

Early engagement notice – Updating wastewater treatment pathways for the Seventh Carbon Budget

A Pre-Procurement Notice from the Climate Change Committee (CCC)

Background on the CCC

The Climate Change Committee (CCC) is an independent, statutory body established under the Climate Change Act 2008. Our purpose is to advise the UK and devolved governments on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

Part of the CCC's role is to advise the Government on the appropriate level for each carbon budget – a cap on the amount of greenhouse gases emitted in the UK over a five-year period. The budgets describe the cost-effective pathway to achieving the UK's long-term climate change objectives. They take account of economic, social and technological factors.

We are in the early stages of our work programme for the Seventh Carbon Budget (the period from 2038-2042). As part of this we would like to update our pathways for emission reductions from wastewater treatment.

Context

Wastewater treatment emissions are a small proportion of total UK emissions, but this proportion increases by 2050 in our Sixth Carbon Budget scenarios, as other sectors largely decarbonise while wastewater emissions only fall by a small amount.

Assumptions on emission reductions from wastewater in our Sixth Carbon Budget scenarios were based on academic papers¹ and discussions with academics and stakeholders in the water industry. This resulted in emission reductions of 20% by 2030 across all our scenarios. This increased to a 50% reduction by 2050 in two of our scenarios (Widespread Innovation and Tailwinds).

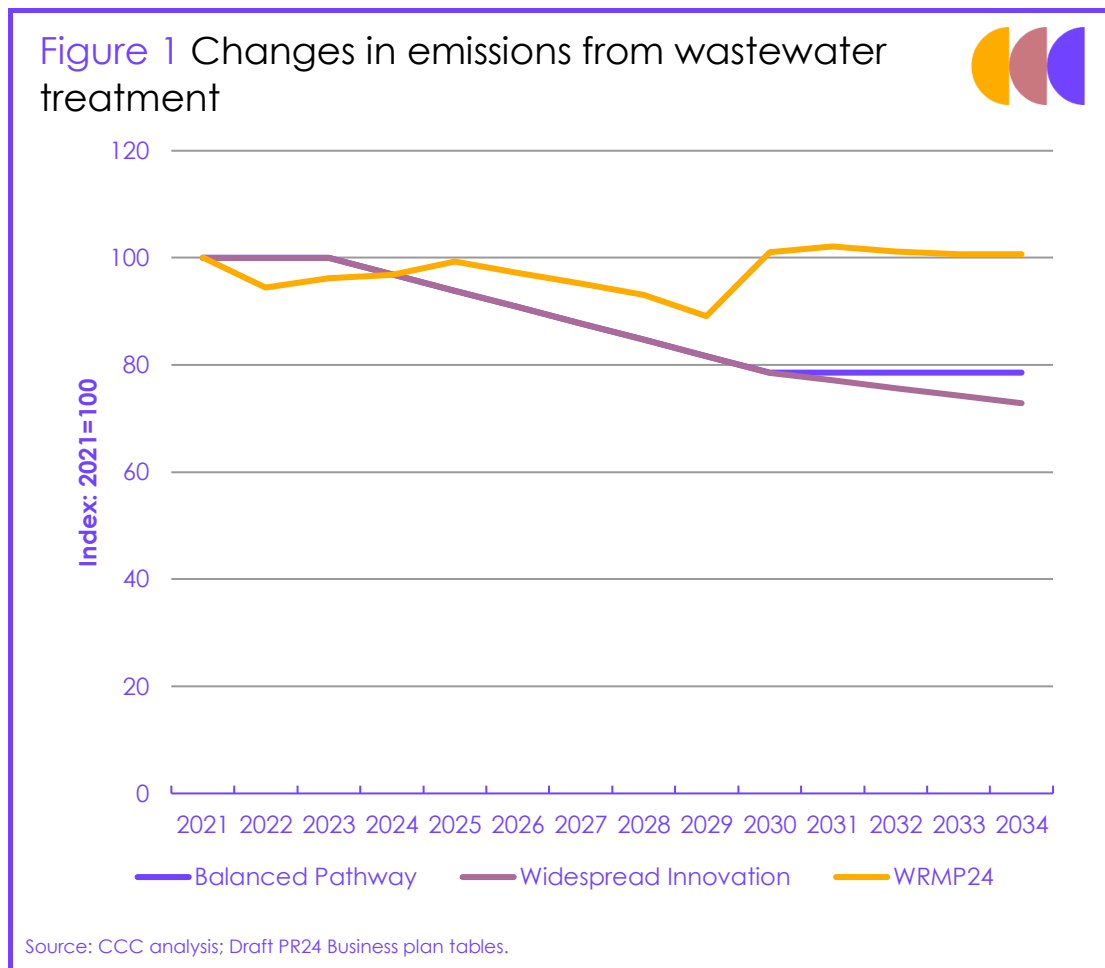
The main solutions assumed to deliver this abatement were:

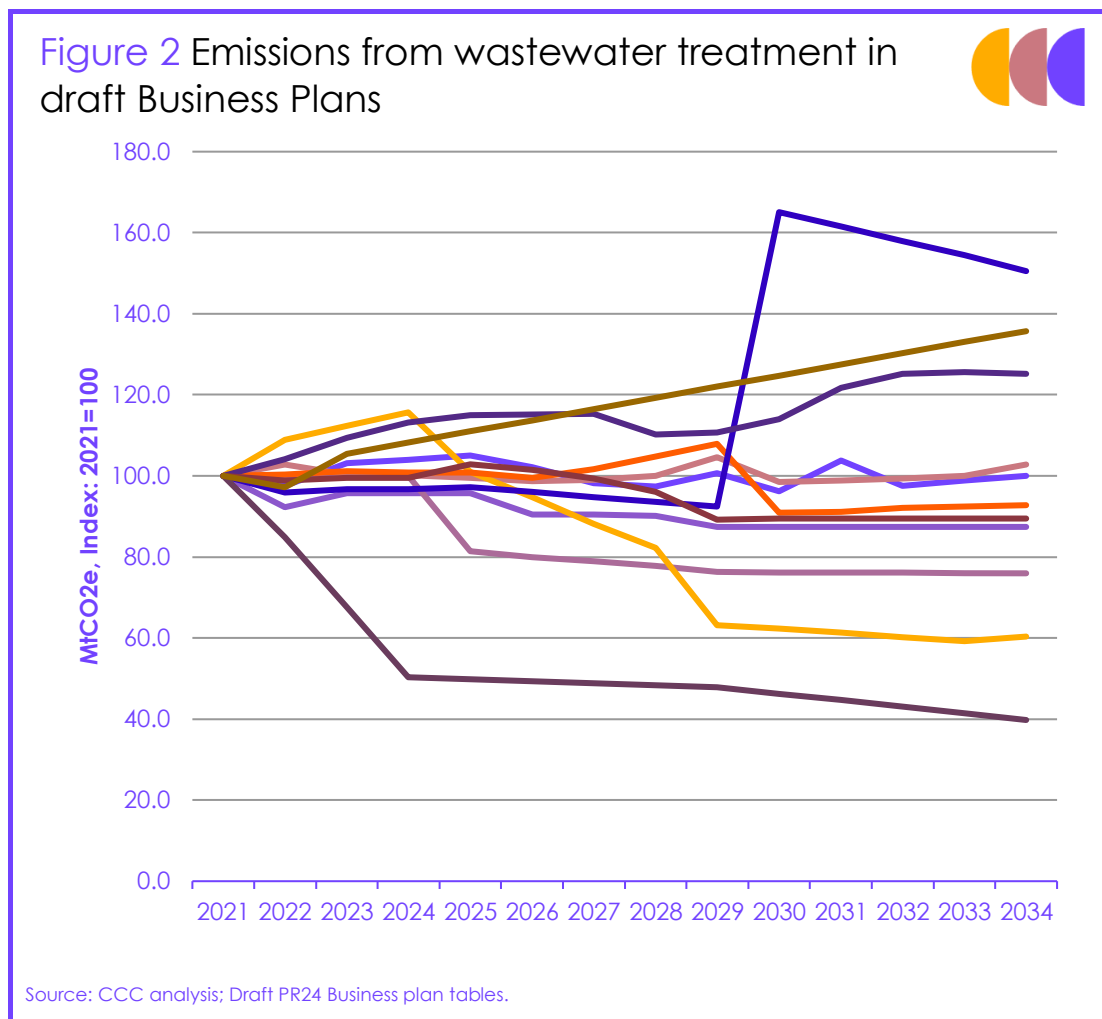
- Across all scenarios – conversion of wastewater treatment plants to advanced anaerobic digestion systems (increasing the amount of biogas extracted and reducing methane emissions) and process optimisation improvements and leak identification using on-site emissions monitoring of CH₄ and N₂O.
- More ambitious scenarios – more innovative options such as membrane-aerated biofilm reactors or partial nitrification-Anammox processes.

Water companies in England and Wales submitted their draft business plans to Ofwat in October 2023. These plans are going through an on-going verification process so are

¹ Including: J. L. Campos et al (2016) Greenhouse gas emissions from wastewater treatment plants: Minimisation, treatment, prevention, Journal of Chemistry, available at: <https://www.hindawi.com/journals/jchem/2016/3796352/>; Collivignarelli MC, Abbà A, Carnevale Miino M, Torretta V. What Advanced Treatments Can Be Used to Minimize the Production of Sewage Sludge in WWTPs? Applied Sciences. 2019; 9(13):2650, available at: <https://www.mdpi.com/2076-3417/9/13/2650>

subject to change but include plans for wastewater treatment out to 2034, with associated solutions, costs and emissions changes. Aggregate wastewater emissions in draft plans are relatively steady over the period in question – differing significantly from the 20% reduction assumed in our Balanced Pathway (Figure 1). There is significant variation between individual water companies, with changes in emissions over the period ranging from a 60% reduction to an 50% increase by 2034 (Figure 2).





Potential project

We would like to commission a research project to update our wastewater treatment emissions pathways for the Seventh Carbon Budget.

This would likely involve:

1. Reviewing assumptions around wastewater treatment across the wastewater sector including water companies draft business plans. This should include:
 - Baseline assumptions – on wastewater treatment volumes and emissions, what is driving these (e.g. population growth, sewage treatment standards, other factors) and how they compare to baseline assumptions in the Sixth Carbon Budget.
 - Wastewater treatment solutions – including their abatement potential, timeline for implementation, costs, energy use, limitations, and other relevant information included in plans.
2. Reviewing additional sources, including:
 - Academic literature published since the CCC's advice on the Sixth Carbon Budget.

- Industry sources.
 - Water company plans in Scotland and Northern Ireland.
3. Engaging with a range of stakeholders to test assumptions, including:
- Water companies in England and Wales, to understand proposals in their published business plans and the range in ambition.
 - Other relevant stakeholders in academia and industry, including in the industrial wastewater treatment sector, and water companies in Scotland and Northern Ireland.

Outputs would include:

- Spreadsheet with quantitative outputs for three scenarios:
 - One baseline and two emissions reduction pathways (updated Balanced Pathway and an Additional Action Pathway).
 - Pathway outputs should include residual emissions, abatement by source, costs (capex & opex), energy use and impact on water bills (if possible).
- Report – summarising the methodology, outputs and limitations of the research, in a publishable format.

We are planning to advertise a tender for this research project on **w/c 11 December 2023**, with bids submitted by **w/c 15 January 2024**. The intention is for this research to commence **early February 2024** and last for up to two months. A first-draft set of analytical outputs will be required by **early March 2024**.

We are inviting feedback on the idea outlined above to gauge the feasibility of undertaking credible and robust analysis within the timelines described. We are open to suggestions on the appropriate scope and methodology for undertaking this work.

We are inviting suppliers who may be interested in this project, have ideas on how to refine or tighten its scope, or want further information to get in touch with Bianca de Farias Letti (bianca.letti@theccc.org.uk) and Felicity Taylor (felicity.taylor@theccc.org.uk) by **27 November 2023**.