COORDINATION

Decarbonising heat – planning nationally to deliver locally

Artist's impression of the NCDH building proposed for Tyseley Energy Park in Birmingham

Image: University of Birmingham

What's missing in the drive to decarbonise UK heating are two organisations to coordinate local planning. So writes *Professor Martin Freer* from the University of Birmingham, which is making a bid to be involved.

Progress on decarbonisation of electricity generation has been tremendous and has generated great pride for the UK government where the remarkable scale up of the roll out of wind power, matched by the very significant cost reductions, stands as a benchmark of what is possible. Electricity generation from wind has grown from negligible levels at the time of signing the 2008 Climate Change Act, to days where wind now accounts for over 30% of generation.

This success story has been made possible by a series of interventions, including the introduction of Contracts for Difference and the Offshore Wind Sector Deal. The former provides long-term security associated with guaranteed levels of return on the capital investment required to develop wind farms and the associated grid infrastructure, de-risking the venture from the business perspective. The latter helped to drive innovation in the UK supply chain to increase competitiveness and development of UK intellectual property.

This innovation and co-ordination has driven down the costs of wind power and driven up the number of jobs in the UK wind sector to over 80,000.

It is tempting to forget that electricity is only a relatively minor component of overall energy use in the UK. There is a significant contribution from transportation fuels and an even bigger demand associated with heat. Indeed, heat accounts for approximately 40% of the UK's energy use. Why then has decarbonisation started with electricity and not heat?

There are many factors which come into play here. The main reason is that decarbonisation of electricity is a great deal easier. Electricity is typically generated by power stations at a scale from hundreds of megawatts to many gigawatts, heat is generated home-by-home. The diversity of housing types, standards of thermal insulation and grid connectivity means that there is not a one-size-fits-all solution.

Technology options

Potential heating solutions include deployment of heat pumps, hydrogen boilers, district heating and others. Heat pumps might source their heat from ground or air and even be of a hybrid generation which continue to exploit the combustion of natural gas. Wide scale deployment of heat pumps would place significant demand on national electricity generation and local electricity networks, with both requiring extension and reinforcement.

Moreover, installation and operation of heat pumps will require significant enhancements in the training of heating system installers and changes in customers' expectations. The generation of heat by a heat pump, unlike the immediacy of a gas boiler, is slow and steady. Installation of heat pumps needs careful design of the whole heating system and thermal insulation. Customers will need to change the way that they expect to heat their homes.

Hydrogen has the potential to be simpler in that injection of hydrogen into the gas grid uses existing infrastructure, though not all of it might be suitable. Also, a hydrogen boiler is not so different from a conventional gas boiler. One significant challenge is to generate sufficient low-carbon, low-cost hydrogen.

District heating on the other hand has been utilised for decades, if not millennia, and there are many national district heating schemes which typically have been commercially viable in high population density regions. Increasingly, the challenge for district heating is to deliver low-carbon heat, as typically generation is by combined heat and power (CHP) plants combusting natural gas.

Whatever the heating solution, it is vital that it is delivered in tandem with improvements to thermal insulation and energy efficiency of the UK's homes.

Local delivery mechanisms

The mechanism by which the new heating solutions will be delivered may also be complex. It is expected that this will be market-driven, with a strong element of customer choice. However, for a customer to have a choice, the infrastructure to support that choice needs to be in place – that's to say capacity in the local electricity grid, a hydrogen gas grid being developed or a district heating network installed.

It is highly unlikely that this will be the case and hence choice may be restricted to a particular type of heat pump or manufacturer's hydrogen boiler. There may be a level of local mandating over which heat technology should be adopted and certainly, to make this all work, a level of local planning.

The development of local and regional plans is essential to ensure that advantage is taken over existing infrastructure with the least expensive and lowest impact solutions delivered. These plans give industry the confidence to invest and can be integrated into a national delivery plan which then establishes the scale for additional electricity and hydrogen generation.

A key element of getting all of this working will be developing large-scale pilot projects to build consumer confidence, establishing programmes that can deliver and

provide a scale of opportunity that allows business to invest in manufacturing the heat pumps and low carbon boilers. At present only a handful of heat pumps are installed per year and there is a need for a massive scale-up to millions. In addition, there is a dearth of qualified low-carbon heat engineers and thus a need for a massive skills programme.

National organisation for heat

In light of this extraordinary complexity, the recent CBI-University of Birmingham heat policy commission, chaired by Lord Bilimoria, recommended that there needs to be a National Delivery Body for heat. This National Delivery Body (NDB) would be an independent, impartial body working with government on creating, coordinating and delivering an overarching national decarbonisation of heat programme.

However, and crucially, the programme will be expected to be locally formulated and delivered by local authorities who will synergise their own local and energy plan with the national programme. Membership of this body would be drawn from industry, independent experts, organisations such as Ofgem and consumer groups, and be led by a chair with the responsibility for reporting to government.

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This would be underpinned by an accord creating cross-party agreement and commitment and forming the basis for industry to agree to work collectively to deliver the heat transition. It would be the responsibility of the NDB to ensure that the scale of manufacturing, delivery of training and skills and the coordination of regional plans into a national delivery plan.

Given the scale and complexity of delivering the decarbonisation of heat, and the rather incredibly short timescales for that delivery, it is unlikely that a transition to low-carbon heating can be delivered otherwise.

In Birmingham?

Of course a National Delivery Body can only have limited impact without some type of delivery arm. It has been proposed that there needs to be a National Centre for Decarbonisation of Heat (NCDH). This would co-ordinate delivery of skills and training, working with industry to support the scale-up of manufacturing and the development of UK supply chains. It would work to establish standards and standardisation, coordinating a number of national pilots and helping to secure finance to deliver such projects.

It has been proposed that a home for the NCDH would be at Tyseley Energy Park in Birmingham. The Midlands is the home for many of the boiler manufacturers, has organisations such as the Energy Research Accelerator, the Energy Systems Catapult and the High Value Manufacturing Catapult, MTC.

Tyseley Energy Park has sources of low carbon electricity, waste heat from energy-from-waste plants and plans to scale-up hydrogen production. It also sits in a community with some of the poorest national housing and significant levels of energy poverty. It is such communities that need to be at the front of the levelling up queue.

It is clear that the level of coordination afforded by a National Delivery Body and a National Centre for Decarbonisation of Heat is going to be required if the UK is going to get even close to delivering its commitment to net zero by 2050. ●

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