



Bertram Street, Camden

A Victorian home's low-carbon retrofit for the future



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There are seven million older, solid walled homes in the UK – two million of these are in London. Up to 40% of their heat loss goes through these solid walls.

Reducing the energy consumption in these homes is notoriously difficult. External wall insulation (EWI) is expensive and planning restrictions often mean that external cladding is not acceptable. Cavity filling is obviously not an option - leaving internal wall insulation (IWI) as the only choice.

IWI, combined with other low-carbon techniques, can be used to great effect to reduce the carbon footprint and improve energy efficiency in these homes.

But what about the residents, who may have to move out for up to 10 days during the works because traditionally the process is dusty, noisy, lengthy and disruptive?

WHISCERS

In 2009, a partnership of the Sustainable Energy Academy, United House, Parity Projects and Camden Council secured funding from the Technology Strategy Board's (TSB) £17 million 'Retrofit for the Future' competition to develop its WHISCERS (Whole House In-Situ Carbon Energy Reduction Solution) process.

WHISCERS* is a revolutionary six part process for retrofitting IWI in older properties:

- 1]** A **laser scanner** measures the internal dimensions of a room
- 2]** The digital data is **downloaded** to a factory-based off-site cutting machine

- 3]** The machine **cuts** the insulation boards to match the walls perfectly. Software optimises the cut to minimise wastage
- 4]** The cut boards are then **marked** with their dwelling address, room, wall position and orientation
- 5]** The boards are **delivered** to site as a kit
- 6]** They are then **fitted** to the walls with the minimum of noise, mess and disruption.

WHISCERS provides many benefits over traditional IWI methods:

- Accuracy of measurement – laser scanning provides far greater accuracy of measurement to a tolerance of 5mm.
- Speed of measurement – the dimensions of a typical wall can be collated in 10 minutes, as opposed to 30 minutes. Therefore, a typical three-bedroom house can be surveyed in 1-1.5 hours.
- Automated, off-site cutting using a CNC cutting machine – little mess in the home and greater accuracy than hand-cutting.
- Fitting – boards arrive on site and can generally be fitted in 1 hour/room or less.
- Less disruption, noise, mess and speedier process for residents.
- Fitting with residents in-situ avoids the need to decant, saving housing providers thousands of pounds in hotel bills, and minimising disruption to the resident.

One of the key benefits of WHISCERS is that it was developed with residents in mind. It is a speedy process that minimises mess and disruption in the home, so residents can get on with their lives with the minimum of inconvenience.

It's a win, win, win situation.



*International PCT Patent applied for – PCT/GB2010/050756.

The Camden project

In January 2010, the Sustainable Energy Academy, United House, Parity Projects and Camden Council partnership bid for further funding in Round 2 of the TSB competition and was one of only 86 projects across the country to achieve funding. £150,000 was awarded to further develop the WHISCERS process. The funding covered retrofit works, research and development, monitoring and project management.

Project partners

A project team of the Sustainable Energy Academy, United House, Parity Projects, Camden Council and the National Energy Foundation was formed to consider what practical measures could be put in place in an older, solid walled home retrofit project to achieve the aims of the competition.

The approach taken was to identify the most cost-effective way of achieving carbon reduction targets by utilising WHISCERS to deliver the IW1, with the residents (a family of five including three young children) remaining at home throughout the retrofit project.

Project aims

- TSB - to achieve a target of 17kg CO₂/m²/year, (80% CO₂ reduction) with the project being monitored over two years
- United House/Sustainable Energy Academy – to undertake a full-scale trial of the WHISCERS process with the aim of developing and marketing it as a mass producible way of insulating older social housing stock across the UK. To install these carbon saving measures along with Better Homes improvements – all with the residents in-situ
- Camden Council – to prototype WHISCERS as a potential methodology for larger projects on the borough's solid walled stock and gain experience of hard to treat solid walled retrofits.

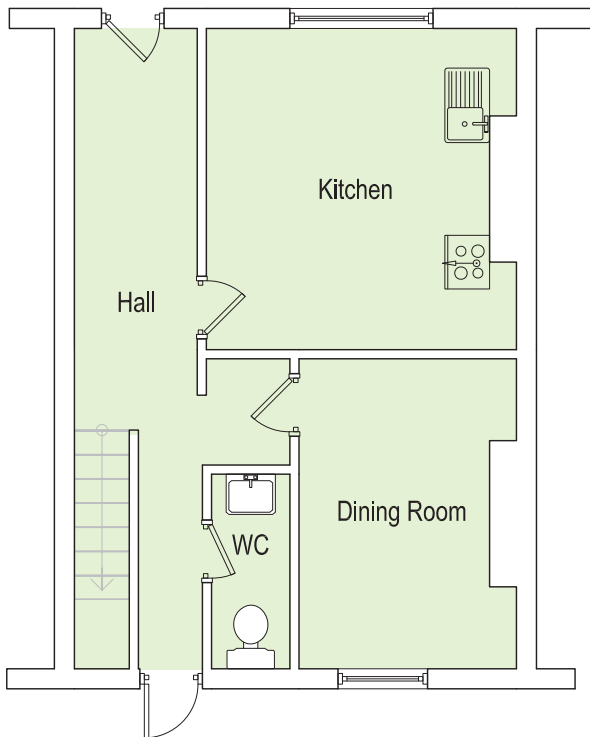
Property selection and resident involvement

Fundamental to the success of the project was the selection of a property according to the cost of retrofit and the willingness of the residents to cope with the disruption. There was a requirement for United House and Camden Council to keep the residents informed of works, including the impact of the work in progress and detail of physical and visual impact.



The works programme

In July 2010, the works programme commenced at 8 Bertram Street, a three-bedroom, three-storey Victorian terraced home in Camden, owned by Camden Council. The team carried out a comprehensive low-carbon retrofit plus a major refurbishment programme.



Ground Floor

Front door

- High performance door. U-value 3.0W/m²K.

Hall

- Damp proofing to party wall.
- Knauf Polyfoam IWI on front external wall. U-value 0.21.
- Meter station – Grid consumption, PV generation, water consumption.
- High performance back door. U-value 2.2.

Dining room

- Damp proofing to back wall.
- Knauf Polyfoam IWI on external wall to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.
- Humidity sensor.

Kitchen

- Damp proofing to front wall.
- Knauf Polyfoam IWI on external wall to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.
- New kitchen units.
- Humidity sensor.
- Gas meters for boiler and cooker.

WC

- Knauf Polyfoam IWI on external wall to U-value 0.21.
- New WC and basin suite.



Walls

- Some floors adjacent to external walls were lifted and fitted with 200mm mineral wool insulation between joists to reduce cold bridging; some were left without the insulation. The difference in any condensation build up will be monitored.
- Thermostatic radiator valves fitted to all radiators.



The next steps

The house will be monitored over two winters to check that the energy saving elements perform as expected.

The WHISCERS process is currently being refined and is available as an exciting innovation that makes wall insulation a faster, cheaper, simpler and non disruptive measure, which can be carried out with residents in place.

First Floor

Landing

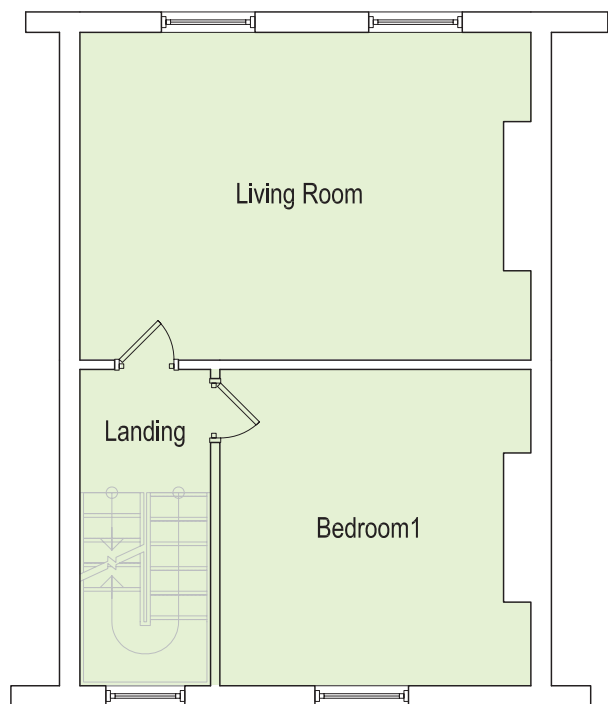
- Knauf Polyfoam IWI to U-value 0.45.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.

Living room

- Knauf Polyfoam IWI to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.

Bedroom 1

- Knauf Polyfoam IWI to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.



Second Floor

Landing

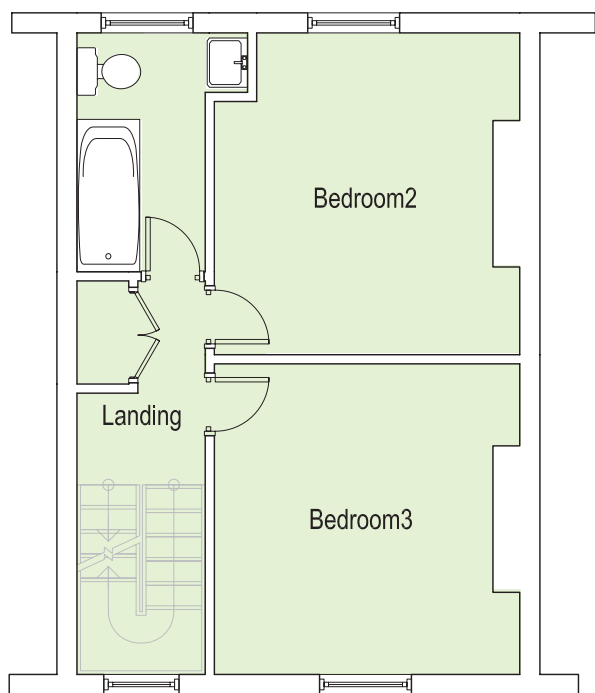
- Knauf Polyfoam IWI to U-value 0.45.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.
- Draft proof seal to loft hatch.
- Loft space insulated with mineral wool roll. U-value 0.13.

Cupboard

- Heat metered solar cylinder.
- Vent-Axia HR25H heat recovery ventilation unit.

Bedroom 2

- Knauf Polyfoam IWI to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.



Bedroom 3

- Knauf Polyfoam IWI to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.

Bathroom

- Knauf Polyfoam IWI to U-value 0.21.
- Pilkington vacuum glazed windows/new sashes. U-value 1.8.
- New deck mounted low flow shower, bath, WC and basin suite.

Roof

- 8m² solar photovoltaic (PV) panels (generating 1.1kWp electrical power).
- 8m² solar thermal panels for water heating.

(Both these items are hidden from the street by the London Roof, typical for a large proportion of London Victorian street properties.)



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