RISE | Retrofit information, support & expertise

Pre-1919 Buildings

Quick guide

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Summary

This quick guide has been prepared to inform people about pre-1919 homes, highlighting their unique characteristics and the challenges they present when it comes to retrofitting. These homes, often rich in architectural heritage, require careful consideration to preserve their historical value while improving energy efficiency and comfort.

The guide begins with an overview of this housing type, followed by a discussion of the key factors that make retrofitting such homes particularly complex. It concludes with a summary of common retrofit measures that can be, and often are, successfully applied to these properties.

This is an introduction to this subject. Those wishing to explore this topic further should refer to the relevant material available on the RISE website. Furthermore, readers that would like this document in a more accessible format should contact rise@turntown.co.uk.

An introduction to pre-1919 buildings

Before the First World War, most homes were constructed in brick or stone. Known as the substrate, these elements are bonded together with lime-based mortar, which functions similarly to modern cement-based mortar but is much softer. These buildings typically feature solid walls comprised of a single solid mass, with timber roof and floor structures. The wall type differentiates pre-1919 buildings from those with modern cavity walls, which contain a gap between two leaves of substrate linked together with metal ties.

The construction methods of pre-1919 buildings were influenced by the materials locally available at the time. Solid brick walls were typically constructed of two leaves of brickwork without a cavity. This meant the leaves could be tied together with bricks laid as ‘headers’ (see figure 1). A timber wall plate would then be placed on top of the brick wall for the timber roof construction to rest on, while timber joists would fit into the walls at ground, mid-floor and ceiling level, to support timber floorboards. It is important that materials in the key constructional elements of these buildings, brick or stone, lime mortar, and timber, were all breathable.

Figure 1 shows a solid brick wall. Most of the bricks are laid as 'stretchers', so their long side can be seen from the front, but the blue 'header' bricks are perpendicular to that and tie the two leaves of adjacent brickwork together.

Breathability is a key performance characteristic of these buildings. The advantages were:

- As the buildings got wet from the weather, the breathability of the materials in them allowed them to dry out quickly
- Moisture from inside the house, caused by everyday activities like cooking and breathing, could pass through the lime-based internal plaster and the solid walls
- The movement of air was accelerated by the chimneys over open fires, which heated and ventilated the home enough for contemporary comfort expectations

However, while this breathable system worked well for the time, it was extremely fuel-inefficient and expensive, especially in larger homes.

Finally, it also notable that the construction of pre-1919 homes relied heavily on skilled labour, which was cheap in relation to materials at the time of construction. That is why many of these homes feature ornate detailing and craftsmanship, from decorative brickwork to finely carved stone. Replicating these details today is made more expensive by the high cost of skilled craftsmanship, especially when compared to the low cost of the materials.

Example of pre-1919 buildings

Pre-1919 homes are very representative of vernacular architecture, reflecting the local materials, skills, and environmental conditions of their time. Unlike today's globally standardised construction, these buildings were shaped by what was available nearby.

For instance, London's iconic yellow stock bricks (figure 2) were made from clay dug directly on site in and around London, while Glasgow's brown sandstone buildings were constructed by stone quarried locally (figure 3). This regional approach gave rise to distinct architectural identities across the UK.

Figure 1: Two London yellow stock brick homes in London, with one recently sandblasted. Source: Building London

Figure 2: A terrace of sandstone homes in Glasgow. Source: Glasgow City Council

These homes often featured bay windows and prominent chimney stacks, essential lighting, ventilation and heating via open fires. Slate roofs were also common, valued for being lightweight and durable.

The use of skilled labour and an interest in durable materials means that many of these buildings have stood the test of time. Around 20% of England's total building stock was built before 1919, and these buildings comprise some of the country's most loved and best visited environments. This means they are valued for the heritage significance, regardless of whether they are protected as a listed or conservation area building.

Why these buildings are considered differently when being retrofitted

Homes build pre-1919 are treated differently during retrofitting because of their traditional construction methods, breathable performance characteristics and the need to preserve their heritage significance. As previously referenced, pre-1919 houses typically used breathable materials, which allowed moisture to evaporate naturally. Modern materials, such as cement and gypsum-based plasters, are often impermeable. If they are applied to buildings that rely on being breathable, they must be detailed to a very high standard. If not, they can trap moisture against the softer, historic materials, creating damp and deterioration of the fabric.

Furthermore, structural considerations also play a significant role. Many older roofs were designed to support lightweight materials like slate. Replacing them with heavier options, such as concrete tiles or solar panels, can overload the structure, causing roofs to sag or walls to crack. Therefore, any retrofit involving the roof must include a thorough structural survey to assess load-bearing capacity and ensure safety. Space constraints in older homes further limit retrofit options, requiring creative and sensitive design solutions.

Additionally, conservation and listed building regulations impose strict limitations on possible alterations. If such protection applies, any alterations should protect the heritage significance, which can restrict the types of retrofit measures that can be implemented. However, some local councils, may allow limited interventions, like solar panels, if specific conditions are met.

What sort of retrofit measures work well

Pre-1919 homes have characteristics that need to be carefully managed when retrofitting and improving their energy performance. Often to optimise value for money and performance, a series of calculations are needed to see what measures will work best in specific houses. Options include:

- **Wall insulation:** Both internal wall insulation (IWI) and external wall insulation (EWI) are common retrofit measures installed in pre-1919 houses. IWI is often preferred when planning constraints or challenges are in place as it doesn't affect the building's external appearance. I can also be installed in homes close to roads or footpaths easily. EWI is usually preferred by residents as the insulation is installed to the outside of the house, leaving residents more floor space inside their home. In some cases, it can be that a combined approach is used with IWI installed to prominent elevations of the property to overcome heritage planning constraints, while EWI is installed on others to optimise space.

- **Window and door upgrades:** Like in many housing types, upgrading windows to double glazing will positively impact the energy performance of the home. This is particularly true of homes with large bay windows where a window upgrade may result in a greater performance than wall insulation. However, this can be challenging in some pre-1919 homes. Where regulatory barriers are present it can be costly to buy and install historically sensitive windows and window frames that align to planning requirements. Additionally, door upgrades, whether it be to the door itself or infilling gaps around the door to prevent drafts are feasible and common retrofit measures in pre-1919 homes.

- **Loft and underfloor insulation:** Loft insulation is a typical retrofitting measure applied to pre-1919 houses due to it being relatively straightforward to install without significant structural alteration. Additionally underfloor insulation is a

common measure to consider as most pre-1919 homes tend to have suspended floors, with a void into which insulation can be inserted. Whilst this is an effective measure, it can come with drawbacks if not installed correctly. The main issue is that the insulation can increase moisture leading to potential issues with damp in floor joists.

- **Heat pumps:** Once a property is insulated, heat pumps are increasingly being installed as an efficient heating solution, with their benefit backed by data. For successful insulation consideration of factors such as size, specifications, and compatibility is essential. For instance, components such as radiators and piping must be compatible with the heat pump's output to ensure optimal performance.

Further resources

For those looking to deepen their understanding of pre-1919 buildings and the challenges and opportunities involved in their retrofitting, several valuable resources are available:

- The **Sustainable Traditional Buildings Alliance (STBA)** offers guidance tailored to the specific characteristics of traditional buildings, helping ensure that retrofit measures are both compatible with historic fabric and effective in improving performance.
- **Historic England** provides additional technical advice on the conservation and energy efficiency of traditional buildings.