

Natural Refrigerant based Heat Pump (NATURALHEAT)

Project Lead: FeTu

Funding:

£465,763.11



The problem: Traditional heat pumps have limited compressor efficiencies and contain refrigerants with high GWP and ODP

Most heat pumps and refrigeration systems use hydrochlorofluorocarbon (HCFC) based refrigerants, which detrimentally affect the environment and so are being phased out. Alternative refrigerants can be manufactured to have low Global Warming Potential (GWP) and zero Ozone Depletion Potential (ODP), but production is highly energy intensive compared to natural alternatives. The key thermodynamic design feature of any heat pump to maximise its Coefficient of Performance (COP) is compressor efficiency. The current state-of-the-art (SOA) effectivity (volumetric x isentropic efficiency) is only 65%.

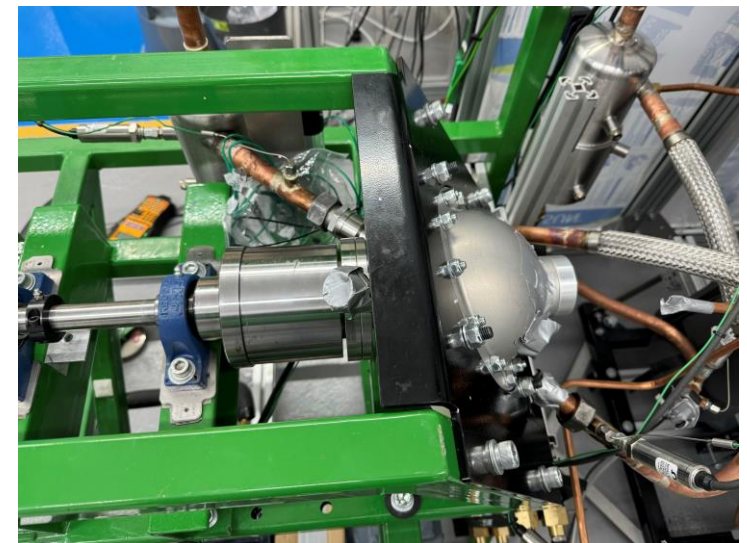
The solution

The FeTu NaturalHeat project will reduce power demand of a heat pump and improve the COP while utilising low-risk low-GWP and zero-ODP natural working fluids, delivering a much more environmentally friendly system to address end-user needs. FeTu's innovative compressor is at the heart of the novel heat pump system, demonstrating breakthrough volumetric and thermal efficiencies. It is lightweight, runs at low speeds, uses less energy, and is mechanically robust. This means a reduced carbon footprint thanks to lower power consumption in manufacture and operations, plus an extended design life.

Knowledge and data support FeTu's incredible efficiencies. Having proven our ability to transform the heat-to-power landscape, we very much look forward to reciprocating the HPR Programme opportunity in proving our capability to truly empower heat pumps. The future of humanity dictates that we must do better.

Jonathan Fenton

CEO and Founder, FeTu Limited



Using FeTu's novel, highly efficient compressor to demonstrate high performance comparable to state-of-the-art heat pumps, whilst using natural fluids.

What are we going to do?

FeTu aims to develop a system based on a proven compressor innovation to support the transition away from traditional boiler technology to electrically driven heat pumps. It plans to do this through reducing power demand, improving the coefficient of performance, utilising low-impact natural fluids, and delivering a much more efficient system to address end-user needs. It further intends to develop its heat pump system utilising FeTu's novel compressor, undertaking design, manufacture, assembly, and testing activities.

Why is this an improvement on current solutions?

FeTu's design offers a smaller footprint/weight, significant CO2 emissions reduction and higher efficiency than alternative technologies at no additional capital cost. The device is highly recyclable, with metal materials comprising 95%+ of the heat pump by weight. The compressor has only two moving parts, operating slower than state-of-the-art, with reduced noise pollution and increased design life. It also has a lower maintenance requirement of 50,000 hours between service intervals. The working fluid in the heat pump circuit can be zero legacy, with near-zero GWP. This reduced environmental impact and cost-saving performance differentiate it from current heat pumps and remove existing barriers influencing poor UK uptake.

What would success look like?

FeTu has three overarching goals: for the system to meet and demonstrate efficiency/COP targets of 4 or above, to complete a timely and successful manufacturing phase in which it is able to manufacture in-house, and to secure a pilot site - either within the project timescales or afterwards.



How will this project help towards the target of installing 600,000 heat pumps per year by 2028?

The FeTu solution has a strong value proposition for both domestic and district consumers. Its use of natural fluids reduces risk, it takes up less space and makes less noise, making it more popular for domestic uses in district heating schemes, and it's competitive on costs with market leaders, both in terms of upfront costs and operational costs, due to its increased efficiency.

The Optimised Solutions Development stream of the Heat Pump Ready programme supports the development of innovative tools, technologies and processes to overcome specific barriers to heat pump deployment in the UK. Wave 2 of this stream supports solutions aiming to improve the ease of heat pump deployment in homes that are 'complex to decarbonise', develop innovative solutions to enable heat pumps to be deployed in 'distress purchase' situations, improve performance of domestic heat pumps with low-GWP refrigerants and improve the domestic consumer experience of using and living with a heat pump.

Heat Pump Ready is funded by the Department for Energy Security and Net Zero through the NZIP programme. The Collaboration & Learning stream is managed by the Carbon Trust with support from Ipsos and Technopolis. We give no warranty and make no representation as to the accuracy of this document, and accept no liability for any errors or omissions.

Contact information

Name: Kirsty Hinchliffe

Email: info@fetu.co.uk

www.heatpumpready.org.uk

Funded by:



Department for
Energy Security
& Net Zero

Supported by:



technopolis
group