Floor Insulation Programme for Argyll Community Housing Association

Q-Bot has developed the first affordable and fully accredited solution for the retrofit of insulation to suspended timber floors. The results of this case study with Argyll Community Housing Association (ACHA) show that the measure reduces heat loss by **79%** through the floor and cold draughts **30%** for the whole house. Compared with other options to upgrade energy efficiency Q-Bot is the most **cost-effective** solution available. The average cost was **£2,750** per install, with an improvement of **9.5 EPC points** per home, resulting in a cost of **£290 per EPC point** gained. **9 out of 10** customers surveyed were satisfied with the install and would recommend Q-Bot to their neighbours.

"The house is less draughty – I'm now able to walk around with bare feet."

– Customer, Argyll & Bute

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Argyll Community Housing Association

As part of a drive to improve energy efficiency and reduce fuel poverty, Argyll Community Housing Association has worked with Q-Bot to install underfloor insulation across 38 properties in Scotland. This case study shows the impact on comfort and energy savings of the service.

The properties include a wide range of all housing types, different ages and sizes. The energy savings achieved by the upgrades were modelled in SAP using elemental U-values for the individual floors and the airtightness test results of each property. This enabled the energy improvements to be calculated against a range of scenarios with alternative retrofit measures. In addition, a pre and post installation questionnaire provided qualitative feedback from customers..

Impact

The installation of floor insulation significantly improved thermal comfort with fewer cold draughts and much more even temperatures within the house. The results show, on average, a **30%** improvement in airtightness and a **79%** reduction in the heat loss through the floor.

Q-Bot's solution for the insulation of suspended floors was shown to be the most **cost-effective** retrofit measure, after draught proofing. The average cost was **£2,750** per install, with an improvement of **9.5 EPC points** per home, resulting in a cost of **£290 per EPC point** gained. In addition, due to the innovative installation process, there was minimal disruption for the Housing Association's customers.

Fig 1. A happy customer.

Customer Feedback

Of Argyll Community Housing Association's customers who were surveyed, **89%** of the occupants said they were '**Satisfied**', or '**Very Satisfied**' with the installation process and **100%** scored Q-Bot 7 or higher on a survey of how likely would you recommend Q-Bot (where 1 stood for 'not at all' and 10 for 'highly recommend').

Q-Bot's non-disruptive approach has received praise from customers:

"Wow, what a fantastic team you have. I had excellent communication from the start. Great work carried out by a clearly competent team and my house was left better than it was."

Customer, Argyll & Bute

86% *of surveyed customers find the home warm on very cold days.*

"The house is less draughty – I'm now able to walk around with bare feet."

Customer, Argyll & Bute

Summary

Key Outcomes from the Pilot with Argyll Community Housing Association

Measurement	Floor heat loss (U-value)	Draughts (Air Permeability)*	Space Heating Requirement
Before (average)	0.91 W/m²K	20.1 m³/m².h @50Pa	9,806 kWh/yr
After (average)	0.19 W/m²K	13.8 m³/m².h @50Pa	7,215 kWh/yr
Reduction (average)	79%	30%	26%
EPC Points Improvement			9.53
Total Carbon Emissions Savings (all 38 homes, over 42 years)			808,000 $kgCO_2e$

*An average was used when specific results were not available.

The EPC rating for **21** of the **38** properties was improved by at least **1** grade, with **5** properties improving by **2** EPC grades – from band G to E or from band F to D.

Residents could save an average **£227** per year on their energy bill.

The U-Value of the floor in all **38** homes following installation, now complies with the Part L1B requirement for upgrading retained thermal elements in existing dwellings of <= **0.25 W/m².K**.

Fig 2. A property in Argyll undergoing airtightness testing.

Fig 3. A customer enjoying a warmer home.

100% of residents would recommend Q-Bot

The most **cost-effective** solution available

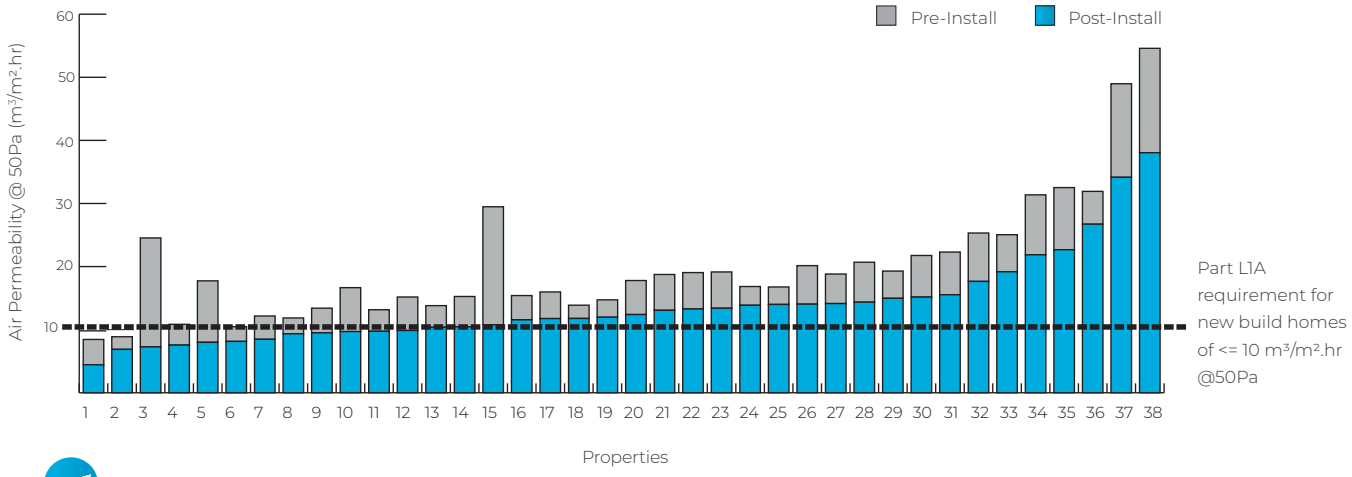
30% reduction in draughts

79% reduction in heat loss

Results

Reduction in Air-Permeability

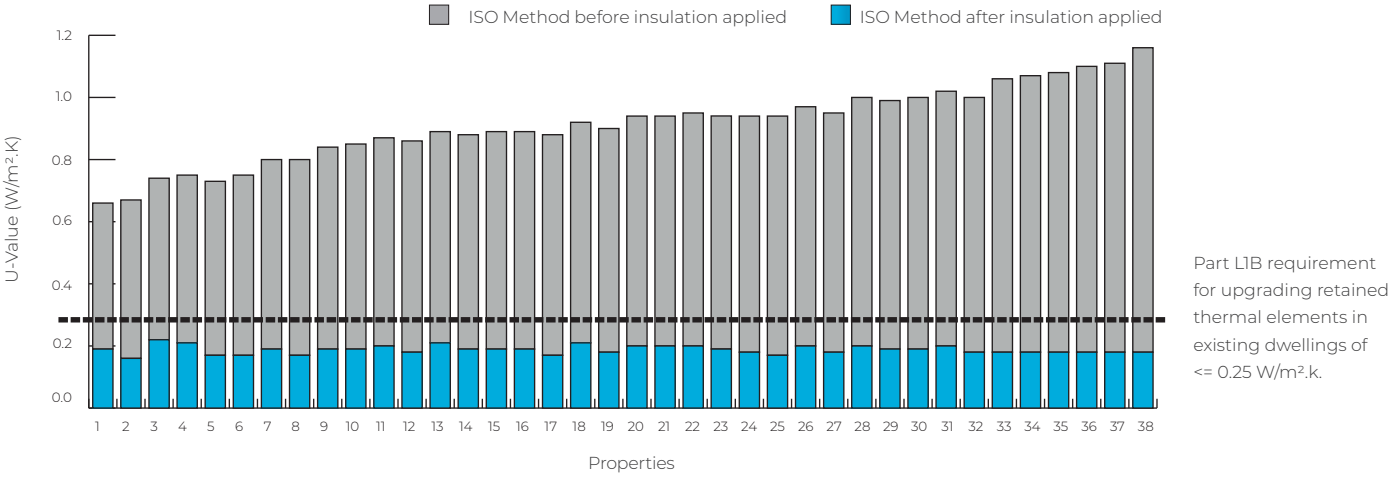
The air-permeability of the properties was tested according to the ATTMA Technical Standard to comply with BS EN 13829:2001. Of the 38 properties with air-permeability results, 13 did not have a pre-installation pressure test (mainly due to being 'too leaky' to pressurise). For these cases, a "pre-install" air permeability was estimated using the average improvement of the other properties. All the post-installation results were measured directly for each of the 38 properties, with an average post-installation test result of **13.7 m³/m².hr**. The before and after test results demonstrated an average **30%** improvement in airtightness.



14 homes now meet the building regulations air permeability threshold for new builds.

Improved U-Values

The floor U-values for both pre- and post-installation conditions, were calculated using actual measurements of the floors, vents, perimeter walls and physical site conditions within each home (in accordance with ISO 13370:2007). The pre-installation U-values for the floors were, on average, **0.91 W/m²K**. The post-installation U-values were, on average, **0.19 W/m²K**, which constitutes a **79%** improvement, and meets the Part L1B requirements for elemental U-values of floors in existing buildings.



Every home now meets the requirement of Part L Building Regulations for upgrades to existing buildings.

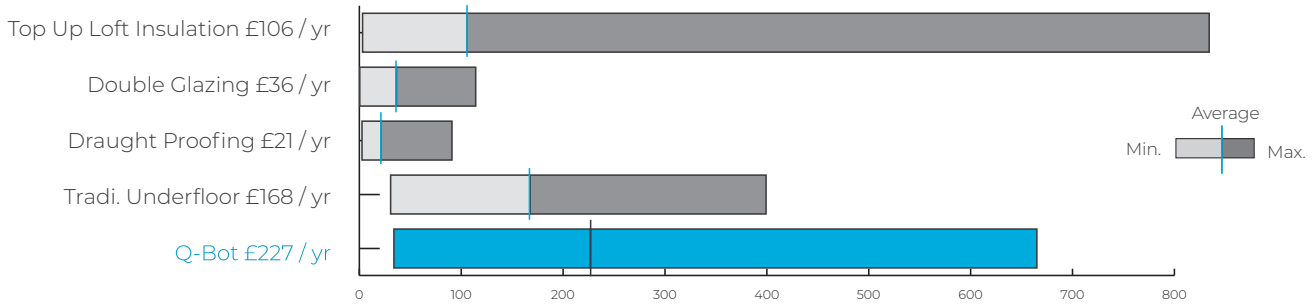
Energy Savings and Cost Effectiveness

The comparison of annual energy savings of Q-Bot's floor insulation with a range of standard retrofit measures was calculated using SAP. Q-Bot's solution was shown to provide the most cost-effective measure, after draught proofing, at an average cost of **£290 per EPC point**. It also produced an average annual energy saving of **£227**, with properties saving up to **£665** per year. The average EPC improvement across the range of properties was **9.5** points.

The average sales price for the installs was **£2,750** per property based on a minimum volume per year.

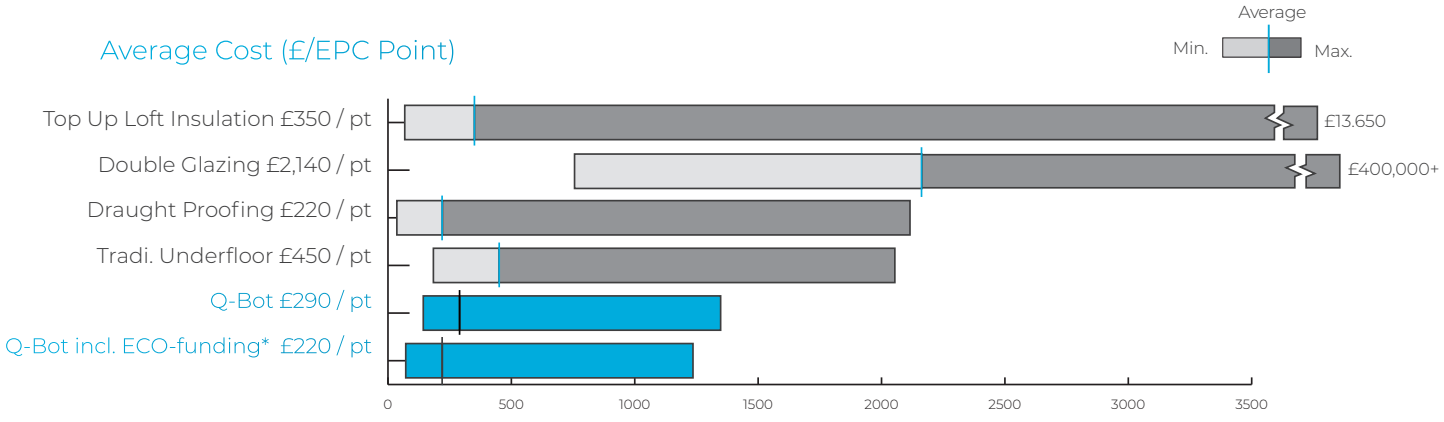
All properties already had loft insulation and double glazing. **25** of the **38** trial properties were not connected to the national gas grid, all had cavity wall construction with all except one property having 100mm of external wall insulation. The retrofit measures applicable for these properties are relatively narrow, with these properties being especially difficult to upgrade.

Average Annual Energy Savings (£ saved per year)



Significant energy savings without the disruption of major works.

Average Cost (£/EPC Point)



* Value calculated as at August 2018, subject to change due to new regulations.
Assumptions based on a large volume programme.

Q-Bot is the cheapest option per EPC point after draught proofing.

Example **Semi-Detached House**

Fig 4. Semi-detached house in West Scotland.

A three bedroom two storey house in West Scotland was insulated as part of the pilot. The house was a semi-detached house built between 1980 and 2000 and had **40m²** of suspended timber floor. The property was not connected to the national gas grid and had loft and external wall insulation as well as double glazed windows. **150mm** of insulation was installed between the joists and **25mm** below the joists. This resulted in an annual energy saving of **£652** per year and will pay back within 5 years. Q-Bot improved the energy performance rating of the house by two bands, from G to E, and a carbon emissions reduction of **108,000 kgCO_2e** over the 42 year lifespan of the insulation.

Property Details

Suspended floor area 40m²
Area Insulated: 38.7m²
External wall area: 37m²
Window area: 13m²

KPI	Before	After
EPC Score	G 20	E 41
Annual Heat Cost	£1,983	£1,331
Annual CO_2e	7,360 kgCO_2e/yr	4,790 kgCO_2e/yr
Air Permeability	55 m³/m².h@50Pa	38 m³/m².h@50Pa
Floor U-Value	1.16 W/m².K	0.18 W/m².K

The price of the install was **£3,100**.

Pays back the initial investment within 5 years.

Fig 5. Before the installation.

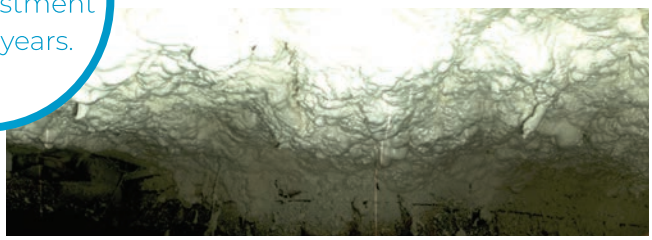
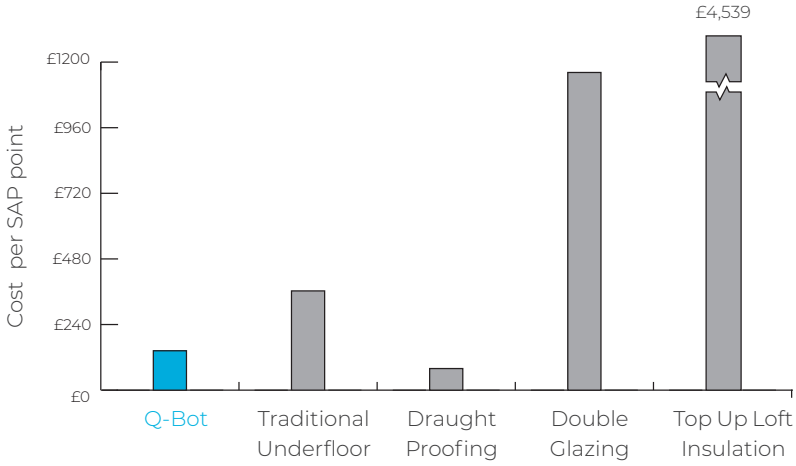


Fig 6. After the installation, showing the insulation now applied.



Example
End of Terrace House

A bungalow in Argyll and Bute in Scotland was insulated as part of the pilot. The property was an end-terrace house built between 1950 and 1980 with cavity wall construction and had **40m²** of suspended timber floor. **130mm** of insulation was installed between the joists and **25mm** below the joists. This resulted in annual energy saving of **£432** per year and will pay back within 7 years. Q-Bot improved the energy performance rating of the house by two bands from F to D, and a carbon emissions reduction of **71,400 kgCo_2e** over the 42 year lifespan of the insulation.

Fig 7. End of terrace house in Argyll and Bute.

Property Details

Suspended floor area 40m²
Area Insulated: 36m²
External wall area: 65m²
Window area: 12m²

KPI	Before	After
EPC Score	F 36	D 55
Annual Heat Cost	£1,390	£959
Annual CO_2e	5,220 kgCO_2e/yr	3,510 kgCO_2e/yr
Air Permeability	17 m³/m².h@50Pa	14 m³/m².h@50Pa
Floor U-Value	0.95 W/m².K	0.20 W/m².K

The price of the install was **£2,750**.

EPC points improvement of 19

Fig 8. Before the installation.

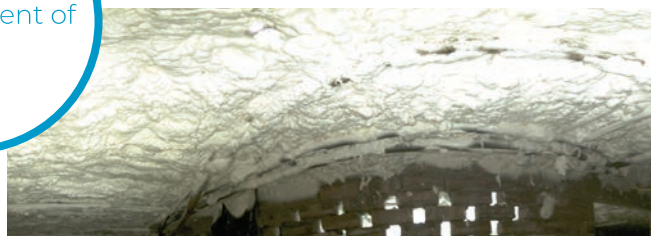
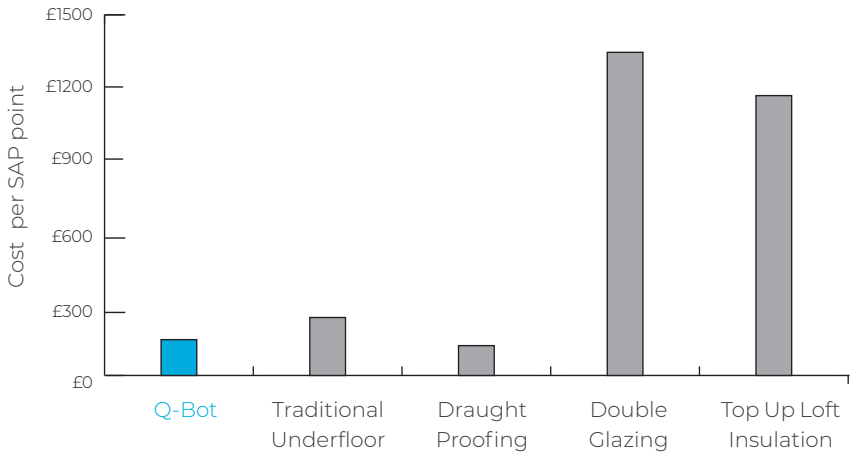


Fig 9. After the installation, showing the insulation now applied.



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1st of October 2018

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