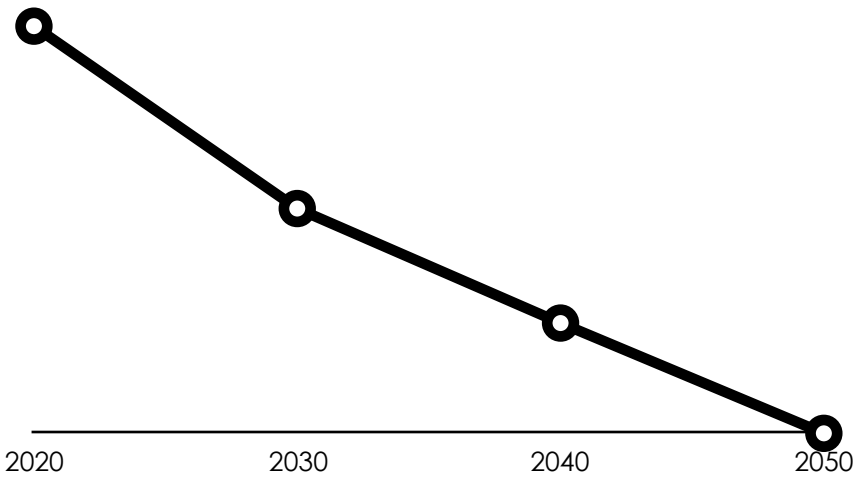
EXPLORING NET ZERO

Energy&Climate INTELLIGENCE UNIT



Net zero: heating

The shift to low carbon heating is at a relatively early stage compared with sectors such as power and transport. However, the technology needed to warm our homes without producing carbon dioxide is already in existence, and falling in cost.

There is a consensus that decarbonisation of heat will occur through deployment of low-carbon technologies such as electric heat pumps, district heating and low-carbon gases, in combination with reducing demand through improved energy efficiency.

Heating is responsible for around 40% of UK energy consumption and 25% of emissions. Policymakers have identified heat as a 'difficult' area to decarbonise, due to large energy requirements (at peak, demand can be several times that of the power sector) and the extent to which points of emissions (such as boilers in homes) are locally distributed.

However, there is no reason why emissions from heating buildings cannot be almost completely eliminated.

British homes generate the majority (57%) of heat demand. Since 1990 emissions from homes have fallen by 20%, largely due to more efficient boilers and better insulation, meaning we need to use less energy to keep warm - ultimately leading to lower energy bills.

Heating homes is a major source of carbon emissions.

Currently, 80% of UK homes are heated with natural gas – a higher dependency than many other countries. This can be traced back to development of North Sea reserves. As these dwindle, the desire to become less reliant on imported fuels to keep warm is another reason to decarbonise the UK's heat supply.

Options

Despite slow progress in developing low carbon heat policy, the technologies needed to decarbonise the sector exist today. There are a number of options available, with the main source of uncertainty the extent to which each will be used.

Options include:

- electric heating (usually via heat pumps)
- adapting the existing gas grid to run on low carbon gas(es)
- increasing the number of district heating schemes attached to a low-carbon heat source.

A heat pump is rather like a refrigerator in reverse - drawing heat from the ground or outside air, even when it is cold, and transferring the heat into the building.

The eventual solution is likely to involve two or three of these options, with the government stating 'it is not certain which approaches or combination of them will work best at scale and offers the most cost-effective long-term answer'.

As well as changing to modern technology, increasing the efficiency of the UK's housing stock also has a major role to play. The UK's housing stock is one of the least efficient in Europe, losing three times more heat on average than Swedish homes due to poor insulation. Cutting the amount of heat that escapes through roofs, walls and windows is widely acknowledged to be the logical first step in cutting carbon from heat.

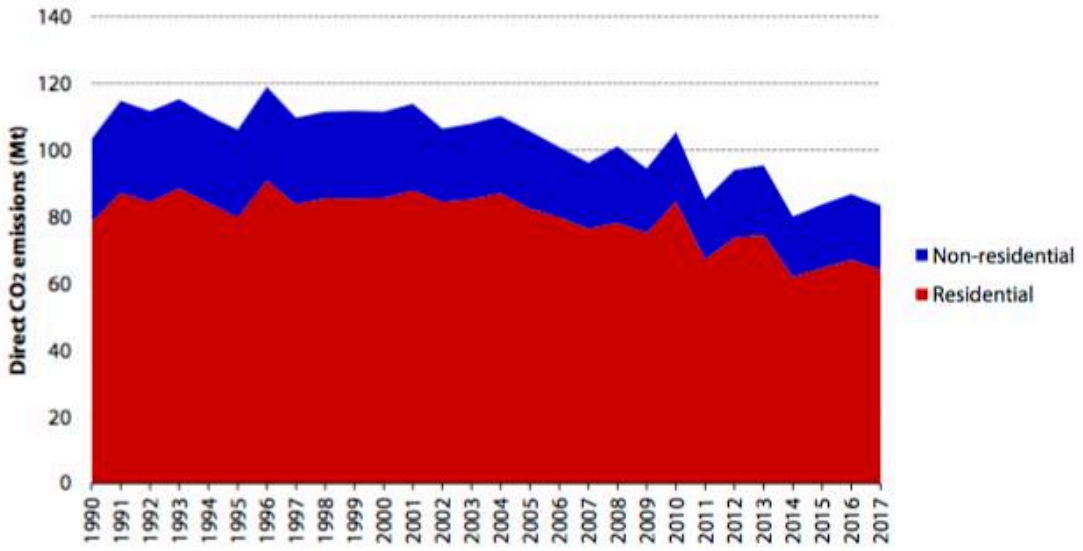
The government is currently consulting on a future framework for low-carbon heating technologies, and has acknowledged that decarbonised heating systems must be rolled out rapidly during the first half of the 2020s.

Forecasts

A 2015 review of the scientific literature on the future of heat in the UK found three common messages:

- demand reduction through improved efficiency is essential
- there will be a major role for electrified heat
- district heating schemes attached to low-carbon heat sources will be in use.

The National Infrastructure Commission recently advised that either low-carbon gas (principally hydrogen) or heat pumps should be the centrepiece, but all technologies would have some role.



Progress on cutting emissions from buildings has been slow. Image: CCC

Modelling by the Committee on Climate Change (CCC) shows that all practicable lofts and cavity walls should be insulated by 2032, and that emissions from buildings will fall by a further 16% to 2030. It also says that 20% of the UK's heat could be provided by heat networks by 2050, with the remaining 80% generated in the building where it is used.

A major factor in determining the best source of low-carbon heat is the number of other homes nearby, with those in more rural settings suited to heat pumps and those in towns and cities connected to heat networks. The population density at which it makes sense to switch between these technologies is one of the major decisions facing politicians and policy makers. An advantage of low-carbon gas (biogas or hydrogen) is that it would minimise (although not eliminate) disruption to homes and businesses by making use of existing gas networks.

Decision time

Current action to decarbonise heating in the UK occurs via the Renewable Heat Incentive (RHI), which provides payments to homes and businesses to shift to non-fossil fuel heat sources. Currently, this is almost entirely met by demand from biomass (wood) and waste. The RHI will close in 2021, after which point there will be no low carbon heat policies in place.

However, the government acknowledges that decisions need to be made in the next few years. With the solution expected to be a combination of reducing

demand as well as decarbonising supply, the path to a zero carbon heating system will become increasingly clear.

Action on boosting building efficiency seems imminent, with political support from all major parties. The return of Zero Carbon Homes standards would be a big step, while measures to make buildings 'energy positive' - so that they generate more energy than they consume, as is happening in other countries - could also be replicated in the UK.

A national net zero emissions target would give UK industry a head start on a nascent global business, providing considerable export opportunities as other countries decarbonise their heating supplies.

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