

Heat pumps work* What's next?

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21st November 2025

CATAPULT
Energy Systems

Accelerate Net Zero
energy innovation



About Energy Systems Catapult

Mission: Accelerate Net Zero energy innovation



We help energy innovators launch new products and services



Independent, not-for-profit



Based in Birmingham, 250+ experts



Established by Innovate UK



SME support



Consumer insight and proposition design



Whole system modelling



Delivering trials and demonstrations



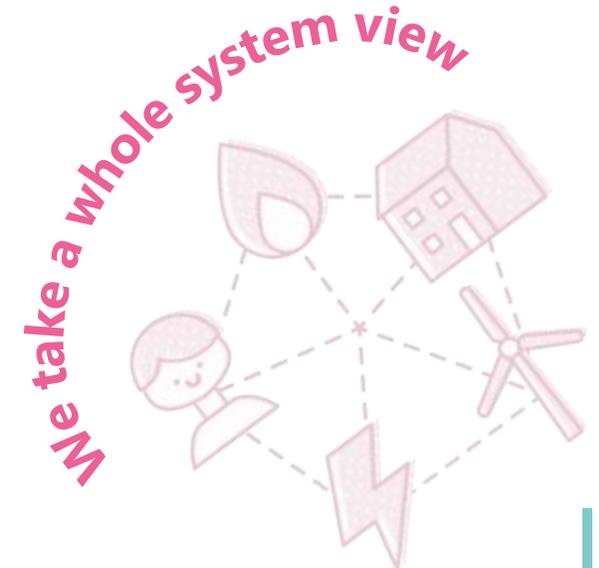
System and clean technology engineering



Digital and data expertise



Markets, policy and regulation



Electrification of Heat Demonstration Project



Heat pumps work?



Demonstrate that heat pumps can be installed in a wide variety of homes



Demonstrate that heat pumps can deliver high levels of consumer satisfaction across a range of consumer groups



Better understand the feasibility of a large-scale rollout of heat pumps across the UK

Funder



Department for
Business, Energy
& Industrial Strategy



Department for
Energy Security
& Net Zero

Management Contractor

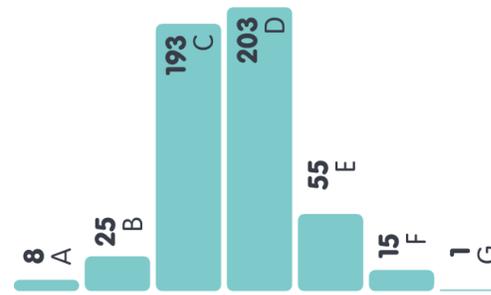


3 Delivery Contractors



**Installation
subcontractors**

Heat pumps work



Heat pumps can be installed in a wide variety of homes

- 742 heat pump installs across a wide variety of housing types, EPCs, ages
- 15% had energy efficiency upgrades, almost all had at least 1 radiator change
- Monitoring of COPs allowed identification of performance issues (and now on heatpumpmonitor.org)



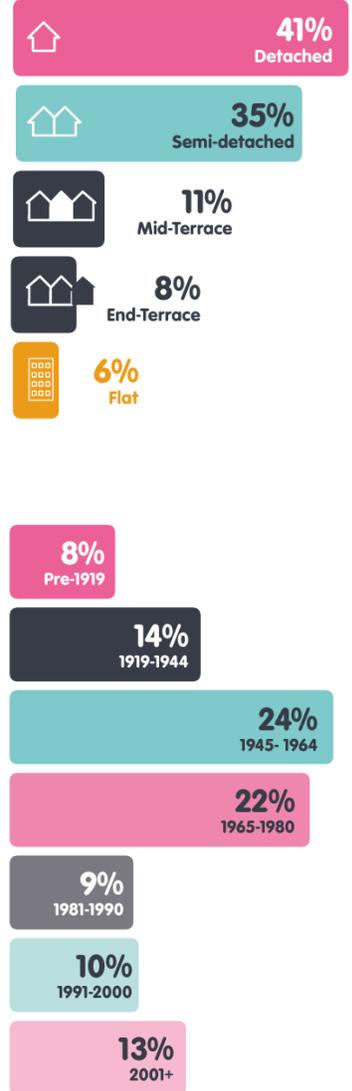
Heat pumps can deliver high levels of consumer satisfaction across a range of consumer groups

- 85% of participants likely to recommend a heat pump to family or friends
- High level of engagement with consumers throughout the journey
- Biggest reason for participant drop-out was potential disruption during installation



Large scale rollout of heat pumps is feasible

- Good levels of participant satisfaction and majority good efficiencies
- Average installation time 2-4 days (microbore+)
- Impact of **Permitted Development Rights**
- High variation in quality and performance indicates work to be done



All housing types are suitable for heat pumps

Homes for Net Zero trials



Homes for Net Zero: Project Overview

Improve the UK
evidence base
for home
decarbonisation

Better
understand the
challenges
faced by
householders
trying to
decarbonise

Test whether
available
options are
both appealing
to consumers
and technically
viable

Funder



Department for
Energy Security
& Net Zero

Lead



Partners, subcontractors and other stakeholders



Robert Heath



mixergy
eskimo

Homes for Net Zero: Project Overview

The project is made up of three distinct trials

Trial 1

Low-cost measures



Evaluating the impact of (relatively) low-cost measures on solid wall, gas heated homes

Trial 2

Air-to-Air heat pumps



Assessing the role of reversible air-to-air heat pumps for homes with electric resistive heating Including barriers to adoption, user experience and in-situ performance

Trial 3

Domestic Heat batteries



Analysing the in-situ performance of central-heating-linked domestic heat batteries

Homes for Net Zero: Project Overview

	Trial 1: Low-cost measures	Trial 2: Reversible air-to-air heat pumps	Trial 3: Heat batteries
Retrofit measures to be deployed	<ul style="list-style-type: none"> • PAS2035 survey • Heat loss survey • Heating MOT • Loft insulation • Draught proofing • Behavioural advice 	Reversible air-to-air heat pump (RAAHP)	N/A – Pre-existing heat battery
Recruitment criteria	Solid walls, gas boilers	Electric resistive heating	Pre-existing heat battery
Recruitment target	1,000 ~300 receiving retrofit measures	165 ~30 receiving RAAHPs	50
Monitoring provided	Smart meters, room temperature and humidity, air quality, heat metering	Smart meters, room temperature and humidity, air quality, electrical submetering	Smart meter, room temperature and humidity, heat battery sub-metering



Flats are tricky for A2A heat pumps...

- Freeholders
- Working at heights
- Planning permission, PDR changes in England only
- Noise constraints + issues with acoustic enclosures
- External space constraints



...Heat batteries may be one solution

- No outdoor unit
- 80% “not at all” or “slightly” disruptive installs
- Location of heat battery affects comfort



Insights to come include...

- A2A heat pumps and cooling
- Impacts on air quality
- Lived experiences with heat batteries
- Recommendations to feed into technical standards and innovative tariffs for heat batteries
- Impacts of retrofit roadmaps for households and small measures

Integrating waste heat into heat networks

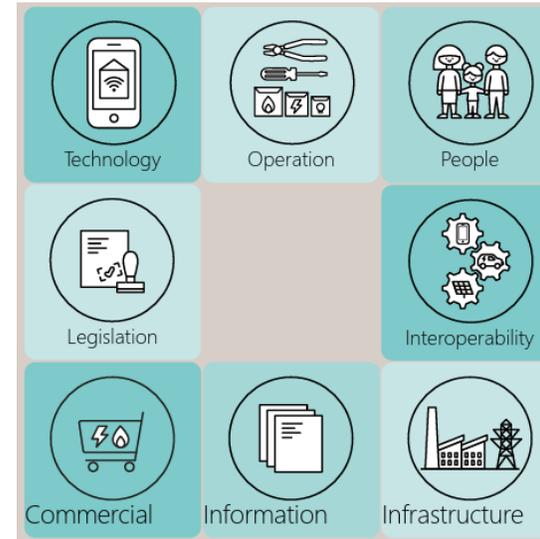


Unlocking the value of waste for Net Zero heat networks

- What are the key characteristics that enable successful waste heat integration into heat networks?
- How can the commercial barriers to integrating waste heat sources with heat networks be overcome?



1. Market review of waste heat projects
2. Mapping waste heat sources and heat networks
3. Business model innovation opportunities
4. Policy & regulatory analysis



Thank you

Kat Young

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