

Should you get a heat pump? Here's how they compare to a gas boiler

9 December 2020, by Aurore Julien



Felix says yes. Credit: [InesBazdar/Shutterstock](#)

[Home energy use](#) accounts for 14% of all the UK's greenhouse gas emissions, and much of that comes from gas boilers. Each time you turn up the thermostat, the burning natural gas generates heat through the radiators—and carbon dioxide to the atmosphere.

Some of that heat escapes the building and is wasted. [Two-thirds of homes](#) in the UK don't meet [energy efficiency standards](#), and decarbonising the UK's leaky housing stock is one of the toughest tasks the government faces in its bid to make the country carbon-neutral by 2050. Heat pumps are [widely seen as a solution](#), and the UK government has announced its aim [to install 600,000 per year](#) by 2028.

There are two types of heat pumps you need to know about for heating. One extracts heat from the air, known as an air source [heat pump](#). These are the most commonly installed varieties and resemble an air conditioning unit on the outside of your house. There are also ground source heat pumps that extract heat from the ground. Both types essentially transfer heat from one place to another by using a liquid refrigerant and a compressor in a process powered by electricity.

As it's powered by electricity, the amount of CO₂ emitted by a heat pump depends on how that electricity is generated. Fortunately, the UK's national grid is increasingly green: during the first quarter of 2020, renewable energy provided [47% of the country's electricity](#). But deploying heat pumps en masse will add to the peak electricity demand the national grid needs to cope with, and strain local transmission [cables and transformers](#). This would be concerning on its own, but the government also plans to replace much of the UK's fossil fuel vehicles with battery-powered alternatives—adding another load to the national grid.

So making housing more energy efficient would drastically reduce the overall electricity demand used for heating. This would benefit each household in turn, as heat pumps [operate more efficiently](#) in energy-efficient buildings.

With all that in mind, should you swap your boiler for a heat pump?



Air source heat pumps extract warm air from outside to heat the house. Credit: [I MAKE PHOTO 17/Shutterstock](#)

How to know if a heat pump is right for you

The performance of heat pumps and how much electricity they use [depends](#) on the heating system design. At times, this performance can be dramatically better in laboratory settings than in real homes as users are not necessarily using them in the most effective way, and the heating systems to which they're hooked up aren't always ideal. For example, a study of retrofitted homes in Northern Ireland showed that efficient gas boilers were actually [more cost-effective](#) than heat pumps.

Heat pumps are a lot more efficient when they run in combination with systems like underfloor heating or very large, specially designed oversized radiators that produce enough heat to warm the space without needing to run at hot temperatures. Where a heat pump is installed to replace a gas boiler, the heat pump will not work at optimum efficiency with the existing radiators, so you may need to change your radiators. For households that aren't connected to mains gas, heat pumps are often an excellent solution, certainly better than an oil boiler, which produces high CO₂ emissions.

Heat pumps are also not suited to providing big boosts of heat as gas-fired boilers are. Heat pumps are like marathon runners—they like running at a moderate, continuous pace. Gas boilers are like sprinters—they operate best at high loads. Unlike with a gas boiler, it's best to let a heat pump run throughout the night rather than switching the heating off at night and on again in the morning.

When turning up the temperature of heating in a heat pump system, it's best to use small increments. This prevents the heat pump from having to run at high power, which would reduce its efficiency. If it's your first time living with a heat pump, you'll probably need to change your longstanding habits for controlling the heating. [Research shows](#) that new users who read up on heat pumps first got the most out of their new heating system.



How to break the habit of a lifetime? Credit: [Daisy Daisy/Shutterstock](#)

Installers must be also be trained to fit these systems. The location of an air source heat pump is important, as some residents complain about [noise](#) from fans near the windows of living spaces. In cold areas, air source heat pumps should be placed in reliably sunny spots to reduce the risk of [frost damage](#).

Installed and run properly with an energy efficient home, heat pumps can offer great comfort—and reduce heating costs. The Energy Saving Trust estimates that replacing an old gas [boiler](#) with an air source heat [pump](#) in a four-bedroom detached home would save [£395-£425 per year on heating bills](#), but may at times, compare poorly to brand new, very efficient gas boilers. Yet in most cases, heat pumps can help save a huge amount of carbon.

So while [heat](#) pumps are a vital part of a low-carbon strategy, they are not a one-size-fits-all solution. Each household must be considered individually. And making homes more energy efficient is as critical to the UK's decarbonisation strategy as replacing gas boilers and investing in [renewable energy](#).

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