

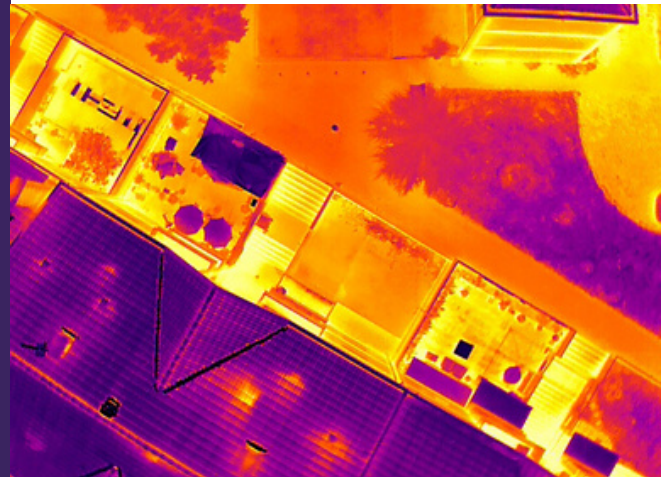
USING PHYSICS & AI TO VERIFY RETROFIT OUTCOMES

BUSINESS WHITEPAPER

This whitepaper outlines how Kestrix used its RetroSPECT drone- and AI-enabled technology to verify outcomes of Peabody Trust's Wave 2.2 SHDF retrofit programme to independently estimate cost and carbon savings.

USING PHYSICS & AI TO VERIFY RETROFIT OUTCOMES WITH KESTRIX

How Peabody used AI-enabled *RetrosPECT* by Kestrix to demonstrate retrofit efficacy.



OVERVIEW

RetrosPECT by Kestrix has found evidence of reduced heat loss in homes that could save residents up to £520/year per home and reduce emissions by 1.3 tonnes CO₂e. Kestrix used proprietary AI to analyse images of Peabody homes taken by drone cameras before and after retrofit work carried out as part of Wave 2.2 of the Social Housing Decarbonisation Fund (SHDF).

This technology is a scalable way of demonstrating asset investment outcomes and value for money, providing accountability that is essential to secure future funding.

In similar retrofit programmes, lack of accountability has proven to have consequences: the NAO found in 2025 that 98% of audited homes with External Wall Insulation (EWI) under ECO4/GBIS had issues requiring remediation.*

HOW KESTRIX WORKS

With InnovateUK and Peabody's support, Kestrix has developed a lower-cost, less invasive way to verify fabric performance: *Rapid Thermal Performance Assessment (RaThPAs)* algorithms.

RetrosPECT, powered by the algorithms, analyses drone images of buildings before and after retrofit to estimate thermal performance. This helps reveal what works have been done, and to what quality.

WHY VERIFY RETROFIT?

The UK is investing £2.3 billion through SHDF/WH:SHF to make social homes warmer, lower carbon, and cheaper to heat. But evidencing value for money is challenging: EPCs are widely recognised as inaccurate, and internal monitoring can be costly and unscalable.



"Peabody is investing to retrofit thousands of homes. Scalable, reliable validation is essential to ensure every pound spent translates into measurable savings for residents."

Richard Ellis, Director of Sustainability at Peabody

DESNZ is to invest

£2.3BN

IN SOCIAL RETROFITS OVER 5 YEARS

Audits of other schemes (e.g. ECO) said

98%

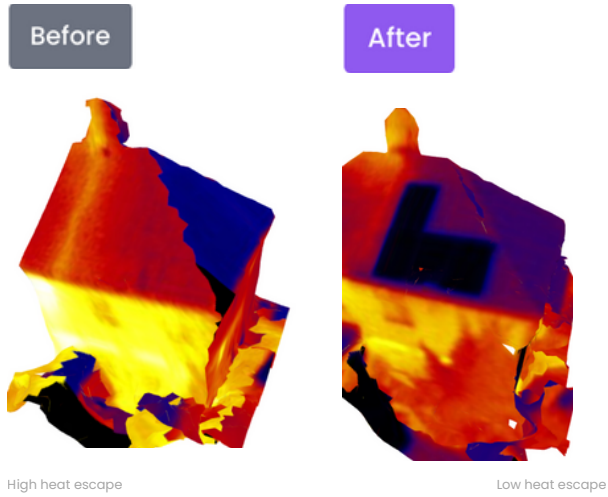
EWI INSTALLS HAD MAJOR ISSUES*

*98% EWI failure [audit finding](#) relates to ECO schemes (supplier-obligation programmes administered by Ofgem, rather than DESNZ). While SHDF/WH:SHF operate under different delivery and assurance models, audit learnings highlight the importance of robust verification across all programmes.

STUDY OUTCOMES

Kestrix performed blind analysis of thermal and visible (RGB) drone imagery taken of Peabody homes in Potters Bar to independently demonstrate retrofit outcomes and quantify benefits.

The study correctly detected lofts had been insulated and PV installed in 7 homes, leading to an average predicted reduction in energy bills of £520 a year (£325 connected to loft fabric upgrades.)



Pictured: comparison of one property at 2 points in time. The 2024 pre- scan (left) shows significant heat loss, whilst the 2025 post-scan (right) confirms effective insulation installed, correlating with a U-value shift from 2.3 to 0.2 W/m²K. Solar panels are also visible.

EMPIRICAL SUMMARY

Fabric upgrades	Cost Savings (Avg.)	£ 325 / yr
	CO ₂ Savings (Avg.)	1.04 t / yr
	Metred Energy (Avg.)	4,955 kWh/yr
Solar PV	Cost Savings (Avg.)	£ 195 / yr
	CO ₂ Savings (Avg.)	0.23 t / yr

Est. thermal improvement

77%

ACROSS ALL ROOFS

Est. avg. savings per home of

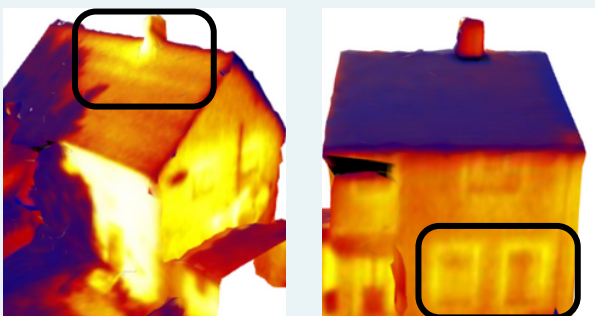
£520/YR.

OR 14K SMART TV

Est. avg. CO₂e reduction p.a.

1.3 TONNES

OR 5,300 DRIVING MILES



High heat escape

Low heat escape

Pictured: Likely outstanding thermal defects post retrofit. Brookside (left) indicates possible roofing defects, while Carpenter Way (right) shows thermal bridging around windows, suggesting poor installation.

AREAS FOR IMPROVEMENT

In addition to proving loft insulation installation (and disproving other installs), the system highlighted fabric anomalies in both image sets for further investigation:

- Thermal bridging (window lintels): 45% of properties
- Roofing & window defects: 18% of properties

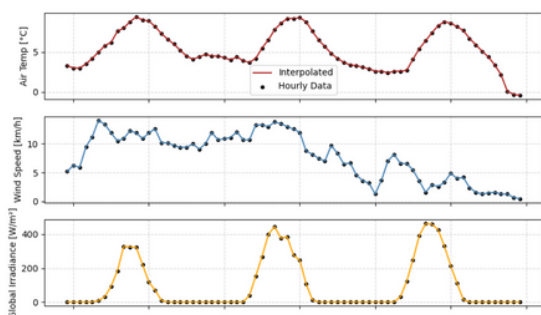
METHODOLOGY: PHYSICS-DRIVEN VALIDATION

Standard thermography is often subjective. Kestrix takes a different approach: it turns images into hard numerical data. These inputs inform calculations that mathematically, independently prove or disprove a retrofit has worked.

Kestrix's proprietary engine layers multiple analytical methods to eliminate 'false positives.' Instead of relying on a simple visual check, Kestrix interrogates the data by:

Accounting for the environment

Kestrix accounts for environmental conditions (e.g. air temperature and solar gain) to isolate the building itself. This ensures that a comparison between pre- and post- retrofit surveys reflect a genuine change in the building fabric, not just a change in the weather.



Solving the "internal temperature problem"

Kestrix has developed a proprietary algorithm to estimate internal temperature of each home, based on measured surface temperature. This ensures Kestrix data validates the retrofit's performance regardless of whether the resident keeps their home at 15°C or 25°C.

Thermodynamic validation

Kestrix uses thermodynamic simulations to know exactly how a retrofitted wall should behave. A real-world scan is then matched against that model to confirm the building's DNA has changed, so surface anomalies are not misleading.

ABOUT KESTRIX

Kestrix is on a mission to make retrofits easier and more effective by using real data from actual buildings. With the help of thermal drones and AI, Kestrix maps and quantifies heat loss and creates practical retrofit plans. This approach makes it possible to improve energy efficiency not just one home at a time, but across large groups of buildings at once.

To learn more about how you can use Kestrix to verify retrofits, please contact:

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