

Exploring the role of alternative clean heating solutions

Centrica plc
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About Centrica

Centrica brings together capabilities which support the UK and Ireland's energy security and will help both countries reach net zero. We provide energy and services to almost one in three homes in the UK. British Gas customers benefit from zero carbon electricity supplied from our interest in the UK nuclear fleet, long-term power purchase agreements with renewable electricity generators, and £70bn worth of long-term gas supply contracts. We are advancing a low-carbon future with a £4bn investment pipeline, which includes our investment in Sizewell C and acquisition of the Isle of Grain. We also install low-carbon heating solutions in our customers' homes and work with hospital trusts, local authorities and large business customers to reduce their carbon emissions and improve their energy resilience. As one of the country's largest energy suppliers, we intend to make clean energy accessible across a wide range of UK homes and businesses. In doing this we are committed to delivering wider economic benefits in terms of new skilled jobs and supply chain innovation.

The Transition to Clean Energy

We announced last year that we will be a net zero business by 2045 with a 40% reduction in GHG emissions by 2034. We also committed to help our customers be net zero by 2050 with a 28% reduction in GHG intensity by 2030. Centrica supports the Government's direction on the transition to heat pumps, particularly, the announcements in the recent Warm Homes Plan and Comprehensive Spending Review (CSR) that was delivered last year.

Alongside the CSR, the Government confirmed the extension of the Boiler Upgrade Scheme to 2030, with funding of the scheme set to increase each year. There have also been positive policy changes addressing planning challenges, such as removal of the Permitted Development Rights rules for heat pumps in England. To encourage heat pump installations, we need to remove these restrictions across the UK to ensure that those that want to install heat pumps can do so.

Delivering a clean and resilient energy system is one of the biggest challenges facing the UK – and the world. The process will take time, determination and significant investment. Centrica is playing a key role in supporting the UK's transition to a more sustainable energy system – and is already making important investments to help the UK reach its net zero target. This includes investments in hydrogen, nuclear, solar, heat pumps, batteries and storage.

Questions 1, 2, & 3

Electric Boilers

- We recognise that electric boilers are less efficient than ASHPs, however, resistive electric heating remains more efficient than gas heating. Electric boilers are often thought of as having limited load-shifting capacity; however, this is highly dependent on the system design. When integrated with thermal energy storage, many electric boilers can offer significant load-shifting potential, mitigating the limitations highlighted in Question 1. As such, electric boilers continue to be an important decarbonisation option for property archetypes that are unsuitable for heat pumps, including flats and more complex buildings.

Infrared (IR) Heaters

- Infrared heaters are often considered to have more limited load-shifting capability, as they cannot participate in thermal storage in the same way as storage heaters. However, unlike convective heating, infrared heat is readily absorbed and retained by

building materials, meaning the building fabric itself can act as a form of thermal store. As a result, infrared heaters can offer effective short-term load-shifting potential, with warmed surfaces continuing to radiate heat after the system has switched off.

- Infrared heating may be well suited to certain property archetypes, such as compact or “boxed” properties without external walls or existing wet heating systems. The effectiveness of this technology is highly dependent on the thermal characteristics of the building fabric. There are additional behavioural shift concerns associated with infrared heating which may present challenges in terms of customer understanding and acceptance.

Questions 4 & 5

Panel Heaters & Electric Radiators

- While these forms of electric heating typically offer limited flexibility (unless integrated with thermal storage), they remain widespread and necessary for many incumbent property types, particularly within the social housing sector. Their simplicity, ease and low cost of installation make them well suited to settings such as flats, student accommodation, and social housing, where alternative low-carbon technologies may be impractical or disproportionately disruptive. They may also be suitable for properties with different habitual patterns, for example rentals, holiday homes, or student accommodation.
- It is important that these property archetypes are not overlooked. However, a key limitation is that while these systems support decarbonisation, they typically offer limited reductions in energy bills. As a result, other technologies should be considered alongside them to assess whether additional consumer cost savings could be achieved and avoid vulnerable customers being saddled with expensive on-going running costs.
- Each panel/radiator needs to have an individual thermostat & timer (which should be standard in new models) to keep costs under control, only heating individual rooms when necessary. This must work for the occupants, not just be set to a standard schedule by the landlord or installer.

Questions 6 & 7

High-Temperature Heat Pumps

- High-temperature heat pumps (HTHPs) currently have a limited role within the low-carbon heating artillery, due to their lower efficiency and higher running costs relative to standard ASHPs. At present, customers generally expect a reduction in energy bills when installing a heat pump, an outcome that we believe high-temperature systems are typically unable to deliver.
- These systems may be appropriate in specific circumstances such as for hard-to-treat properties, for customers who prioritise decarbonisation over cost considerations, or for buildings where upgrades to insulation or radiators are not feasible.
- The Warm Homes Plan recently announced a requirement for heat pump installations to be completed within three days of signing. Introducing a requirement for a 3-day lead time allows heat pumps to be considered as a distressed purchase, when a gas boiler fails (especially in winter). However, that doesn't allow time for radiators & insulation to be put in place first if you go for a conventional ASHP. High temperature

heat pumps have a speed and disruption advantage from avoiding radiator and internal systems upgrades.

- Running costs for HTHPs will largely vary over the course of the seasons. As ambient temperature drops, HTHPs efficiency decreases, this is made worse if they are installed in an under-insulated property. This is particularly an issue for low-income households, including customers who may have had the installation encouraged through a government grant, or those whose landlord has installed the system. For these reasons we believe they may not be suitable for vulnerable customers. Overall, we consider this technology a last resort, suitable only where lower-temperature alternatives are not viable.

Questions 8, 9, 10 & 11

Air-to-Air Heat Pumps

- Air-to-air heat pumps remain a relatively under-recognised technology, with limited public awareness being one of the primary barriers to wider adoption. There are also practical installation challenges, including the need for scaffolding to install external units. Air-to-air heat pumps are well suited to terraced properties and other buildings with external walls, whereas deployment in blocks of flats is likely to be more challenging. In addition, air-to-air systems typically require multiple internal units, as they serve fewer rooms than wet central heating systems.
- Despite these barriers, we support the Government encouraging the adoption of air-to-air heat pumps, particularly to customers based in cities. Air-to-air heat pumps will be critical in the transition to clean energy as the technology provides both heating and cooling. Cooling technology is becoming particularly desirable for customers as heatwaves in the UK become more frequent.
- We believe customers would be interested in more options for effective passive cooling, this relies on appropriate ventilation and airflow standards, and we therefore consider robust building regulations to be essential in supporting successful outcomes.

Questions 12, 13 & 14

Heat Networks

- As outlined in the Government's recently published Warm Homes Plan, heat networks are expected to play a key role in reducing both energy costs and emissions. To meet the Government's target of supplying 7% of properties through heat networks by 2035, continued policy and financial support will be required, including for networks powered by low-carbon sources such as heat pumps.
- It is essential that appropriate customer protections are in place. It is also important to note not all existing heat networks will be suitable for conversion to low-carbon heat sources, such as heat pumps, due to factors including building fabric constraints. Building owners and managers should be well informed about what is technically and economically feasible for their specific assets.
- We consider heat networks to be a suitable alternative in appropriate circumstances, particularly where individual heating systems are impractical, and as a decarbonisation pathway for certain existing networks.

Questions 15 & 16

Exhaust Air Heat Pumps

- Exhaust heat pumps are not currently widely used. However, this type of technology might be suitable for new builds or flat developments, given their lack of an external unit. They may be suitable for non-domestic properties, for example where there may be heat exhausts from ex-refrigerant cabinets.

Questions 17, 18 & 19

Heat Batteries

- We support the inclusion of heat batteries in BUS, alongside the aim of ensuring that this doesn't impact heat pump sales and installations. With minimal disruption in installing the technology, the cost of the technology, system flexibility and grid optimisation, heat batteries provide a viable solution for consumers.
- Additionally, we support the extension of zero-rated VAT to heat batteries for central heating by designating them as Energy Saving Materials (ESMs).

Questions 20, 21 & 22

High Heat Retention Storage Heaters

- Storage heaters play an essential role in the decarbonisation of many flats and can enhance the effectiveness of other low-carbon technologies through their ability to enable load shifting. They can charge during off-peak periods and discharge during peak demand, pairing well with flexible electricity tariffs and, where appropriate, home battery systems to support potential energy bill savings for customers. We consider storage heaters to have very high potential to assist in the decarbonisation of heat. However, work will have to be done to reduce the spark gap to facilitate their success.

Questions 25, 26, 27, 28 & 29

Renewable Liquid Heating Fuel

- We consider the market for renewable liquid heating fuels to be too small to be economically viable for widespread deployment. Such fuels are only likely to be viable where they can be aggregated with larger markets, such as aviation and other liquid fuel applications. As a result, we do not consider renewable liquid heating fuels to be well aligned with our current capabilities, nor do we expect them to play a significant role in the decarbonisation of heating.

Question 30

Bio-Hybrids

We don't have evidence on hybrid systems combining heat pumps with liquid renewable fuels, however a recent [report](#) from Guidehouse, commissioned by the Green Gas Taskforce in partnership with Cadent, has assessed the potential for biomethane fuelled boilers in combination with air source heat pumps (Bio-Hybrids) as a clean heat solution for Great Britain. The report concludes that:

- Bio-hybrids offer the lowest cost clean heating solution for 30-47% of British residential buildings. They are the lowest cost solution available for low efficiency stock (EPC F, E) in all building types and for some moderate energy efficiency stock (EPC D) of select building types (e.g. detached houses). They are a complementary heating solution for difficult-to-electrify building stock.
- Bio-hybrids offer a clean heating solution using an electric heat pump paired with a boiler running on biomethane, a green gas, delivering 90-95% emissions reductions by 2030 and closer to 100% savings by 2050.
- Biohybrids minimise the need for expensive upfront building upgrade costs, and would also directly address the slow uptake and low consumer demand for full heat pump solutions presenting a solution to the distressed boiler purchasing challenge.
- It is important for installers to have the capabilities to install both elements of the hybrid, taking overall responsibility for the installation, outsourcing any elements they are less specialist on. Equally important is the ability to maintain the system moving forward.

Questions 36 & 37

Other Low-Carbon Heating Systems

- Ground source heat pumps can be suitable for the right properties; however, drawbacks such as high expenses and limited land availability can limit their deployment. Shared ground loops can be effective for multi-property schemes, enabling economies of scale.
- Microgrids can also play an important enabling role, particularly in developments with limited or constrained grid access. By combining electricity infrastructure solutions with low-carbon heating technologies, microgrids can help unlock developments that might otherwise be unviable.
- We are currently awaiting the Government's consultation on the role of hydrogen will play in domestic buildings. We would encourage the Government to decide on this as soon as possible.
- Electric underfloor heating is often useful in house or partial house refurbishments and can be combined with upgrading underfloor insulation. These measures could be used to upgrade the EPC of a property. This is useful in smaller rooms where space is at a premium (i.e. there is no need for airflow around a radiator), even if the technology is not extended to the whole property.

Early-stage technologies / BRE certification issues

- The development and deployment of new heating technologies are currently constrained by significant delays and cost barriers associated with BRE field trials, which are both expensive and time intensive. These challenges have been exacerbated by the withdrawal of government funding for such trials. To address this, we recommend that the Government considers mechanisms to underwrite innovation risk. This could include establishing more proactive partnerships with developers, enabling large-scale trials within new build developments, and broadening the acceptance of test house data where appropriate.

- In addition, there is a need to address the fact that organisations that fund and deliver trials assume the full commercial risk, only for the resulting evidence to become immediately available to competitors. Measures to provide a period of data exclusivity could help incentivise greater private-sector participation in innovation and accelerate market development.
- It is important to consider, how easily the original installation of these technologies can be carried out, and how it can be maintained going forwards. If the technology is too niche and does not gain enough interest the installers may abandon the business, leaving customers exposed to escalating costs for maintenance or the need to replace their heating technology. It might also impact how easy it is to insure and sell the property when the owner wants to move house.