



The Impact of Floor Insulation Across 180 Homes

Developed with the support of BEIS and InnovateUK, Q-Bot has fully commercialised the first affordable, ECO funded solution to retrofit insulation to suspended timber floors. Q-Bot has had its results verified by the Energy Savings Trust, and is fully accredited by BBA, PAS and TrustMark.

The results of this case study across 180 homes show that the measure reduces heat loss by 77% through the floor and cold draughts by 1/3 for the whole house. Compared with other retrofit measures, Q-Bot is the most cost-effective solution available. The average cost was £3,380 per install, with an improvement of 5 EPC points per home, resulting in a cost of **£695 per EPC point gained**.

“I am much warmer, and I’m saving £20 per month on bills. I love Q-Bot, it has made a massive difference.” – *Customer, London*

w: www.q-bot.co

e: sales@q-bot.co

t: +44 (0) 203 795 0236



Working with Q-Bot

Q-Bot's underfloor insulation can be installed as a standalone measure or part of a Whole House Retrofit, both approaches are designed in line with PAS 2019:2035. Q-Bot can provide the retrofit coordinator and retrofit assessment service, or only be in responsible for the technical surveys, retrofit design and installation.

Q-Bot's solution uses a robot to apply insulation:

- Installed in 1-2 days to minimise disruption.
- SAP improvement of 2 to 12 points (verified by Energy Saving Trust).
- Eligible primary measure for ECO, GHG-LADs, SHDF and HUG attracting funding for DEFG rated properties.

And reduces the risk of damp and mould:

The layer of high-performance foam creates a hydrophobic barrier between the floor and void. The insulation raises the temperature of the floor and reduces the risk of condensation.

The Impact of Floor Insulation

As part of a drive to improve energy efficiency and reduce fuel poverty, several Local Authorities and Housing Associations have worked with Q-Bot to install underfloor insulation. This case study shows the energy and environmental impact of the service as well as residents' improved comfort.

The case study is based on a wide range of housing types, different ages and sizes from Camden Council, Abri Group, The Guinness Partnership, Curo Group, Plus Dane Housing, Hexagon Housing association, Castlehill Housing Association, Argyll Community Housing Association, Langstane Housing Association, Stonewater, Flagship Group, Aston Group, Oxford City Council, Osborne Energy, Link Housing Association, and Midas Group.

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.

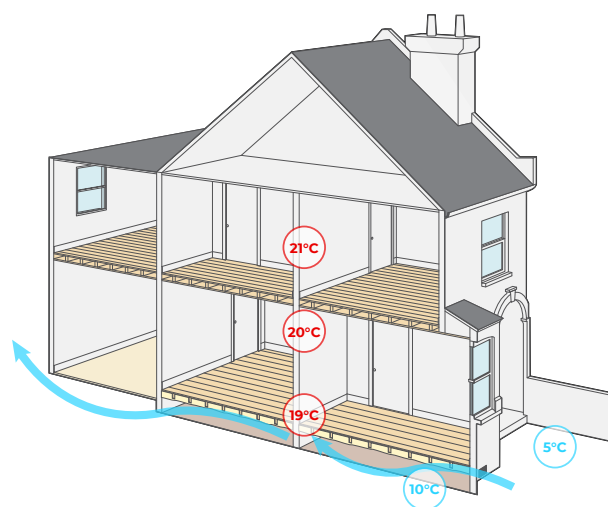


Fig. 1 Thermal improvements in a terraced house and ventilation maintained in the underfloor space.

Summary

Key Outcomes From The Programme of Works

Measurement	Floor heat loss (U-Value)	Draughts (Air Permeability)*	Space Heating Requirement	SAP Assessment Score
Before (average)	0.85 W/m2.K	15.6 M3/m2.h @50Pa	12,170 kWh/yr	58.7
After (average)	0.19 W/m2K	11.0 M3/m2.h @50Pa	10,260 kWh/yr	63.5
Reduction (average)	77%	30%	16%	8%
EPC Points Improvement				4.8
Total Carbon Emissions Savings (all 180 homes over 42 years)				3,811,350 kgCO2/yr

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

The U-value of the floor in **179 homes** now complies with the Part L1B requirement for upgrading retained thermal elements in existing dwellings of **$\leq 0.25 \text{ W/m}^2\text{.K}$** .



Customer Feedback

- **100%** of the occupants said they were '**Satisfied**', or '**Very Satisfied**' with the installation in terms of disruption.
- **90%** 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').

"I am much warmer, and I'm saving £20 per month on bills. I love Q-Bot, it has made a massive difference. There are now no draughts." – Customer, NW London

"The house is a lot warmer now, and we don't have the heating as much as compared with before. It's a great service to have, it helps people like me to keep the house warm."
– Customer, Oxford

"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 when they came." – Customer, Argyll & Bute

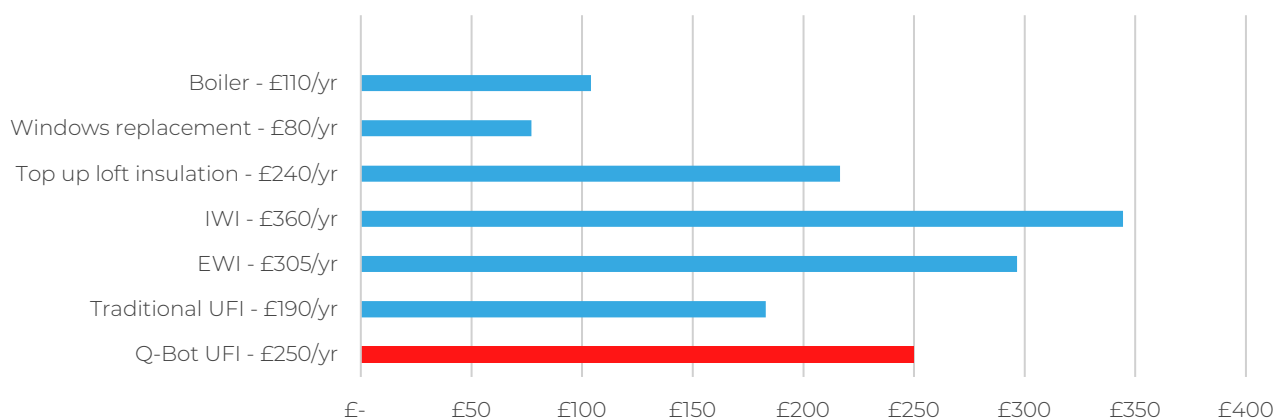
Results

Energy Savings and Cost Effectiveness

Q-Bot's solution was shown to provide the most cost-effective measure, at an average cost of **£695 per EPC point**. It also produced an average annual energy saving of **£250** at 2022's energy price. The average EPC improvement across the range of properties was **5 points**.

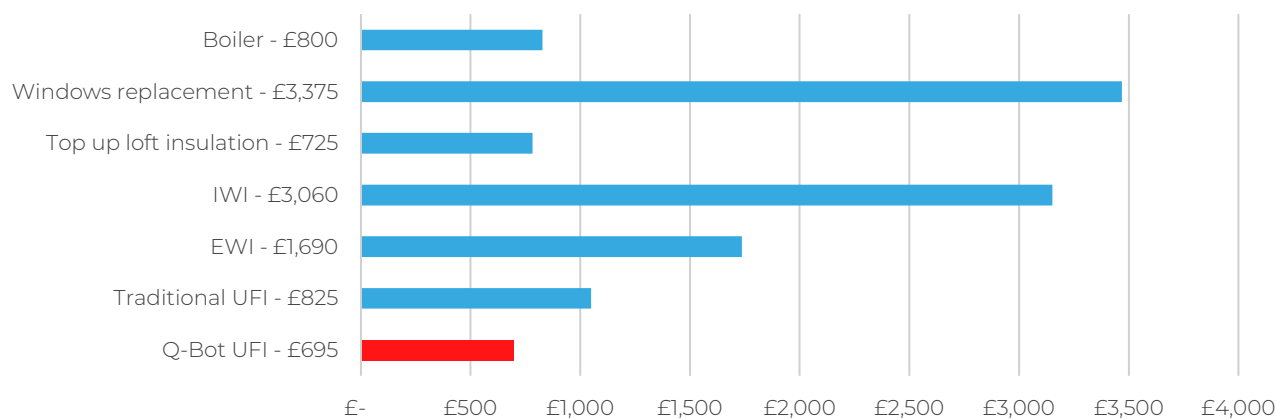
The average sales price invoiced for the installs was **£3,380 per property**.

Average Annual Energy Savings (£ saved/year)



Significant energy savings without the disruption of major works.

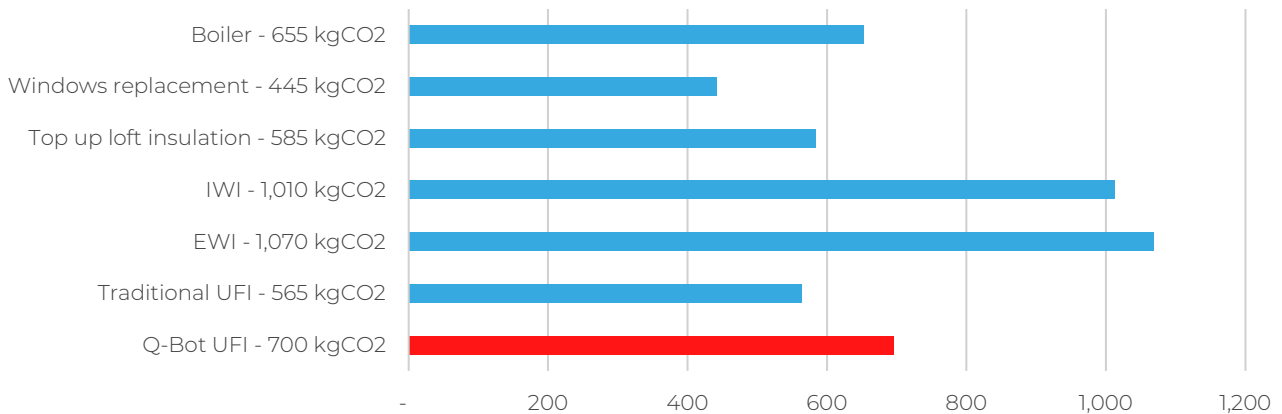
Average Cost (£/EPC Point)



Q-Bot is the cheapest option per EPC point.

Carbon savings (kg CO2 saved per year per property)

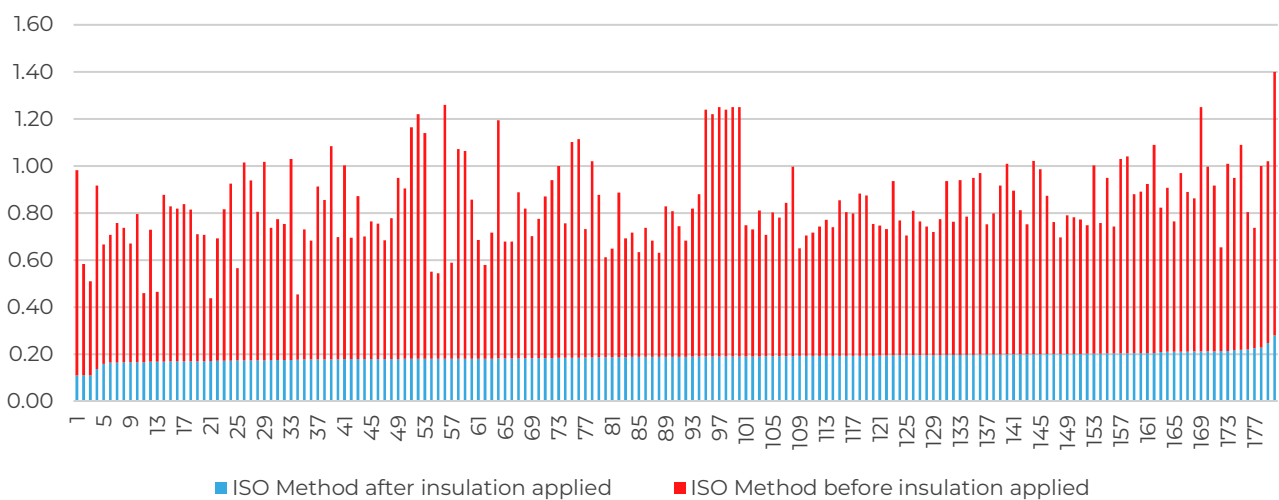
Retrofitting existing buildings is essential to reaching net zero by 2050. Residential homes are responsible for around 25% of the UK's CO2 emissions. Space heating is the largest single energy use in the UK, and accounts for over half of domestic CO2 emissions. After the installation of underfloor insulation, each household cut its annual CO2 emissions by 700kg on average. This is the equivalent greenhouse gas emission saving as driving over 1,700 miles in a car.



Equivalent CO2 savings of driving from London to Munich and back again.

Improved U-Values

The 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 180 homes (in accordance with ISO 13370:2007). The pre-installation u-values for the floors were, on average, 0.84 W/m²K. The post-installation U-values were, on average, 0.19 W/m²K, which constitutes a 77% improvement.



99 homes now meet the requirement of Part L Building Regulations for upgrades to existing buildings.

Example

Mid-terraced bungalow

A one-bedroom, mid-terraced bungalow, in the Midlands, was insulated as part of a programme of retrofit work under GHG-LADS 2. The property was built between 1950 and 1980 with cavity wall and had 40m² of suspended timber floor. Prior to the floor insulation, a ventilation strategy document was generated to recommend the installation of an extractor fan in the kitchen to meet PAS ventilation requirement. 125mm of insulation was installed between the joists and 25mm below the joists. This resulted in an SAP improvement of 9 points, moving the EPC band from D to C.



Fig. 3 Entrance of the mid-terraced bungalow.

Property Details

Suspended floor area:42m²
 Area Insulated:33m²
 Heating type:Gas
 Cavity wall:Filled with 100mm insulation
 Pitched roof:200mm loft insulation

Cost per SAP point of £480

The price of the install was **£4,325**.

KPI	Before	After	Improvements
EPC Rating	D 63.0	C 72	9.0
Floor U-Value	0.81 W/m ² K	0.19 W/m ² .K	77%

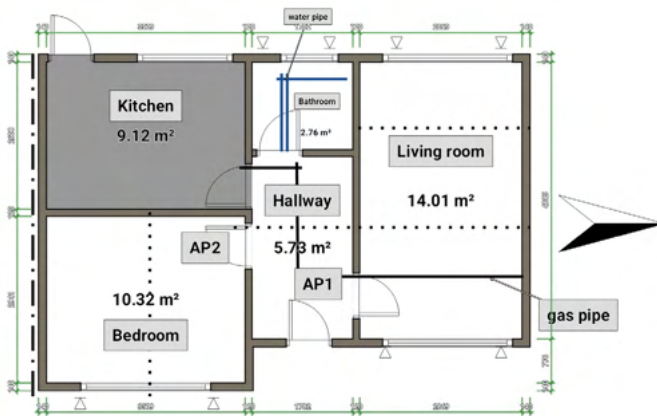


Fig. 4 Floorplan of the mid-terraced bungalow.



Example

Ground Floor Flat

A one bedroom, ground floor flat, in Northwest London was insulated as part of the pilot. The flat was built between 1920 and 1950 and had 40m² of suspended timber floor. 130mm of insulation was installed between the joists and 25mm below the joists. This resulted in an EPC points improvement of 8.2, and a carbon emissions reduction of 50,210 kgCO₂ over the 42-year lifespan of the insulation. Q-Bot was the most cost-effective solution at a cost of £455 per EPC point.

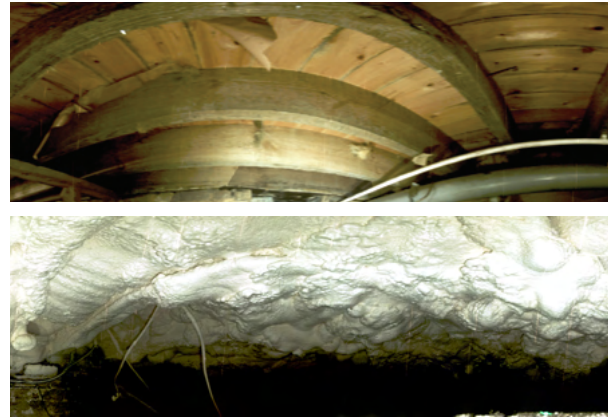


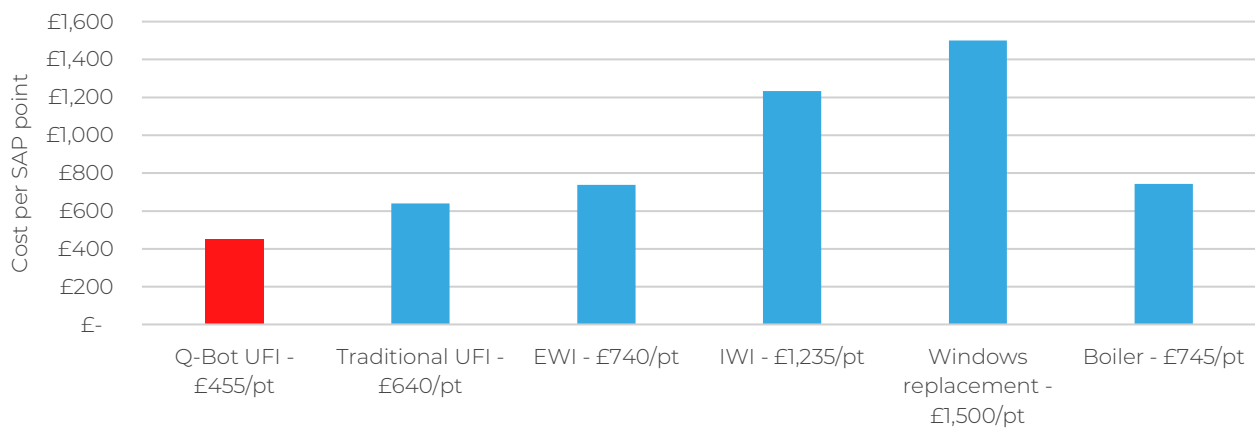
Fig. 5 and 6 Panoramic views of underneath the suspended floor before the installation (top) and after the installation (bottom).

Property Details

Suspended floor area:40m²
 Area Insulated:.....36m²
 Wall:Insulated
 Windows:Single glazed

Pays back the initial investment in 13 years

The price of the install was **£4,325**.



KPI	Before	After	Improvements
EPC Rating	E 53.0	D 61.2	8.2 points
Annual Heating Cost	£1,305	£1,020	£285
Annual CO ₂	3,890 kgCO ₂	2,695 kgCO ₂	1,195 kgCO ₂
Air Permeability	17.9 m ³ /m ² .h@50Pa	11.0 m ³ /m ² .h@50Pa	40%
Floor U-Value	1.25 W/m ² .K	0.19 W/m ² .K	85%





w: www.q-bot.co e: sales@q-bot.co t: +44 (0) 203 795 0236

Q-Bot Limited, Block G, Riverside Business Centre,
Bendon Valley, Wandsworth, SW18 4UQ
Reg. No: 07972299

