**Early engagement notice – Interventions for building economy-wide water resilience**

**A Pre-Procurement Notice from the Climate Change Committee**

**Background**

The Climate Change Committee (CCC) is an independent, statutory body established under the 2008 Climate Change Act. It is tasked with:

* Providing independent advice to the Government on risks and opportunities to the UK from climate change, in part through the UK Climate Change Risk Assessment, and reporting to Parliament on progress in adapting to climate change.
* Providing independent advice to Government on setting and meeting carbon budgets in line with the UK’s longer-term target to reduce greenhouse gas (GHG) emissions to net zero by 2050, and reporting to Parliament on the progress made.

To do this, we conduct independent analysis into climate science, economics and policy, and engage with a wide range of organisations and individuals to share evidence and analysis. Our past reports are available [here](http://www.theccc.org.uk/publications/).

The UK Climate Change Act 2008 requires that every five years, the UK government must publish a Climate Change Risk Assessment (CCRA). The CCRA seeks to provide an authoritative and up-to-date assessment of the risks and opportunities facing the UK from climate change and the adaptation actions that need to be put in place across society to ensure that the UK is well-placed to manage these risks. The Fourth UK Climate Change Risk Assessment (CCRA4) Government Report is due to be published in January 2027. As with CCRA2 and CCRA3 it will be based on an Independent Assessment that the CCC has been commissioned by Defra to lead; this will be published in mid-2026.

As part of CCRA4, the CCC will be developing a new output to complement the Technical Report as produced in previous CCRAs. This output – to be known as the ‘Well-adapted UK report’ (WA report) – will focus on the potential for key aspects of the UK adaptation challenge to reduce the climate risks threatening the achievement of key UK policy and societal outcomes and hence set out a vision for aspects of a well-adapted UK. The WA report aims to provide a policy-relevant evidence base on effective systemic adaptation scenarios, their costs and benefits (and how these are distributed across society). It aims to use this information to establish a resilience standard against the risks modelled for key societal systems and establish the investment requirements to meet this standard.

The report will be tailored to best inform the development of effective actions in the next set of national adaptation programmes from governments across the UK (covering the late 2020s and early 2030s). It also seeks to provide a more spatial and quantitative representation of UK climate risks and adaptation, an improved understanding of the potential for cascading climate risks, and their interactions with other key policy priorities such as delivering Net Zero.

This WA report will be informed by a set of commissioned, bespoke analysis projects, in-house CCC analysis and wider external evidence. The analysis will need to be developed collaboratively with decision makers and consider both risk and adaptation interventions as systemically as possible, while focusing on delivering social and economic analysis and evidence at appropriate spatial scales.

One of these commissioned projects is likely to focus on economy-wide water scarcity risks. Changing patterns of non-household water use, particularly in the context of Net Zero, are insufficiently understood. The analysis will answer the following questions:

* **How is water demand (particularly for uses outside of the public water system) expected to change by sector, particularly in the context of efforts to reach Net Zero in the UK, and how will this vary by location?**
* **How will water scarcity risk (at times of drought) change in the UK, accounting for sectoral water demand as well as climate change, population growth and environmental water needs?**
* **Which adaptation actions are most effective in managing water scarcity risks, particularly outside of public water supply, and what package of adaptation actions could deliver an optimal level of resilience?**

**Potential project**

We are planning to advertise a tender for this research project in early 2024, with the intention that the research should commence in April 2024 and last for a duration of around eight months.

At a high-level, the methodology for this analysis is expected to follow a three-stage approach:

1. review of the drivers of future water demand to prepare baseline scenarios
2. risk analysis of water scarcity under baseline scenarios for future water demand
3. adaptation action analysis and development of adaptive pathways
4. Drivers of demand in a baseline scenario

The supplier will review the drivers of sectoral water demand and develop baseline scenarios for future water demand.

The baseline scenarios should be consistent with the analysis currently being undertaken as part of the CCC’s Seventh Carbon Budget (CB7), and as far as possible use CB7 analysis as inputs – this will be particularly important for the industry, electricity generation, fuel supply, agriculture and land use and removals sectors. However, the supplier will have to review additional data and analysis from other sources, as CB7 analysis will not always have the required level of detail or spatial granularity.

The projections should include (1) abstracted and discharged water by sector at the catchment level, covering both licensed and unlicensed abstraction, and (2) non-household water use by sector at the water resource zone level. To capture seasonal variation, sectoral water use should be shown at an appropriate time-step. In some cases, water use is weather-dependent, such as in the case of demand for irrigation in agriculture, or cooling in thermal power stations. Where this is the case, the supplier should explore the feasibility of inputting simulated compound heat and drought weather data into models for estimating sectoral water demand under plausible weather conditions expected in the UK over the decades to 2050, accounting for climate change.

1. Water scarcity risk analysis

The supplier will model the future risk of water scarcity associated with the baseline scenarios. The analysis should model the water supply shortfall by sector for both typical conditions and in the event of plausible future droughts. The analysis should also estimate the full economic cost associated with these water supply shortfalls – for example including agricultural losses or costs associated with forced shutdowns of thermal power generators in the event of abstraction restrictions, as well as the cost of actions in the public water system.

The analysis should involve water resource system modelling. We would expect the supplier to leverage naturalised flow simulations from national-scale hydrological models which have been run using UKCP18 and openly available. The analysis should be conducted at a spatial granularity no coarser than water resource zones. We are aware that existing modelling has been more developed in England and Wales than for other areas of the UK. It is required that analysis covers Scotland and Northern Ireland, but it may be the case that a different methodology is undertaken for these two countries. If possible, we would like the analysis to account for water temperature and water quality, where these relate to water availability. We would also like the supplier to consider the disaggregation of risk across society, particularly with regard to the risk faced in different geographic areas and by different economic sectors.

1. Adaptation action analysis and pathway development

Working with the CCC and other key stakeholders, the supplier should identify and propose a range of adaptation actions, analyse the effectiveness of those actions in reducing water scarcity risk and develop adaptive pathways for improving resilience. Although the supplier should develop scenarios which account for planned action on public water supply, as outlined in water resource management plans which will be finalised early 2024, the analysis should focus on adaptation actions outside public water supply. We expect the supplier to identify and consider options such as water efficiency, siting-decisions for water-intensive infrastructure (particularly Net Zero infrastructure), on-farm reservoirs, rainwater harvesting and abstraction licensing reform, as well as more innovative solutions.

The supplier should analyse the effectiveness of adaptation actions by considering: (1) the reduction in the water supply shortfall; (2) the avoidance of the economic costs which the shortfall would have incurred; (3) wider co-benefits (e.g., cascading impacts on other infrastructure systems, benefits for nature); and (4) the investment costs needed for deployment. The supplier will be expected to develop and cost packages of adaptation actions which can be deployed to deliver specific levels of resilience, in order to inform the setting of appropriate resilience standards for the non-public water sector.

**Questions for suppliers**

We are inviting feedback on the idea outlined above to gauge the feasibility of undertaking credible and robust analysis within the timelines described. In particular, we would be interesting in understanding:

* **Which data (in addition to the CCC’s sectoral analysis for CB7) and methods could be used to develop future scenarios of sectoral water demand which are spatially disaggregated and, where necessary, account for weather-related demand fluctuations?**
* **Which data and methods could be used to model water resources, accounting for future climate change and water demand scenarios?**
* **Which data and methods could be used to estimate the economic cost of water scarcity for different sectors?**
* **Which adaptation actions outside of public water supply are critical to building economy-wide resilience to water scarcity, and how could the effectiveness of these actions be modelled?**

We are inviting interested suppliers to respond to the above questions by getting in touch with Bianca de Farias Letti ([bianca.letti@theccc.org.uk](mailto:bianca.letti@theccc.org.uk)) and Flo Bates ([florence.bates@theccc.org.uk](mailto:florence.bates@theccc.org.uk)) by 12 January 2024. We would also welcome engagement on how to refine or tighten the project scope, or suggestions on the resources (including data) that would be required to deliver the project.