

MOVING FROM TRADE-OFFS TO SYNERGIES IN THE WATER SECTOR

How the revised PAS 2080 can help improve performance in the water industry.

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We live in a world of competing priorities, where short-term needs sometimes make it hard to progress long-term goals. The controversy over extending the ULEZ zone in London to improve public health, for example, has led to fears the added costs to motorists will hit those who can least afford them.

The water sector is no exception. The UK Environment Secretary has recently written to water companies suggesting they might delay measures to meet “non-statutory commitments including net zero” to reduce short-term costs to customers. The expected benefit is that this will help companies focus on meeting the urgent need to improve performance; but can we really afford to delay action?

The climate emergency is arguably our biggest long-term threat. According to the Copernicus Open Access Hub, July 2023 saw daily surface air temperature records broken four days in a row, the hottest month ever recorded, and record global sea surface temperatures¹. Anthropogenic emissions are not reducing fast enough. The Climate Change Committee highlights a lack of urgency and opportunities being missed². Meanwhile, we struggle to honour existing international agreements, such as on climate financing, and to make new ones, such as on deforestation³. Climate change is not a future problem and we should not be decoupling it from other priorities.

Conventional wisdom is that we must make trade-offs: to gain in one area (making urgent short-term performance improvements), we lose out in another, (long-term decarbonisation of the sector). But does it have to be this way? Surely, we can find more ways to achieve synergies rather than trade-offs⁴.

The situation in the water sector is, to some extent, representative of UK infrastructure as

reported in the Green Construction Board’s paper “Good progress but not fast enough”⁵ published in 2021.

In 2019, the water sector’s public commitment to achieve net zero operational emissions by 2030 was leading the pack⁶. Individual companies developed their net zero route maps and made good progress in reducing their use of fossil fuels and grid electricity, electrifying their transport fleets, deploying more renewable energy, and monitoring process emissions. Since then, it has become clear that process emissions require a longer-term plan and commitments need to encompass total emissions, particularly the carbon emissions arising from capital programmes. Notwithstanding the recent steer from Westminster, Ofwat has said it expects to see this integrated into companies’ long-term plans⁷. While some companies have pioneered approaches to understand their capital carbon emissions and have been reducing them, others are revisiting their route maps to encompass all emissions to support the national net zero target.

PAS 2080 can help improve performance
The re-launch of PAS 2080 in April this year, is testament to a great collaborative effort by many across the industry who recognise the need for change. The revised version embraces some key themes very applicable to the UK and Irish water sectors:

- Systems thinking and net zero – the most effective decarbonisation depends on considering asset improvements in the context of the connected networks and wider systems (on the transition to net zero) of which they are part.
- A whole life view – assess and manage the full lifecycle impacts of capital investments.
- Resilient nature-positive solutions – designed to both adapt to environmental change and deliver multiple benefits – natural capital, biodiversity, greater community value, as well as carbon reduction.
- Collaboration – generate fully integrated value chains with water companies,

designers, constructors, and product suppliers all working with regulators and stakeholders. The clause on procurement encourages asset owners to integrate carbon formally into the process.

Importantly, PAS 2080 is not a badge to be achieved on individual projects; it requires organisational change and is a long-term commitment.

Water sector should set the right ambition

As PAS 2080 reminds us, net zero is a national target. Should it also be a sector target, or should companies work with others in their regions on regional targets? I am not convinced that individual companies should be striving for total ‘net zero’ on their own. Rather let us support companies in setting ambitious targets for deep decarbonisation.

Targets for capital works should be based on absolute carbon budgets. Achieving a percentage reduction from business-as-usual is no longer good enough. Focus instead on setting annual carbon budgets aligned to the net zero transition, translate them into targets for capital programmes and collaborate with the value chain to achieve them. At least one company with which we are working is already pursuing this hard.

This means understanding the carbon emissions from capital works, including their future operational impacts, then forecasting the year-on-year reductions needed. The potentially huge carbon impacts expected from the WINEP, storm overflow and SRO programmes need to be subject to ambitious carbon reduction targets. High level estimates, such as tonnes CO₂e per £m spent, give a good understanding of scale but, to reduce uncertainty, better forecasting based on types and numbers of solutions is needed. The supply chains can help since, as designers, constructors, and product suppliers, we understand the resources needed to deliver.

Carbon budgets will need to be kept under constant review as decisions made today (e.g., to defer spend) may impact emissions

tomorrow. We should also factor in how the economy is expected to decarbonise over time. We might want to deploy more nature-positive solutions earlier since it takes time for the sequestration they bring to take effect.

PAS 2080 explicitly extols whole systems thinking beyond conventional physical and financial project boundaries to consider the wider consequences of interventions. Traditionally, in the pursuit of financial efficiency, we have tended to group projects of similar types together. Grouping projects by geography, not only by type, will enable more cross-sector, system-level approaches. For example, in improving wastewater treatment to remove nutrients, we should include the downstream carbon impacts of the extra sludge produced, since treating this could use more energy and chemicals and produce more byproducts.

Widening the boundary helps us to recover more valuable resources such as excess heat from CHP systems to provide heat for horticulture or using heat from sewers to reduce building energy demands. Decarbonisation can also help promote blended approaches to improving water quality where measures in the upstream catchment are combined with reduced scale end-of-pipe solutions leading to lower overall carbon emissions and other benefits. Systems approaches are already being incorporated into strategic resource options to improve regional water resilience but is enough being done to minimise their carbon impacts?

Make carbon reduction central to delivery.

A robust PAS 2080-compliant carbon management process needs to integrate into end-to-end asset management and delivery, as some water companies are doing. Additionally, this means identifying hotspots, assessing the carbon of all options, driving reductions, challenging at gateways, and monitoring progress. Crucially, carbon must be included as a key criterion on the decision scorecard. We find that combining the stages of the updated PAS 2080 carbon reduction hierarchy – avoid, switch, improve – with the TOTEX hierarchy – eliminate, operate, invigorate, fabricate – widely used by water companies, can drive value by addressing performance, carbon and cost altogether. Seeing individual assets as part of networks and systems is an important lens for reviewing needs. Combined with an adaptive management approach, it could help eliminate the need for new assets.

TOTEX hierarchy	Carbon reduction hierarchy		
	Avoid	Switch	Improve
Eliminate the need for new assets	Evaluate basic need and explore alternatives using network, catchment systems-level approaches.	Adopt adaptive planning and apply thresholds. Switch to performance-based standards.	Improve asset data, smarter performance monitoring and control.
Operate existing assets more effectively	Avoid introducing new demand for fossil fuel use, chemicals, etc.	Replace fossil fuel use with renewables and support the circular economy.	Improve operational regimes to improve efficiency.
Invigorate existing assets	Avoid new construction by reusing or refurbishing existing assets.	Integrate nature-based solutions with existing asset systems using risk-based approaches	Apply circular economy principles to maximise byproducts recovery.
Fabricate new assets	Avoid designs that depend on carbon-intensive technologies, materials and consumables.	Switch to alternative technologies, leaner designs, low carbon materials, more off-site fabrication.	Use construction techniques that avoid waste, minimise materials and energy use on site.

Invigorating asset systems through reuse or refurbishment and switching from fossil fuel to renewables also helps drive down the emissions of improvements.

When new asset fabrication is required, finding ways to switch to low carbon alternatives is vital and depends on co-ordinating enablers, such as challenging outdated asset standards, engaging suppliers of low-carbon products early, and integrating renewable energy and resource recovery. The mandate to adopt more nature-based solutions for managing drainage and treating wastewater is clear and there are now some good precedents such as the Clifton Wastewater Treatment Works - Integrated Constructed Wetland project which took a collaborative risk-based approach. However, more work is needed to clarify which types of nature-based scheme are best to deliver genuine carbon reduction.

Manufacturing more packages offsite, improving materials recovery and reuse on site, eliminating waste, and deploying carbon-efficient construction remain vital routes to decarbonising capital schemes. We must keep sharing not only big successes but also the marginal gains achieved.

How do we decarbonise faster?

Carbon reduction needs to be central to all engineering disciplines. We must both substantially reduce the amounts of carbon-intensive concrete, steel and diesel we use and find lower carbon alternatives. There is a lot of exploration now ranging from trials of low carbon concretes and exploring alternative rebar materials to specifying

alternatives to GRP kiosks and reviewing the amount of GAC media used in water treatment. More of the contractors with whom we work are instructing their designers to specify alternatives and requiring carbon data to be incorporated into digital models.

Carbon challenge workshops are a great practical tool, particularly if used both at the front end of projects and further along like a HAZOP going through step-by-step to cut out the carbon and weighing up the cost-benefit of doing so.

We must adopt many measures in combination to achieve our decarbonisation targets. The best outcomes will be those where multiple measures add up to a big carbon saving – from system level down to asset level, from the top of the carbon and TOTEX hierarchies to the bottom, bringing our collective expertise from our respective disciplines and organisations together in a collaborative way on every project. Doing so will help the water sector produce the synergies it seeks – both creating solutions that meet today’s performance imperatives and progressively decarbonising, whilst protecting nature and enhancing people’s lives.

References

- 1 <https://climate.copernicus.eu/july-2023-sees-multiple-global-temperature-records-broken>
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- 4 <https://www.nature.com/articles/s41599-019-0335-5>
- 5 <https://www.constructionleadershipcouncil.co.uk/news/good-progress-but-not-fast-enough-decarbonising-infrastructure/>
- 6 Public Interest Commitment (nwg.co.uk)
- 7 PR24-and-beyond-Final-guidance-on-long-term-delivery-strategies_Pr24.pdf (ofwat.gov.uk)