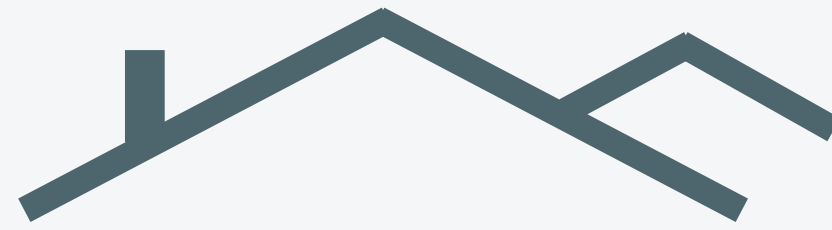


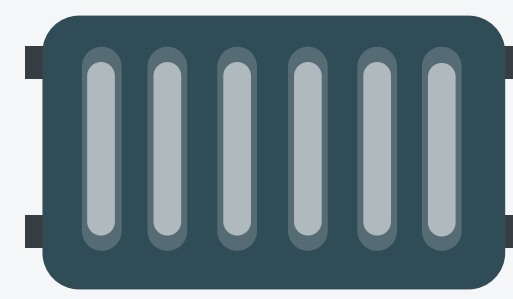
Problem

Retrofitting Efficiently

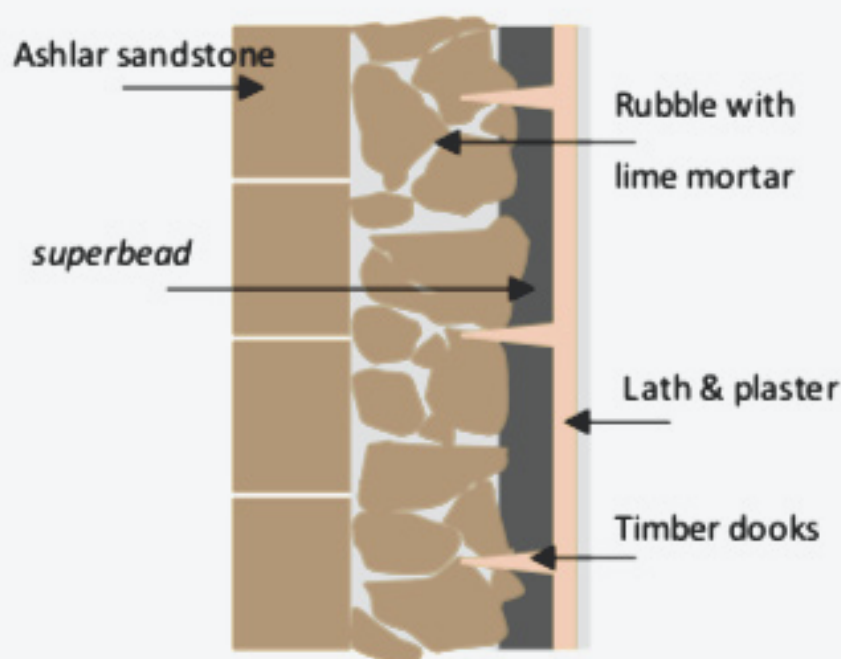
Pre-1919 buildings lose a large amount of heat due to low thermal resistance and high air leakage, making them energy inefficient and expensive to run.



66% of pre-1919 sandstone dwellings are uninsulated.



1/3 of a house's heat is lost through its walls.



Superbeads placed in wall-cavities less invasively: ideal for pre-1919 dwellings

Solution

Superbead insulation

Energystore Ltd's superbead insulation consists of an expanded polystyrene bead that provides high resistance to heat loss when bonded with adhesives.

Up to **83%** heat improvement in 10 analysed dwellings

1. Heat Transfer

Mean improvement for all 10 dwellings was **63%**. 6 dwellings in Forfar showed a mean reduction of **56%**.

2. Condensation

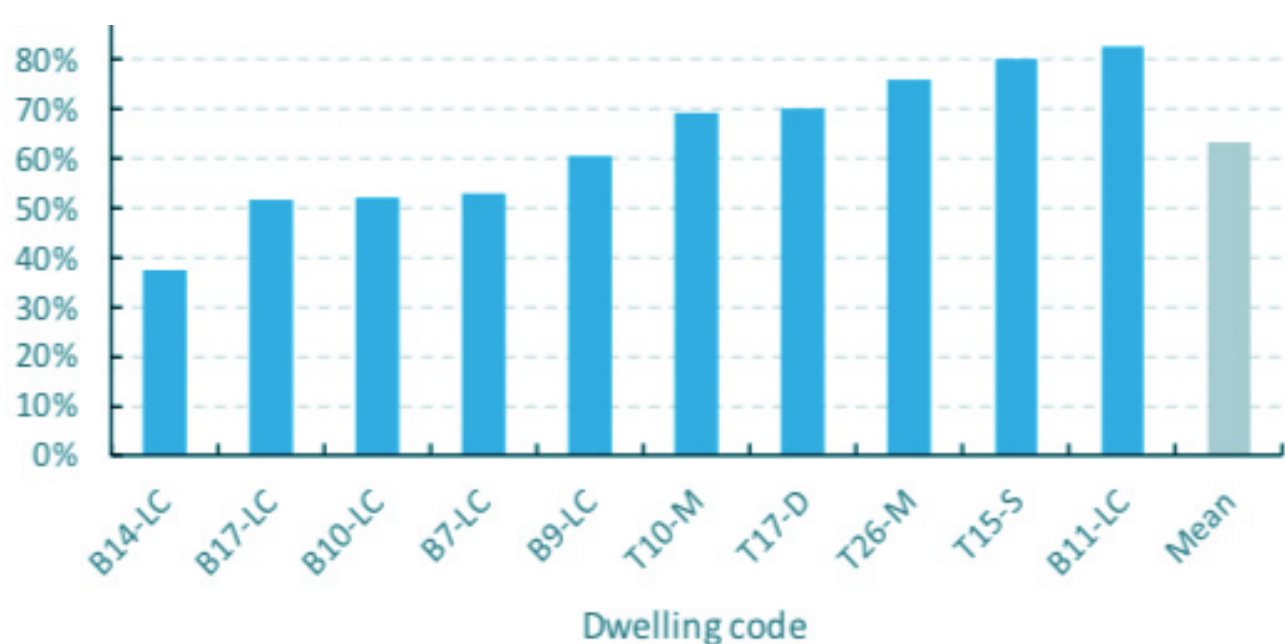
Over 15 days of monitoring, the tests found **no** risk of condensation build-up using superbeaded walls.

3. Air Leakage

Air permeability reduced **5-19%** when combined with repairs. It reduced the most when all walls were insulated.

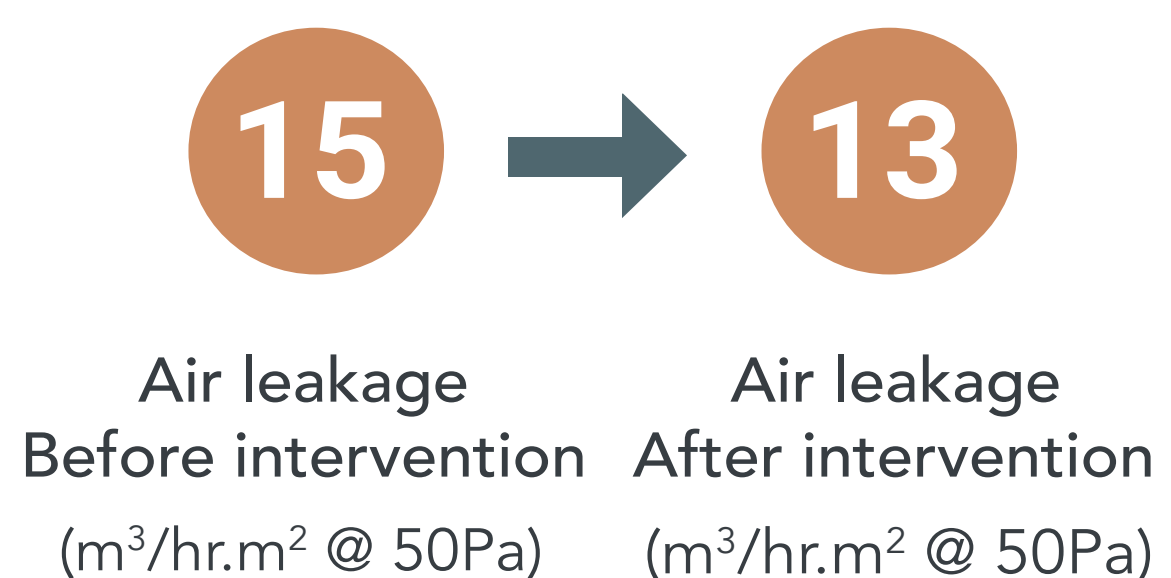
Heat Transfer % Improvement

(U-Value) / (all 10 dwellings)



Mean Air Leakage Reduction

(m³/hr.m² @ 50Pa) / (all walls)



More efficient insulation

- SAP rating improved between **5-8** points
- **3,450kWh/yr** average energy reduction
- **750 kgCO₂/yr** in emissions curbed
- **£136/yr** saved on natural gas energy bill
- Upgraded 6 energy efficiency EPC ratings from band D to band C.

For a potential **£800 and 20,700kWh** of energy saved every year

If applied to all walls in some analysed dwellings, **£800/year** could be saved.

"This project has shown that existing insulation products, such as superbead by Energystore Ltd, can substantially reduce dwelling envelope and ventilation heat loss and are an important approach to **meeting Scotland's ambitious CO₂ reductions and net zero targets.**"

- Dr Julio Bros-Williamson



60k

Project Cost:
£60,307.21

23k

CSIC Contribution:
£23,316.17

11 months

Project Length:
Jan-Dec 2019