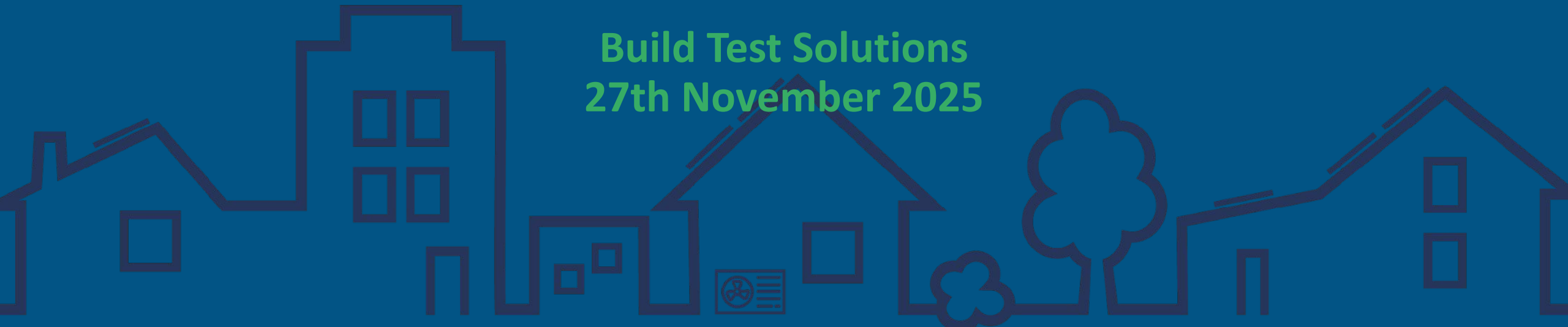


Doctor, diagnose my building!

Performance measurements for deeper insight

Presented By
Richard Jack, Technical Director

Build Test Solutions
27th November 2025



Contents

- **Defining performance diagnostics**
 - What problems will we diagnose & how?
- **Worked example**
- **A standard method?**
- **Opportunities**



Defining “Performance Diagnostics”



Medical Stages of Care

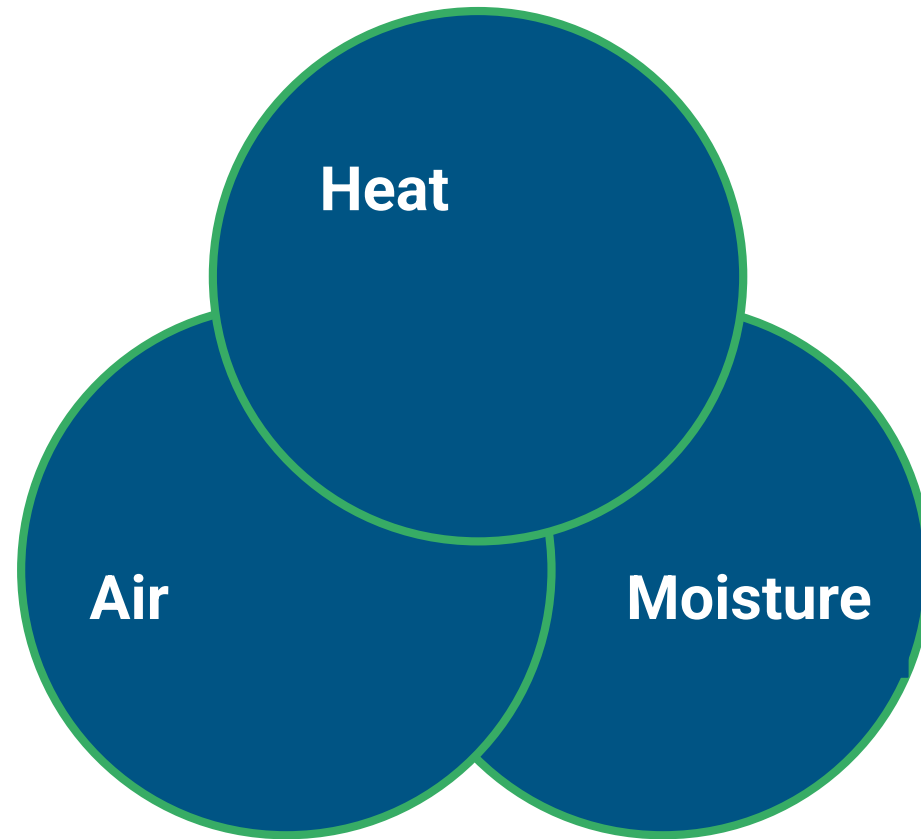
- **Primary:** GP ~ energy assessor
- **Secondary:** specialist ~ energy, temperature, RH monitoring
- **Tertiary:** advanced/complex care ~ diagnostic measurements



A Staged Approach to Building Diagnostics



Building Physics Fundamentals



Power in Numbers

Key metrics:

- Heat Transfer Coefficient: *total rate of heat transfer*
- U-value: *rate of heat transfer through a part of a building*
- Air permeability: *air movement by infiltration*
- Ventilation flowrate: *air movement by ventilation*

Key concept: compare *measured* with *expected* and benchmark values



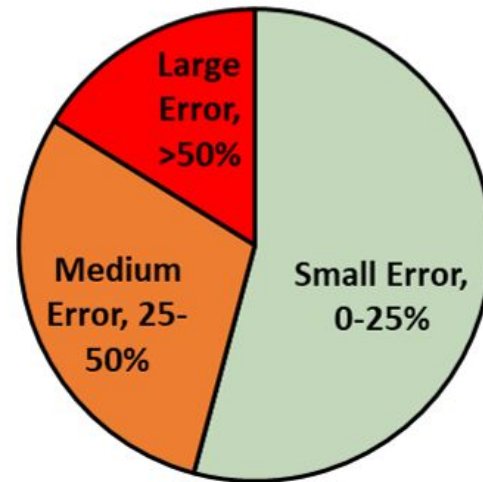
But why do we need in-situ measurement?



The *reality* gap

Heat Loss is **Wrong by 25%+** in
Nearly Half of EPCs

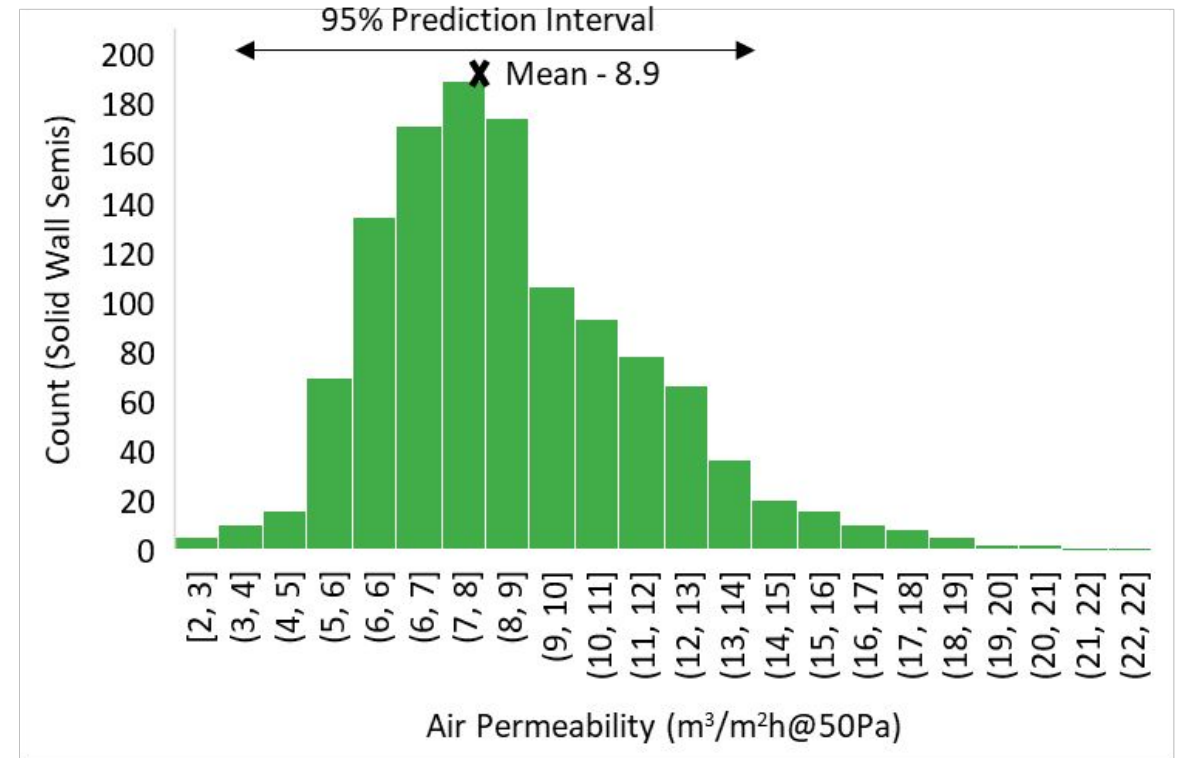
587 Buildings Tested



What's up with these buildings??

Building performance is incredibly variable

Measurements show **typical uncertainty** in model inputs like airtightness or U-values of **>50%**



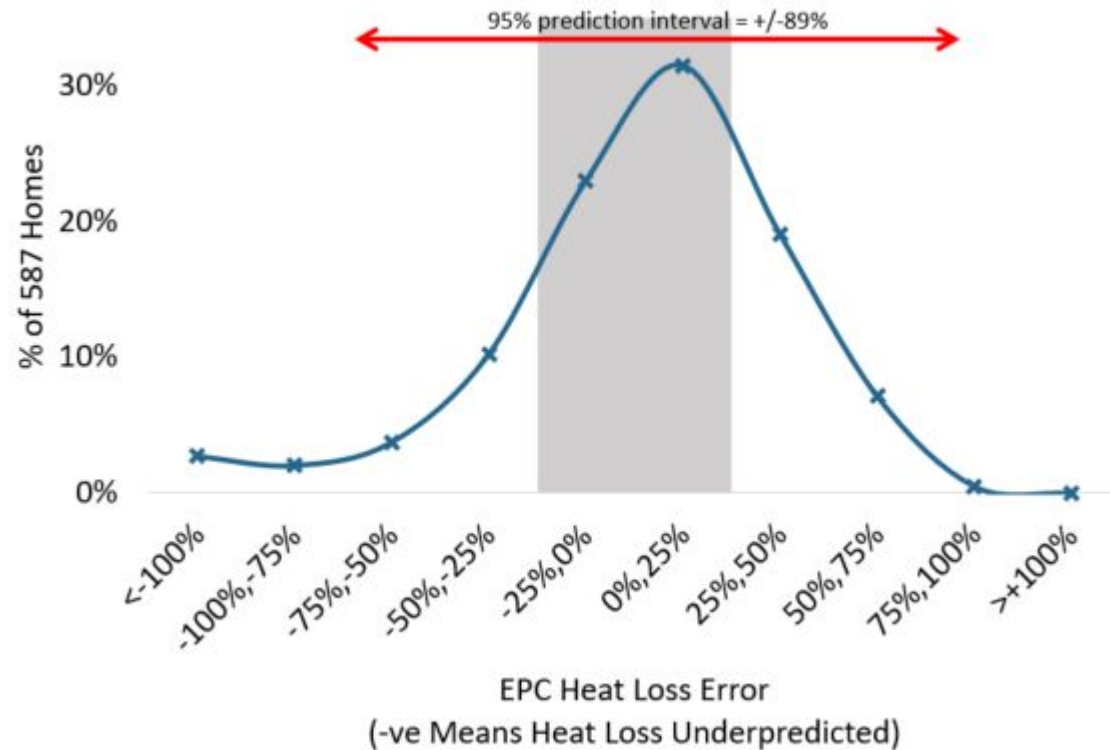
Is it a big deal?



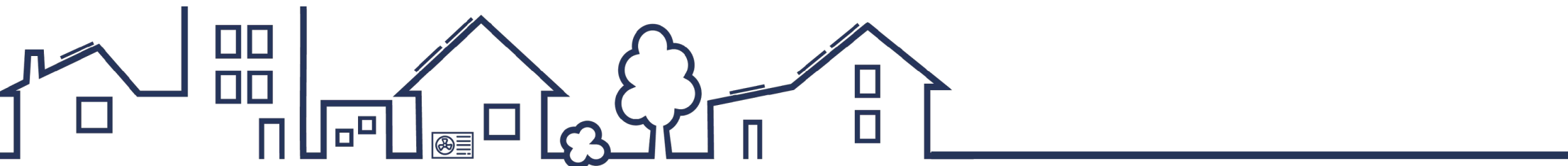
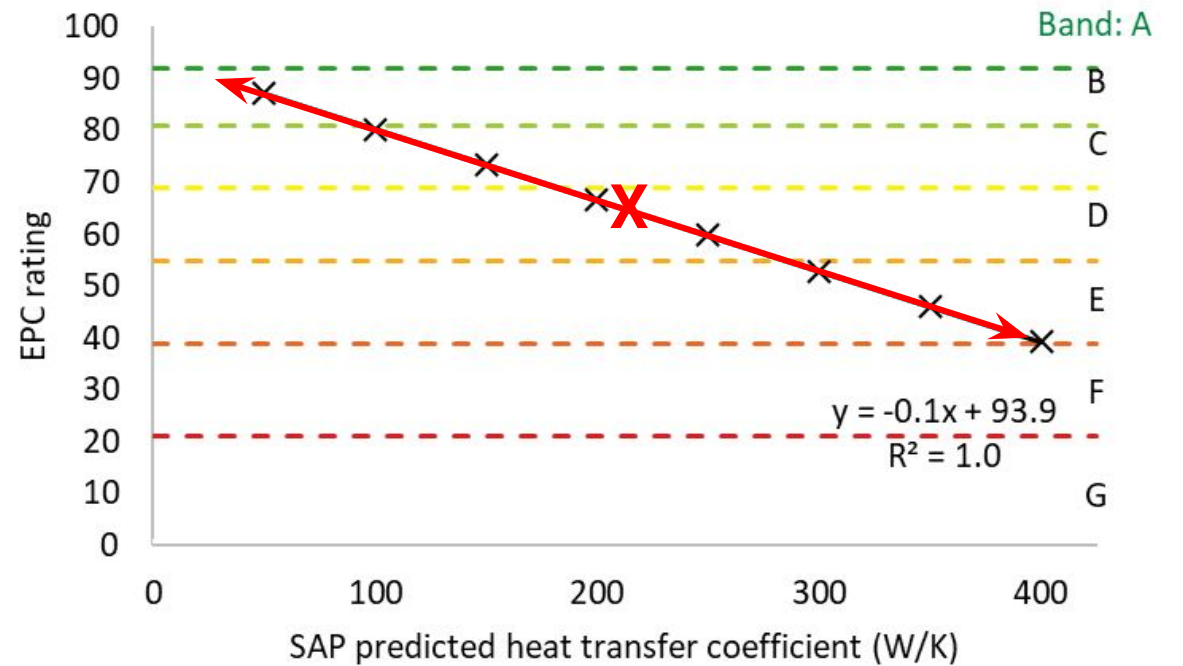
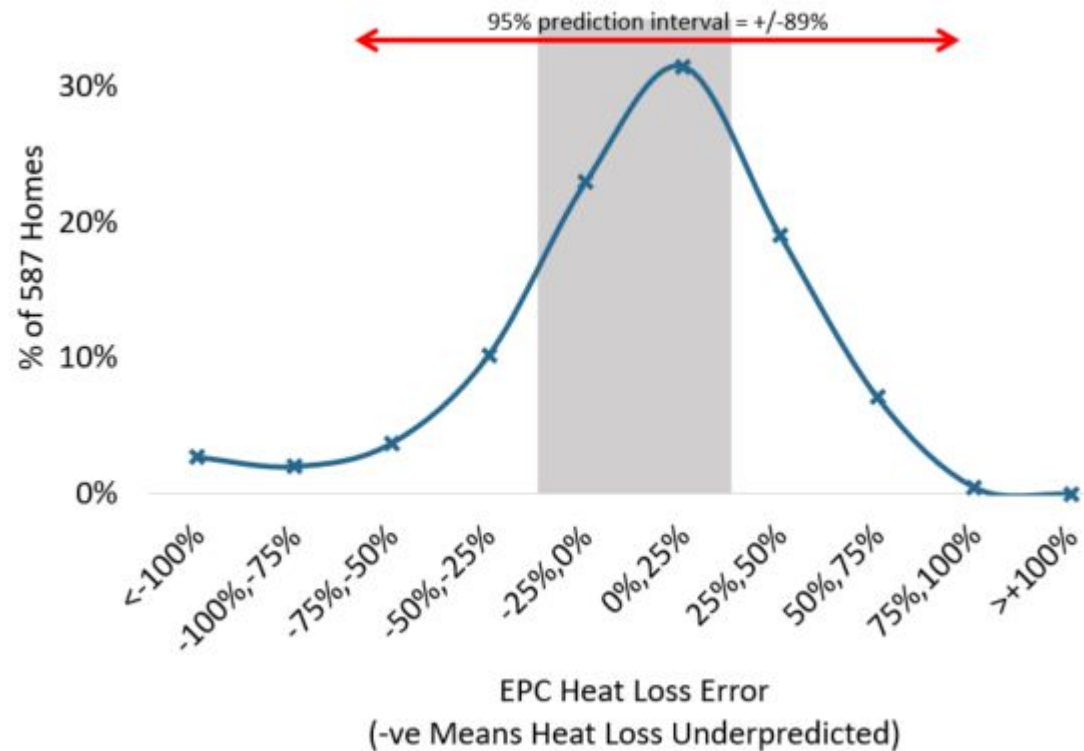
Score	Energy rating	Current	Potential
92+	A		
81-91	B		84 B
69-80	C		
55-68	D	63 D	
39-54	E		
21-38	F		
1-20	G		



Is it a big deal?



Is it a big deal?



Why inaccuracy matters

- Quality
- Cost
- Health

UK home energy scheme has 98% failure rate on outside wall insulation

Poor standards of work from contractors undermines flagship ECO programme, audit finds



The government says the work has created 'serious problems with mould and damp' in the worst cases © U. J. Alexander/Getty Images/iStockphoto



Measurement-led insights: our toolkit

- To truly understand any building, we must prioritise measurement over assumptions.
- BTS tools provide evidence-based insight into building performance:
 - SmartHTC & Mould Risk
 - Heat3D
 - Pulse and Leak Checker
 - Ventiflow / Flowfinder



Worked Example



Newly Built Flats

- Residents complaining of cold & high bills
- No visible defects
- What next?



Stage 1: Understand and Prioritise

Compare predicted and measured thermal performance
(HTC: Heat Transfer Coefficient)

- SAP HTC = 54W/K
- SmartHTC = 157W/K
- **292% underperformance** 😱



Stage 2: Building Health Assessment

Do we have a ventilation safety issue?

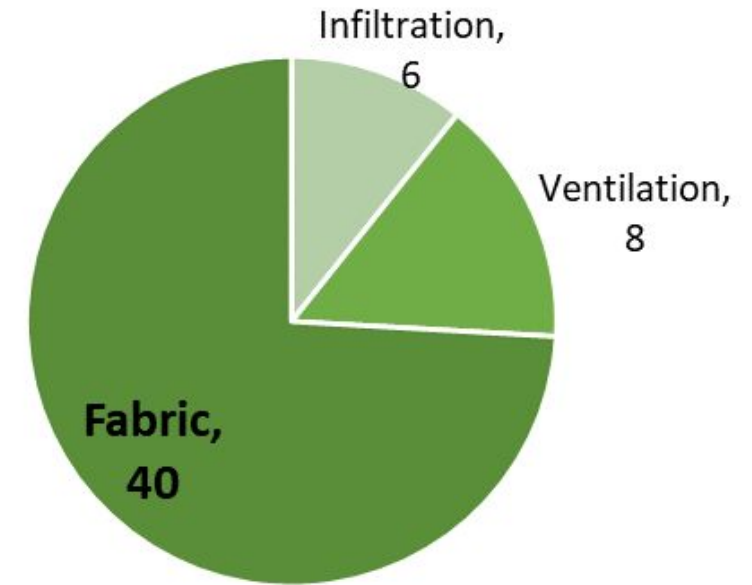
- Airtightness 15% lower than design
- Ventilation flowrates as per design
- Mould risk index very low



Stage 3: Building Diagnostics

- Infiltration & ventilation measured, meet design spec
- Issue must be with fabric heat loss
- U-value measurements next

Heat Loss Paths (W/K)



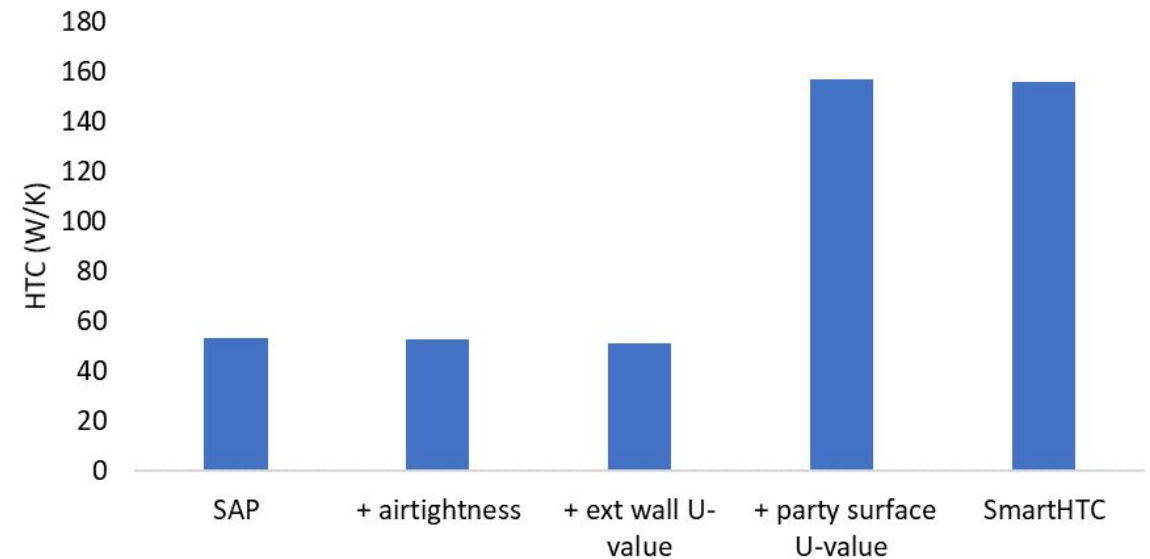
Stage 3: Fabric Diagnostics

- External walls major exposed area
- Measure U-values in several locations...
- Roughly in line with expectations!



Diagnosis: Partial Occupation

- Design assumes all flats occupied
- Hence no party surface heat loss
- But building is part occupied!
- **Party walls, floors & ceiling unexpected large heat loss source**





**Energy models work if the inputs
are right, measurements can
provide the right inputs**



Diagnostics & EPCs

EPCs are **the** central tool to manage building performance

- Airtightness now a permissible input
- U-values **are not**

Why not make EPCs as good as they can be?



A standardised method?



IEA Annex 94: Subtask 4

- International collaboration seeking to standardise BPE methods
- Aims to produce standard method for building diagnostics



Opportunities



Data Informed Energy Assessment

- Diagnose defects
- Provide meaningful, valuable, advice
- Conflict resolution
- Feedback & continuous improvement



Informed Health Risk Management

- Identify insufficient ventilation
- Proactive mould risk monitoring
- Mould risk diagnostics
- Monitor over & under heating

**Proactive, evidenced, Awaab's
Law compliance**



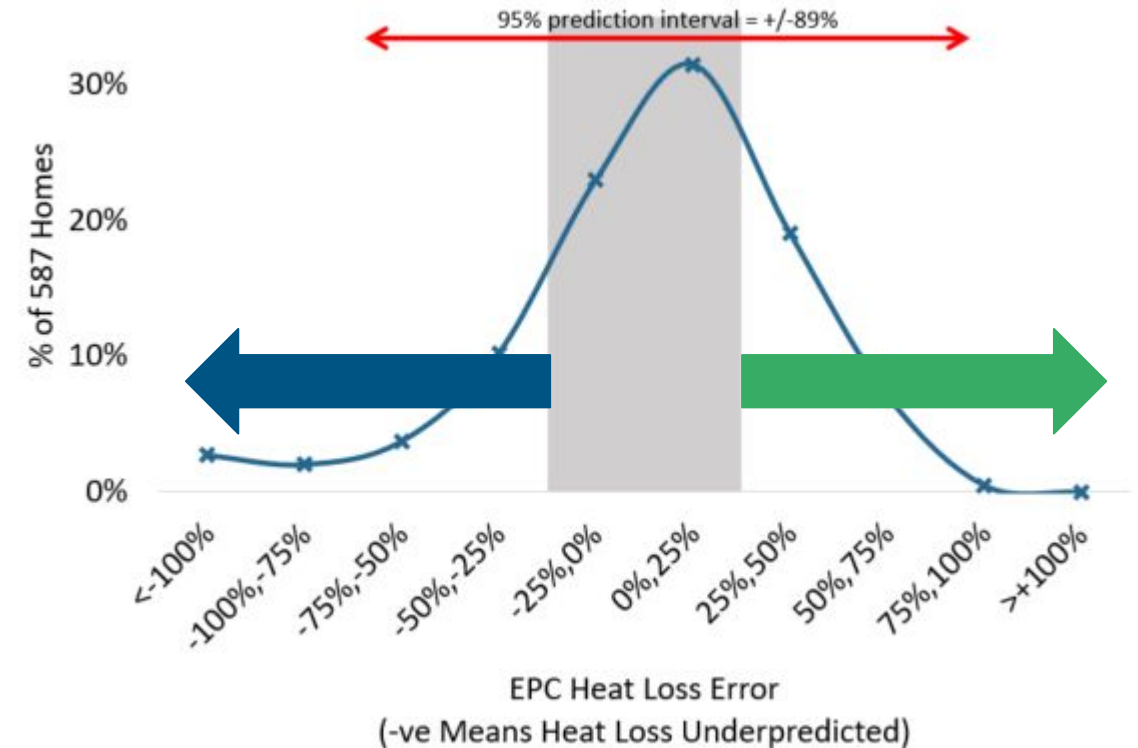
Optimise Retrofit Spending

Less heat loss than expected:

- Lower priority
- Lower fuel poverty risk
- Prioritise systems?

More heat loss than expected:

- Prioritise for retrofit
- Diagnose defects
- Deliver quality



Free Handbook



<https://www.buildtestsolutions.com/help/measurement-handbook>

Diary Dates

- Next webinar:
**Holistic ventilation sufficiency
assessment**
18th December 2025



Thank you!

richard.jack@buildtestsolutions.com

www.buildtestsolutions.com

