

Department for Energy security and Net Zero response to the Environmental Audit Committee Heat Resilience and Sustainable Cooling Call for Evidence

We note the terms of reference to the Environmental Audit Committee's inquiry into Heat resilience and sustainable cooling are wide ranging and cover responsibilities that sit with several Government departments. We have prepared the following written response corresponding to the aspects of the terms of reference which the Department for Energy Security and Net Zero (DESNZ) has responsibility.

2. How can sustainable cooling solutions and adaptation strategies be implemented in such a way as to minimise overheating, reduce energy consumption and prevent overloading of the electricity grid during peak demand?

As outlined in the NAP3, DESNZ will conduct targeted research into which building types, tenures and groups are most at risk and most likely to be impacted by climate related risks. This research will look to close evidence gaps by identifying the buildings most vulnerable to extreme heat and where these are located, as well as appropriate adaptation solutions. The CCC recognised in its March 2023 *Progress in Adapting to Climate Change* report to Parliament that such research is a critical enabler in improving the climate resilience of buildings.

Part of this research will be an assessment of projected energy demand and energy system impacts due to the risk of overheating and different potential cooling energy demand trajectories building on existing evidence. This will aim to identify the optimal combination of both active and passive cooling measures to effectively minimise overheating in buildings, while preventing overloading of the electricity grid. Research will be carried out through the NAP3 implementation period from 2023 to 2028, producing evidence to support analysis and decision making with outputs delivered throughout this period. This will include:

- The Climate Services for a Net-Zero resilient World programme which will report by 2025 on modelled overheating scenarios in existing homes.
- Further analysis of overheating in existing homes using of the Energy Follow Up Survey with report to be published in 2023
- Sponsored research is underway by Loughborough University to quantify the impact of retrofits on overheating risks for a warmer than average summer at the present under present climate conditions. The report is due to be published in 2023;
- Maintaining close links with academic and other studies, e.g. membership of advisory boards, sponsorship of PhDs

This will build on previously published research including the Cooling in the UK Report (2021)¹, which assesses potential future cooling needs in buildings under different scenarios, and the Energy Follow Up Survey (EFUS) Reports (2021)², which collected temperature monitoring data covering the summer heatwave of 2018.

In addition, for new buildings, Part O of the Building Regulations was implemented in June of 2022 and seeks to ensure that buildings limit unwanted solar gains in summer and

remove excess heat from the indoor environment. The new Part O requirement applies to all new residential buildings subject to the Building Regulations, using passive means as far as reasonably practicable.

4. To what extent do the Government's Climate Change Risk Assessment and National Adaptation Programme (as well as other related strategies such as the Net Zero Strategy and Heat and Buildings Strategy) identify and address the risks from extreme heat? (*Note: The third NAP, covering the five-year period from 2023-2028, is expected to be published in the summer of 2023*)

In relation to this Department's remit, the Net Zero Strategy (2021) and Powering Up Britain (PUB) publications (2023) set out how we will reduce our greenhouse gas emissions and deliver our carbon budgets. The Net Zero Growth Plan (part of the PUB package) noted that protecting our natural environment and adapting to climate change, including through investing in nature-based solutions such as tree planting and peatland restoration, goes hand in hand with our Net Zero future and government will continue to take an integrated approach to ensure co-benefits are maximised.

While we accelerate our efforts to reach Net Zero, we are also ensuring that the country is prepared for the effects of climate change that we are already experiencing, and the approach to this is set out in Defra's third National Adaptation Programme (NAP3).

For Buildings, the 2021 Heat and Building Strategy set out the actions government would be taking to reduce carbon emissions from buildings in the near term and provided a clear long-term framework to enable industry to invest and deliver the transition to low-carbon heating. In the Heat and Buildings Strategy, the government committed to considering current and possible future climate scenarios, including overheating risk and indoor air quality risk when developing future policies to future-proof buildings. DESNZ reiterated this commitment in the NAP3 and set out the research the department is undertaking between 2023 and 2028 to close knowledge gaps to develop the necessary detailed policy framework.

6. What can be done to protect the UK's existing public and private sector housing stock from the impacts of extreme heat while ensuring that homes are sufficiently warm in the winter months?

In the NAP3, DESNZ set out its integrated approach to minimise climate risks in existing buildings as they are retrofitted to deliver Net Zero. DESNZ will ensure that measures to deliver Net Zero and retrofit existing buildings, as described in the Heat and Buildings Strategy, will seek to minimise risks of overheating, reduced indoor air quality, and risks to the energy system.

Through the NAP3 implementation period, DESNZ will conduct targeted research from 2023 to 2028 into which building types, tenures and groups are most at risk and likely to be impacted by climate risks such as overheating. This research will look to close evidence gaps

by identifying the buildings most vulnerable to extreme heat and where these are located, as well as appropriate adaptation solutions.

While research using the latest UK Climate Projections has provided high-level understanding on the potential severity of climate impacts, there is less understanding on the cost-effectiveness of specific adaptation measures and strategies, and what measures are most effective for which building types in the UK. Research is an essential step in determining what adaptive measures will best suit our unique building stock. Different building types in different locations across the country will require different measures; there is not one-size-fits-all solution.

This research work will inform the ongoing development of policies to deliver the government's effort to deliver Net Zero retrofit to existing buildings in ways that appropriately consider how to minimise climate risks, keeping homes sufficiently warm in the winter and cool during the summer.

Insulation measures can help reduce risks of overheating, if correctly installed and with adequate ventilation. This is why all energy efficiency measures installed under current government funded schemes require installers to be Trustmark registered and measures must also be installed in accordance with the Publicly Available Specification (PAS) 2030 and PAS 2035. This ensures installations are done to the highest quality, protecting the consumer against poor workmanship. PAS 2035/2030 requires a whole house approach to home retrofit projects and ensures that the risks of unintended consequences, such as mould and condensation due to poor ventilation, are minimised. TrustMark is a government endorsed quality mark for home improvement. To become TrustMark registered, businesses must register with a TrustMark approved scheme provider and commit to the TrustMark Code of Conduct and Customer Charter, as well as the codes of practice relevant to their industry. PAS 2035/2030:2023 will be published in 2023.

7. What role might reversible heat pumps (which can act as both heating and cooling systems) and other emerging technological solutions, such as the development of smart materials, play in meeting future cooling demands?

In the NAP3, DESNZ set out its integrated approach to minimise climate risks in existing buildings as they are retrofitted to deliver Net Zero. As part of this, targeted research will aim to identify suitable passive and active measures that could play a role in meeting future cooling demand in the face of more extreme temperatures for different existing archetypes. Examples of emerging technological measures that may be considered include passive measures such as reflective coatings and smart materials, as well as active measures such as reversible heat pumps and smart building management systems.

The Cooling in the UK report prepared for the Department for Business Energy and Industrial Strategy in 2021, estimates that without policy intervention the proliferation of low cost, low efficiency active cooling systems could cause annual cooling energy consumption in the UK to increase by around 6.3TWh and 12.0TWh for the high and low

emissions scenarios respectively by 2100. The report noted that passive first approaches paired with efficient cooling technologies could reduce projected cooling demand by up to 34%. A key finding was that there may be potential synergies between decarbonising heat and increased cooling demand, although there are also trade-offs to consider. For example, air-to-air heat pumps can provide low carbon heat and be run reversibly to provide cooling, but cannot provide hot water. Air- or ground-to-water heat pumps are also able to provide cooling when operating in reversible mode, but there are significant challenges in doing so, including condensation on pipework and requirements for fan assisted radiators. For these reasons, we advocate for a passive first approach to managing cooling demand in buildings, but we will continue to explore the potential role of reversible heat pumps in meeting future heating and cooling demand.

August 2023