

From Assumption to Evidence

How Real Performance Measurement Is Reshaping Social Housing Retrofit

*A white paper from the inaugural Knauf Energy Solutions and Healthy Homes Hub Roundtable
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In partnership with

Knauf Energy Solutions · Healthy Homes Hub · DESNZ · Loughborough University

Executive Summary

The UK is spending billions on retrofit programmes while making critical decisions based on assumptions rather than evidence. Energy Performance Certificates — the dominant framework for housing performance assessment — were never designed to measure how homes actually perform. They were designed as a relative indicator: useful in their original context, but now being asked to carry far more weight than the methodology was built to bear.

The consequences are significant. Retrofits deliver inconsistent outcomes. Heat pumps are mis-sized. New-build homes consume far more energy than their design specifications suggest. Housing providers are directing scarce capital against performance data that may bear little relationship to the reality of their stock.

The good news is that this is a solvable problem. Smart Meter Enabled Thermal Efficiency Rating (SMETER) technologies can now measure real in-use building performance accurately, at low cost, and in occupied conditions. Multiple independent studies — from the Energy Systems Catapult, Buildwise in Belgium, and most recently Leeds Beckett University — have confirmed that this capability is robust, validated, and ready for deployment at scale. The decisive question is no longer whether the technology works. It is whether the sector will move quickly enough to use it.

On 30 April 2026, Knauf Energy Solutions and Healthy Homes Hub convened an inaugural roundtable in London, bringing together more than twenty thought leaders from across the social housing, retrofit, energy, and policy sectors. Chaired by **Barry Lynham**, Managing Director of Knauf Energy Solutions, the session heard from **Kevin Gornall**, Head of SMETER Policy and Implementation at DESNZ, **Michael Harrison**, SMETER Strategy and Evidence lead, Smart Metering Implementation Programme at DESNZ, Professor **David Allinson** of Loughborough University, and **Jenny Danson**, CEO of Healthy Homes Hub.

Three clear outcomes emerged. There is growing consensus across government, academia, and industry that performance measurement must become embedded in retrofit delivery. The social housing sector — with its scale, operational maturity, and existing asset management infrastructure — is uniquely positioned to lead this transition. And the moment to act is now, not when legislation catches up. This white paper captures the substance of those discussions and sets out what the evidence demands of the sector next.

Introduction

There is a question that sits at the heart of every major retrofit decision: do we actually know how this home performs?

For most of the housing sector, the honest answer is no. What exists are models — survey-based calculations, standardised assumptions, and EPC ratings designed to enable relative comparisons between properties, not to measure real energy demand. That was never a fatal flaw when EPCs were asked to do limited things. It becomes a serious problem when those same ratings are used to direct billions of pounds of public investment, justify heat pump specifications, and underpin compliance frameworks.

The roundtable convened on 30 April 2026 brought together leaders who are grappling with precisely this challenge — and who are beginning to build the evidence base to move beyond it. The session was not about whether the current system is imperfect. It was about what comes next, and how the sector — particularly social housing — can shape that transition rather than wait for it.

This paper captures the key themes and insights from that discussion, drawing also on the growing body of independent evidence on SMETER technology and measured performance. It is intended as a practical resource for housing leaders who want to understand where this is heading and what they should be doing about it now.

1. The UK's Blind Spot: Why Assumptions Are No Longer Good Enough

The UK has been operating without knowing how its homes actually perform. This is not a controversial statement — it is increasingly the shared view of government, academia, and the most forward-thinking parts of the housing sector. Yet its implications remain underappreciated, and the investment decisions being made on the basis of incomplete data are growing larger by the year.

EPCs and the Standard Assessment Procedure that underpins them were developed as tools for comparing properties and setting minimum standards. They work by applying standardised inputs — assumed occupancy patterns, default U-values, typical heating behaviours — to a surveyor's observations about a property's construction. The result is a calculated estimate of likely performance, not a measurement of actual performance. That distinction matters enormously when the estimate is wrong.

And the evidence suggests it very often is. Research shared at the roundtable from mid-century housing stock showed SAP calculations overestimating heat loss performance by approximately 42% on average. In newer stock, the gap can be even more striking. An independent study examining nearly new-build homes found that actual space heating demand was, on average, 250% higher than the EPC had predicted. For a gas-heated household, the cumulative cost of that gap over thirty years is in the region of £12,000.

250%

Higher actual space heating demand than EPC predicted

An independent study of nearly new-build homes found space heating demand averaging 250% above EPC predictions. For a gas-heated household, that gap costs an additional £12,000 in heating bills over 30 years.

The challenge is not simply that averages are wrong. It is that the variation between individual homes is enormous. Two properties of the same type, age, and construction standard can perform very differently in practice. This variation — invisible to EPC-based models — is precisely what makes measured performance data so valuable, and what makes the current system so risky for providers allocating retrofit budgets based on archetype assumptions.

The roundtable was explicit: the performance gap is not an academic curiosity. It is a live risk to public investment, to resident wellbeing, and to the credibility of decarbonisation targets. Billions of pounds are flowing through retrofit programmes and compliance frameworks that rely almost entirely on modelled assumptions. The sector cannot afford to keep making these decisions in the dark.

2. The Evidence Base: Measuring What Actually Happens

The response to the performance gap is not to design better models. It is to measure.

SMETER technologies are designed to determine how a home actually performs while it is occupied and operating normally. Rather than applying standardised assumptions, they observe how a building responds to real weather conditions, combining temperature data from indoor sensors with energy consumption data from smart meters, heat meters, and other monitoring sources. The output is a measurement of real in-use thermal performance.

The key metric this generates is the Heat Transfer Coefficient (HTC) — the rate at which heat leaves a building under real conditions. HTC captures the combined influence of insulation quality, airtightness, ventilation, thermal bridges, and thermal mass in a single, measurable figure. For housing providers, it offers something the EPC cannot: a direct, evidence-based understanding of how much energy a specific home genuinely requires to stay warm.

“We can now quantify how much energy each home genuinely requires to stay warm — based on evidence, not assumption.”

— From *Guesswork to Measured Reality* — KES Policy Brief, December 2025

This capability has been independently validated by multiple organisations. The Energy Systems Catapult and Buildwise in Belgium both confirmed that KES SMETER technology delivers accurate blind estimations of heat demand. Most recently, Leeds Beckett University completed an independent verification study comparing in-use SMETER measurements with co-heating tests — the gold standard for quantifying building thermal performance. Their conclusions were unambiguous: the KES SMETER methodology produces HTC values in strong agreement with co-heating test results, with accuracy levels of 5% CVRSME for the premium product and 12% for the standard version.

A practical illustration underscores the difference measurement makes. In a project in the North West of England, residents in homes with apparently adequate insulation were experiencing cold conditions and high bills. Performance measurement revealed that cavity wall insulation, loft insulation, and party walls had all failed or been inadequately installed. Following targeted remediation, KES technology measured an average improvement in home efficiency of 34% across the affected properties. The EPC assessment showed almost no change.

34%

Average efficiency improvement measured after targeted remediation

In a North West England project, SMETER measurement identified failed cavity wall, loft insulation and party walls invisible to EPC assessment. Post-remediation, average efficiency improved by 34% — verified by measurement, not assumption.

Without measurement, that remediation would either not have happened, or would have occurred without any means of verifying its impact. With it, housing providers could target investment precisely, demonstrate outcomes to funders, and provide residents with evidence that their homes had genuinely improved. That feedback loop — from intervention to measurable outcome — is what the sector has been missing.

3. Policy Direction: Where Government Is Heading

The roundtable benefited from direct input from Kevin Gornall, Head of SMETER Policy and Implementation at the Department for Energy Security and Net Zero. His contribution made clear that government's direction of travel is firmly toward measured performance — and that this shift is already underway.

The DESNZ SMETER policy team emerged from the government's smart metering innovation programme, which was originally tasked with testing whether in-use thermal performance measurement could operate reliably at scale. Findings from that programme were sufficiently compelling to justify the creation of a dedicated policy function. The team is now focused on two parallel workstreams: integrating SMETER within existing government schemes including the Social Housing Decarbonisation Fund and the Digitalisation Fund; and developing the governance, evidence, and assurance frameworks required for wider market adoption.

The most significant near-term development is work underway to establish a national SMETER validation and quality assurance framework. This will provide standardised validation processes, certification pathways for assessors, and the governance infrastructure needed to support confidence at scale. Work being developed through CIBSE on technical standards will underpin this framework and is essential for ensuring comparability between projects across the sector.

In parallel, government is progressing proposals to allow the voluntary inclusion of SMETER-derived HTC data within the EPC framework. This is not a proposal to replace EPCs. It is a proposal to augment them — to create a pathway by which measured reality can sit alongside modelled assumption within national building performance frameworks. Although initially voluntary, it represents a meaningful step in the transition toward measurement-led housing policy.

The message from the policy session was clear: the infrastructure is being built, the direction is set, and the social housing sector has both the opportunity and the responsibility to influence what gets built and how quickly. Government is progressing the validation and certification framework; the sector should be building its capability to use it.

4. Social Housing as the Lead Sector

If any part of the housing market is positioned to lead the transition toward performance-based retrofit delivery, it is social housing. The roundtable was emphatic on this point, and the reasons are structural rather than aspirational.

Social housing providers operate at scale. They manage large portfolios with established data infrastructure, long-term investment programmes, and resident engagement models that make measurement-led approaches practical in a way they are not across the fragmented private market. They also carry the operational disciplines — asset management structures, contractor relationships, compliance frameworks — needed to sustain data collection and evidence generation over the multi-year timescales that meaningful performance analysis requires.

Many providers are already closer to measurement-led approaches than they realise. Sensors installed to monitor damp, mould risk, humidity, and indoor environmental quality are already collecting performance-relevant data across significant portions of housing stock. The infrastructure for a more comprehensive view of building performance often

already exists — it needs to be connected with energy consumption data and treated as a coherent system rather than isolated monitoring outputs.

The sector is also acutely aware of the consequences of getting retrofit decisions wrong. With billions of pounds flowing through the Warm Homes programme, SHDF, and related funding mechanisms, the reputational, financial, and human costs of poorly targeted interventions are not abstract. Providers who have invested in measurement are already reporting tangible benefits: more accurate specifications, reduced waste, stronger evidence for funders, and improved resident outcomes.

The roundtable also recognised the sector's growing influence on policy development. Social housing providers are generating the evidence base that government needs to design future frameworks. The pilot projects, measurement studies, and outcome-based delivery models being developed across the sector today are not just improving individual programmes — they are shaping the national approach to retrofit accountability. That is a position of real influence that the sector should recognise and use deliberately.

CASE EVIDENCE

5. Evidence from the Field: What Real Projects Are Showing

The roundtable heard from a range of case studies and pilot projects demonstrating what performance measurement looks like in practice. Several themes emerge from this evidence that are directly relevant for housing leaders making decisions about their retrofit programmes today.

Measurement changes what you specify

A 184-home retrofit project used SMETER monitoring across both the pre- and post-retrofit period, enabling the housing provider not only to select the right interventions based on measured performance data, but to demonstrate to funders that those interventions had delivered the expected outcomes. The ability to close the feedback loop — to move from assumed outcome to measured outcome — represents a fundamental shift in how retrofit accountability works.

Measurement prevents expensive mistakes

A 64-home project in Belgium provides a striking illustration of the cost implications. Prior to measurement, the standard approach would have involved heat pump installation alongside full radiator replacement — a significant capital outlay. Measured performance data showed that the heat pumps had been oversized relative to actual heat demand, and that radiator replacement was unnecessary. Measurement transformed a costly, over-specified programme into a proportionate and accurate one.

64 homes

Belgium — radiator replacement avoided through accurate heat demand measurement

Measured performance data showed heat pumps were oversized and radiator replacement was unnecessary. Accurate thermal data delivered significant capital savings and prevented a major specification error that standard EPC assessments would not have caught.

The same principle applies to heat pump deployment across the UK more broadly. Oversized systems running inefficiently, unnecessary capital costs, and inappropriate retrofit assumptions are all risks that accurate thermal performance data can substantially reduce. For a sector under mounting capital budget pressure, the savings from better specification are material and immediate.

Outcome-based delivery is becoming viable

Evidence from Energiesprong-style delivery models — including projects in Belgium and emerging activity in the UK, such as the Bromford flagship initiative — points toward a more fundamental shift in how the sector can contract for retrofit outcomes. Rather than paying for measures installed, providers contract for measured performance delivered. The incentive structure changes entirely when performance is observable and independently verifiable. Some projects have significantly outperformed expected energy reduction targets when designed around measured outcomes rather than assumed measures.

The roundtable acknowledged that the evidence base, while compelling, is not yet comprehensive at national scale. The sector still lacks a full picture of real housing performance across the stock. Further measurement, piloting, and sustained evidence generation are needed. But the case for beginning that process now, rather than waiting, is clear.

6. Implications for Social Housing Leaders

The question facing housing leaders is not whether performance measurement will become part of retrofit delivery. It will. The question is whether organisations engage early enough to shape how that happens and to build the internal capability to benefit from it when it does.

The roundtable was clear that waiting for legislative change is not the right strategy. Measurement can be deployed today, within existing funding frameworks, at manageable cost, and with immediate operational benefit. The case rests on three practical arguments.

First, evidence generated from early measurement activity directly strengthens future funding applications. Funders across the Warm Homes programme and SHDF are increasingly interested in outcome evidence, not just compliance documentation. Providers who can demonstrate real performance improvements — with independently verifiable data — hold a meaningful and growing advantage in competitive funding environments.

Second, the cost of continuing to make long-term retrofit decisions based solely on assumed performance data is material and accumulating. Every major fabric intervention specified without measured pre-retrofit data is a risk taken on incomplete information. Some will materialise as underperforming retrofits, wasted capital, or heat pump installations that cost more than they needed to. Building measurement into programme design now reduces that regret cost significantly.

Third, the operational capability to run measurement-led programmes takes time to develop. Understanding what data is needed, how to collect and interpret it, and how to integrate it into procurement and specification — these are not capabilities that can be acquired overnight. Organisations that begin building them now will be significantly better positioned when policy change makes them necessary.

The practical starting point is not wholesale transformation. It is identifying a manageable pilot within an existing retrofit programme, using SMETER monitoring to generate pre- and post-intervention performance data, and using those findings to improve specification quality and develop internal knowledge. That step is available to any housing provider today.

Recommendations

The roundtable produced a shared set of priorities that participants committed to advancing collectively. These are presented here as recommendations to the sector and to government.

For Housing Providers

1. Begin measuring before your next major retrofit programme.

Use SMETER technologies to establish baseline HTC data at property and archetype level, creating the foundation for better-targeted investment decisions and a defensible evidence base for future funding applications.

2. Connect your existing monitoring infrastructure.

Treat damp, mould, humidity, and indoor air quality sensors as the starting point for a more comprehensive performance data strategy. Build toward integration with energy consumption data.

3. Treat measurement as investment, not overhead.

The returns — better specification, reduced waste, avoided errors, stronger funding evidence — are material. Build a business case that reflects the full value of the evidence generated, not just the cost of the sensors.

4. Contribute to the collective evidence base.

Share learning, data, and outcomes across the sector. The national performance picture that policy development requires will only be built if providers share what they are finding, not just what they are doing.

For Government

5. Prioritise completion of the national SMETER validation and QA framework.

Move at a pace that matches the urgency of retrofit delivery. The technology is ready; the framework needs to catch up.

6. Create clear pathways for measured HTC data within EPC and compliance frameworks.

Start with voluntary inclusion and develop toward more substantive integration as the evidence base matures. The goal is augmentation of existing tools, not replacement.

7. Align Warm Homes Plan and SHDF guidance with measurement-led delivery.

Create active incentives for performance verification alongside measure installation, rewarding providers who can demonstrate real outcomes rather than simply compliance.

Conclusion: The Opportunity Is Now

The UK has the technology to move from guesswork to evidence. The capability exists, it is independently validated, and it is ready for deployment at scale. What has been missing is the sector-wide momentum to make performance measurement a routine part of how retrofit decisions are made.

The roundtable brought together the people who are building that momentum — government policymakers designing the frameworks, academics generating the evidence, housing providers developing the operational models, and

technology specialists demonstrating what is now possible. The collective view was clear: this transition is coming, the direction is set, and the social housing sector is both the most important environment for scaling these approaches and the best positioned to lead.

“The time has come to move from guesswork to measured reality. The opportunity is immediate. The capability exists. The case is clear.”

— From Guesswork to Measured Reality — KES Policy Brief, December 2025

The real question is not whether to move toward measurement-led retrofit delivery. It is how quickly the sector can organise itself to do so, and whether housing providers will be shaping that transition or simply responding to it. Every programme designed without measured performance data is an opportunity missed. Every pilot that generates real evidence is a contribution to the national capability the sector urgently needs.

The conversation started on 30 April 2026. The work continues now.

About This Paper

This white paper was produced by Knauf Energy Solutions in partnership with Healthy Homes Hub, drawing on discussions at the inaugural SMETER Roundtable held in London on 30 April 2026. It also draws on the KES policy brief From Guesswork to Measured Reality (December 2025) and independent research from Leeds Beckett University, the Energy Systems Catapult, and Buildwise.

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