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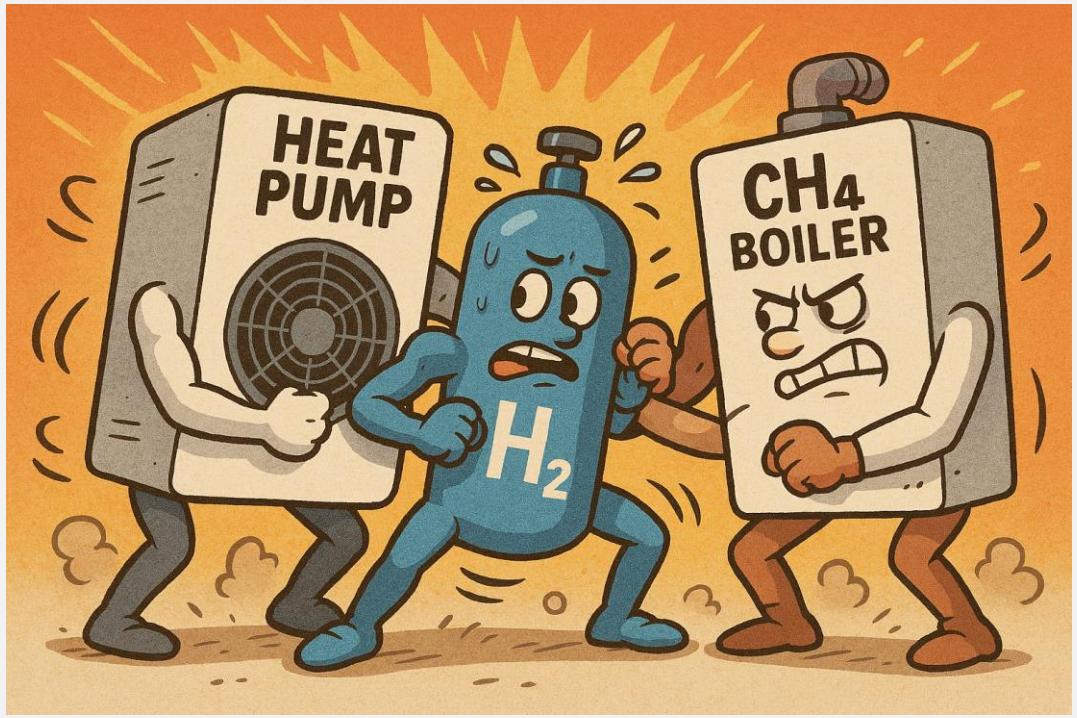
Enemies to lovers: the hybrid heating approach

April 2025



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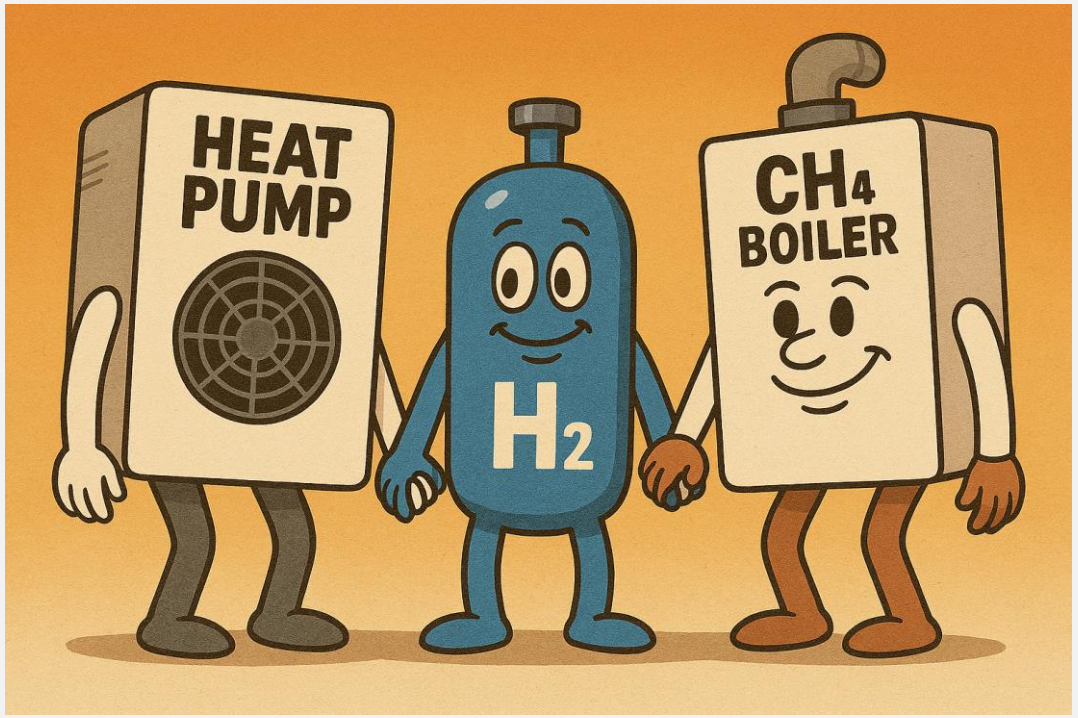

All war is a symptom of man's failure as a thinking animal – John Steinbeck

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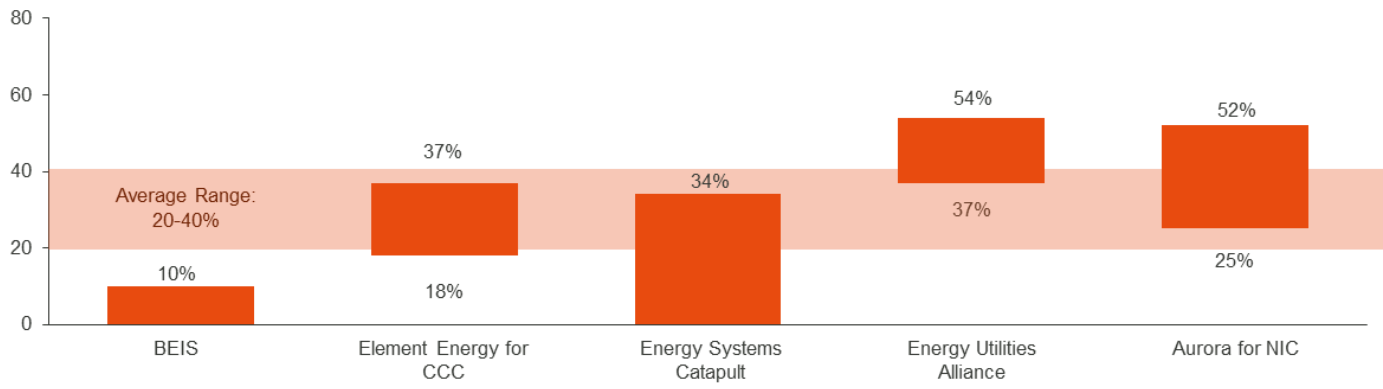
Hydrogen Boilers and Heat Pumps

Decarbonising all our housing stock is a technical and affordability challenge

- **For most homes, electrification will be the most economical solution for achieving decarbonised heating.**
- **But, between 20-40% of homes are considered hard or costly to electrify.**
- **The energy sector will need to work together so that all homes have feasible and affordable decarbonisation options.**
- **Ruling out gaseous heating risks costs and disruption for those households unsuitable for heat pump installation.**
- **Choice matters, in this decision and in participation with the energy transition.**

I'd like to see research and evidence. So something like, 'here's a property like yours, and how it works there'. Then you can make a decision that's best for you.

Consumer Research, Savanta, 2024

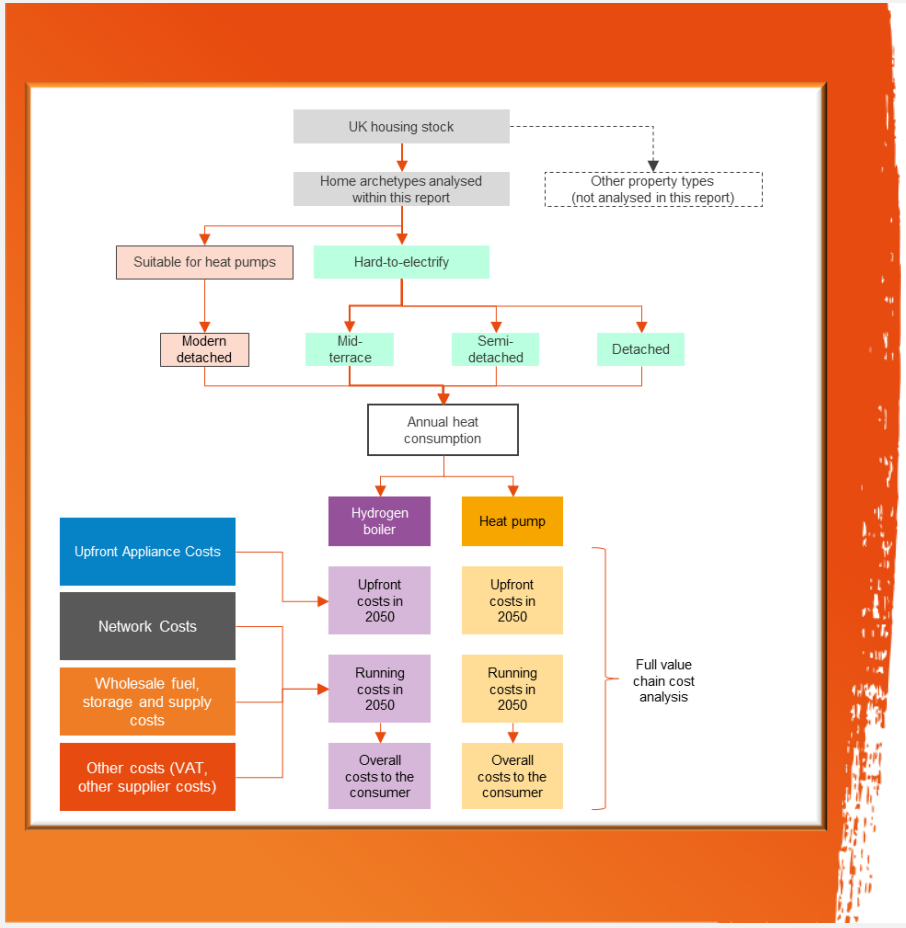


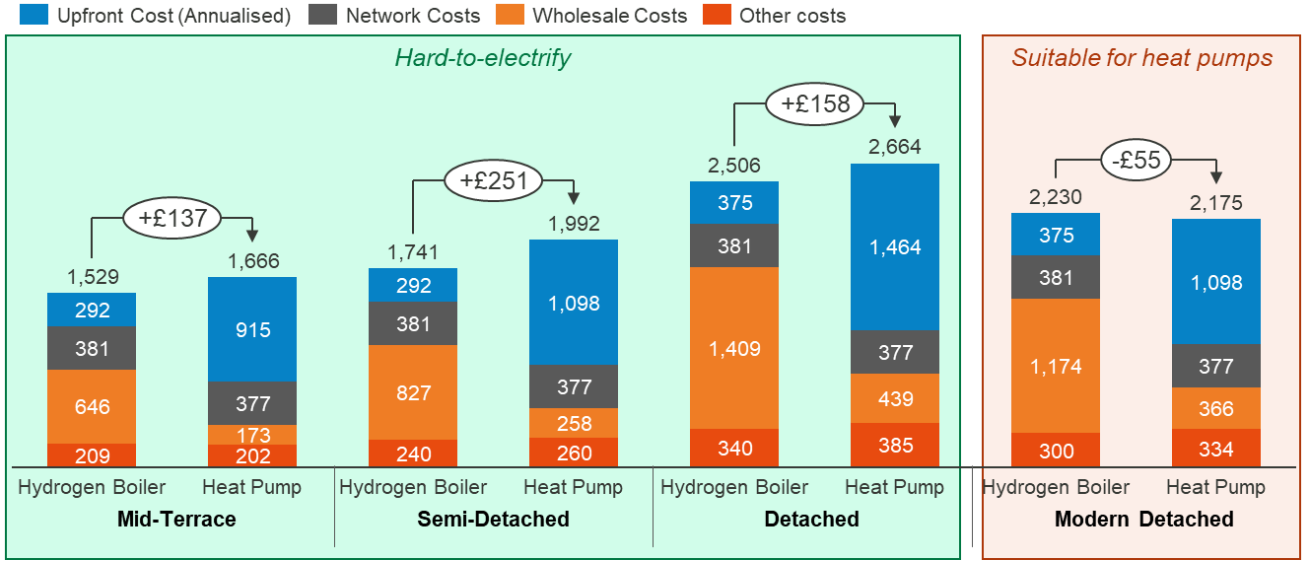
Hydrogen for heat may be the best and cheapest option for some homes

- **Some homes are harder to electrify than others.**
- **Many UK homes lack the insulation and modern heating systems needed to keep energy bills low and reduce carbon emissions.**
- **The diversity of the UK's housing stock also presents challenges to single solution approaches.**
- **So, we identified four housing archetypes, as representatives of 27% of the on-gas-grid GB homes.**
- **Three are harder to electrify, one that is easier to electrify.**

		Property Age			Property Characteristics				
Property Type		Period	Proportion of the Housing Stock	Built pre-building (thermal) standards (1965).	Thermal efficiency improvements needed	Solid Wall	Cavity Wall	Limited Outdoor Space	Limited Indoor Space
Hard-to-Electrify	Mid terrace	Pre 1919	8%	✓	●	✓		✓	✓
	Semi-detached	1945-1964	10%	✓	◐		✓		
	Detached	1945-1964	7%	✓	◐		✓		
Easier to Electrify	Detached (modern)	Post 1990	3%						

We compared the costs to customers of electric and hydrogen heating through a full value chain cost analysis





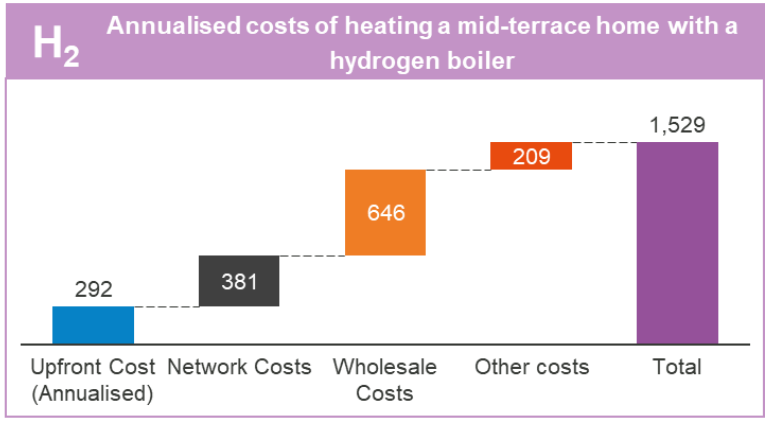
The most economic heating solution will depend on the home archetype

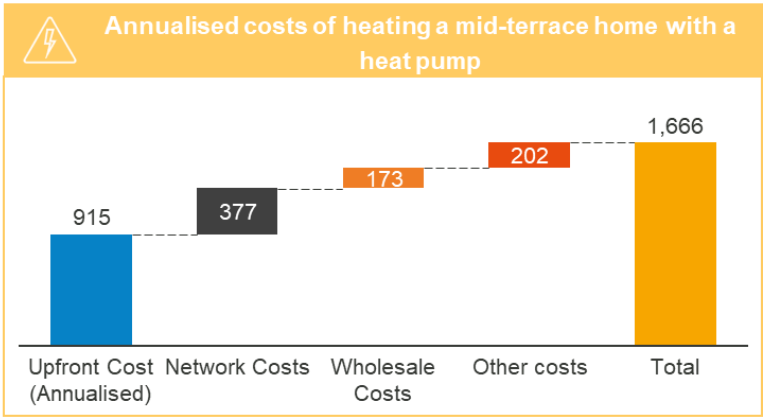
- **This is an example of the annualised costs to consumers using a heat pump versus a hydrogen boiler in a mid-terrace home with no additional energy efficiency costs included.**

Upfront cost depends on the property type, its typical thermal properties, the heat demand, and the size of the appliance required.

Network costs are the cost of the electricity and hydrogen networks required to deliver the energy required for heating the homes.

Wholesale energy costs depended on the unit cost of producing the energy needed, and the cost of the flexibility and storage required to deliver the heat demand.

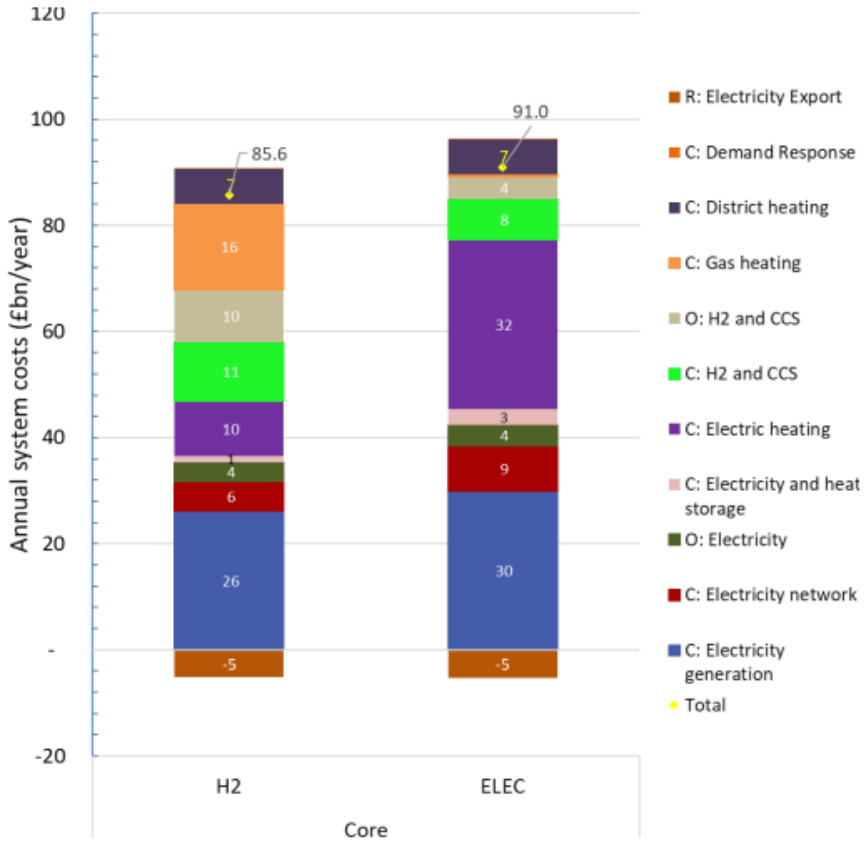




And the energy system benefits from a dual-fuel approach.

- **Imperial College London produced analysis based on detailed cost-minimisation of a 2050 energy system, that meets net zero and resilience requirements.**
- **The overall efficiency of primary energy use in the Hydrogen Pathway is down 19%, but the Hydrogen Pathway costs £5.4bn/year less than the Heat Electrification pathway.**
- **The savings in the Hydrogen Pathway are driven by the lower capital cost of appliances and the reduced (peak demand) infrastructure and energy storage required.**

The Role and Value of Hydrogen in Future Zero Carbon Great Britain's Energy System. Pudjianto et al 2023



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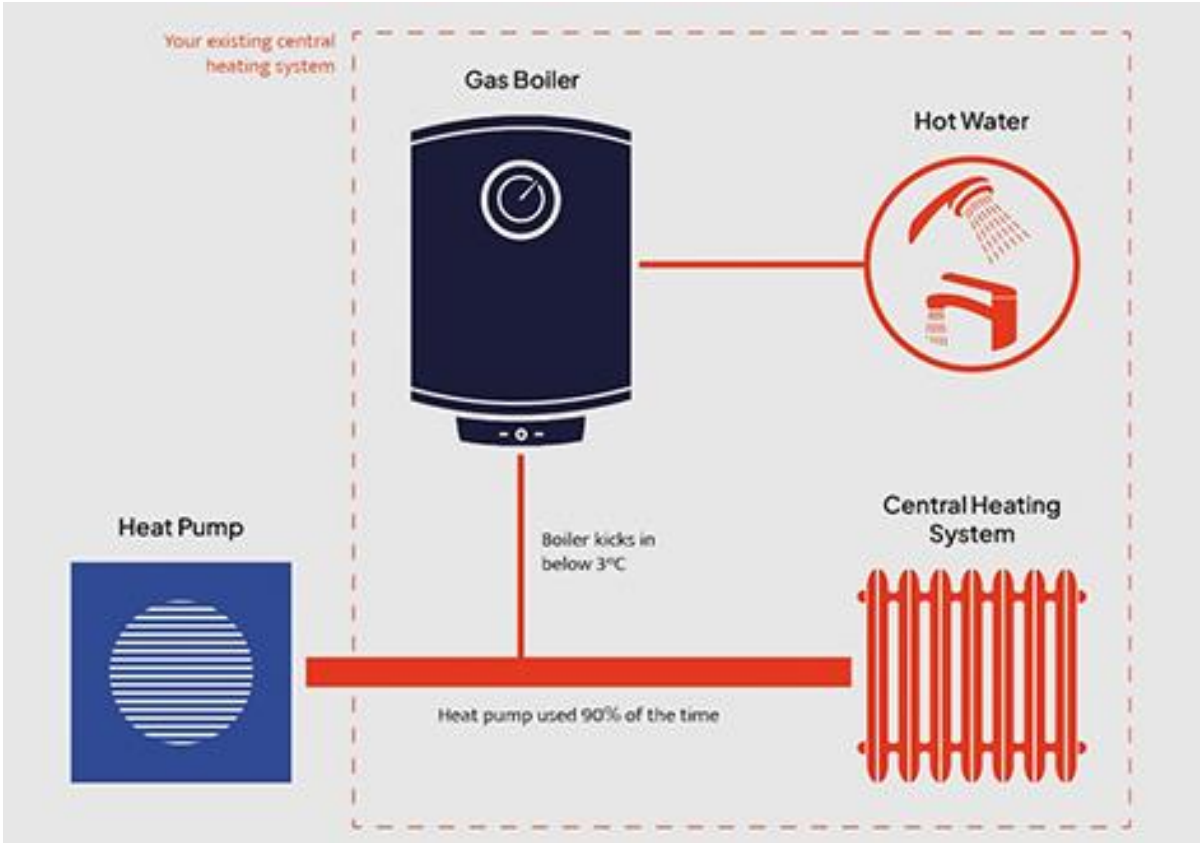
Hybrid Heat Pumps

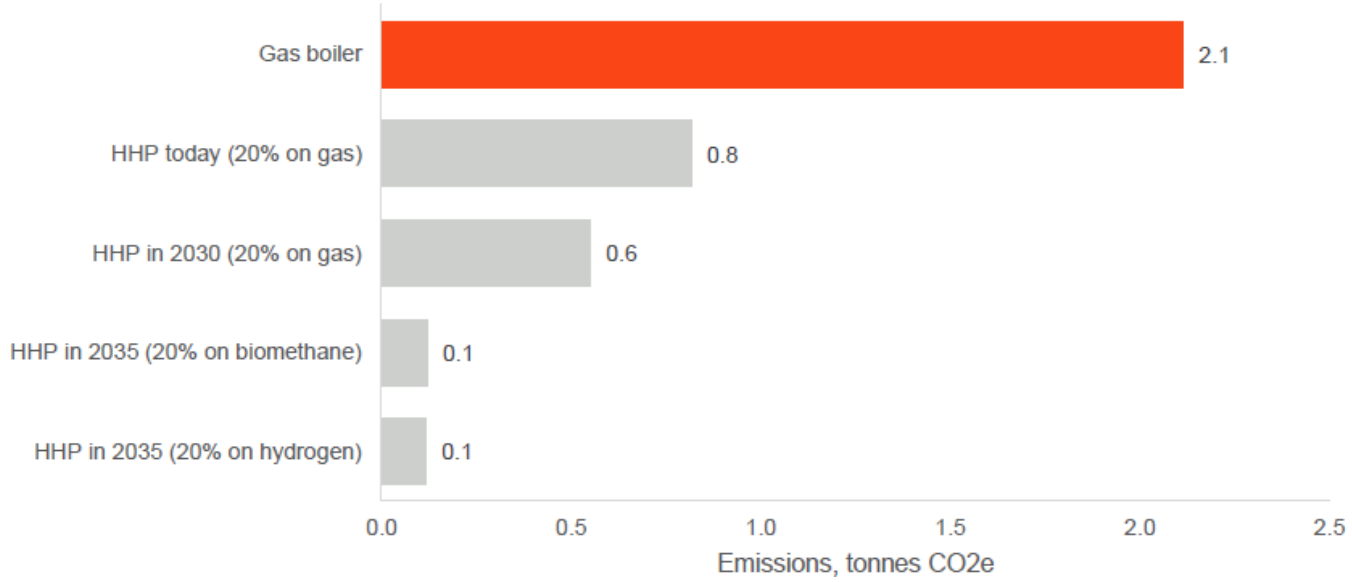
What is a hybrid?

- A hybrid heating system is a heating system that combines a heat pump with another heat source
- A regular hybrid heat pump system – with a boiler, hot water cylinder and electric heat pump – provides space and hot water heating.
- A combination hybrid heat pump only optimises the space heating.
- Hybrids come in different configurations (integrated or non-integrated) to suit both the property's and consumer's needs.
- The need for potentially costly thermal insulation retrofit is avoided.

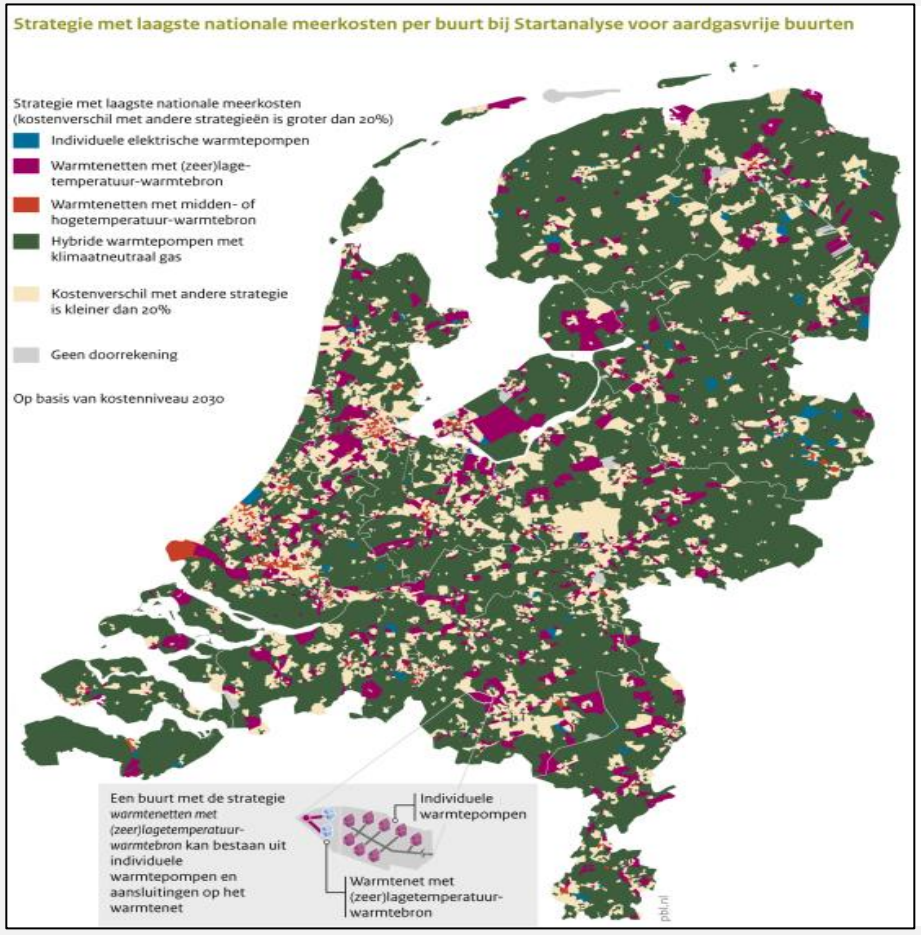


Hybrids heat pumps decarbonise gas use without removing boilers

- In a hybrid set up, the heat pump unit meets most of the energy demand.
- Research undertaken for the Climate Change Committee found hybrid heating systems can operate in heat pump mode up to 80% of the time.
- The boiler is required to meet demand during peak times and during periods of cold weather.
- Gas consumption can go down by 80% and after one year of operation.
- A cleaner grid and green gases could decarbonise hybrids further.



Across the Channel, hybrid deployment is flourishing. Could it here?



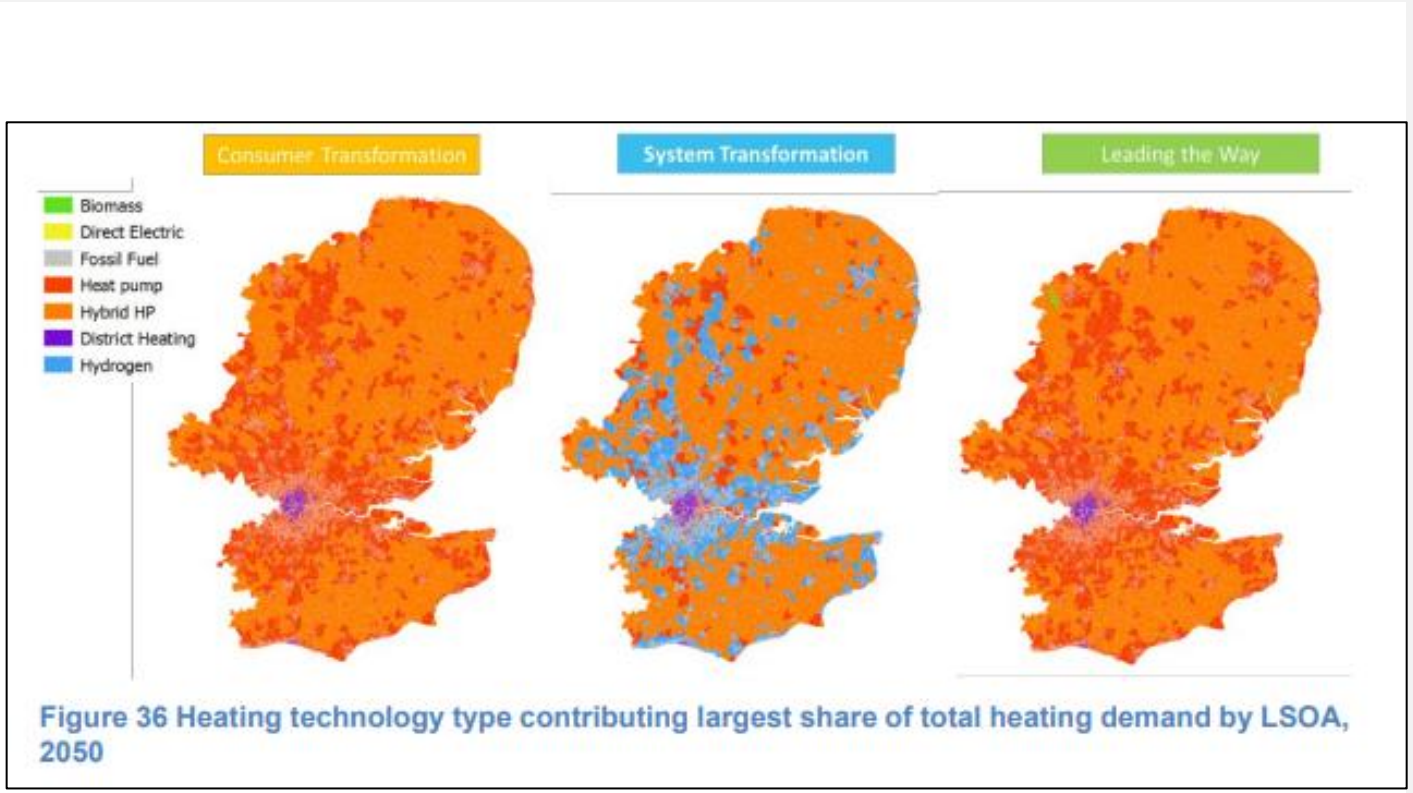


Figure 36 Heating technology type contributing largest share of total heating demand by LSOA, 2050

The benefits are clear, but there are still questions to be answered

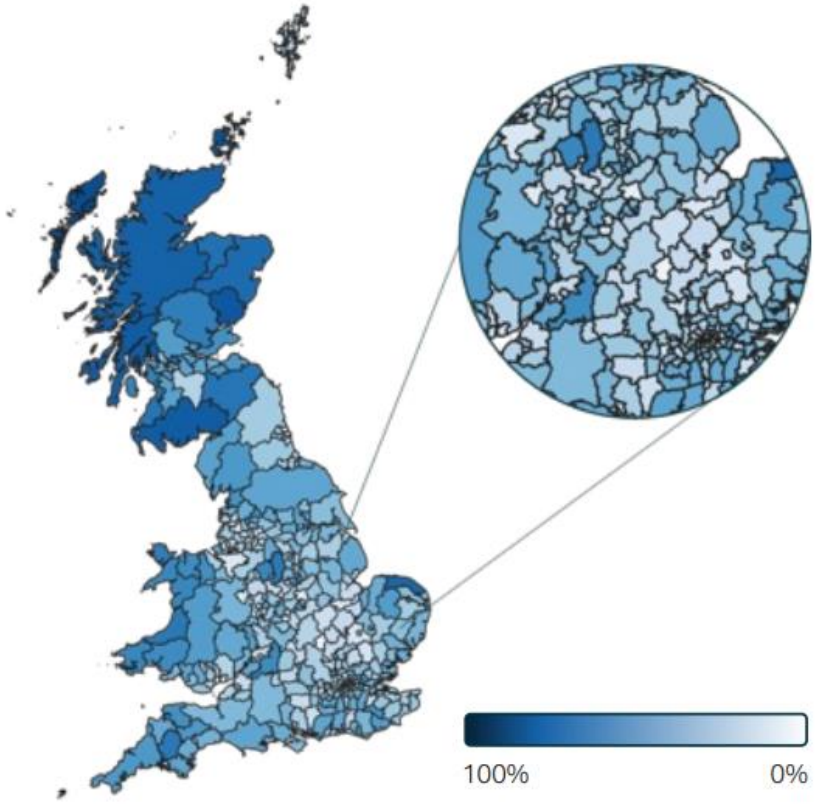
What do the public think?

- Over 8 in 10 households found the low disruption of installing hybrids appealing. Hybrids also cost less than traditional heat pumps, and retain the the familiarity of a boiler.
- But customer appeal is uncertain and bill impact inconclusive.

What will the government do?

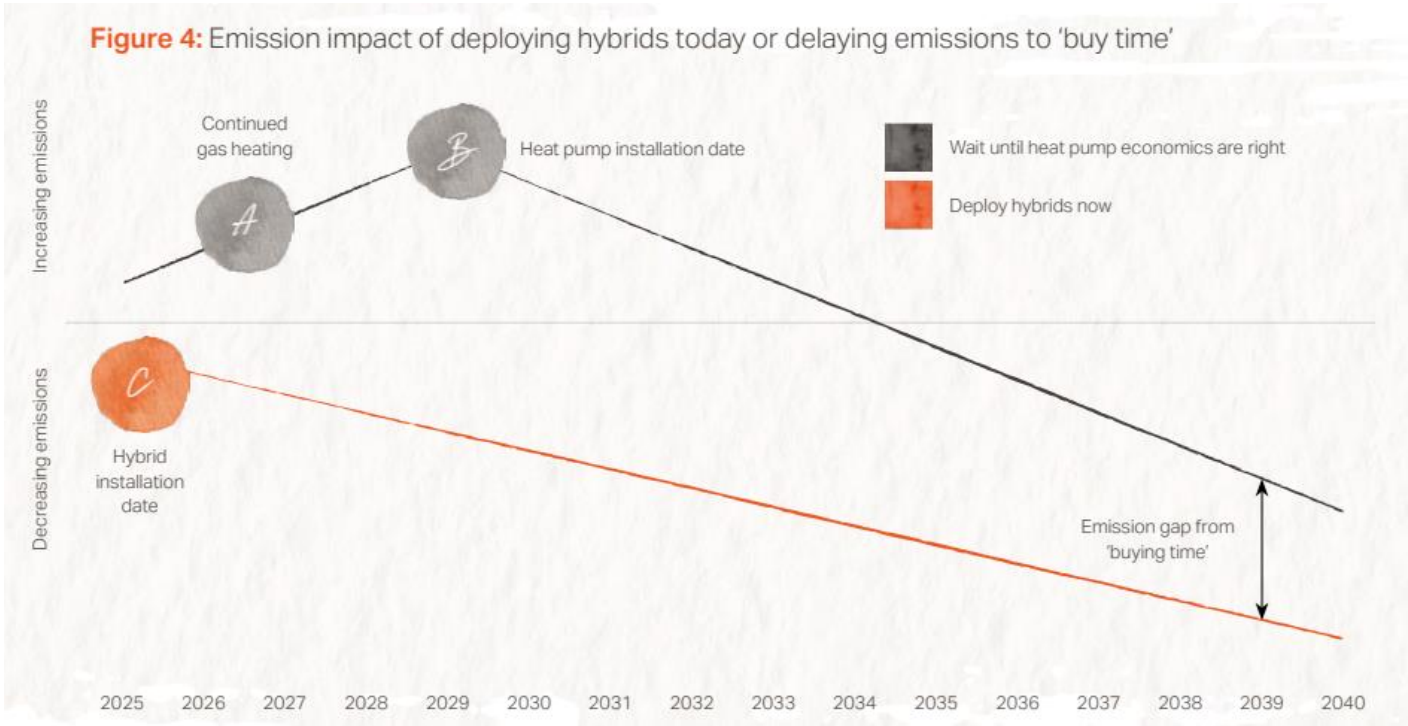
- Hybrids should reduce electricity peak demand, and could be route to encourage smart meter roll out.
- They may catalyse heat pump supply chains and installer markets.
- Hybrids are not a 100% decarbonisation solution, as they – for the time being – retain a fossil fuel energy source.

Share of homes (%) in each **Local Authority** where hybrids are cost-effective versus electric heat pumps



We could do something good today. Shall we?

- Assuming a five-year delay between hybrid and only heat pump installation, **an additional 11 tonnes of CO_2** is emitted per household.
- It takes a further five years to elimete the total emissions increase during the delay period.
- By 2040, hybrid rollout could save 25 tonnes of CO_2 per household.
- Hybrids today reduces cumulative emissions and the required effort and cost to abate in the future.



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Time for questions