**Early Engagement Notice – Assessment of climate risks to UK cold-supply chains**

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

Please send your suggestions (and any follow up questions) to [Louis.worthington@theccc.org.uk](mailto:Louis.worthington@theccc.org.uk) by **19th January 2024.**

**Background**

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 undertake an assessment of the risks and opportunities from climate change facing the UK now and, in the future, through the Climate Change Risk Assessment. We have begun work to inform the Fourth Climate Change Risk Assessment for the UK, and as part of this we would like to explore in detail how climate change might impact some of the UK’s critical systems. One of the systems we would like to explore in depth is the UK’s cold-supply chains which are integral to supplying and exporting essential products including perishable food products and critical medicines/pharmaceutical products.

* + The cold chain enables pharmaceutical trade (e.g. in vaccines, medicines and therapies) worth around £50bn a year to the UK economy (UK’s fifth largest import sector and fourth largest export sector last year).
  + Also enables around £30bn a year in food trade (heavily weighted towards imports, main products: meat, dairy, seafood and fruit and veg). The food and drink industry is the largest manufacturing sector in the UK
  + Directly employs around 100,000 in the UK.
  + Food refrigeration is estimated to be responsible for 2-4% of the UKs total GHG emissions

**Potential project**

To inform this work we are considering commissioning a research project to assess the extent of climate change risks facing the UK’s cold-supply chains, and how these might be effectively mitigated. In particular, we are keen to understand what it would take for cold-supply chains to fail/ be significantly disrupted and then assess the likelihood of that happening, and actions the UK can take to make the system resilient to increasing climate hazards.

We want to be able to use this analysis to inform metrics for measuring the expected impacts from climate change to UK cold-supply chains, as well as the costs, benefits and efficacy of adaptation actions (compared against a baseline of today’s resilience levels). The type of metrics we have initially identified as being potentially relevant include:

* + Availability and price of essential products
  + Health indicators such as mortality or illness rates from food poisoning or inadequate medication ([QALY](https://www.nice.org.uk/glossary?letter=q#:~:text=One%20quality%2Dadjusted%20life%20year,a%200%20to%201%20scale).)s), and nutritional deficiency ([Priority Places for Food](https://www.cdrc.ac.uk/priority-places-for-food-index/))
  + Economic losses by food, pharmaceutical or distribution businesses
  + Product wastage
  + Damages to key assets or infrastructure
  + Energy-demand and F-gases from cooling

Specifically, this should consider the risks to cold chains from increasing temperatures and extreme weather, today, in 2030 and in 2050. Given the international nature of supply chains, the research should also consider where (and how) these risks occur overseas (but focusing on how the impacts are felt in the UK). We also want to consider material impacts on emissions (UK and internationally), for example from energy demand and F-gases from the cold-supply chain, or the waste products avoided.

We want to identify the most critical and vulnerable parts of the system, considering the supply chain in an interconnected way (from manufacturing through to home storage/consumption – but not including impacts to crop or livestock farming). As part of this we would like to collect information on the condition and adaptive capacity of these assets and actors to help inform the risk assessment, including for example:

* The age, condition and cooling capacity of cold chain assets
* Lifetimes and investment cycles for key cold chain assets .
* The capacity for stockpiling essential products
* The opportunities for alternative sourcing of essential products

We want to consider impacts and responses of a range of actors, assets and communities in the UK. Particular vulnerabilities we have identified initially include:

* + The Short Straight between Dover and France, which is a key link for the supply of short life food products 62% of fruit and vegetable imports, 43% of meats and 41% of dairy and pharmaceutical products ([around 75% of the medicines we use come from or via the EU](https://www.gov.uk/government/news/update-on-medicines-and-medical-products-supply-as-we-exit-the-eu), mainly via the Short Straight).
  + Food and medical shipments between Britain and Northern Ireland via the Irish Sea.
  + UK dependence on key international pharmaceutical manufacturing hubs in Europe (around Germany/Switzerland), [India and China (which together produce 80% active ingredients](https://publications.parliament.uk/pa/cm5801/cmselect/cmintrade/286/28605.htm)), is prone to [extreme weather and heat](https://qualitymatters.usp.org/how-extreme-weather-affects-medicines#:~:text=Extreme%20weather%20has%20impacted%20major,has%20faced%20in%20six%20decades.).
  + Dependence of remote (e.g. Scottish Island) communities in the UK on resilient connections to supply hubs for food and medical supplies. In 2022 [food shelves in Shetland emptied](https://www.tasteofshetland.com/news/empty-shelves) as the Island was cut off by extended bad weather, while the [price and availability of food](https://www.tagsa.co.uk/how-we-help/our-right-to-food/) elsewhere has been identified as an ongoing issue.
  + Fluctuation in temperatures as products pass through the supply chain, which can incubate bacteria and degrade food products.
  + Distributed refrigeration equipment around the UK (e.g. in food retail and pharmacies). Widespread [failure of supermarket freezers](https://www.independent.co.uk/news/uk/home-news/supermarkets-heatwave-tesco-b2127551.html) occurred in the Summer of 2023 as 40 degree temperatures overwhelmed aging equipment.

We are interested in assessing impacts at a local or site level where these are ‘nationally significant’, but we want to be able to estimate the impacts (and costs/benefits of adapting) at a national level.

* + We are open to considering practical and effective ways of modelling this, such as through a network analysis, using a spatial model or based on some archetypal representation of salient characteristics of the supply chain.

The type of adaptation measures that might be considered includes:

* + Changes in practices, such as re-structuring/re-routing supply links, increasing storage capacity of viable products, enhancing asset maintenance, shifting consumption practices (e.g. reducing dependence on perishable food items).
  + Technology based measures, such as increasing refrigerated capacity along the supply chain, improving packaging design for better insulation, alternative transport solutions (e.g. shipping or drones) or introduction of digital/data solutions to monitor key indicators of risk.
  + Hard-engineering measures such as reinforcing or upgrading key infrastructure (ports, roads and rail) and facilities.
  + Policy measures, such as assigning cold chains as critical infrastructure, mandating contingency plans to be developed and reflecting climate risk issues into trade agreements and diplomatic engagements.

Given the complex nature of this system and the lack of comparable analysis that is available, we are inviting suppliers, who may be interested in this project, to get in contact with us and set out their suggestions on how to address this research specification. In particular we’d welcome suggestions on:

1. How to define a threshold of critical failure or significant failure, e.g. in terms of:
   * + Reduced or limited supply of key medical and or food products, either nationally or to a particular community in the UK
     + Significant health or economic impacts to vulnerable UK businesses, communities or people.
2. What metrics would you suggest using to measure the impact of climate hazards on the cold-chain and the mitigating effect of adaptation actions (we are interested in impacts at a national/site/household level, related to health, economy or broader resilience).
3. What would be a feasible way of assessing/analysing the vulnerability, impacts to and response of the UK’s cold chain (including relevant international dimensions), sufficient to identify nationally or regionally significant risks and inform national level estimates of impacts – in both a baseline based on todays resilience levels, and in scenarios incorporating adaptation actions.
   * How could the analysis consider cascading risk related to climate hazards impacting the cold supply chain?

Feel free to suggest opportunities to simplify the analytical methodology whilst meeting the research specification.

Please send your suggestions (and any follow up questions) to [Louis.worthington@theccc.org.uk](mailto:Louis.worthington@theccc.org.uk) by **19th January 2024.**