

## Case study: interior wall insulation

The best time to undertake energy efficiency improvements is during a major renovation as this makes a truly holistic approach possible. When this attractive Victorian house in the centre of Bath was bought by its current owners, they decided to embark on just such a comprehensive approach, integrating improvements in the living space with radical improvements in energy performance. These improvements included new timber triple-glazed windows at the rear, low energy lights and appliances throughout and a solar thermal panel on the back roof. But the most striking aspect of the project was the use of insulation. The aim was nothing less than to wrap the entire house up in an insulating blanket.

At the top of the house, the loft space was converted to a room and insulation installed between and over the rafters. At the bottom of the house, a new solid floor was laid with a thick layer of insulation between the concrete slab and the floor screed. That left the walls which, given the quality of the exterior stonework, could only be insulated from the inside.

The material chosen was rigid phenolic board. This is a high performance synthetic insulation which is often used for wall insulation and supplied with plasterboard already in place on one side. Because it is such a good insulant, less depth is needed than other materials, which is an obvious benefit if you do not want to lose too much of the room space. The use of this 110mm wall insulation improved the thermal resistance of the wall by a factor of ten, resulting in a wall with lower thermal conductivity than a wall built to modern building regulations.

Phenolic board is not, however, moisture permeable. The house no longer functions as a traditional 'breathing' building (i.e. with fabric that can both absorb and release moisture and water vapour). But nor is the house a cold and draughty Victorian home that is expensive to heat. A trade-off has been made and the risks of condensation within the (now cold) original walls have been addressed as best they can.

The insulation was taken below the floorboards and between the joists, to reduce the risk of the floor junctions becoming 'cold bridges', and the ends of the joists were damp-proofed. Similarly the insulation was extended back from the exterior walls along the party walls to reduce heat losses through these walls. At all window and door junctions, the detailing of the insulation has been thorough to ensure that the blanket is as comprehensive as possible. And indoor humidity is kept low with careful ventilation.

Although not a listed building, the house has character and this was respected. The insulation may have pushed the wall out (centre left) but the mouldings were restored (bottom) and the final result is arguably as good as new (centre right).

