

## **Response to the Environmental Audit Committee inquiry *Technological Innovation and Climate Change: heat pumps***

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Please note that I am submitting this response in an independent capacity and do not claim to represent the views of UCL Energy Institute. I address the first inquiry question only in this response.

### **Q1 What steps can the Government take to increase uptake of heat pumps?**

This brief response draws on a field trial that explored people's experiences of living with heat pumps, in particular when subject to automated control to provide demand response. The latter aspect is important because demand response (or the ability to externally prompt change in patterns of operation of the heat pump) will very likely be a key part of managing future low-carbon electricity networks.

Understanding user experiences of heat pumps is important because they will affect people's future choices about whether to install them and/or recommend them.

The trial tested a new controller to make it easier for people to interact with their heat pump, run it more economically, and permit demand response. While there were many positive experiences, there were also some problems:

- Technical problems (such as communications technology issues) were quite common. It was a technical trial so this was to be expected, but people who have had first experiences because of technical problems were less forgiving of other aspects of normal operation (see subsequent points).
- Even though the controller was designed to be simple to use, less tech-savvy users had difficulties which sometimes led to them thinking the system was malfunctioning, even when working properly. This highlights the importance of ensuring appropriate user interface design/selection for the intended user group.
- There were instances of night-time overheating and noise caused by the heat pump running at night, which caused some participants to ask for the controller to be removed. This was in part due to the most economical mode of operation for heat pumps being 'long and low', and in part due to pre-heating to allow demand response by turning the heat pump off during peak demand periods. Again, people often attributed this operation to technical problems, when in fact it was intended. Importantly they did not feel able to override it because of the inability to set an upper bound on temperature.

To minimise the chance of these kinds of negative experiences being encountered, Government should:

- Conduct monitoring and research to ensure that good installation practice is being followed (for example the MCS Heat Pump Guide) and recognise and act on points of common dissatisfaction with heat pump systems early on. Government cannot afford to let poorly designed/installed/controlled systems lead to a general perception that heat pumps are an inferior or unreliable form of heating.
- Ensure that guidance emphasises the importance of installing with the need for demand response in mind, even if it is not immediately being employed. This is important because it may be in the national interest, but not in customers' short-term interest. For example, it may be necessary (or strongly advised) to install a system with a hot water buffer tank to permit great and more comfortable demand response, especially in areas where high penetration of heat pumps and/or electric vehicles is expected.
- Support awareness-raising about the different mode of operation of heat pumps compared to gas boilers. This is likely to be best accomplished through installer guidance. Again, this could include advice on managing with demand response, such as using thermostatic radiator valves to keep bedrooms cool.

Further details on the research I refer to can be found in the following publications:

- Trevor Sweetnam, Michael Fell, Eleni Oikonomou & Tadj Oreszczyn (2019) Domestic demand-side response with heat pumps: controls and tariffs, *Building Research & Information*, 47:4, 344-361, DOI: <https://doi.org/10.1080/09613218.2018.1442775>
- Michael Fell (2016) Taking charge: perceived control and acceptability of domestic demand-side response, Doctoral, UCL (University College London), 2016. <https://discovery.ucl.ac.uk/id/eprint/1475103/>