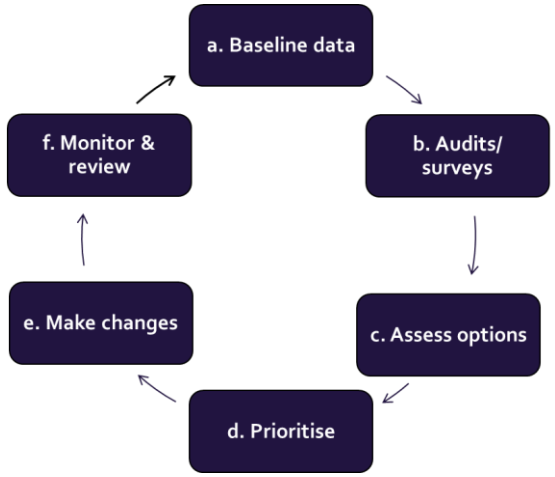
Introduction to retrofit

Building energy retrofit refers to any improvement work on an existing building to improve its energy efficiency. The most sustainable buildings are often those which already exist. Retrofitting existing structures is often better than new construction.

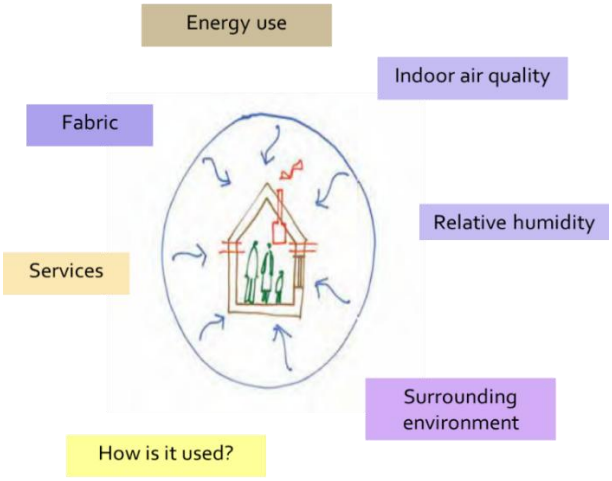
Key principles to consider when planning retrofit of a building

Do no harm	It may be tempting to view any intervention as good; this is not true. Understand the risks before acting.
Assessment & monitoring	Understand what you have, how it's used, and the potential impacts of a changing climate. Remember, every building is different.
Repair & maintenance	This may include the removal of any inappropriate past works to ensure the building is dry. Wet walls loose heat faster than dry ones.
Whole building approach	Individual elements in a building do not work in isolation but as part of a whole system, actual performance is often a balancing act.
Fabric first	A buildings fabric should be assessed for potential fabric measures (insulation, glazing, draughtproofing) prior to installing technology.

The process of building retrofit

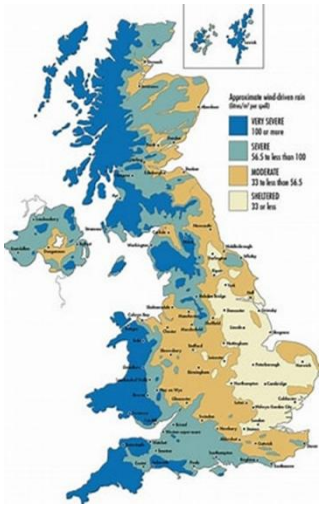


Building environmental interactions



Types of surveys and assessments

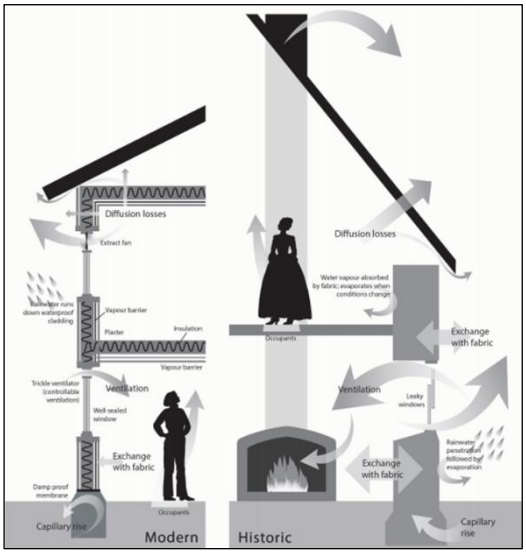
- Energy audit – an assessment of energy use, and carbon footprint, often with recommendations
- Thermal imaging – use in colder months to identify cold spots, draughts and insulation gaps
- Building condition survey - visual assessment to identify maintenance needs, priorities and cost
- Heating survey - looks at performance of existing systems and can recommend alternatives
- Solar PV assessments - high level online software (desk based) e.g. solarwizard.org.uk
- CSE DIY survey – a walkaround survey template to assess energy efficiency options



Location and local climate

Every building performs differently according to location, orientation, design, construction, services, use pattern and condition. Construction type plays a key part in this – traditionally built properties will behave differently from modern ones and require a different approach using vapour open materials and lime-based mortars, plasters and renders.

The choice of material should be shaped by the building's natural materials. It's important to think about what kind of materials the building currently has, and what will be used in modifications.



Building fabric

Building fabric = the components and materials that the building itself is made of – walls, floors, roof, windows and doors. Traditional construction was generally built pre-1919, and used materials that let moisture move through them. Modern construction is the opposite of this and has been built since 1919; this has evolved since then to become more energy efficient.

Insulation and ventilation

Adding insulation fundamentally changes the way heat and moisture move through a building. When doing this consideration should be given to moisture, ventilation and damp. It is likely that as you add insulation your building will become less draughty, in which case additional levels of ventilation maybe needed to maintain a healthy indoor environment. This can be done through natural means such as trickle vents in window frames or mechanical systems such as extractor fans and mechanical ventilation heat recovery systems. Monitoring your indoor air quality for temperature, relative humidity, CO_2 is always a good idea before and after installing energy efficiency measures.

Common insulation measures

Cavity wall insulation

Insulating your cavity walls can be an effective way to reduce your heating bills. If your building was built after the 1920s, its likely its external walls are made of two 'skins' with a gap between them. This cavity gap between them can be filled with insulating material to stop heat escaping.

Internal solid wall insulation

Solid walls can be insulated internally. This may be suitable for building made from brick, stone or concrete, and works by adding a layer of thermal material to the existing inside wall. This can be particularly appropriate where you need to maintain the external appearance of the building, such as a heritage site.

Loft insulation

Loft insulation is a simple and effective way to reduce your heating bills and improve energy efficiency. Loft insulation is effective for at least 40 years, and it will pay for itself repeatedly in that time.

External solid wall insulation

Nearly half of the heat lost from some solid-walled buildings escapes through the walls. This involves adding a layer of insulating material to the outside walls of a building and coating this with a protective render or cladding.

Get more energy advice at www.cse.org.uk/advice