Defra

Environment Act 2021: Environmental Targets

Background to CIWEM

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector. Established in 1895 and with over 10,000 members globally, the Institution provides independent commentary on a wide range of issues related to water and environmental management, environmental resilience and sustainable development. CIWEM welcomes the opportunity to respond to Defra on its consultation on the environmental targets within the Environment Act.

In drafting this response, we received input from our Water Resources and Wastewater and Biosolids specialist panels.

Summary of our response

- **We strongly support a statutory target for water demand reduction in England.**
- **A national water demand target is necessary to drive the water demand management agenda, reduce abstraction and provide benefits for nature.**
- **We support the national target being based on a Distribution Input basis, but this should not preclude strong government focus on bringing down per capita consumption and driving efficiency in parallel.**
- **The target should be more ambitious on reducing household consumption.**
- **The target for the leakage is less ambitious than that which water companies have planned for in Water Resource Management Plans.**
- **Policy to encourage non-public water supply users to reducing abstraction much also be introduced.**

Water Demand

Proposed target: Reduce the use of public water supply in England per head of population by 20% by 2037.

Question: Do you agree or disagree with the level of ambition proposed for a water demand target?

Disagree

Water abstracted for human use both reduces the amount of water available for nature, which will come under increased pressure as a result of climate change, and requires processing which uses energy and emits greenhouse gases, negatively contributing to the climate and ecological crises. Reducing water demand is critical to ensure security of supply and to meet the needs of nature, industry and people.

CIWEM strongly supports a statutory target for water demand reduction in England. A national water demand target is necessary to drive the water demand management agenda, improve water efficiency, reduce water abstraction and provide benefits to nature. However, we believe the target to "reduce public water use per head of population by 20% by 2037" has several drawbacks.

Firstly, as the target is on a Distribution Input/per capita basis, any benefits in water efficiency for the environment could be negated by population growth. As the population grows, the benefits for the environment of reduced abstraction are conversely negated, but the target becomes easier to achieve. And if the population increases by more than 20% then, in reality, more water could be taken from the environment than is currently extracted and the target would still be met, but with no benefits to nature – which is the objective of the target. Improving water efficiency can offset increases in abstraction that will occur as a result of population increase, leaving a similar amount of water available for nature. A target which is not on a per capita basis would be much more appropriate and better provide the intended benefits to the environment.

Secondly, the proposed target sets a 31.3% target for leakage which does not reflect the current levels of ambition committed to by water companies in the Water UK Leakage Routemap, in which water companies have committed to triple the rate of leakage reduction and halve leakage by 2050[1]. The target should be increased in order to reflect the higher level of ambition already included in Water Resource Management Plans published in 2019.

Thirdly, a DI/per capita target on public water use will not drive any action on household water efficiency on its own. Public water use is predominately made up of household consumption (55%), non-household consumption (21%), and leakage from water supply networks (21%)[2]. Action on any one of these major uses will help meet the target, without a need to focus on reducing household consumption. Government, regulators, water companies and other stakeholders must proactively raise public awareness of the intrinsic value of water resources, the nature of pressures upon them and practical (and ideally tailored) advice to encourage behaviour change and reduce water use. CIWEM believes the government must encourage demand-side action as well as supply-side, and not rely solely on water companies to achieve water demand reduction.

We believe that the household per capita consumption (PCC) target at 122 litres per day by 2037 is not ambitious enough. The Environment Agency's National Framework for Water Resources says that PCC needs to fall to 110 litres per person per day by 2050. This target was set to be the least ambitious and could be achieved without government action in addition to water company action. Given future climate change scenarios and the environmental destination for water resources CIWEM believes that England should be

[1] Water UK. A Leakage Routemap to 2050. 2022.
[2] Environment Agency. Meeting our future water needs: a national framework for water resources. March 2020.

aiming for an average of less than 100 l/p/d[3]. Additional, strong policy drivers will be needed to reduce PCC, such as water metering and labelling.

Non-public water supply abstractors, which make up approximately 1-5% of total water abstraction depending on the catchment[4], must also be encouraged through introduction of government policy to reduce their water use, as they will not be covered under a target based on Distribution Input.

Nutrient Pollution

Target - Reduce phosphorus loadings from treated wastewater by 80% by 2037 against a 2020 baseline

Question: The target needs to allow flexibility for water companies to use best available strategies to reduce phosphorus pollution, including the use of nature-based and catchment-based solutions. Do you agree or disagree that the proposed target provides this flexibility?

Agree

We agree that water companies should be able to determine the range of approaches deployed to achieve P reduction targets. There are considerable challenges associated with achieving this target from a technical and carbon (both embedded and operational) perspective and flexibility would enable cost and wider environmental impact to be mitigated whilst taking opportunities to work at the catchment scale and with supply chains to reduce P at source, rather than having to remove it through treatment.

Question: Do you agree or disagree with the level of ambition proposed for the nutrient targets?

Disagree

[If disagree] What reasons can you provide for why government should consider a different level of ambition?

We welcome the ambition behind putting in place strong targets for phosphorus loading reductions in wastewater effluent, beyond the current 50% targets worked into AMP programmes to date. Moving to this level is a big and potentially highly costly step and should be considered in the context of the returns other sewerage undertaker investments might make for the environment, as well as the level of understanding of other non-nutrient factors which impact river ecology.

Sewage treatment works without phosphorus removal can generally see a 50% reduction in P from influent to effluent (so going from ~6mg/l total phosphorus to ~3mg/l). With well-run

[3] CIWEM. Planning Water Resources in England. 2018.
[4] Environment Agency. Meeting our future water needs: a national framework for water resources. March 2020.

chemical precipitation, it is possible to achieve up to 90% (from 6 to below 1mg/l). With novel technology you can achieve more (perhaps up to 95%).

The consultation's reference to loads from treated wastewater could be interpreted to mean that all works without P removal should have additional treatment and this could be enough to reduce the overall national load. Alternatively it could mean that every single WwTW has to reduce P load against its own 2020 baseline.

Given the extent of phosphorus reductions in discharged effluents from these larger and medium sized treatment works up to 2020, smaller treatment works may need to be targeted in order to achieve the aim of a further 80% reduction, which may result in a very large numbers of smaller treatment works requiring significant investment to achieve a modest reduction in catchment phosphorus loads. Some treatment works already have discharge permit requirements below best available technology currently, so including these within the scope of a further 80% reduction is potentially technologically impossible.

Nature-based solutions could include biological treatment processes, but these are presently impractical for a very large number of small sites due to land take requirements. Other 'low tech', systems such as natural adsorptive filtration media can be successful in achieving extremely low effluent phosphorus concentrations but are land extensive and not practical for medium of large wastewater treatment plants.

The national programme looking at the ability of various technologies to achieve effluent phosphorus concentrations down to 0.1 mg/l or less evaluated a number of processes. Almost all of these were physio chemical processes, and none were found to be capable of meeting a regulatory effluent standard of 0.1 mg/l phosphorus (some were able to meet or exceed this requirement some of the time but not with sufficient reliability to meet it as a regulatory standard). This level would be required in many instances to meet the target 80% reduction.

We would also flag two areas of uncertainty concerning the accuracy of measuring P concentrations at low levels, as well as the interactions of other factors which potentially impact on river ecology:

Measuring P at low levels: Standard laboratory analysis of phosphorus as phosphate in water samples is undertaken by the 'molybdenum blue' method. This is required as it is the phosphorus speciated as phosphate or hydrogen phosphate that is regards as 'reactive' or bio available. Historically, this has been used in the wastewater sector to measure typical concentration in the range 0.5 – 10 mg/l PO4-P and so phosphorus fractions comprising sub 100 ü$g$ll quantities have not been of great concern.

It's accuracy/reliability to measure at concentrations of below 0.1 mg/l is questionable. This is the subject of ongoing multi water company sponsored research due to report in 2 years' time which is also looking at phosphorus speciation with regards to the reporting of the molybdenum blue test, and as expected the chemistry starts to become less straightforward at such low concentrations raising concerns on both measurement accuracy and species identification.

More research is required in this area to improve understanding of the speciation and bio-availability of these small phosphorus fractions and importantly improved accuracy in their measurement.

This is linked to the second concern; that of the impact of further reductions in phosphate concentration on the ecology of the receiving waters without consideration alongside other factors:

Whilst the measurement of phosphorus concentrations in river water and its apportionment to point and diffuse sources is relatively straightforward (subject to the comments above) its impact on the ecology and in particular primary production in the receiving waters is far less clear. At near-to growth-limiting concentrations of phosphorus, looking at phosphorus in isolation may not give the full picture of the mechanisms that govern primary profusion. More research is required to establish the impact of other macro and micro nutrients when phosphorus concentrations are at or close to the eutrophic/oligotrophic boundary.

Aside from chemical parameters UV intensity is a key input driving algal and macrophyte production. Therefore, the impact of water turbidity which governs light penetration into the water body and of shading (by trees) which limits the amount of light reaching the water surface needs to be considered.

In a drive to regain 'natural status' of water courses, shading/ tree cover may be an essential part of the primary production equation. In a 'natural state' most of the UK as well as Western Europe would have been forested which would fundamentally change nutrient flows in the wider ecosystem and therefore a judgement needs to be made as to what the term 'natural status' means in practice.

At present river trusts such as the Tamer River Trust in the South West are actively removing trees from river banks in order to increase sunlight incidence at the water surface. If previously limiting, this will increase primary production (which is the aim) and run counter to the aim or reducing phosphorus concentrations (assuming that these reaches of the Tamar are running with eutrophic levels of phosphorus). This is an example of why reaching a prescribed chemical water quality in isolation may not deliver the environmental benefits which they are aimed at. It is also at odds with a desire to restore 'natural status' to water bodies by looking in isolation at phosphorus concentrations.