

Our energy insights

District heating and the race to 2050

Decarbonising the UK's energy sector means radically rethinking how we heat our homes and businesses. With district heating offering one possible solution, National Grid has been busy investigating, as Market Insights Manager Simon Durk explains.

Here in the UK, we're committed to reducing carbon emissions by 80% from 1990 levels by 2050.

Heating buildings contributes a third of those emissions, so tackling the problem will mean reconsidering our reliance on gas-boiler heating. One possible solution is a growth in the use of district heating, which uses a single centralised source to heat a network of surrounding buildings.

The technology is already well established in many countries in Europe, but currently supplies just 2% of heating demand in the UK.

District heating itself is only a distribution system. It still needs a main source of heat to be connected to the network. If we want it to be a useful piece in the jigsaw of decarbonising the UK's power sector, that source needs to be low-carbon. In other words, it needs to come from something like a heat pump or waste heat from another process such as factories or a power station.

Generated heat is transported from the source through pipes to heat exchangers in buildings connected to the network.

One advantage is that the infrastructure can be put in place when gas is still being used as the source, and then replaced with a low-carbon solution at a later date. Alternatively, green gas could be used as the heat source, or large scale gas fired plants could be fitted with [carbon capture and storage](#) (CCS).

Future Energy Scenarios

So why is our business interested in the future of district heating? Well, as part of our work creating [Future Energy Scenarios](#) (FES), we aim to provide transparent and credible paths through uncertain future energy landscapes.

These scenarios set out the potential sources and demand for gas and electricity, how they might change between now and 2050 and the implications for the wider energy industry. So we need to constantly build our evidence base to support this work.

We've considered the growth of district heating in our FES scenarios for several years, but were keen to build a deeper understanding. We wanted to explore where schemes are likely to be built, how much market penetration will be achieved and their potential impact on the gas and electricity markets.

We commissioned a project using [Network Innovation Allowance](#) (NIA) funding with district heat experts BuroHappold. The project, among other things, explored economically viable locations for district heating in the UK, the



types of heat source used and how they could interact to balance demand for heat across the network.

We learned, for example, when district heating schemes use waste heat from power stations as their source, a system of top-up heating is also required to meet heat demand when it is at its highest. The most economical solution is to use gas boilers, but this scales down the scheme's environmental benefits. So for district heating to make a positive contribution to the 2050 carbon targets, top-up heat would also need to come from lower carbon sources.

Our findings identified several challenges likely to limit the growth of district heating, the first being the high costs involved. Retro-fitting a street with a new district heat system, for example, is expensive and only justified when there are a lot of heat consumers to ensure the investment can be repaid. In addition, Government incentives, appropriate regulation and funding to support the high cost of materials might need to be in place to encourage developers to take the risk of building a new network.



Suited to the city

In light of our latest evidence, we suggest that urban areas are the obvious location for effective district heat networks. High population density in such places minimises the amount of pipework required and the resulting thermal losses, which makes those projects more viable. Other opportunities include new developments where costs are lower, near sources of low cost heat or where there are large industrial heat users.

Our findings were included in our [FES 2016](#) publication. If you're new to this, the document predicts four differing scenarios — Consumer Power, Gone Green, Slow Progression and No Progression — all based on different levels of prosperity and green ambition.

Based on all the evidence, our forecast for the implementation of district heating in FES 2016 ranges from 1.6 million homes in 2040 in Gone Green, down to 200,000 in No Progression.

Arrested development

So in short, while district heating has the potential to play a role in helping to decarbonise energy, it will require clean heat sources, planning and co-ordination and a policy environment that encourages long term investment if it's to be effective. The large capital costs involved – as well as the additional need for communities to buy into the principles of the scheme – are seen as big barriers to entry.

The District Heating commissioned report has strengthened our understanding of district heating and made our future scenarios more robust. But we've only scratched the surface. We will continue to work to develop a thorough base of evidence that strengthens our forecasts for the years ahead.

The BuroHappold report can be found here: <http://fes.nationalgrid.com/media/1215/160712-national-grid-dh-summary-report.pdf>

If you have any questions or comments we would like to hear from you.

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