

Windows

Replacement glazing will be one of the most expensive parts of a renovation, so making good choices is important. Your choice will also affect the environmental impact, lifetime and maintenance needs of your new windows. Fitting secondary glazing inside old windows will sometimes be more suitable than replacing windows.

One-fifth of the heat lost from a home can be due to old single-glazed windows. Modern double-glazing should be three times better, with triple glazing five times better.

Double or triple glazing?

When building or renovating to a very high standard – such as 'passivhaus' – you will be looking at triple glazing. For many renovation projects double glazing may be fine – perhaps fitted as secondary glazing. You want to allocate your budget carefully and get a good balance of insulation measures across the whole house. The extra weight and thickness of having a third pane may be an issue in some renovation projects.

It's important for the installation of windows to be done well. If the airtightness around the frame is poor, a high-performance window can be badly compromised.

Specifications

Double glazing panes with a low-E ("low emissivity") coating and an argon gas fill are now common. You will need windows with these measures in order to

meet the minimum current building regulation standards.

Low-E coating is a very thin layer of metal on the outer surface of the inner pane. This coating reduces heat transfer across the gap. Argon gas does not conduct heat as well as air. Therefore, putting argon gas in the gap between the panes improves the performance of a window. Krypton gas fill will lead to even less heat loss than argon gas, but it is lot more expensive. You may only need krypton windows if a very thin profile is needed to meet conservation glazing standards.

The gap between the two panes of glass should usually be about 20mm – a very narrow gap tends to gives a slightly worse performance. A bigger gap won't make much difference, except that it can give better sound insulation. Windows with lots of glazing bars (Georgian style) don't perform as well – the multiple bars conduct heat out.

Comparing performance

U-values measure thermal performance, and a lower U-value means less heat loss. Overall energy savings will depend on the house design, the number of windows, orientation, location, and so on. When renovating to a high standard, the u-value of each choice can be entered into design software. The difference in performance can then be modelled and compared.

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Specification	U-value
Single glazing	5.5
Standard double glazing	2.7
Double glazing, low-E coating	1.8
Double glazing, low-E coating and argon-filled	1.6 to 1.3
Triple glazing, multiple low-E coating and argon-filled	less than 1.0

Wood, metal or PVC Frames

These use less energy in manufacturing, can last for over 50 years, and can then be renovated rather than replaced.

In contrast, uPVC window frames require more energy to manufacture and lead to higher pollution problems at manufacture and disposal. Aluminium manufacture involves a lot of energy use and pollution and some frame coatings make recycling difficult. This is not ideal for such a high-value material, so if you have to use aluminium, look for anodized frames.

Wooden frames had a poor image in the past, as UK-made softwood windows were often of low quality. However, we've learned from the Scandinavians and it's possible to get UK-made windows with high standards of airtightness, built from homegrown, durable, untreated wood.

Which wood

Our first choice is FSC-certified temperate (not tropical) hardwood or durable softwood. A durable temperate hardwood like oak, sweet chestnut, or larch (softwood, but durable) won't need treating and should last 30 years. Other durable softwoods include Douglas Fir and European Redwood.

Window frames should be made with heartwood – as this is the most durable and resistant to movement. To resist twisting, some windows frames use engineered wood. This is layered and glued sections of wood (like plywood or glulam).

The preservatives used to protect less durable softwood will cause pollution at the eventual disposal. If you choose a less durable wood, look for one pre-treated with a low-impact natural,

renewable treatment. Any sustainable timber is preferable to uPVC, but painting wood does increase the environmental impact.

Secondary Glazing

If you're on a tight budget, you can improve the performance of old windows instead of replacing them. A simple and cheap alternative is to add some form of secondary glazing, as well as thick well-fitting curtains. The best quality secondary glazing will be an extra window, but a rigid pane or even just plastic film could work well.

The most advanced type of secondary glazing is to fit a new second window inside the existing one. This will often be cheaper than replacing windows altogether, especially where more restrictive planning rules apply. You could hire a local joiner to make them, or look for an off-the-shelf system in a DIY store.

Rigid (or slightly flexible) plastic sheets are also usually available from DIY outlets. Panes that are held in place magnetically are easier to clean. More advanced options could be a single pane in an aluminium frame attached on hinges or sliding runners, or perhaps an old window cleaned up and fitted inside the frame. There are also specialist films that improve the performance of glass by letting through certain wavelengths of light in only one direction.

Clear plastic film (polythene) should be available from DIY stores. You attach it to the interior frame around the edge with double-sided sticky tape. Then you heat it – which first makes it stretch but then it contracts as it cools and clears any wrinkles. It won't last a huge length of time – probably one winter – but is very cheap.