

Project Lead: Wondrwall Ltd

Funding:

Partners: Daikin Airconditioning UK Ltd

£452,292



The problem: Optimising the performance of a heat pump

Commonly used heating controls are often not sophisticated enough to optimise heat pump operation, resulting in higher emissions and running costs.

The solution

By repurposing an advanced intelligent home management platform for electric infrared heaters, the functionality of the existing platform will be extended to heat pump systems to permit optimised integration with solar PV and battery storage, and improved operational performance.

Wondrwall's project aims to deliver a data driven, digital solution that optimises the integration and energy performance of heat pump systems. Using a combination of artificial intelligence (AI) software, sensing instrumentation, external data streams, and subjective occupant feedback, the solution seeks to enable genuine automated control of heat pumps.

The platform is expected to simplify heat pump operation, increase user experience and comfort, and reduce running costs.

“ Taking part in Heat Pump Ready has created the opportunity to develop the world's most intelligent heat pump solution. One that will reduce running costs, grid load and enable the technology to be deployed at scale. ”

Mark Lufkin

Technical Sales Director, Wondrwall Group



Improving user comfort and reducing energy bills

What are we going to do?

The project aims to overcome key technical barriers to extending Wondrwall's existing solution to heat pump systems. This includes:

- Software development to account for higher response times and increased complexity of space heating and domestic hot water management.
- Integration of the solution with hardware utilising Daikin air-source heat pumps.
- Capturing real-world data across circa. 15 homes to validate the technology and train the solution for optimum performance across all scenarios including new home developments and retrofits.

Why is this an improvement on current solutions?

Heating controls in most homes use single thermostats, without any independent monitoring or control functionality to capture room-level occupancy, conditions or personal requirements. Even 'smarter' systems are often limited to real-time data and unable to automate predictive functionality for optimised heating controls.

Wondrwall aims to deliver a first of a kind platform for intelligent home energy management with heat pump systems, realising predictive functionality and fully automated decision-making to optimise heat pump performance.

What would success look like?

Successful validation and training of an intelligent software platform that delivers improved occupancy comfort and reduced energy consumption relative to an uncontrolled system.



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

Wondrwall's smart and automated control system offers the potential for reduced energy consumption with the associated cost and carbon savings, and improved user comfort – two major components of a householder's buying decision for a heating system.

These benefits will help to increase the consumer appeal of heat pumps and drive increased installations in the residential sector.

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. This stream supports solutions aiming to reduce the life time cost and increase the performance of domestic heat pumps, minimise home disruption whilst providing high quality installations, develop and trial financial models to support heat pump deployment, improve the heat pump consumer journey and provide a smart and flexible home energy system.

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Contact information

Name: Jonathan Williams

Email: J.Williams@wondrwall.co.uk

www.heatpumpready.org.uk

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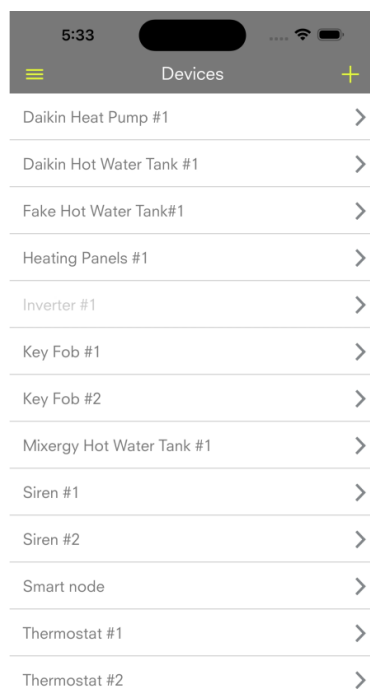


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Key Findings

- Establishing an API between organisations is a critical enabler to solution development, but it can be a time consuming process that requires senior buy-in.
- The most attractive proposition is expected to be when other technologies can be deployed alongside heat pumps (e.g., solar PV, battery) and a holistic approach can be taken to energy optimization. This will maximise energy/cost savings and present the most attractive proposition to homeowners and/or housing developers.
- Market research has indicated that Wondrwall's heat pump solution will be more suited to larger homes, with a complementary infrared solution more appropriate for smaller homes.



Intelligent air-sourcing to net zero Project Progress (Autumn 2023)

What progress have we made so far?

Wondrwall's energy management algorithm, traditionally applied to infrared heating systems, has been adapted for testing with heat pump systems. The application programming interface (API) between Wondrwall and Daikin has been established to allow compatibility with Daikin heat pumps.

A user interface has been developed and the system is ready for consumer testing, with 20 trial sites being secured for monitoring to begin in early 2024.

What barriers have we identified and how has this changed our approach to delivering our project?

- Currently, smart energy management systems that optimise home energy usage are not recognised in the performance assessment of households through the Energy Performance Certificates (EPC) scheme. This can restrict interest from homeowners and/or business developers that are focussed on EPC improvements.
- Delays in establishing the Wondrwall – Daikin API were experienced due to data sensitivities. Despite delays, senior sign-off was granted and the project has managed to establish a functioning API, allowing Daikin heat pumps to be controlled via Wondrwall's third party software.

What are our next steps?

- Establish a monitoring programme across 20 test sites and perform independent analysis through Birmingham City University of monitoring data to quantify system efficacy.
- Refine and optimise the energy management algorithm using in-situ monitoring data.
- Finalise a commercial offering for wider deployment.