Water Infrastructure and Asset Health – ICE presidential roundtable summary

December 2025

Background

The resilience of water infrastructure is a growing priority in England and Wales amid increasing pressures from climate change, ageing assets, and rising expectations from government and the public. Stakeholders, from non-governmental organisations and industry bodies to companies and government, have begun exploring, and calling for, formalised resilience standards to ensure that water companies are proactively managing risks and investing for the long-term.

Infrastructure resilience standards are potential tool to clarify expectations for companies, shape asset regulation, and maintain essential services in the face of disruption, whether from climate change, population growth, asset failures, or supply chain vulnerabilities. Centrally set resilience standards could provide a structured approach to ensuring that supply and wastewater services remain robust and capable of recovery.

How we currently measure resilience

The current metrics used by Ofwat to measure resilience, such as sewer collapses and mains repairs address short term measures and are backward looking – they do not address long-term, system challenges.

Water companies are subject to various discrete requirements on infrastructure which do address resilience. Companies are required, for instance, to map certain assets, meet performance targets, gather information, and plan improvements. These requirements have not, however, been linked.

The government committed to developing infrastructure resilience standards in its 10 Year Infrastructure Strategy, and the Cunliffe Review – released earlier this year, outlined the clear need for further work to be undertaken to develop national resilience standards for the sector.

The conversation focused on the 'why' and 'how' of filling resilience standard gaps. The roundtable took place before Defra's recently published white paper was released. This document is available here.

Key discussion points

- Better data on asset health and system performance is needed. This includes data on underground assets and wider asset health, position and deterioration. This data needs to be collected and linked with deterioration models to develop a fuller picture of asset and system health.

- Asset specific risks include power supply resilience and pinch points in supply chains for water treatment chemicals. Alongside these, the potential impact of cascading infrastructure failures across multiple infrastructure systems should also be considered. Standards should be rigorously tested with other sectors to avoid unintended consequences.

- Resilience standards must be supported by improved institutional capability, useful feedback loops for assessing and applying lessons learned over time, and a collaborative approach to risk allocation to support innovation. They must also pertain to green infrastructure and nature-based solutions.

- A suite of standards could within an overarching risk-based framework. Specific standards should then sit beneath that framework to add specificity and clarity. Standards need to include clear, scenario-based targets. As these are developed, resourcing, capability and consumer affordability will all need to be considered alongside resilience outcomes and asset performance, with clear review processes built in.

- Communicating the purpose of resilience standards to the public will be crucial. The language of risk must be accessible, raising awareness of the role of users in a resilient system and the impact on safety from asset failures have will be central to this.

Defra is building on previous work to identify resilience gaps

This roundtable was chaired by ICE past President, Professor Jim Hall and held as a collaboration between the Institution of Civil Engineers and the Royal Academy of Engineering.

The event was held on behalf of the Department for the Environment, Food and Rural Affairs policy team for asset health and infrastructure who are leading on elements of the response to the recent Cunliffe review of the water sector, and provided an opportunity for water sector leaders to feed their expertise into the policy development process ahead of the publication of Defra's upcoming water white paper.

Jim opened the discussion and covered the findings from the National Infrastructure Commission's (now part of the National Infrastructure Service Transformation Authority) 2024 report on developing resilience standards in UK infrastructure.

The report identified gaps in resilience standards across a variety of sectors including water. These focused on the sector's ability to respond to peak water demand, the vulnerability of communities' reliance on single sources of water supply, the need for forward looking asset health metrics, and the need for a desired risk reduction target for customers at risk from a one-in 50-year storm.

Defra's work programme

The Cunliffe report contains the line "we don't know where we are and we don't know where we're going" and that's where Defra is starting from in undertaking the ecosystem scanning work to understand where the existing gaps in resilience and resilience standards lie. Their focus will then turn to what the next steps are in terms of resilience standard development in the water sector.

Key themes that came through in the report which the department is now building on include the need for asset mapping, a hard look at funding and allowances and improved oversight and capability. At present, no single regulator has a strong grip on asset resilience and performance. Engineering capability on the regulator side is also a barrier to improvement.

What are the gaps?

Single source of supply: There is general support for the NIC recommendation for a standard for number of people relying on single source, but this should be extended to also consider the vulnerability of trunk water mains and who could be affected if they fail. In major cities, millions of people would be at risk of loss of services if water could not be moved through single trunk mains. Despite their central role, many water companies are managing these trunk mains on a reactive basis, which is worrying.

Asset data: Better data on asset health and system performance is needed. This includes data on underground assets, on asset health, position and deterioration. This data needs to be collected and linked with deterioration models to develop a fuller picture of asset and system health. There are also opportunities for utilising new innovations, for example, using AI to process video surveys of sewers. Data standards may help raise the quality of evidence and understanding of assets.

Some providers have carried out a total condition assessment of their whole network. Many centres in Europe do this much better than the UK. It may be helpful to set out the unacceptable limits.

Power supply: Power supply resilience and its interlinkages with water supply was identified as a gap. It was noted that the electricity sector's standards for supply interruption are less rigorous than what water companies need. It will be important to understand what systems would be affected by local power station disruption and where the is backup generation available.

Chemical supply chain: Pinch points in the supply chains for water treatment chemicals is also a concern and often identified as a key risk for water companies, as a disruption to the supply will limit how much water can be treated. It was suggested that a comprehensive assessment of where the risks are is needed.

Interdependencies: Alongside asset-specific resilience gaps, potential impact of cascading infrastructure failures across multiple infrastructure systems should also be considered. First steps should include a resilience assessment to understand where the interconnections, and vulnerabilities, lie as well as any climate-related vulnerabilities of assets themselves (e.g. assets that could be affected by landslips or risks of accelerating deterioration in extreme weather).

There is a need to ensure standards make sense in all future climate scenarios (e.g., 2 and 4 degrees of warming), so that interventions made today are not making it worse in the future.

The fourth round of the adaptation reporting power focused on the impact of climate shocks. TfL and Heathrow were noted as exemplary in their reporting on interdependencies in ARP4. We must now also consider the cascading effects of operational shocks as well. Attendees discussed the potential for soft requirements for operators to talk to other stakeholders about the impacts of unexpected events.

This also applies to cross-sector and cross-land use vulnerability. For example, understanding how agricultural farming practices affect environmental targets for water companies and downstream resilience.

Performance and monitoring of natural assets: Natural assets such as aquifers and engineered nature-based solutions are key assets in the system, the condition of watercourses can impact water infrastructure and drought and flood management will be important. Standards will also need to pertain to green infrastructure and nature-based solutions. As there is a drive for creating more natural assets, we need a better understanding of how to monitor performance and what aspects need to be measured. In some ways, attendees reflected, dealing with nature would be more difficult than built assets.

Water quality: The lack of up-to-date water quality metrics was noted. It was also noted how different standards around water quality can lead to counterproductive outcomes, such as the limitations on effluent reuse.

Demand management: There is a (9%) target for demand reduction but the question of how to apply demand management measures remains. There are few policy levers for reducing demand but much of the resilience planning is based on assumption of the 9% target being achieved.

Organisational resilience and adaptive planning: Minimum resilience standards for organisations could be put in place, including requiring comprehensive assessments of where risks lie. Resilience standards must be supported by improved institutional capability, useful feedback loops for assessing and applying lessons learned over time, and a collaborative approach to risk allocation to support innovation.

How should standards be developed?

With any one of these gaps, there is a trade-off to be made between setting standards with specific targets versus taking a process driven risk-based approach. The latter approach may be easier to apply but will come with significant variability in application, whereas standards provide clarity but are much more challenging to set. Some areas, such as storm water drainage could be handled through a risk-based approach or a standard.

Riks-based framework: One option might be to have a suite of standards that sit within an overarching risk-based framework. Water companies are practiced in thinking about risk, but it was noted that this does not always develop into good risk management plans. Risk assessments – understanding of the consequences and controls, should consider impacts to linked assets and the overall services so this can be fed into asset management plans and monitoring. There is value in being able to demonstrate that an organisation has a good risk-management process in place. The example of the National Resilience Standards for Local Resilience Forums (LRFs) was raised, as was the Water Industry Commission for Scotland's risk-based approach introduced in the Strategic Review of Charges. Organisational resilience standards may include a soft requirement to explore interdependencies to identify risks.

Specific standards: These should sit beneath a risk-based framework to add specificity and clarity. Standards need to include clear, scenario-based targets. The importance and benefit of having a standard to deliver against was emphasised - standards don't need to be perfect and should have scope for review and iteration but measuring and reporting against standards drive cultural change. To set these targets we need to think about the outcomes we want to set for society.

As these are developed, resourcing, capability and consumer affordability will all need to be considered alongside resilience outcomes and asset performance.

Standards will need to have a clear review process built in and be iterated on over time. Feedback loops and institutional skills and capability for learning are required.

It is also important to consider who the burden of meeting the standards falls on and what kind of infrastructure investment that will incentivise.

From a water company perspective, asset health was the key priority, as 'the tide that raises all boats'. A standardised approach to assessing the risk of asset failure is required, for example, through deterioration modelling.

A resilience standard could include a target focused on 'no further worsening' of the incidence of asset failures. It was noted that worsening of performance is particularly unacceptable to the public, however, there were questions over whether this target was good enough. Some water companies have undertaken a review of asset health and failure risk and used this as the basis to ask for additional funding via Ofwat, with mixed success. The regulator's asset health roadmap as part of price review 24 looks promising, and there is now a focus on engaging with regulators on other asset types. It will be important to consider the level of risk tolerance for different asset classes.

Attendees suggested Defra look at Ofgem's ranking of energy sector asset health through the DNO common network asset indices methodology. It comprises a matrix approach where assets are ranked by levels of criticality, and physical deterioration.

Systems health: One approach could be establishing a systems health standard rather than an asset focussed one, bringing together data on asset condition and system performance, framing the standard around the service that the infrastructure provides. However, it was noted that if we focus on system resilience, there may be lots of assets which are deteriorating but which fall below the priority threshold. Equally, there may be some assets for which deterioration is acceptable.

Learning lessons from examples of bad practice is also worth doing. One example used of what not to do was the notion of 'economic level of leakage'. This was felt to be a flawed argument, as however cost efficient it may be, leakage is not socially acceptable, and the water lost is a valuable resource. It was felt this notion set us down the wrong path. It was also noted that standards should not seek to separate part of the industry off, given the complex landscape of governance across water. Standards are not simple and need to be introduced over time – they shouldn't be designed to just address the immediate problems and need some degree of interpretation and flexibility.

Peak water demand: A suggestion was raised for setting a standard for a minimum number of hours of storage e.g., 5-hour peak storage.

Communication and accessible language: Communicating the purpose of resilience standards with the public will be crucial. The language of risk must be accessible, raising awareness of the role of users in a resilient system and the impact on safety from asset failures have will be central to this. The room discussed whether a standard for communication was needed, though attendees suggested a focus on culture and best practice may be better placed.

Cross-sector learning: Resilience standards and targets should be tested with other sectors to avoid unintended consequences and help to address cross-sector cascading risks It was noted that, at present, it can be difficult for organisations in this space to work together as a result of their legislative remits where the benefit of work is seen to accrue to others.

Resources: There was consensus on the need for those developing the standards to be properly resourced with dedicated skilled staff. When this kind of work has been done in the past it has relied in part on the voluntary involvement of sector experts which has slowed development and the implementation of standards. Equally, regulators need to be appropriately resourced to effectively assure the application of these standards.

Questions to take away

- What is required to improve the collection and use of data on asset health and system performance?
- How should we best address the risk of cascading failures across asset classes? Is the potential for soft requirements for operators to talk to other stakeholders about the impacts of unexpected events the best way forward?
- How can we best ensure that the language of risk is accessible for the public?
- What specific standards should sit below a risk-based framework?

Further reading

- Defra's recently released white paper.
- The ICE's analysis of the white paper and Cunliffe Review.
- The Cunliffe Review's final report.
- OfGem's DNO common network asset indices methodology.
- ICE Cunliffe review final report response blog.