



Future support for low carbon heat: response on behalf of two CREDS themes (Decarbonisation of Heat, Buildings)

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The Centre for Research into Energy Demand Solutions (CREDS) is a research centre established in 2018 with a vision to make the UK a leader in understanding the changes in energy demand needed for the transition to a secure and affordable, low carbon energy system. We are a team of over 140 academics at 20 academic institutions across the UK, led by Professor Nick Eyre at University of Oxford. www.creds.ac.uk

This response has been prepared by Prof Robert Lowe, of University College London, who leads the CREDS' team working on the Decarbonisation of Heat.

Introduction and context

On behalf of the CREDS Heat Decarbonisation Challenge and the CREDS Buildings Theme, we welcome the opportunity to respond to this consultation on Future Support for Low Carbon Heat. Our detailed comments focus on **Building Level Technologies**, and in particular on **hybrid heat pumps**.

The overarching theme of our response is to welcome the proposal by BEIS to act in this space. Structural features of the UK heat market make decarbonising heat in UK buildings a significant challenge, and programmes of support for new low/zero carbon heat technologies and supply chains unavoidable. Such structural features include:

- the near-monopoly of natural gas for heat in UK buildings;
- the availability of highly developed gas boiler technologies;
- the comparative weakness of supply chains for alternative heating technologies;
- the fact that gas sold into the domestic market is exempt from carbon pricing and is subject to VAT at a significantly lower rate than other forms of energy for heating;
- long-standing, cross-party political scepticism with respect to the role of regulation in the UK economy.

We note that other policy developments including the development of a new UK Emissions Trading System will begin to address some of the above, but that the goal of harmonising taxation on domestic gas and electricity will almost certainly prove elusive. If this were to be the case we would continue to see a situation in policies to support low carbon heat were at variance with energy pricing policy.

The consultation document makes clear that the package of measures considered is specifically designed as a successor to the current Renewable Heat Incentive (RHI) scheme, and will sit alongside a wider range of measures to improve energy efficiency and support the move to low carbon heating which will be supported through the Home Upgrade Grant, Public Sector Decarbonisation Scheme, and Social Housing Decarbonisation Fund commitments.

Comments on the ambition and scope of the proposed support arrangements

We commend BEIS for pursuing this consultation despite the COVID-19 crisis. We agree that the proposed support for low carbon heat will contribute to supporting businesses in the low carbon heat sector. We note that the need for low carbon heating solutions is distributed around the UK, essentially wherever people live, and that much of the economic activity supported by this package of measures will be undertaken by SMEs. The package will therefore also contribute to the levelling up agenda, and to an increase in the number of high-quality jobs available. Indirectly, it will contribute to addressing the problem of the adult skills

gap. In our view, the goal of expanding supply chains for low carbon heating technologies is of the highest importance.

Comments on coordination of the proposed package of measures with other policies

The consultation document identifies a number of policies that are either in force or under consideration in the area of low carbon heating. These include the Non-Domestic RHI, the proposed Support for Heat Networks, the Green Heat Network Scheme, the Home Upgrade Grant, Public Sector Decarbonisation Scheme, and Social Housing Decarbonisation Fund. Care will be needed to ensure that these policies join up and that potentially important technologies do not slip down the cracks between them.

Technologies supported by the proposed support arrangements

The arrangements set out in this consultation will support biomethane injection, heat pumps and where heat pumps are not feasible, biomass.

We note that a number of potentially important technologies and combinations of technologies are not supported. The most important of these are hybrid heat pumps.

Hybrid heat pumps

The consultation states:

The heat pumps we propose to support are air source heat pumps (ASHPs), ground source heat pumps (GSHPs) and water source heat pumps (WSHPs). We propose to support both low and high-temperature units, but not 'hybrids' installed alongside a fossil fuel system.

However, given our 2017 Clean Growth Strategy commitment to phase out high carbon fossil fuels (such as oil and coal) off the gas grid in the 2020s, and increasingly ambitious carbon reduction targets, the government is not minded to support hybrid heating systems through this policy. This includes hybrids that might be installed in both off and on gas grid areas. Given the limited funding available we believe that the targeted public support available under this policy should be directed towards the technologies that offer the greatest carbon savings, rather than those that may play an interim or transitional role, and which would continue to involve the burning of fossil fuels for heating.

The arguments against hybrids are that hybrids are incompatible with a net zero carbon target, that they are not suitable for deployment off gas grid, and that their promised CO₂ savings may be undermined by poor control systems. We take issue with these arguments on the following grounds:

- A key advantage of hybrid heat pumps is that they can be deployed in areas of the UK where the electricity distribution grid may be too weak to support pure electric heat pumps, including in areas off the gas grid.
- Where an off-gas-grid hybrid heat pump operating in heat pump mode displaces high carbon fossil fuels (such as oil and LPG), the CO₂ savings would be greater than those from an equivalent hybrid connected to mains gas.
- The commitment to phase out “high carbon fossil fuels (such as oil and coal) off the gas grid in the 2020s” leaves open the possibility that this may not happen for another ten years. The UK’s avoidable impact on global climate¹ will be determined by the total emissions of GHGs from now to the point at which the net-zero target is reached. Hybrids running on oil or LPG over the coming decade can play a role in reducing this avoidable impact, by reducing the use of these “high carbon fossil fuels”, in situations where it is not possible to deploy a pure heat pump.
- It is possible to run hybrids on hydrogen, hydrogen-derived fuels, or biomethane. Worcester-Bosch already offers a hydrogen-ready gas boiler which can be easily converted to H₂, if and when hydrogen becomes available. There is nothing to stop the same technology being built into hybrid heat pumps.
- The long-term function of hybrid heat pumps would then be to provide an arbitrage mechanism between electricity and the infrastructures needed to provide hydrogen and hydrogen-derived fuels, and to extend the reach of intrinsically limited resources such as biomethane.
- The development of green hydrogen, hydrogen-derived fuels and biomethane would make hybrid heat pumps a zero-carbon technology, deployable on and off-gas grid, with potential long-term strategic value to the UK energy system.

The consultation document goes on to state:

A further consideration informing our position not to support hybrid heating systems through this mechanism, is the limited available evidence on how they perform in practice in off gas grid installations, where the Clean Heat Grant scheme is targeted. There is an inherent risk in a hybrid system that the fossil fuel boiler may still meet a significant amount of the property’s heat demand, depending on usage. This could mean that carbon savings delivered by hybrid systems are lower in practice than anticipated.

Our response to this is that a range of control strategies are available to ensure that hybrid heat pumps spend as much time as possible operating in heat pump mode. And the control problem is essentially the same whether hybrids are installed on or off the gas grid. Rather than encouraging manufacturers to develop, implement and demonstrate effective control strategies, the

¹ Historic emissions are, of course, not avoidable.

Department proposes simply to abandon the technology, but with the option of re-adopting it later. In our view, such a strategy would be likely to undermine the development of hybrid heat pumps. We conclude that excluding hybrids from the Clean Heat Grant would be a mistake.

Our answer to Question 41, is therefore, No.