### POLICY

## Making policies for heat transformation Policy proposals for the of the UK heat market in



he UK has a legally binding greenhouse gas emissions reduction target up to 2050, but is facing some real challenges about how to meet the fiveyear carbon budgets intended to achieve it. The Committee on Climate Change has stated that progress to date won't be maintained without new policies, raising the prospect of the UK missing future targets without concerted policy action.

The electricity sector, despite some false starts, has benefitted from some effective policy to boost the adoption of renewables. As a result, there have been significant steps taken in decarbonising the UK electricity supply, notably with the recent growth in offshore wind capacity. The electricity system is undergoing real technical change, with renewables supplying over 29% of the UK's electricity in 2017.

In contrast, the heat sector has not received the same concerted policy attention, despite the fact that heating and hot water make up about 40% of the UK's energy consumption and contribute about 20% of its greenhouse gas emissions. Decarbonising heat will be vital if the UK is to achieve its climate change goals.

Some policy measures are in place to encourage decarbonisation, notably the Renewable Heat Incentive, but they have not led to widespread adoption of low carbon technologies. Similarly, there is a Policy proposals for the decarbonisation of the UK heat market include those bent on repurposing the existing gas distribution network in some way, and those which rely on new technology solutions. Here, Exeter University's *Bridget Woodman* examines the role of the incumbent heating companies.

Might UK households be

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future?

long way to go to improve the

energy efficiency of our building

stock to reduce our heat demand.

the socio-political dynamics of the

heat system have not really been

researched and consequently are

understanding what the system is

– not just the technologies, but also

the companies and consumers who

are an intrinsic part of the system

- then making effective policy will

be impossible.

The heating incumbents?

A recent UK Energy Research

Centre (UKERC) project: Heat,

was designed to help more

sector, mainly focusing on

Incumbency and Transformations,

effective policy making for the heat

non-industrial heat. The aim was

to try and understand more about

the non-technical dynamics of the

existing players, and what are they

doing about the decarbonisation

agenda? What lessons might this

reduce emissions from the sector?

The first phase of the project

was geared towards understanding

system. The word incumbency can

hold for policymakers trying to

the current players in the heat

have negative connotations of

however, that this is not

companies dragging their feet in

the face of change. We were clear

necessarily the case. For example,

there is evidence in the electricity

UK's heat system. Who are the

not well understood. Without

So, what can be done to improve things? Part of the problem is that

heated with hydrogen in the

sector of large, incumbent companies in the electricity sector recognising the implications of decarbonisation and adopting new technologies and business practices as a response.

On the other hand, though, there are some good reasons why incumbent companies might not want to see change. They are established companies in a sector which have made investments which will endure for decades in networks and other technologies, and have established business models and practices which guide their activities.

But decarbonisation implies the adoption of new technologies and practices which could threaten these financial and business commitments. It also opens up the possibility of new entry into the sector – as we are seeing at the moment in the electricity system – with new ideas and new ways of doing things which challenge the activities of the incumbent companies.

The importance of understanding incumbents is that they are not necessarily going to be innovative in their approach to decarbonisation. Their natural – and understandable – impulse will be to protect their current activities and business models because that is where their investment and expertise lies.

#### **Classic defensive strategies**

So, how are incumbents engaging in the decarbonisation agenda? One of the interesting findings was that the 'Big Six' and upstream gas companies, where much of the money in the sector lies, are not really engaged at all. This could be because of the policy focus on the electricity sector, or a business focus on international gas markets rather than solely on what's

In contrast, the heat sector has not received the same concerted policy attention, despite the fact that heating and hot water make up about 40% of the UK's energy consumption and contribute about 20% of its greenhouse gas emissions Smaller players such as installers are not involved in the debate either, mainly because of a lack of resources to input into policy making processes such as consultations.

The main focus of business activity on the decarbonisation agenda came in two sectors: heating appliance manufacturers and gas distribution network companies, who supply gas to around 90% of UK homes. Both sectors have adopted an argument that the existing gas grid should be decarbonised, rather than the deployment of new approaches such as heat pumps and district heating networks. This can be seen as a classic defensive strategy by companies whose activities and business is threatened by an alternative way of doing things.

In an electric heat/district heating future, the use of gas networks would decline, meaning that transmission and distribution companies would lose a major source of revenue. This is a dilemma already being faced in some electricity systems as consumers generate their electricity off-grid using renewable sources, and as a result distribution companies are having to spread costs among fewer consumers, raising their bills and indirectly encouraging them to go off-grid too.

There is an active debate about this at the moment in Australia, where the future of utilities and the potential for this sort of 'death spiral' is a very real industry and political concern.

#### Hydrogen for gas networks

Looked at this way, the idea of incumbents promoting hydrogen for gas networks is not surprising. In this future, the incumbent gas companies would maintain the use of their networks, ensuring that their business models were effectively unchanged. The basic infrastructure of gas networks would remain, as would the companies' source of revenue, although there are of course much broader system implications for infrastructure to produce the hydrogen and adaptation of appliances in the home.

The gas network industry has put considerable resources into commissioning and promoting studies which argue for the practicality of injecting hydrogen and biogas into the existing gas grid. The network companies have also put in place Ofgem-sanctioned trials for innovations which would support the development of decarbonised gas networks, while not pursuing innovations for non-gas solutions.

This is a clear case of incumbent companies trying to protect their established business models, and it appears to have achieved some success. The idea of a decarbonised gas network has entered the political mainstream, with the Committee on Climate Change and other organisations endorsing trials. The government's Hydrogen Innovation Programme is aiming for pilot projects by 2020.

Does this examination of hydrogen matter for policy? Well, yes, because the power and influence of the incumbent companies outweighs that of new entrant companies which might advocate a different future based around heat pumps and district heating. By emphasising one option so clearly, other options which may be as or more effective for decarbonisation could be excluded.

#### Value of different options

The final part of the UKERC project was to put forward some policy recommendations about decarbonisation, innovation and companies in the light of our understanding of incumbents' activities. The recommendations are designed to encourage policy making to enable the deployment of all known low carbon technologies, rather than excluding options. This includes trials for hydrogen in networks, but should also ensure that other low carbon technologies are deployed. That way the relative value, feasibility and impact of different options can be evaluated.

Importantly, we also try to address the key issue of the defensiveness in incumbent companies in the face of change by calling on the government to support them in diversifying their businesses into low carbon technologies and services. It is not surprising to find that incumbents are seeking to preserve their investments, business models and practices, but policymakers need to recognise that this is what is going on.

Accepting incumbents' claims while potentially excluding other options will not lead to optimal policy for transforming our heat systems.

Bridget Woodman is the Deputy Director of the Energy Policy Group in the School of Geography, University of Exeter, **exeter.ac.uk** 

# Gas consumption during the 'Beast from the East'

Research published by the UK Energy Research Centre (UKERC) sheds new light on the scale and variability of local gas demand, highlighting the particular challenge of providing energy for heating and hot water throughout the winter.

The decarbonisation of heat is regarded as one of the toughest challenges the country faces in its low carbon transition, not least because of the ubiquity and ease of use of existing natural gas heating systems.

By consolidating gas demand data from Great Britain's local gas networks over a period of 11 months, research from UKERC highlights the hourly variation in local gas consumption, revealing immense swings in demand throughout the day. The data covers the cold weather event popularly termed the 'Beast from the East'.

The Beast from the East led to the highest gas consumption of the 2017/2018 heating season, with 214 GW of local gas demand measured at 6 pm on 1 March.

Earlier in the day, National Grid issued a gas deficit warning, calling for additional gas to be made available to ensure sufficient supply during this day of peak demand. A forecast drop in gas pressure was averted as market players brought more gas onto the system and withdrew less gas from the system than was originally forecast.

The data published by UKERC reveals that this peak demand was only marginally higher than that of the previous day (4 GW higher), but there was significantly increased demand between the hours of 10 am and 3 pm. With many schools and businesses closed, homes were occupied throughout the day leading to a greater demand for heating, increasing the load on the system considerably.

The data also highlights the formidable challenge of delivering the necessary amount of gas to get Britain up and running on winter mornings.

Between the hours of 5 am and 8 am there is an immense increase in gas consumption – the steepest rise was recorded on Wednesday 28 February, with an increase of +116 GW. This is by no means atypical; a quarter of all days during the 2017/18 heating season measured an increase in demand of +100 GW between 5 am and 8 am.

For comparison, the peak supply of the entire electrical system over 2017/2018 heating season was 53 GW, and the highest 5 am to 8 am increase was +16 GW.

This paper highlights the need for an increased focus on measures that target and reduce heat demand between 5 am and 8 am, particularly during the winter months.

Dr Grant Wilson, UKERC researcher, University of Birmingham, and report author says: 'This research provides additional evidence to take into consideration when modelling and planning low carbon heat strategies. The sheer scale of the variability in demand was particularly surprising. It highlights another important challenge for the decarbonisation of heat and provides even more evidence of the wider system benefits of improving the energy efficiency of homes throughout Britain.'

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