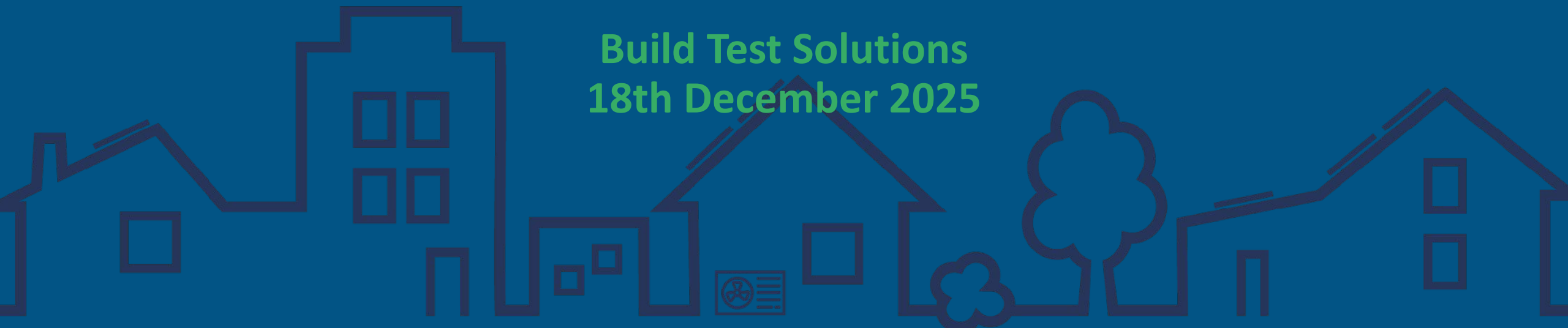
BUILD TEST SOLUTIONS

From compliance to performance: why a holistic ventilation approach matters

Richard Jack, Technical Director

Build Test Solutions

18th December 2025



Contents

- The importance of ventilation, now
- Why traditional ventilation assessment fails
- Our minimum goal: Risk aware compliance
- A new way? Performance led, holistic ventilation sufficiency
- The business case for effective ventilation

BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

The importance of ventilation

What is ventilation?

Fresh air in & stale air out to control moisture, pollutants, & temperature

- **Infiltration**: uncontrolled air movement
- **Ventilation**: controlled air movement
  - Mechanical
  - Deliberate openings (vents, windows)

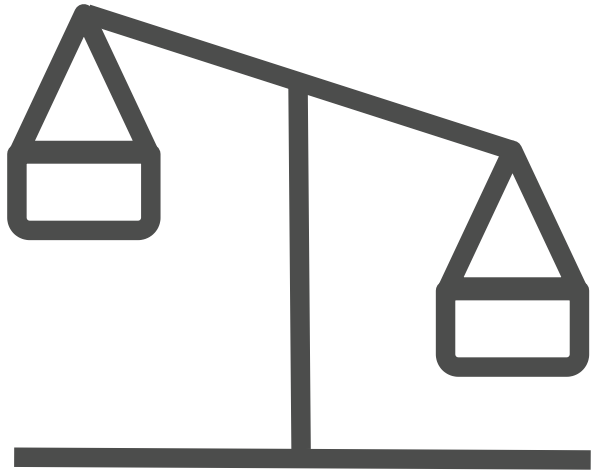
BUILD TEST SOLUTIONS

Very broadly: how does ventilation work?

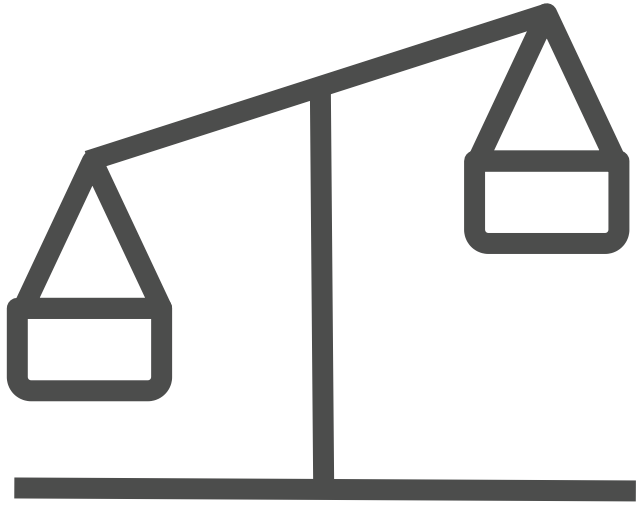
- **Natural:** Air moves due to wind and temperature difference though *all openings*
- **Extract**: stale air removed by fans, fresh air in through *all openings*
- **Supply & extract**: fresh air in and stale air out by fans, ideally very few openings

BUILD TEST SOLUTIONS

Ventilation balance



Infiltration vs Ventilation



Infiltration **vs Ventilation**

More airtight

BUILD TEST SOLUTIONS

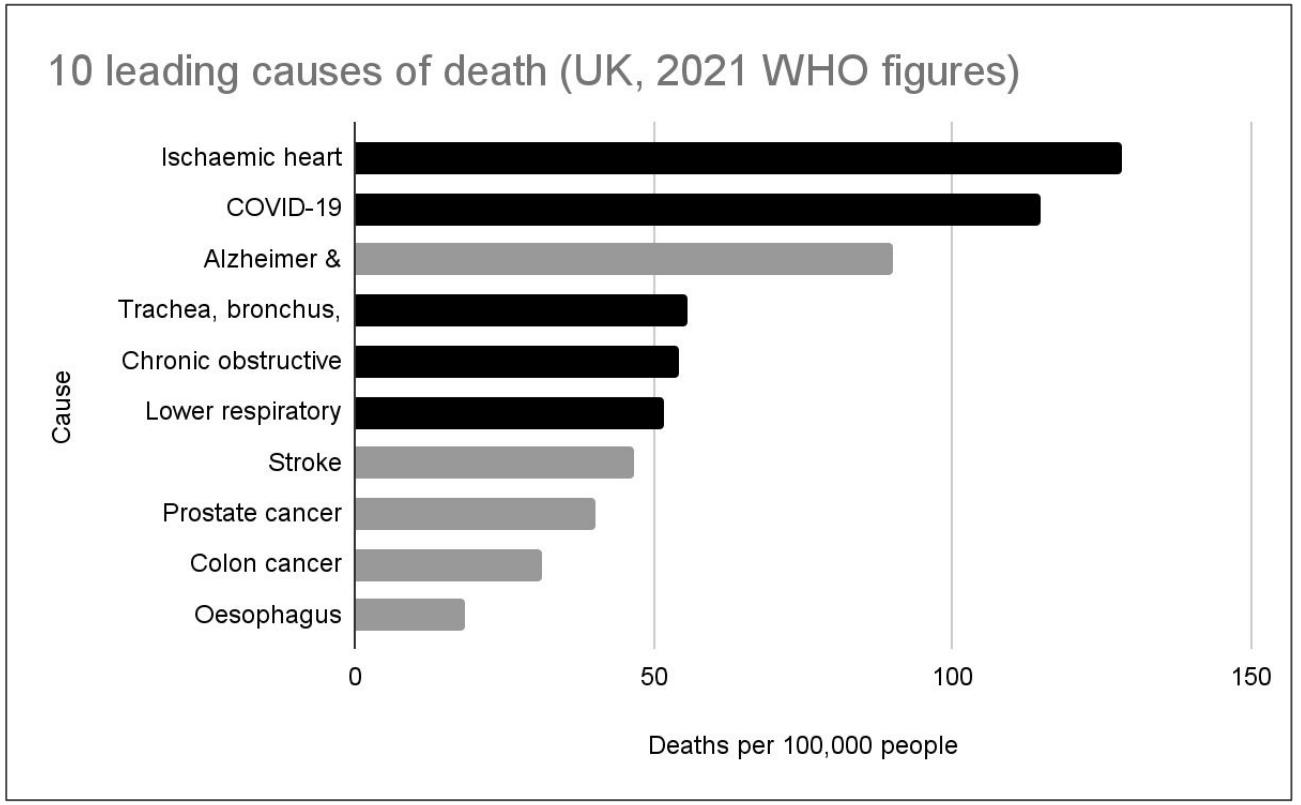
A serious hazard for people

Poor ventilation increases:

- Damp & mould risk
- Viral transmission
- Pollutants (CO_2, PM, VOCs)

In turn these impact:

- Illness & death
- Mental health
- Concentration



BUILD TEST SOLUTIONS

Poor ventilation…

Impacts
64%
of leading health risks

NHS annual direct costs of
£900m

Impacts the vulnerable hardest

BUILD TEST SOLUTIONS

And a serious hazard for buildings

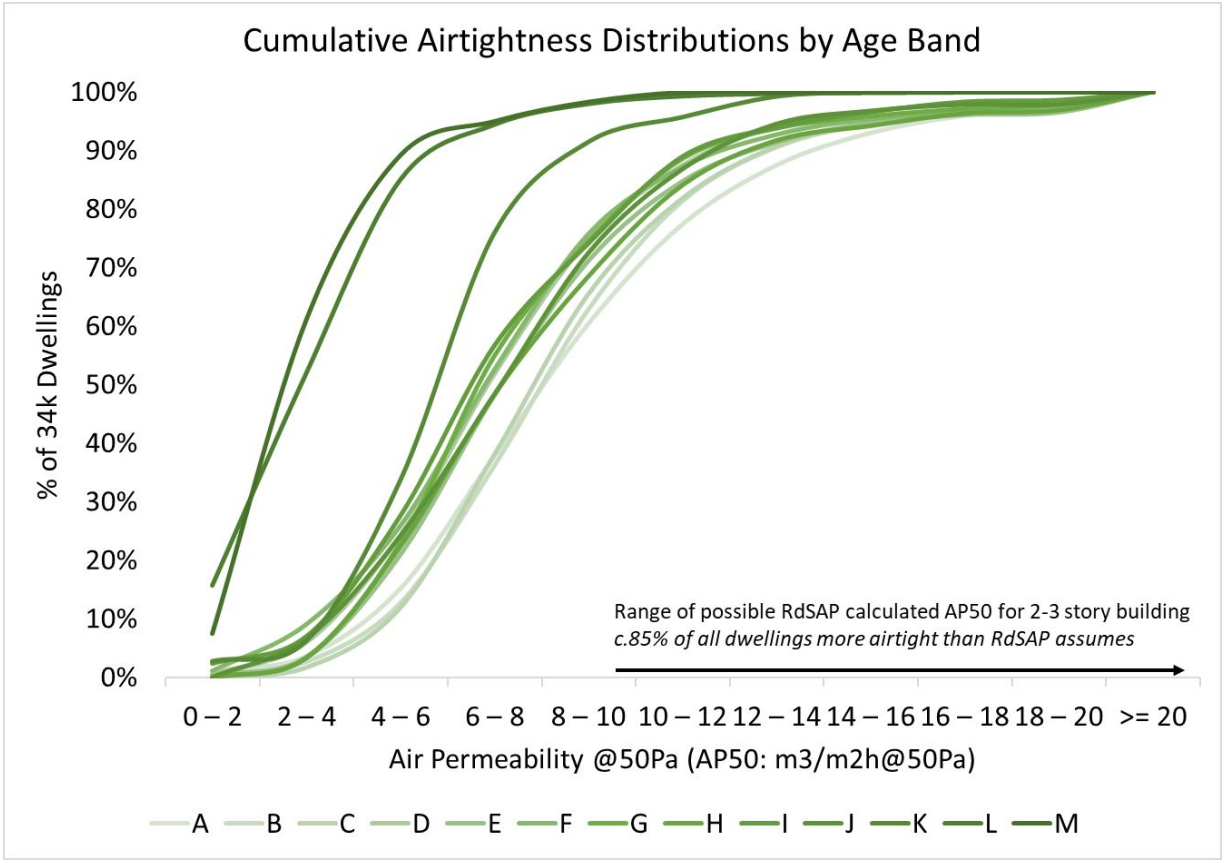
- Moisture damage - surface & **interstitial**
- Mould
- Insects & particulates

Expensive, reactive & repeated remedial works

BUILD TEST SOLUTIONS

We know more now than ever before

PAS2035 has driven the first large scale airtightness measurement of existing buildings

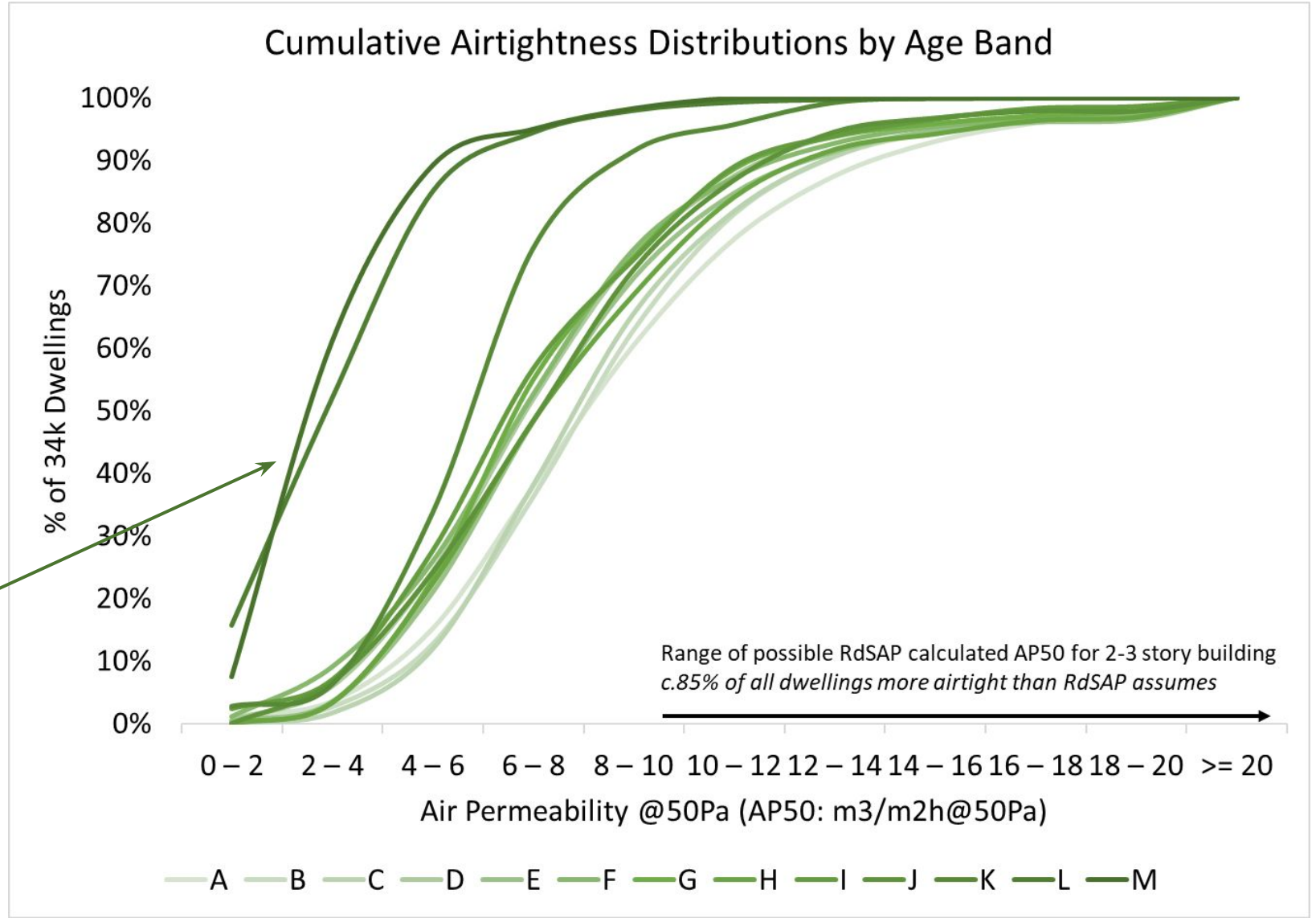


Data from BTS Pulse database

BUILD TEST SOLUTIONS

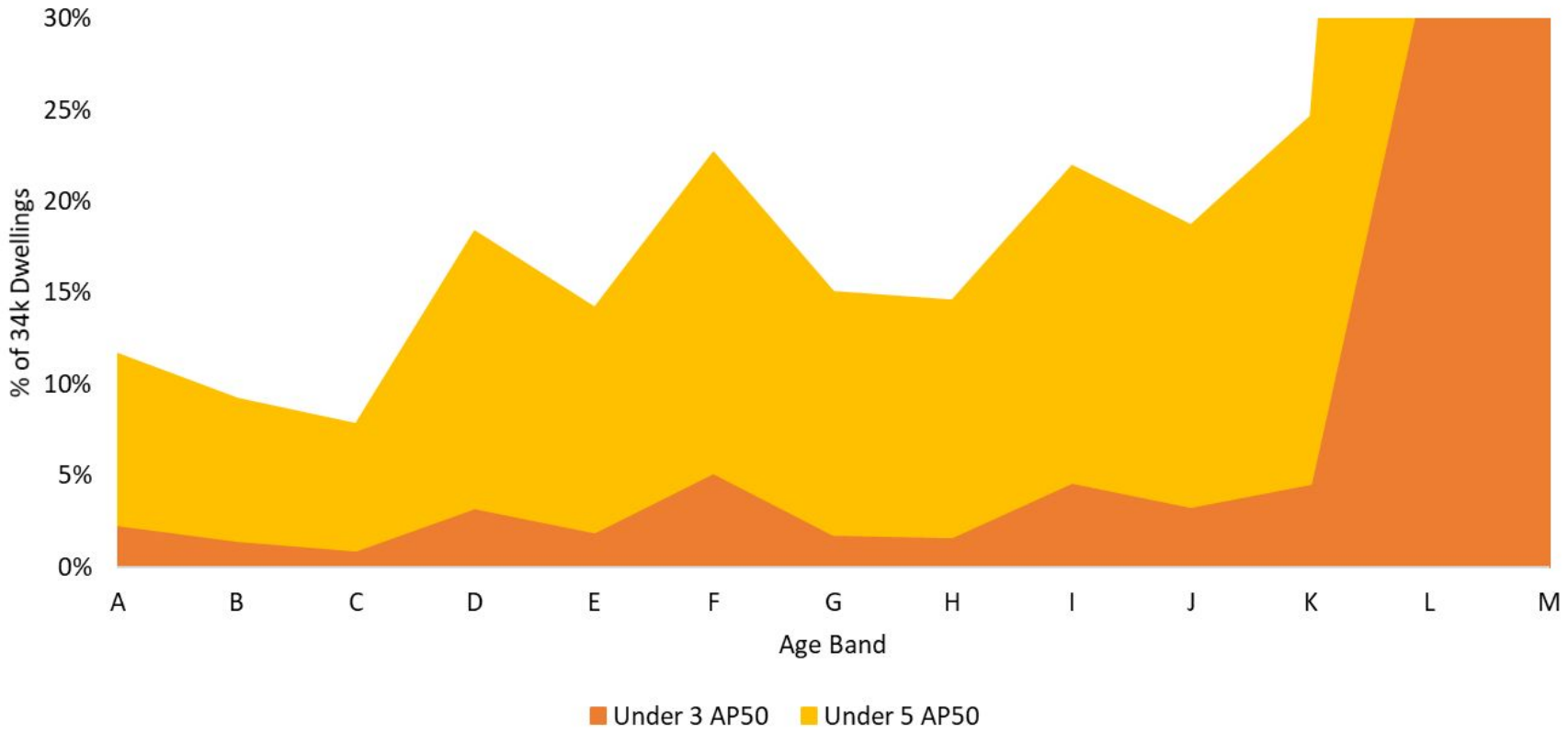
New builds get tighter…

Age band	England
A	before 1900
B	1900-1929
C	1930-1949
D	1950-1966
E	1967-1975
F	1976-1982
G	1983-1990
H	1991-1995
I	1996-2002
J	2003-2006
K	2007-2011
L	2012-2022
M	2023 onwards



BUILD TEST SOLUTIONS

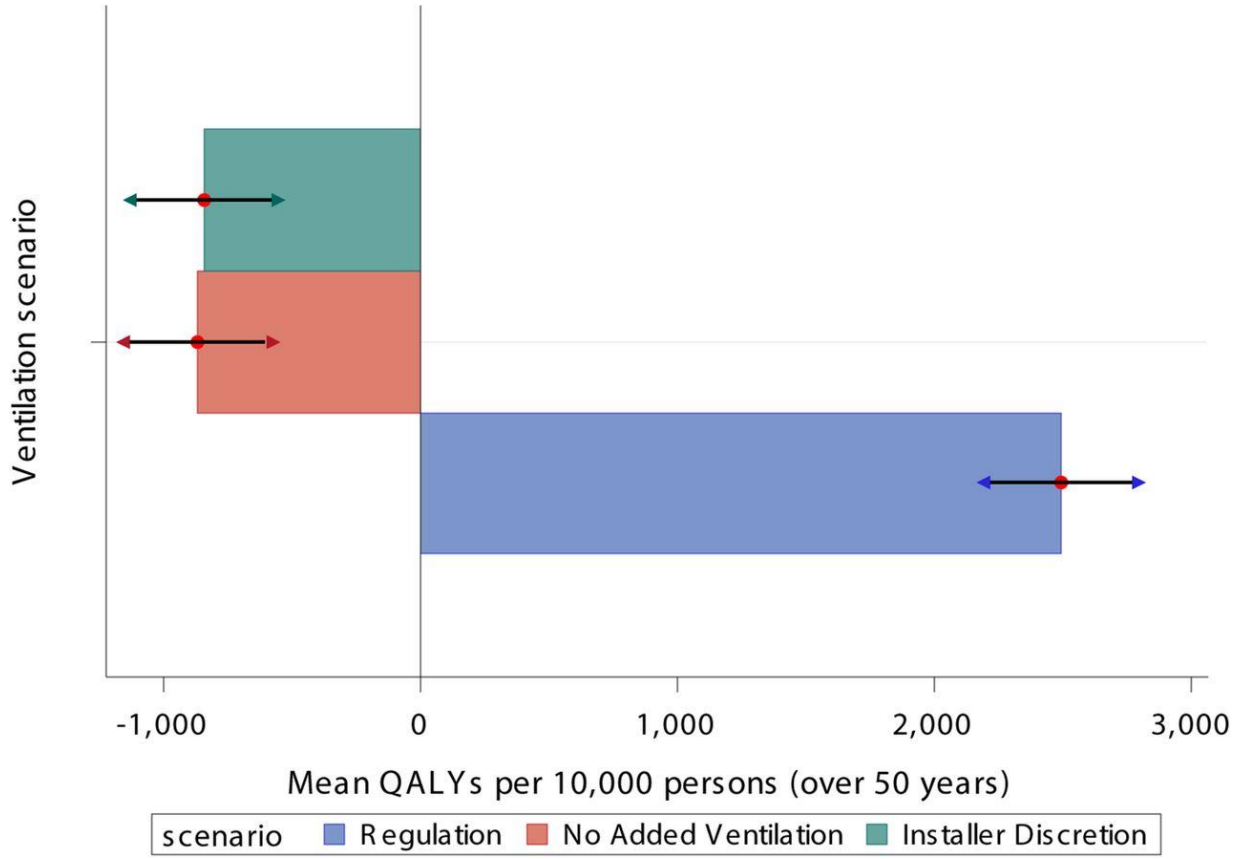
Old builds are tight too though…



Data from BTS Pulse database

BUILD TEST SOLUTIONS

Good ventilation…



Hamilton I, Milner J, Chalabi Z, et al. Health effects of home energy efficiency interventions in England: a modelling study. BMJ Open 2015; 5:e007298. doi: 10.1136/bmjopen-2014-007298

BUILD TEST SOLUTIONS

Key takeaways

- Ventilation means fresh air
- Ventilation strategies typically include deliberate and accidental air movement
- Poor ventilation is a KEY health risk
- Poor ventilation costs health and money

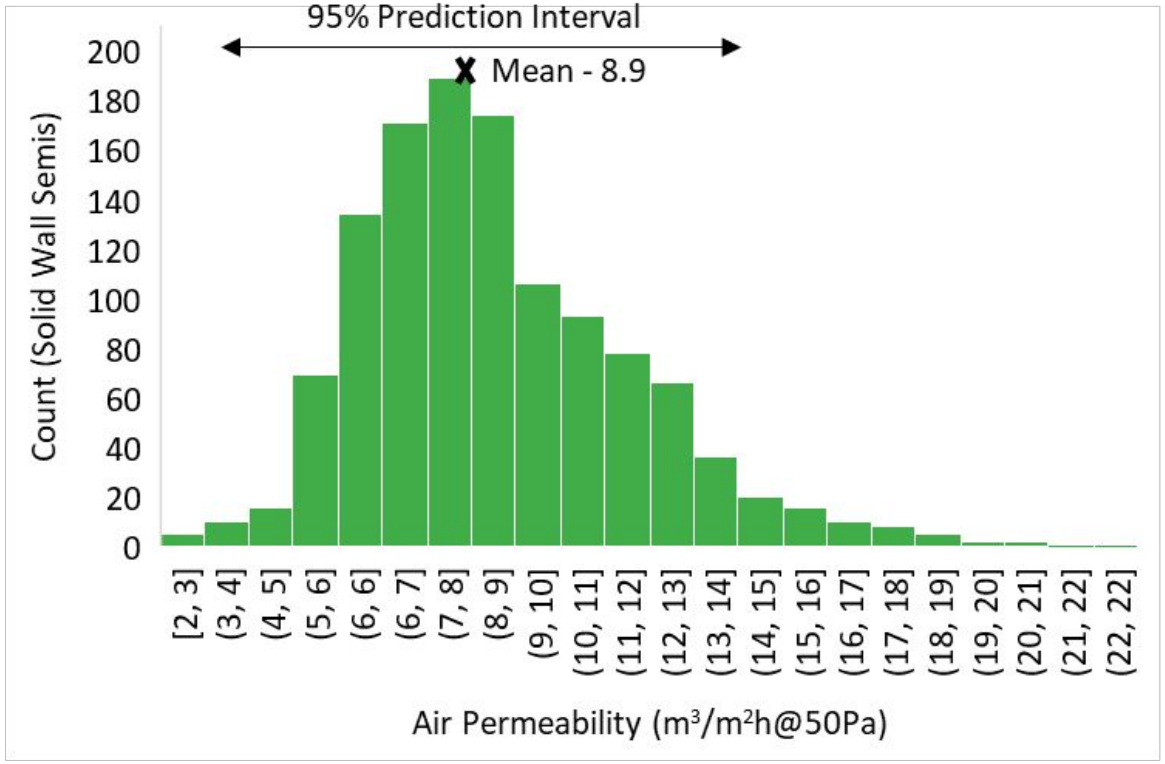
BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

Why traditional ventilation assessment fails

Unknown airtightness

- Airtightness is extremely variable
- Uncertainty of **75%+**
- You just ***can't*** guess it accurately



Data from BTS Pulse database

BUILD TEST SOLUTIONS

Fans that blow?

In a 2019 new-build study:

Only
9 / 55
intermittent fans met ADF

Only
1 / 25
continuous fans met ADF

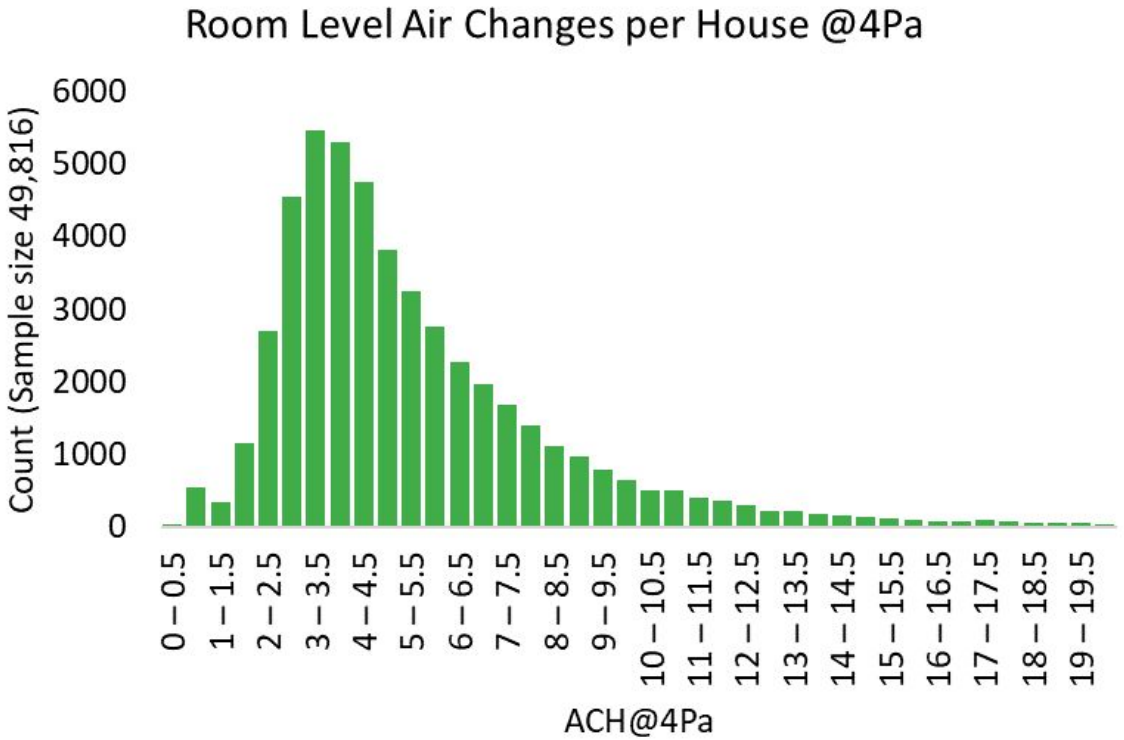
No standard data storage

[Ventilation and Indoor Air Quality in New Homes, Sept 2019 Conducted by Aecom Limited on behalf of the Ministry of Housing, Communities and Local Government]

BUILD TEST SOLUTIONS

Room level insight

- **New** dataset driven by Background Ventilation Testing
- Rooms also have very variable airtightness
- Rooms also need to be considered **individually**



Data from BTS Pulse database

BUILD TEST SOLUTIONS

Visual inspection ≠ performance
Design ≠ delivery in use
Assumptions ≠ evidence

BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

Our minimum goal:

Risk aware compliance

Relevant Regulations

Building Regulations ADF

PAS2035 & Background Ventilation Testing

Awaab's Law

Key measurement metrics:			
Building Airtightness	✅	✅	
Room airtightness		✅	
Fan flowrate	✅	✅	
Temperature & RH	☑️	☑️	✅

BUILD TEST SOLUTIONS

Relevant Regulations

EPCs & MEES

Building Regulations ADF

PAS2035 & Background Ventilation Testing

Awaab's Law

Key measurement metrics:			
Building Airtightness	✅	✅	
Room airtightness		✅	
Fan flowrate	✅	✅	
Temperature & RH	☑️	☑️	✅

BUILD TEST SOLUTIONS

The toolkit

Ventilation flowrate measurement →

Airtightness measurement ↓

BUILD TEST SOLUTIONS

Minimum process

- Measure airtightness → determine required level of mechanical ventilation according to Building Regulations ADF
- Measure ventilation flowrate → check it complies with specification and regulated minimums

Shouldn’t this be BaU??

BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

One step beyond?

Performance led, holistic ventilation sufficiency

What are we missing?

- Ongoing performance - inc. fan degradation, filter condition, fabric degradation & changes
- Context - inc. occupancy level, behaviour & knowledge, heating practices, weather, building sheltering
- Risk protection from fundamental knowledge gaps - how does airtightness relate to infiltration in-use?

BUILD TEST SOLUTIONS

One more tool for the box

- Ongoing temperature & RH monitoring *(others?)*
- **Benchmark** against BRs
- BTS Mould Risk Indicator
- Monitor for changes
- Target interventions and detailed measurements

Part F Compliance

Surface Water Activity (applies to new and existing dwellings)

Approved Document F states that for all dwellings (both new and existing, where Part F applies) the moisture criteria are likely to be met if, during the colder months of the year, the moving average surface water activity of the internal surfaces of external walls is always less than that maximum permitted value below, evaluated over each moving average period.

Moving Average Period	Maximum Permitted	Result
1 month	0.75	Fail
1 week	0.85	Pass
1 day	0.95	Pass

Indoor Air Relative Humidity (applies to new dwellings only)

Approved Document F states that for new dwellings the moisture criteria is likely to be met if, during the colder months of the year, the moving average relative humidity in a room is always less than the maximum permitted value below, evaluated over each moving average period.

Moving Average Period	Maximum Permitted (%)	Result
1 month	65	Fail
1 week	75	Pass
1 day	85	Pass

BUILD TEST SOLUTIONS

Ongoing monitoring to ensure in-situ performance

- RH & surface moisture as per ADF
- Low Mould Risk Indicator score

Measure airflow, don't assume it

- Airtightness
- Ventilation flowrate
- *Bedroom airtightness*

Well documented evidence and lower repeated remedial costs

- Evidenced BR compliance
- Ongoing resident protection for Awaab's Law

BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

The business case for effective ventilation

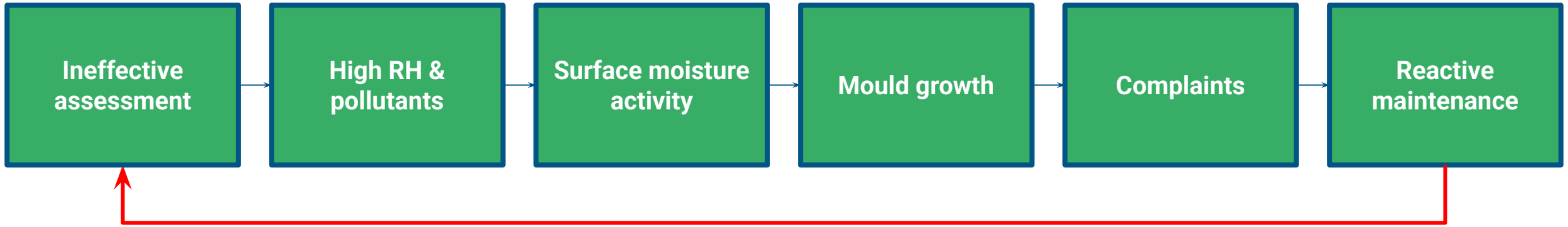
What does it cost us to get ventilation wrong?

Budget lines:

- Reactive maintenance
- Complaints handling
- Energy waste
- Retrofit underperformance
- Strategic risk
- Lives! Poor health at best

BUILD TEST SOLUTIONS

Poor ventilation trap



BUILD TEST SOLUTIONS

Common BaU scenario

- Damp & mould prone dwelling
- Unknown airtightness & fan flowrates
- BaU: reactive visits, periodic redecoration

BUILD TEST SOLUTIONS

Worked example business case

Portfolio 1,000 dwellings, 5% (50) per year ventilation issues

BaU:

- Mould wash (£600) + inspection/admin time (£400) = £1,000
- Annual stock costs = 50 x £1000 = £50,000
- Repeat

Measurement:

- Airtightness + ventilation flowrate = ~£150/dwelling
- Measure all dwellings = £150,000
- Target 30% with most common complaints = £50,000
- Understand the root cause and address it once

BUILD TEST SOLUTIONS

Worked example business case

Scenario A: measure all buildings, 50% lower repeat works

- Annual saving = 50% of £50,000 = £25,000
- Payback for measuring all buildings: 6 years
- 10 year return on investment = £100,000 (per 1,000 stock)

Scenario B: target high risk buildings, 30% lower repeat works

- Annual saving = 30% of £50,000 = £15,000
- Payback for measuring all buildings: 3 years
- 10 year return on investment = £100,000 (per 1,000 stock)

BUILD TEST SOLUTIONS

Indirect benefits

- ✅ Improved, evidenced compliance
- ✅ Right first time, quality reputation
- ✅ Healthier, happier residents
- ✅ Improved retrofit planning
- ✅ Better energy performance
- ✅ Better EPC ratings

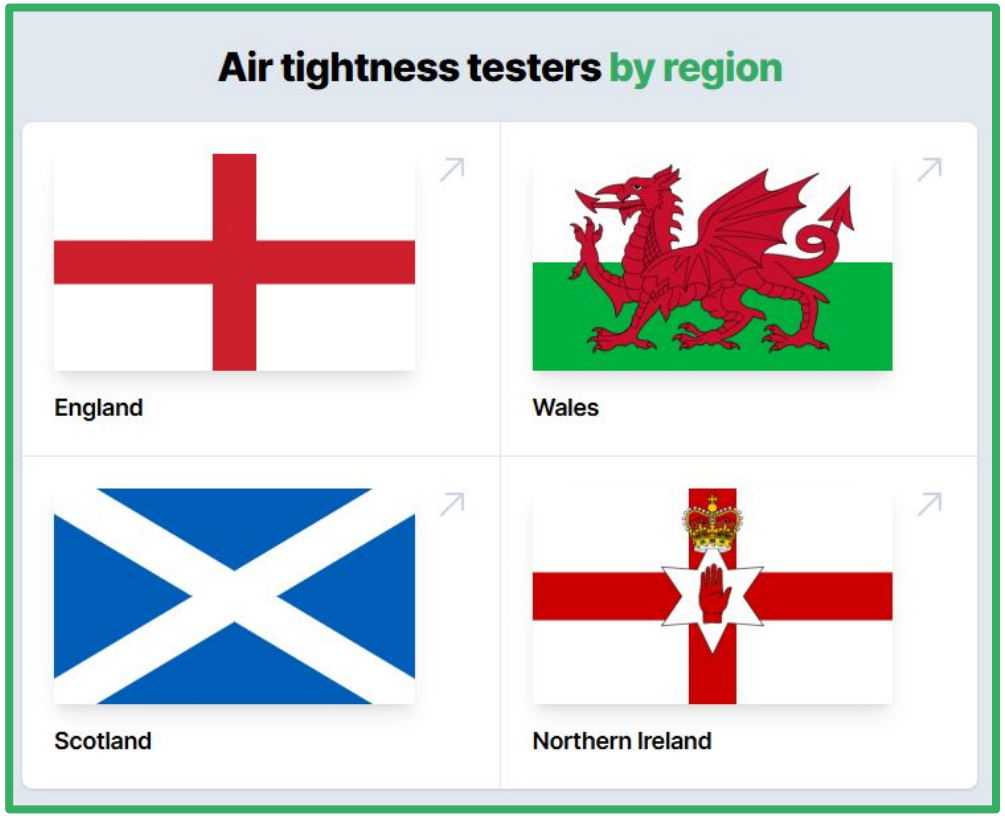
BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

A new year’s resolution?

Start targeted measurements

- Tests for problem properties
- Ask more of your monitoring: do we meet BRs?
- Proactive compliance
- Record keeping and **benchmarking**



BUILD TEST SOLUTIONS

Add value to each visit

- Add measurement to toolbox
- Help deliver effective ventilation
- Deliver efficiency to customers

BUILD TEST SOLUTIONS

BUILD TEST SOLUTIONS

Thank you!

richard.jack@buildtestsolutions.com
www.buildtestsolutions.com