Hydrogen East: Finding the balance between hydrogen and other heating solutions

Michael Brown, Hydrogen East

Policy landscape for heating

- Decarbonisation of heat is a **huge challenge**
- Some small success with domestic RHI (closing March 2022), but nowhere near the scale required for Net Zero
- In the *Ten Point Plan,* the Government set "an ambition of **600,000 heat pumps installations per year by 2028**."
- We are still waiting for **Heat and Buildings Strategy** and confirmation of future financial support mechanisms to help householders and businesses
- The **mix of technologies** that will be adopted and where is very difficult to predict
  - Heat pumps, heat networks, electric heating, hydrogen boilers, hybrid solutions

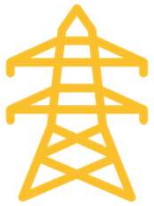
When might hydrogen be an option?

- In the recent *Hydrogen Strategy*, the Government committed to a range of decision milestones to pave the way for widespread use of hydrogen in heating, including:
  - Allowing a **20% hydrogen blend in the gas network** from as early as 2023
  - Establishing a **hydrogen neighbourhood trial by 2023**, a village scale trial by 2025 and hydrogen town by 2030
  - Consulting on the case for enabling, or requiring, **new natural gas boilers to be 'hydrogen-ready' by 2026**

Ongoing feasibility and safety testing needs to complete to understand viability of mass conversion of the network to hydrogen

The challenge for the networks

- The extent to which different technology options are used to decarbonise heating will have **serious impacts on the energy network operators**



- Electricity networks may need to plan for **significant additional capacity and flexibility** to facilitate mass electrification of heat (as well as transport)

- Gas networks need to identify a **pathway away from fossil gas**, but what options are technically and economically viable?
  - Do the safety cases allow for distribution and transmission of hydrogen?
  - Will there be enough demand for hydrogen to justify maintaining existing infrastructure?

- To mitigate against these great uncertainties, network companies undertake **annual scenario modelling** looking at a variety of variables

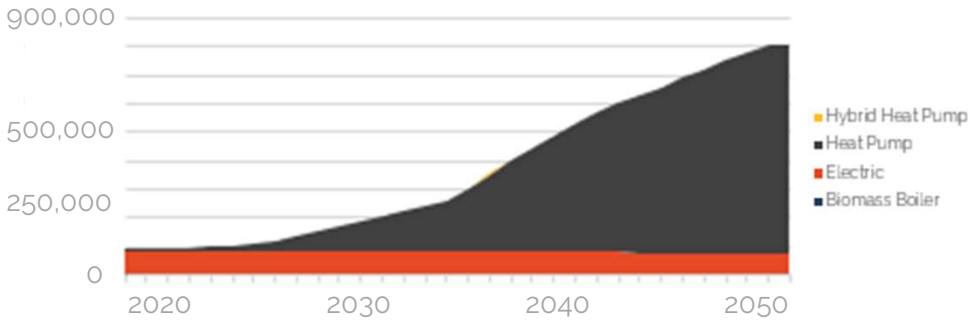
UKPN – Scenario modelling

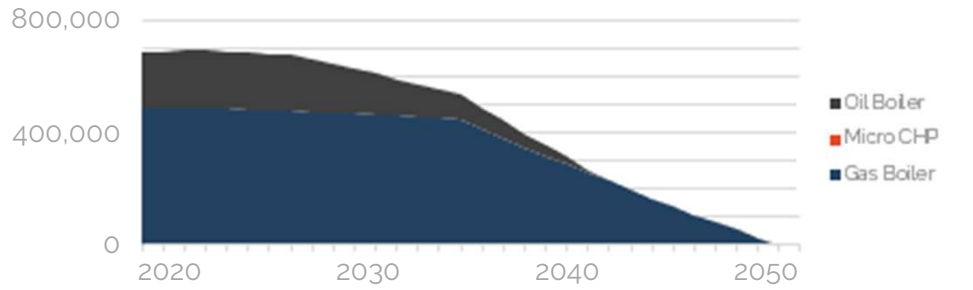
- Four scenarios to account for different policy priorities and consumer behaviours
- System Transformation sees hydrogen heating and Leading the Way assumes significant use of hybrid hydrogen technology
- In contrast, Consumer Transformation sees high electrification

Domestic heating – Consumer led

In **consumer transformation** scenario:

- **Mass uptake of heat pumps**, with rate of install increasing significantly from 2035
- **Replacement of oil boilers targeted first**. Heat pumps likely to be optimal solution given the properties will be off the gas grid
- From 2035, gas boilers replaced at steady rate to ensure **no gas heating by 2049**



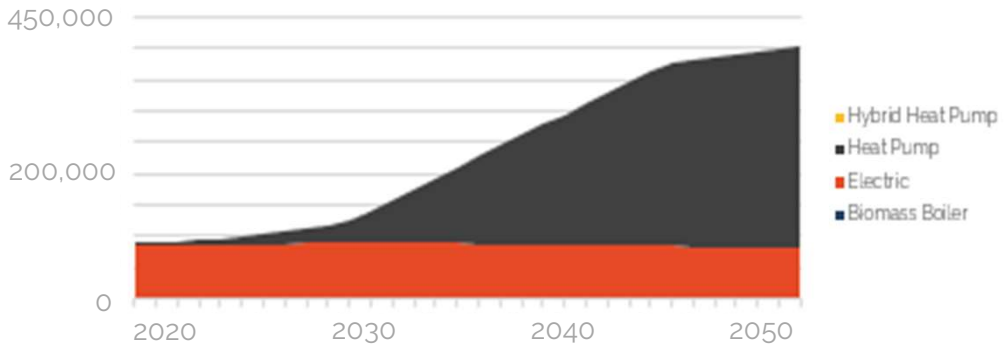


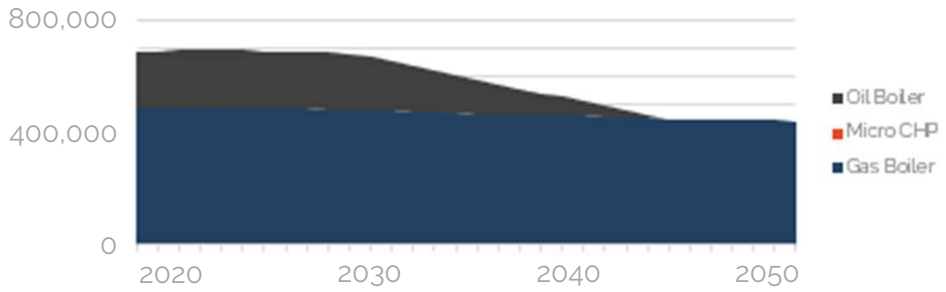
Domestic heating – system led

In system transformation scenario:

- Still significant uptake of heat pumps
- Replacement of oil boilers is main obstacle and they represent the priority for heat pump adoption
- Gas boilers remain relatively constant over time.

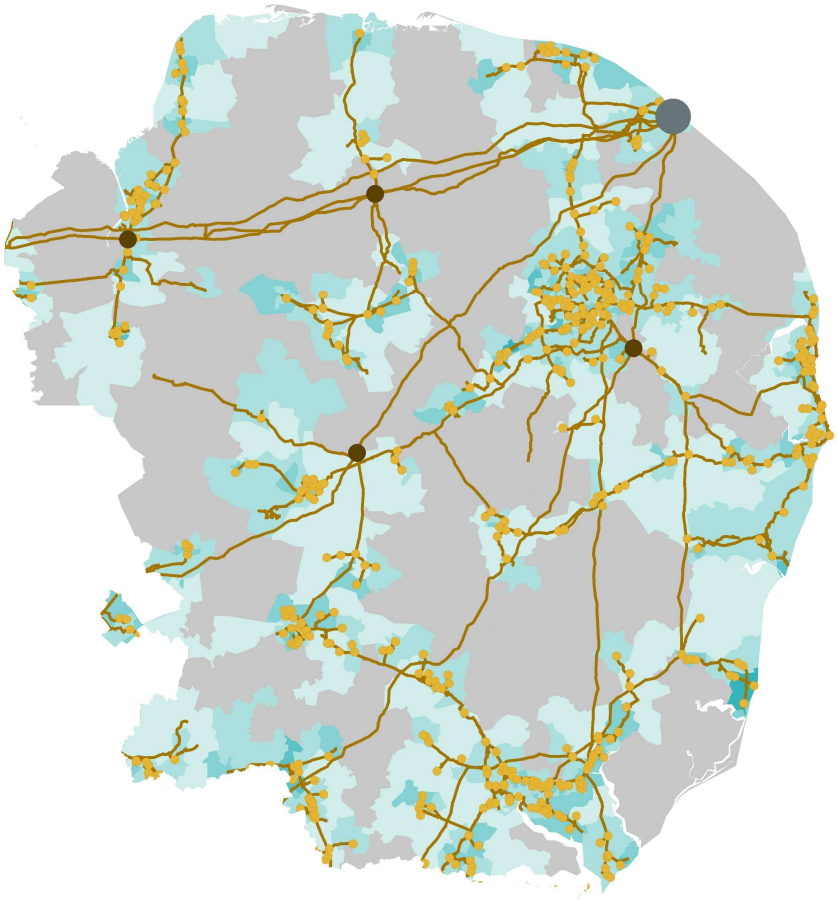
This is where dates we discussed from hydrogen strategy act as important sign posts





Estimating hydrogen for heat (1)

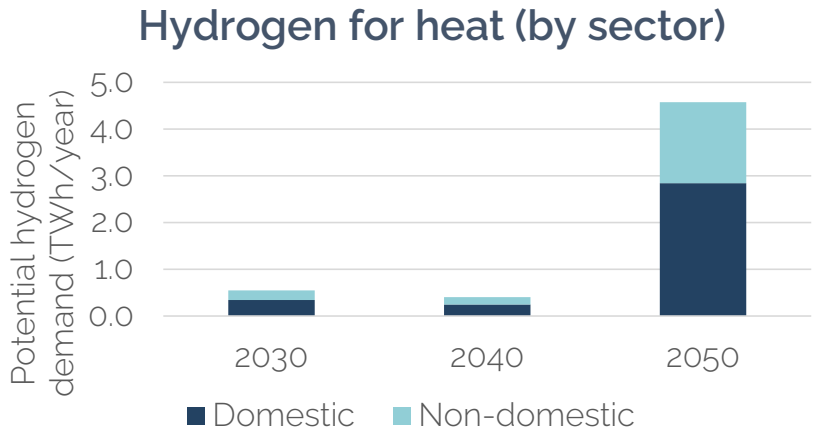
- As part of our **Bacton Energy Hub** study, we used the UKPN DFES to look at a **hydrogen demand curve for heating**
- Aim of the study was to identify potential **demand across the New Anglia region by 2030 and 2050**
- **Assumptions were made on adoption dates** based on the preliminary studies being undertaken by network companies

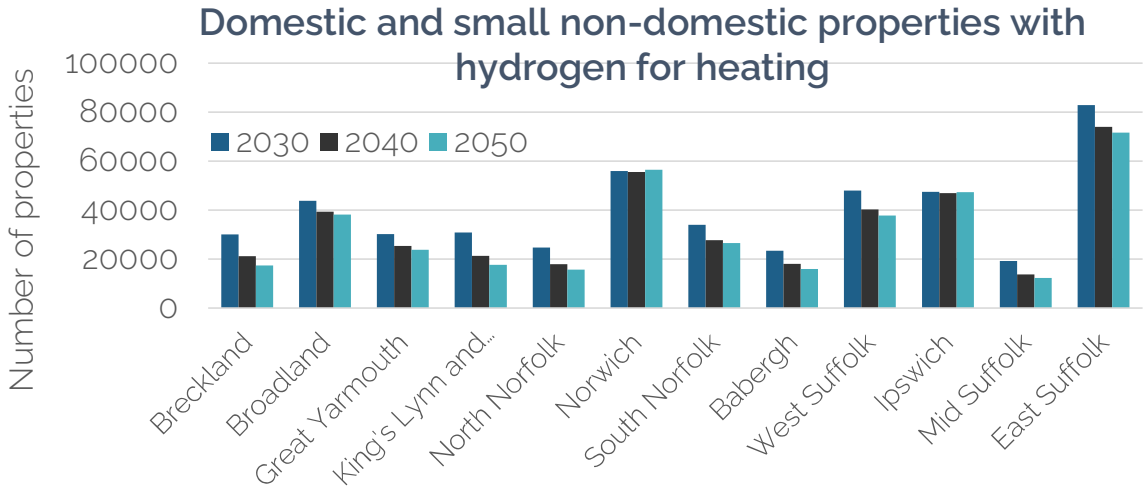


Estimating hydrogen for heat (2)

	2030	2040	2050
Low	0.48TWh	0.14TWh	0.07TWh
Central	**0.55TWh**	**0.41TWh**	**4.58TWh**
High	0.78TWh	9.71TWh	8.49TWh

- Volumes demanded for heat are intrinsically tied to the level of hydrogen blending permitted in the gas network
- The increase in demand between 20% and 100% hydrogen blends is non-linear
- Determined by the interplay between the timing of 100% hydrogen availability, adoption rate of electric heating and changes to annual consumption





Summary

- There is still **significant uncertainty**
- There are a number of technology options to achieve the goal and they should be treated as **complementary, rather than competing**
- To keep Net Zero pathways open, **heat pump roll-out needs to target off gas-grid properties first** and then tackle properties that are best suited for conversion
- There is another layer of complexity that also needs to be addressed – the retro-fit challenge (but that's another webinar in itself!)