

Project Lead: Vital Energi Solutions Limited

Partners: University of Birmingham

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The problem: Deployment of heat pumps in mid- and high- rise buildings is technically complex

This technical complexity is due to internal and external space constraints; commercial difficulties, and the proportions of social housing within such buildings. For example, high-rise buildings have limited space for installing heating systems.

The solution

This project is developing a standardised modular vTherm Hub (vT Hub) to supply heat as a service (HaaS) to homes in mid and high-rise buildings. The vT Hub is designed to simplify and accelerate heat deployment using inherent flexibility to enable heat to be sold at affordable rates. The vT Hub is externally sited, designed to minimise footprint and volume, and contains a robust refrigerant leak detection strategy containing multiple refrigerant sensors to improve general fire safety. The design allows the unit to be prefabricated at scale, and standardisation will improve the speed and cost of manufacturing, installation and maintenance, which is beneficial when availability of trained installers may be constrained. The vT Hub's 80°C flow temperature matches that from a gas boiler so is sufficient to supply most homes without requiring upfront energy efficiency measures or changes to heating systems such as radiators.

“ Vital Energi has been dedicated to understanding the requirements of heat users and the complexity of the electricity markets whilst advancing development of heat pump and thermal storage technology. The vT Hub brings this knowledge together to deliver simplicity and affordability to heat users and help accelerate heat decarbonisation. ”

Chris Taylor

Technical Development Director,
Vital Energi



The project goal is to develop a standardised modular system called vTherm Hub for providing Heat as a Service (HaaS) to homes in mid- and high-rise buildings, which are complex to decarbonise due to technical and commercial challenges.

What are we going to do?

The project will develop a standardised modular system called vTherm Hub. The vT Hub integrates a high temperature heat pump, water store and a resistively heated high temperature store containing phase change material (CPCM).

Why is this an improvement on current solutions?

The vT Hub is a truly innovative concept, as there are no existing or competing solutions which offer an “off the shelf” unit combining a communal heat pump with thermal energy storage and resilience. The prefabricated design reduces cost as procurement, manufacturing, labour and installation timelines are all reduced compared to alternatives. The heat pump achieves flow temperatures up to 80°C from a R290 cycle, and no other product on the market achieves this to our knowledge. The heat pump in the vT Hub has innovative defrost management, that maintains both capacity and coefficient of performance (COP) from a quiet design to help mitigate urban noise creep. The vT Hub can operate at a lower noise level than most urban area background noise levels.

What would success look like?

In order to be considered a success, the project must simplify and accelerate the deployment of heat pumps with a design that addresses space constraints, fire safety, and the need for high-temperature heating without extensive energy efficiency measures. The vTherm Hub must also be cost-effective, easy to maintain, and capable of delivering affordable heating costs to homeowners in mid- and high-rise buildings.



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

This solution will enable heat pumps to be connected in mid- and high-rise buildings earlier than would otherwise be possible. This is possible thanks to its modular design allowing easy installation and maintenance; its cost-effectiveness and flexible operation, and scalability. The vT Hub is designed with storage that can quickly fill when prices are low or negative, which will provide a lower cost to the end user through flexible operation, and can be scaled to meet varying building sizes and requirements.

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.

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