Net zero and the energy system transition

Case study

HYHY

Hybrid-Hydrogen (HyHy)

We're looking for solutions to decarbonise heat for homes. We want to integrate all available renewable energy, innovate with heat technology and prepare our networks to become low carbon gas grids.

The HyHy project examined how hydrogen and hybrids could decarbonise the heating of a city sooner and more effectively than alternatives.

FACT FILE

- Before conversion to natural gas began in 1967, the gas network was used to transport a manufactured gas, commonly referred to as towns gas. Hydrogen was the majority component.
- Our study has opened the door to the possibility of local hydrogen supply – by demonstrating that an economic balance of flexible hydrogen production with critical storage is now a viable option for coastal towns and cities like Cardiff around GB and beyond.

Need

This study sets out an achievable path to net zero which keeps disruption to communities and cost to customers as low as possible.

CARDIFF BAY FROM ABOVE

Approach

The project studied the Welsh capital of Cardiff and simulated the decarbonisation of home heating in a number of different ways.

It showed that using smart-controlled hybrid heating systems – where you pair a boiler with an air source heat pump – can reduce carbon emissions quicker.

Hybrid installations of this kind use renewable electricity when it is available, and green gas like hydrogen and biomethane when it is not. It also reduces the amount of green gas needed to heat homes, relying on electricity for 80% of the time and on hydrogen or biomethane to meet peak heat demand.

> "Most exciting of all is the prospect of producing low-carbon heat; using smart hybrid heat pumps in combination with natural gas in the short-term, with the potential for hydrogen in the long-term.
>
> – Lord Deben, Chairman of the Committee on Climate Change (CCC)

Benefits

The existing gas network is already able to transport various amounts of hydrogen as it has done in the past. If Government mandate that all boilers should be hydrogen-ready, then the conversion process will entail little more than a short visit from a gas engineer.

First rolling out heat pumps for use alongside existing gas boilers (fueled by an increasingly green gas supply) means we can start to decarbonise home heating sooner using existing infrastructure, before switching to hydrogen in the future.

The main findings also show local hydrogen production is a viable and affordable alternative to a national supply. This solution could significantly reduce the amount of hydrogen required to meet Cardiff's energy demand, simplifying the transport and storage of carbon dioxide from the hydrogen production process.