

These air conditioner alternatives are cheaper—and better for the planet

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Credit: AI-generated image ([disclaimer](#))

Heatwaves in numerous countries during 2022 sent all-time temperature records tumbling. On the day before the UK endured a shaded air temperature of [40°C](#) for the first time ever, the Met Office issued its first ever red alert for extreme heat, which meant that people needed to take extra care to keep cool and [avoid heat stroke](#).

In countries like the US and Japan, that might mean staying indoors and cranking up the air conditioning. But air conditioners are still relatively rare in many European countries, [including the UK](#). Should increasingly brutal summer heat—and [uncomfortably warm autumns](#)—compel people to install them?

Actually, reasonable comfort can usually be maintained much more efficiently in a climate strongly influenced by the ocean, like the UK, with measures that use hardly any energy at all. These work to keep heat out, keep fresh air flowing and take advantage of the body's natural ability to cool itself with evaporation.

Anyone considering an air conditioner should beware of ballooning energy bills. The compressors contained within consume sudden bursts of power. In places where air conditioning is common, the surge in demand during heatwaves can overwhelm local power networks. Blackouts result unless the increased electricity demand is met by backup generators, often gas turbines which can be fired up quickly.

All [air conditioners](#) compress refrigerant vapors such as hydrochlorofluorocarbons which are greenhouse gases thousands of times more powerful than carbon dioxide if they leak into the atmosphere.

It would be much better for the climate, household finances and [the wider economy](#) if buildings were insulated with windows designed to capture sunshine in winter and external shades to keep it out in summer. This is known as [passive cooling](#) because no energy is needed to keep the temperature lower.

Another alternative, especially if your building doesn't have openable windows, is to use a mechanical ventilation system. These use fans to extract heat and [indoor air pollution](#) through ducts and sweep fresh air

through rooms.

Any air conditioner you install will probably recirculate cooled indoor air rather than fresh air. Meanwhile, because mechanical ventilation systems channel [cool air](#) from outside and purge hot air, they can reduce temperatures in every nook and cranny for a fraction of the electricity that air-conditioning uses to constantly treat indoor air.

On days when the temperature is typically hotter outside the building than inside, ventilators can be used in the early morning when they can draw fresh air in at its coolest. If damp filters are installed in the ductwork, ventilation systems can cool a house further with no additional energy use.

From summer 2023, [building regulations](#) will require new housing in England to adopt passive or low-energy cooling features such as mechanical ventilation. Where high temperatures linger late at night (think [large urban areas](#) like central London and Manchester) housing developers will need to provide either external shutters, window glazing that restricts the sun's heat but admits light, or [awnings over south-facing windows](#).

Newer buildings are more prone to overheating because they tend to be made from lighter materials that heat up quickly. These dwellings are usually better insulated too, which can serve to trap the heat. [Equipping](#) them in this way can reduce the need for air-conditioning.

The London Assembly is mulling ways to [adapt existing homes](#) to extreme weather like heatwaves. The use of white-colored roofing materials or paints to reflect more of the sun's energy is one of the methods being [considered](#).

So-called "cool roofs" reflect visible rays of sunshine and radiate out

invisible infrared heat from white surfaces, a trick deployed beautifully in a lot of traditional Greek architecture. Conventional insulation resists heat coming in but can also trap it indoors. Cool roofs allow heat to rise in your attic and escape from your roof to the sky.

When air conditioning may be necessary

People and horses are unique among mammals in our ability to regulate body temperature by secreting slightly salty water from millions of sweat pores in the skin. We can thrive in hot climates if we drink sufficient water—as long as our sweat continually evaporates in a breeze.

But at a certain threshold, sweat stops evaporating and accumulates. Humans cannot tolerate a wet-bulb temperature over 35°C (95°F) for long. Wet-bulb is the temperature of an object soaked in water as it is cooled by evaporation. This measure indicates the minimum temperature your skin can reach through sweating, while your core body temperature will be higher.

Whether a space is safe to occupy, and how much rest and rehydration is recommended, can be assessed by a combination of dry- and wet-bulb temperatures as well as exposure to the sun, producing a measure known as the [wet bulb globe temperature](#). This takes into account the limits of sweating to cool you down during [high humidity](#), as well as heat exposure from direct sunlight and that radiated from nearby surfaces like concrete.

A high wet bulb globe temperature is much more important in deciding whether air conditioning is needed than the dry-bulb temperature that weather forecasts report. [My research](#) identified where air-conditioning is a necessity: essentially, when there are ten days per year where the wet bulb globe temperature exceeds 29°C (85°F).

I showed that this is [a reasonable guide](#) for situations where air-conditioned shelters ought to be opened to the public. Nowhere in the UK has the Met Office (yet) measured so many stressful days in one year that [air-conditioning](#) is generally recommended using this guide.

But there are sun-drenched streets flanked by buildings on both sides (known as urban canyons) where weather stations are not installed, and the inside of badly designed buildings that become [overheated](#). In such places, you might need to escape to an air-conditioned shelter or find sanctuary in a wooded park.

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