relation to energy network asset heath, it is much more involved in forward-looking risk management than Ofwat.

3: Forward-looking risk management and the call for evidence

In relation to asset health, the Commission has expressed an interest in elements of forward-looking risk management. For instance, the Call for Evidence invites views on the establishment of infrastructure resilience standards that could be used for long-term planning or assurance purposes, and in a potential regulatory role in stress testing and scenario analysis relating to asset health and capital maintenance expenditure: [6]

> *"The Commission would also like to explore whether there should be industry wide infrastructure resilience standards in the water industry. The NIC have suggested that resilience standards should be published for the water sector by the UK government. The NIC suggest this standard could consider climate change and other future pressures, with the aim of ensuring that long-term maintenance is sufficient. The Commission would like to gather views on this suggestion but is also keen to consider other forms of resilience 'standard'. Other sectors, are subject to standards or rules, which require regular assurance reporting to regulators, as well as resilience testing and scenario-based exercises. The Commission would like to understand what lessons can be learned from other sectors."*

[4] We consider that a number of inter-related aspects of Ofwat's current regulatory framework mean that it is unable to incentivise effective and efficient long-term risk management in relation to asset health. See Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report,* pages 13-23.

[5] Ofwat (2021) *Asset management maturity assessment*.

[6] Call for Evidence, paragraph 556.

We support the Commission's interest in other sectors that have moved towards greater use of forward-looking risk management, through stress testing and scenario analysis. As we highlighted in our work on asset health last year,[7] there are lessons from cases such as the failure of GB energy retailers and the global financial crisis, where regulators did too little to safeguard their regulatory approaches against risks that should have been apparent in advance.

The Commission is also considering whether financial oversight could be strengthened in the sector, potentially through a supervisory model,[8] and refers to the potential for more robust stress testing of company finances. The Commission also refers to the PRA's supervisory model, highlighting that: "*The PRA uses its supervisory framework to inform proactive intervention, in advance of risks crystallising*".[9] Our view is that elements of the supervisory approach envisaged by the Commission for financial resilience are also relevant when considering operational resilience and asset health: these relate in particular to scenario analysis and stress testing, as discussed in section 5 below.

4: Links to strategies from the Infrastructure Health project

In this section, we summarise some of the links between the ideas from the Call for Evidence concerning forward-looking risk management and some of the key regulatory policy proposals from the *Infrastructure Health* project.

Reckon's report to workstream 2 from the Infrastructure Health project identified four high-level and inter-related concerns with the current regulatory framework in relation to capital maintenance and asset health.[10] These are summarised in the table below.

Table 1 Key concerns identified with Ofwat's current regulatory approach to asset health

Concern	Summary
Informational concern	The concern that there is not enough useful information available about the risks of service disruption and adverse environmental outcomes in the future that may arise from asset deterioration or poor asset health, and how these risks are being managed by water companies.
Behavioural and decision-making concern	The concern that the behaviour and decision-making of water companies, which is heavily influenced by the regulatory framework, may not be well-aligned with the achievement of good outcomes for customers and the environment over the long term, in terms of the adequacy of investment in asset health to manage risks to future outcomes in an efficient way over time.
Funding concern	The concern that the funding available to water companies from customer bills, as governed by the regulatory framework, would not be sufficient to properly remunerate efficient companies who adopt the best long-term decisions about asset health and the management of future risks.
Responsibilities concern	The concern that Ofwat may not take enough responsibility for understanding and mitigating, through its own actions and decisions, the long-term risks to customers and the environment that may arise from asset deterioration or poor asset health.

[7] Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report*, page 25.
[8] Call for Evidence, page 135.
[9] Call for Evidence, box 15 page 137.
[10] Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report*, page 13.

The information concern is particularly relevant to consideration of forward-looking risk management. The informational concern matters in its own right. The limited information available on the risks relating to asset health – and how well these are being managed by water companies – should be a concern for customers, Ofwat and Government. Furthermore, the informational concern is a key driver, alongside the funding concern, of the behavioural concern.[11] The responsibilities concern is, in essence, a concern that Ofwat has been too passive in relation to asset risk management.

Further to reforms to the approach to price control cost assessment (which we highlight in section 6 of this paper), we identified two key regulatory strategies to help tackle the informational and behavioural concerns relating to asset health:[12]

- Supplement outcomes with deliverables based on asset risk metrics or investment programmes.
- Retain a focus on outcomes while enhancing the incentives on long-term performance.

The most promising options under each of these regulatory strategies would involve a greater role for forward-looking risk management by Ofwat.[13] We briefly take each of them in turn below.

Supplement outcomes with deliverables based on asset risk metrics

In relation to the first strategy above, we shortlisted an approach that would build on the NARM methodology developed by Ofgem for energy network companies.[14] This would involve the development of monetised asset risk metrics that draw on: (a) asset failure and deterioration modelling; (b) modelling of the consequences of asset failure in terms of the risks of adverse outcome events; and (c) valuation of the impacts of adverse outcome events (this provides a common currency, enabling different types of risk to be aggregated into a combined metric).

The modelling would cover a long-term future time horizon (e.g. reflecting asset lives for water company investments) and involve analysis of the impacts on monetised risk, over that time horizon, for different scenarios of investment levels. Ofwat would be able to use outputs from the modelling as part of the determination of upfront expenditure allowances under the price control and as the basis for assessing whether each water company has delivered the scale of long-term risk reduction benefits (e.g. via asset replacement) that it had been funded for.

The use of monetised asset risk metrics to specify price control deliverables (PCDs) would require considerable further development work.[15] But it seems superior to an approach of setting granular

[11] Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report*, page 13.

[12] Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience* workstream 2: *main report, page 32*.

[13] For convenience, in this paper we refer to the future regulatory framework of Ofwat, but we recognise that there is a possibility of Ofwat being replaced with a successor body.

[14] See Ofgem (2022) *NARM Handbook: version 3.1*.

[15] As a follow-up to the report from the Infrastructure Health project last year, Reckon has been carrying out further work for one of the sponsoring water companies to: elaborate on the potential roles of monetised asset risk metrics within a reformed regulatory framework; consider the desired/required features of these metrics; specify at a high-level the components of the methodology that could be used to produce monetised asset risk metrics for water and wastewater

and inflexible deliverables based on asset replacement volumes (e.g. as seen in Ofwat's PR24 final determinations for water mains renewal investment). Compared to granular deliverables, monetised asset risk metrics would bring the following benefits:

- Company investment being better directed at what matters to customers and the environment, in terms of mitigation of the risk of adverse outcomes arising from asset failure (and, in turn, fitting better with good asset management practice).
- More flexibility – and opportunities for innovation and learning over time – for companies in terms of which assets to replace (or refurbish), and how best to achieve operational resilience, subject to safeguards that this flexibility is not being used to deliver short-term solutions from funding levels intended for long-term investment.
- Broad coverage of assets across the water and wastewater asset base (e.g. rather than PCDs being focused on a limited subset of asset categories for which data on asset replacement volumes are available and meaningful).
- A practical way to take account of alternative types of asset intervention which differ in the duration/scale of the risk mitigation benefits achieved (e.g. asset replacement with long-life asset versus asset-replacement with short-life asset versus asset refurbishment).

The development and use of monetised asset risk metrics as part of Ofwat's price control determinations would require a greater role for engineering and asset management expertise than under Ofwat's current regulatory approach to asset health.

Retain a focus on outcomes while enhancing incentives on long-term performance

The second regulatory strategy above would not use monetised asset risk metrics in such a direct and mechanistic way. Nonetheless, a key part of the approach we envisaged for enhancing the incentives on long-term performance is to increase the prominence and credibility of information relating to companies' future outcomes performance. In the context of asset health, this points towards regulatory arrangements that involve more explicit and transparent modelling of asset failure risk – and of the consequent risks to outcomes from asset failure. We identified the following initiatives that might be introduced as part of a broader package of reforms:[16]

- **Long-term projections of outcomes performance under well-defined scenarios**. This would involve each water company providing long-term projections of its performance against common performance commitments, and potentially other areas of performance that are important to customers and the environment but not captured under common performance commitments. A key factor to be captured under different scenarios is the assumptions on asset health investment in future periods. In addition, there may be scenarios for defined external conditions under different projections for climate change that may affect the risk to outcomes. Companies would explain their projections by reference to the modelling analysis, assumptions and judgements underpinning it, which they would make available to Ofwat and potentially other

assets; and identify potential differences compared to the NARM approach used for energy network companies. This work is ongoing and not yet published.

[16] For a more detailed description, see section 4 of Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience Annex 1: Further information on workstream 2 policy packages*.

stakeholders. For instance, this might involve modelling of asset deterioration and/or asset failure under different assumptions for capital maintenance investment levels.

- **Company-owned policies on the management of asset health and risks to future outcomes**. Each water company would publish key information about the policy and methodologies that it uses to manage asset health and control risks to outcomes in the future, and information about how it has applied its chosen policy and methodologies in practice. This would refer to the long-term projections and scenario analysis from the initiative above, as well as data on outturn performance.

One option worth considering further in relation to these initiatives would be to integrate the projections and risk modelling relating to asset health into the "long-term delivery strategies" (LTDS) that Ofwat established at PR24. At PR24, the LTDS was primarily focused on enhancement activities,[17] but it could be extended to cover strategies for base expenditure and asset health investment in more detail. Nonetheless, the projections and risk management policies outlined above are something that we envisage being updated annually during the price control period, rather than just feeding into the five-year business plan process.

There is considerable overlap between the type of modelling analysis that would be needed for the long-term projections of outcomes performance and the development of monetised asset risk metrics discussed in the subsection above. Both would involve modelling of asset failure risks and modelling of the consequences of asset failure in terms of risks of adverse outcome events. There may also be value, for some purposes, in consolidating risk estimates across different outcomes (e.g. different aspects of customer service and environmental impacts) using an aggregated and monetised risk metric.

We also identified a potential role for Ofwat (or a third party) to carry out a comparative evaluation of companies in terms of how well they are managing risks to customer and environmental outcomes in the future, drawing on the elements above. The evaluation would cover both: (a) evidence on the extent to which each company explores and understands future risks; and (b) evidence on the extent to which each company manages those risks effectively and efficiently. And we identified an option of Ofwat applying financial incentives based on the outcome of the evaluation. Alternatively, the evaluation could instead take the form of an assurance exercise, especially if combined with resilience standards which specify requirements for risk tolerance or risk management over the long term.

The Call for Evidence highlights potential supervisory models which may involve "*proactive intervention, in advance of risks crystallising*".[18] In the context of asset health, there may be a role in some cases for Ofwat to take remedial action, where a water company has not provided adequate assurance on its management of future risks via the scenario analysis and risk management policies outlined above. Depending on the circumstances, this remedial action might involve further work for a company to understand risk or an agreed plan to control risk (e.g. targeted investment to demonstrably mitigate key areas of risk). If so, there would need to be a reasonable assessment of the extent to which any remedial action should be funded by shareholders and/or

[17] Ofwat (2022) *PR24 and beyond: Final guidance on long-term delivery strategies*.
[18] Call for Evidence, box 15 page 137.

customers (e.g. taking account of factors such as: the nature of the concerns about future risk; whether these are company-specific or sector-wide; and any differences between companies in historical funding levels for asset heath investment).

Across the activities and initiatives outlined above, there would be a greater role than at present for engineering and asset management expertise within Ofwat.

And if Ofwat is to take a more proactive role in forward-looking risk management, it will need to remedy other aspects of its regulatory approach that promote short-term behaviour rather than efficient long-term management of risk.[19] For instance, the PR24 business plan incentives created financial rewards and penalties based on companies' proposals for costs over the forthcoming five-year period (i.e. rewarding near-term cost control), without consideration of the implications for risk and costs over a longer timeframe.[20] The PR24 approach to business plan incentives may inadvertently penalise companies (e.g. through a lower cost of capital or punitive cost sharing rates) that provide business plans that manage asset risk efficiently over time and may deter companies from carrying out the work to better understand the longer-term risks relating to asset health. For PR29 there will be a need to fundamentally change the way that efficiency is considered as part of any regulatory assessment of the quality of water companies' business plans.

In contrast to the shortlisted policy options from the Infrastructure Health project, Ofwat's PR24 final determinations gave limited attention to long-term risk management. For instance, Ofwat's decision to provide additional price control funding that is hypothecated for water mains renewal, but no additional funding for other areas of asset health investment, was not grounded on analysis of relative risks across asset types. And the Roadmap setting out its plans on asset health data collection prioritises data on asset condition and replacement volumes, without looking to relate this to measures of outcome risk or risk mitigation.[21]

5: The potential role of resilience standards

The Call for Evidence refers to suggestions from the National Infrastructure Commission that resilience standards should be published for the water sector by the UK government. In its 2024 report on resilience standards, the National Infrastructure Commission identified that these might take a variety of forms (e.g. standards relating to customer outcomes or standards relating to infrastructure systems).

At a more general level, the National Infrastructure Commission identified a role for stress testing and scenario analysis as a means to gauge future risks relating to outcome standards:[22]

> *"High level customer outcome standards give infrastructure operators the flexibility to decide how to deliver their services. However, they are lagging indicators, because*

[19] See Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report*, pages 13 to 23 and pages 33 to 35.

[20] By business plan incentives, we mean the financial and reputational incentives that arise under the PR24 Quality and Ambition Assessment (QAA).

[21] Ofwat (2024) *Roadmap for enhancing asset health understanding in the water sector*.

[22] National Infrastructure Commission (2024) *Developing resilience standards in UK infrastructure*, page 7.

current system performance is not an indicator of how systems will perform in future. This can be resolved by stress testing systems against certain scenarios or by setting system performance standards, such as specifying levels of redundancy."

In proposing that the government sets new resilience standards for the water industry, the National Infrastructure Commission said that they should include a:[23]

"**Forward looking asset health standard considering climate change related deterioration**: The sector needs a forward looking asset health metric which assesses the likely remaining life of assets, and the probability of failure over time, to ensure that resilience is not threatened by a failure to invest in long term maintenance or to address future threats*."*

These views overlap with the regulatory reforms outlined in section 4 above which would require greater regulatory attention to forward-looking risk management in relation to asset health, as discussed in the subsection below.

Use of resilience standards as planning assumptions for long-term risk modelling

In the context of regulatory reforms outlined in section 4 of this paper, resilience standards could be used for long-term planning purposes and for modelling long-term risks (e.g. as common assumptions on tolerable performance levels over a long-term time horizon, which feeds into risk modelling and scenario analysis). The standards used for planning purposes would not need to be rigid and could be adapted over time.

We take a simplified example for the purposes of illustration, which fits within the National Infrastructure Commission's category of resilience standards relating to customer outcomes. Ofwat's ODI package for PR24 involves a performance commitment level (PCL) of an average of 5 minutes of water supply interruptions per year per customer (excluding any interruptions that are less than three hours), with water companies earning financial rewards in AMP8 for performance above this level and facing penalties for performance levels below it. There is no indication as to what PCL will apply from 2030/31 onwards. If a minimum standard of an average of five minutes of lost supply per customer per year was adopted not simply as a parameter in a short-term incentive scheme, but as a long-term planning requirement, this could provide the basis for proactive regulatory involvement in forward-looking risk management. For instance, this could involve Ofwat looking for assurance that each company:

- has an adequate understanding of the risks of falling short of the standard in the future (e.g. given asset failure risks affected by asset health and climate change);
- is carrying out sufficient activity to adequately control risk and meet the standard over the long term (including investment to maintain or improve asset health guided by risk modelling); and
- is adopting an approach to managing risk that is efficient over time (e.g. recognising the risks that a series of short-notice repairs may be more expensive in the long run than targeted proactive asset replacement).

[23] National Infrastructure Commission (2024) *Developing resilience standards in UK infrastructure*, page 9.

Further work would be needed on the development of potential infrastructure resilience standards for the water industry and how these would interact with other parts of the regulatory framework (e.g. financial ODIs or enforcement action). It would be relevant, for example, to consider whether the standards should be treated primarily as planning assumptions (for risk management purposes) or firm requirements that companies must meet.

As part of the development of the resilience standards it will be helpful to distinguish between the choice of metric or measure for the resilience standards (e.g. metrics capturing aspects of performance or risk) and the calibration of the standards (e.g. setting levels of required performance under a specified metric).

The National Infrastructure Commission has called for the development of forward-looking asset health metrics as part of work on resilience standards for the water industry. As outlined in section 4 above, there is a key role in a reformed regulatory framework for risk metrics that are derived from modelling of asset failure risks and modelling the consequences of asset failure in terms of risks of adverse outcome events. Furthermore, for some purposes such as price control cost assessment and/or setting price control deliverables, there is value in aggregating risk across different dimensions/outcomes using monetisation (e.g. as under Ofgem's NARM methodology). We would expect resilience *standards* to be more applicable to specific customer or environmental outcome metrics (e.g. metrics concerning water supply interruptions) than to monetised asset risk metrics. Compared to metrics used for specific customer or environmental outcomes, monetised asset risk metrics are more technical, complicated and abstract and they relate less closely to the outcomes that are experienced by customers and the environment.

Nonetheless, there is considerable overlap between the underlying data and asset risk modelling needed to produce monetised asset risk metrics and the underlying data and asset risk modelling needed to effectively manage risk against resilience *standards* that are specified in terms of customer or environmental outcome metrics. In our view, the development of asset risk modelling for water and wastewater systems, in a form that can be used for regulatory purposes, should be treated as a priority activity in the near-term. [24] There are a range of different ways that this modelling could contribute to the future regulatory framework and a need to avoid further delays given the likely timescales for successful implementation.

Interactions with longer-term strategic planning

Work on the calibration of resilience standards would help bring a more strategic and long-term perspective to water companies' customer service and environmental performance.

In the PR24 price review, there was not a clear process for establishing what levels of performance it would be appropriate for companies to target over the 2025-30 period, and how this might fit within longer-term objectives. In a number of areas, Ofwat's focus seemed to be on determining what performance levels (and what rates of improvement) it considered to be funded by the allowances from its econometric modelling of historical expenditure, and/or what could be explained by

[24] See Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience*: workstream 2: *main report,* pages 59 to 64.

reference to performance levels proposed in water company business plans (while not necessarily providing the funding proposed in those plans).

Resilience standards would allow for a longer-term perspective, looking beyond recent experience or the proposals in five-year business plans.[25] A more strategic approach might consider, for example:

- Over the longer term, what might be a tolerable level of risk or a tolerable level of performance shortfalls across different aspects of customer service and environmental performance (taking account of potential bills impacts)?
- Recognising that performance improvements will tend to bring additional costs for customers, and take time to achieve, where are the priorities for improvement in the near-term and over what timeframe should companies aim to meet longer-term standards?

Ofwat has neither delegated these questions to companies nor sought to properly address them itself. As the National Infrastructure Commission has proposed, there is a role for Government in setting standards in key areas.

At the same time, it will be important that the overall approach is adaptable over time. For example, the levels of specific standards might need to be refined on an iterative basis, drawing on insight gained in practice (e.g. the costs of achieving and maintaining performance improvements in specific areas) and on updated customer research (on customers' priorities between different aspects of performance and between these and bill levels). The National Infrastructure Commission recommended that the Government sets outcome-based resilience standards for the water industry which would be reviewed every five years,[26] which seems sensible (the timing would need to be aligned so that it fits with water company business planning processes).

6: Implications for price control funding

A reformed regulatory model that places more emphasis on forward-looking risk management for asset health would not be compatible with the approach to price control cost assessment that is currently operated by Ofwat. For instance, the approach used by Ofwat for the PR24 price review involved:

- Emphasis on cross-company econometric modelling that uses historical expenditure data to model future costs.
- A highly restrictive and limited process for water companies to seek adjustments to allowances derived from this modelling to allow for differences between the future and past (e.g. relating to the investment levels needed to manage future asset health risks).

[25] The proposals in companies' PR24 business plans are likely to have been affected by Ofwat's approach to the PR24 Quality and Ambition Assessment (QAA) which placed emphasis on companies' costs and performance within the forthcoming price control period, rather than on the efficient management of peformance and risks over the long term.

[26] National Infrastructure Commission (2024) *Developing resilience standards in UK infrastructure*, page 10.

- Little information available on how risks relating to asset health have evolved over time (including in the period used to calibrate base cost allowances) and the drivers of any changes.
- No modelling of future risks relating to asset health (e.g. how risks to outcomes might evolve under different scenarios for capital maintenance expenditure or asset replacement volumes).

If water companies are to be required to demonstrate that they are effectively managing long term risks, including by meeting resilience standards across future scenarios, this needs to go-hand-in-hand with a reformed approach to cost assessment that adequately funds an effective and efficient approach to asset risk management. There is simply no reason to be confident that the levels of expenditure incurred historically are sufficient for this.

We identified in our report from the Infrastructure Health project a number of broad options for reforming the approach to cost assessment, and elaborated on various types of analysis and analytical tools that could be used to provide evidence to support the most promising options.[27]

The key options would bring a more forward-looking perspective on water companies' expenditure requirements that can take more account of the costs of actions to manage asset health risk. There is a potential to draw in part on Ofwat's current base cost modelling (e.g. taking this as a starting point and then making forward-looking sector-wide adjustments or triangulating between evidence based on historical expenditure and evidence from forward-looking analysis). This would involve setting allowances in a way that gives weight to:

- Analysis of the extent to which the overall risks to outcomes due to asset failure (or poor asset health) has been stable, falling, or increasing over the period covered by modelling of historical expenditure and the drivers of these changes.
- Estimates of future expenditure requirements based on forward-looking modelling that uses either: (a) asset inventories, estimated asset replacement costs and assumed asset lives as under the approach used by WICs for Scottish Water; and/or (b) projections of asset failure risk and associated outcome risk under scenarios for asset replacement volumes and costs.

There may also be potential to replace the econometric modelling of base costs with analytical tools that allow for more direct and more accurate quantification of the costs of effective and efficient long-term management of asset health risks (e.g. drawing on the type of asset risk modelling used for monetised asset risk metrics combined with unit cost benchmarking).

Compared to Ofwat's current approach to cost assessment, the analysis and tools envisaged above would require a greater role for engineering and asset management expertise within Ofwat's team and decision-making processes.

[27] See sections 2 and 3 of Reckon (2024) *Improvements to the regulatory framework for asset health and operational resilience Annex 1: Further information on workstream 2 policy packages*.