

# Designing out unintended consequences when applying solid wall insulation

Colin King and Caroline Weeks





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*Cover image:*

External wall insulation applied with extended roofs, insulated reveals and other best practice details

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Stone solid wall dwelling where external or internal wall insulation may be considered to reduce heat loss

# 1 Introduction and background

Greenhouse gas reduction strategies, together with recent financial incentives such as the Carbon Emission Reduction Target (CERT) fund, Community Energy Saving Programme (CESP) and Energy Company Obligation (ECO), have resulted in a significant uptake in improvements to the existing building stock in the UK. Now that the 'low hanging fruit' has been tackled through installing cavity wall insulation, loft insulation and modern heating systems and boilers, attention is now turning to the harder to treat dwellings that offer the greatest scope for improvements and energy savings.

Generally, these older properties comprise:

- solid wall (brick or stone) dwellings
- non-traditional 'system-built' properties (such as steel-frame or panelised concrete)
- properties with narrow cavities within the wall where installing typical cavity wall insulation is deemed unsuitable due to the risk of causing damp problems.

Examples of each are given in Figure 1. In such cases, improving the thermal properties of the walls is generally done by applying

insulation to either the internal or external façade, which is a significantly more costly process than the more common improvements mentioned earlier. In many cases, it will be necessary to strike a balance between the environmental impact and the cost of the proposed measures, while taking into account the aesthetic and cultural issues related to our built heritage, which may be affected by externally applied solutions, particularly in historic buildings.

Since it is estimated that around 80% of the existing housing stock will still be in use in 2050<sup>[1]</sup> (Figure 2), there is obvious value in making efforts to improve the energy performance of this harder to treat stock in order to help reach the UK's carbon emission targets. However, there have been reports of increased condensation and mould growth and other undesirable effects within some homes following such insulation measures. Recent, as yet unpublished studies undertaken by BRE for the Department of Energy and Climate Change (DECC), have identified various unintended consequences that could arise following solid wall insulation. As installing such measures becomes more common, it is imperative that stakeholders properly appraise the risks that may be associated with these works.



**Figure 1:** Examples of typical wall construction types to which solid wall insulation may be applied: (a) brick solid wall, (b) stone solid wall, (c) system build (BISF steel frame), (d) narrow cavity wall



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## Designing out unintended consequences when applying solid wall insulation

Refurbishing solid walls with externally or internally applied insulation can help to reduce heat loss from a building, but it has the potential to introduce a range of undesirable effects such as condensation and mould growth if not carried out correctly. This guide for surveyors, designers and installers provides advice on assessing the potential risks and reducing the likelihood of long-term problems. It discusses:

- surveying and assessment of exposure risk and existing ventilation

- detailed design
- quality assurance on site
- an integrated approach by surveyors, designers and installers.

The guide will also be useful to clients and householders in creating realistic expectations as they commission an appropriate team of professionals to undertake an installation.

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