HEAT PUMP READY | Department for Energy Security & Net Zero

Part of the Net Zero Innovation Portfolio

MEASURED

The role of measured building performance in heat pump specification, system design and management

CARBON TRUST

Project Lead: Build Test Solutions

Partners: Veritherm UK, Elmhurst Energy Services Ltd

Funding:

£233,888

BUILD TEST SOLUTIONS

Veritherm

elmhurst energy CONSULTANCY

> We are really excited to be taking part in Heat Pump Ready to deliver plant sizing based on accurate thermal performance measurements bespoke to individual buildings, improving efficiency and reducing waste.
>
> **Richard Jack**
> Technical Director, Build Test Solutions

The problem: How can heat pumps be correctly sized?

The current process for heat pump specification is largely based around estimations of the physical characteristics of the property and relies on certain assumptions and the experience of the assessor.

The solution

By using new accurate, non-invasive and cost effective measurement tools it is possible to measure the bespoke heat transfer coefficient (HTC) of a property to determine exactly how much energy is required to appropriately heat it.

The MEASURED project aims to create a new method to optimise heat pump specification, design and management by using onsite measurement of building performance parameters as design inputs. This will be done by using smart meters, low cost sensors and newly established techniques to directly measure key performance parameters on a dwelling specific basis. This information can then feed into heat pump specification and design to accurately size a heat pump for the property.

Using measurements to size heat pumps accurately

What are we going to do?

Through real-world field trials, this project is looking to develop a standardised protocol for the measurement of the heat transfer coefficient (HTC) and standardise the process for feeding this information into the design process for heat pump specification. The project aims to determine how calculations and measurements can co-exist, the latter providing improved confidence as well as optimisation and calibration of heat pump system specification and design.

Through working with all the project partners, the MEASURED project will also be looking to deliver added features and functionality to the measurement in response to heat pump market needs.

Why is this an improvement on current solutions?

The current method of heat pump specification often relies on multiple site visits and the estimation of key data entries into the heat pump sizing calculations.

This project will refine the process to use quick tests, low disruption remote monitoring techniques and infrastructure that is already installed in the home to calculate the accurate HTC and subsequently the size of the heat pump that is required to appropriately heat the dwelling. The process has the ability to reduce both upfront costs and the ongoing running costs of heat pumps.

What would success look like?

A publicly available protocol that defines the measurement options, the standards that must be followed, what the outputs must comprise and how these should be presented.

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

Through the development of a publicly available protocol that uses measurement to accurately size heat pumps, this project aims to add valuable pathways to the industry for fast, affordable and accurate heat pumps sizing. Accurate sizing can reduce the risk of oversizing, upfront capital and ongoing running costs of owning a heat pump, and limit customer disruption.

This project will provide valuable insights and tools for the wider heat pump industry.

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.

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.

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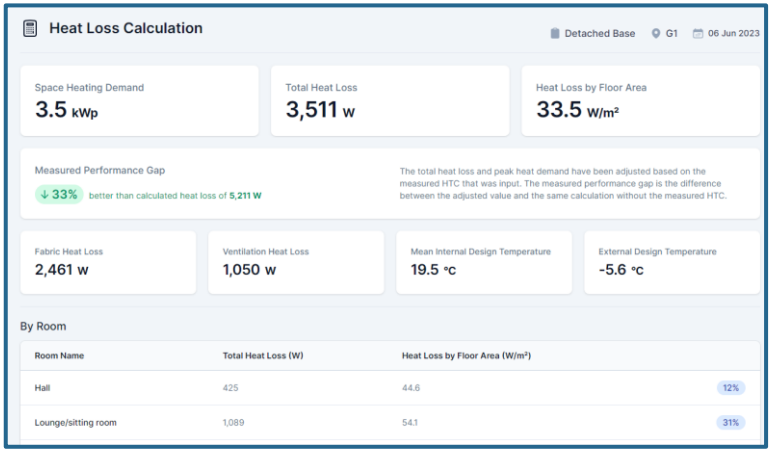
Funded by: Department for Energy Security & Net Zero

Supported by: Carbon Trust, Ipsos, technopolis group

Key Findings

- In a field trial of 50+ homes, only 30% of heat loss calculations matched the true measured performance. This is consistent for BS EN12831 and SAP/EPCs.
- It is more common for houses to have lower heat loss than predicted, especially in older houses. This means: capital saving (on average 11% lower in the field trial, on heat pumps alone), better running efficiency and more ‘heat pump ready houses’.
- Measurements are practical and cost comparable with surveying and can be easily incorporated with room-by-room BS EN12831 calculations to calibrate emitter sizing.



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Project Progress (Autumn 2023)

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What progress have we made so far?

The MEASURED project has conducted field trials in over 50 homes to compare measured heat loss, through Build Test Solutions and Veritherm approaches, with BS EN12831 heat loss calculations. The results showed that only 30% of homes had heat loss calculations that matched the MEASURED approach. Leaving 59% with overestimated heat losses and 11% with underestimated heat losses. Homes with overestimated heat losses can lead to oversized heat pumps with increased capital costs, lower running efficiency and may result in unnecessary changes to existing heat emitters, whilst undersized systems may struggle to adequately heat homes.

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

It can be difficult to change the established methods of installers to use a measured approach, so MEASURED has worked closely with Elmhurst to create heat loss calculation software that incorporates measured results. It is designed to be easy and simple to use, saves installers time and can increase survey success rates.

Current MCS certification requires a BS EN12831 calculation despite the known inaccuracies, so a challenge will be to influence a change in current industry standards to better allow for a measured approach in certified heat pumps installations.

What are our next steps?

Key next steps will be to formalise the role of a measured approach in the roll-out of heat pumps. We believe a measurement-based assessment should form the first step in a consumer heat pump journey and that both MCS standards and leading heat loss calculation software providers should better accommodate measurements taken of the real world performance of buildings.

We will continue to work with leading lights such as Elmhurst to allow the heat loss calculation software to be used by its membership of energy assessors as well as the wider MCS installer community.

For more details and the full project report visit: www.measuredheatloss.com