We're pumped

Upgrading from a fossil fuel system to a heat pump may be cheaper and easier than you think, says *Martina Lees*

Louise Sunderland enjoying her heated floor
VICKI COUCHMAN FOR THE SUNDAY TIMES

Louise Sunderland is so "pumped" with the heat pump warming her Victorian home that she asked her Twitter followers to name it. Since it's made by the Swedish company Nibe, Sven maybe? "I quite like Engelbert Pumperdinck," the energy policy adviser, 44, says.

Fitting the heat pump last month caused "very little disruption" to her five-bedroom house, built in 1879 at the end of a south London terrace. "Most importantly, the house is warm. And it's a comfortable type of heat," Sunderland says. "Don't be put off by the scare stories that heat pumps don't work in older homes."

She and her partner, Matthew, spent £17,000 — including a £5,000 government grant from the boiler upgrade scheme — to upgrade their heating system and swap the gas boiler for a 12kW heat pump.

To "keep 1.5 alive" (the global goal of limiting temperature rises to 1.5C above pre-industrial levels), as world leaders urged at Cop27 this month, British homeowners must do something more radical than climbing motorway gantries. We have to rip out our fossil-fuel boilers. "We simply cannot keep burning fossil gas," Sunderland says.

There are signs of progress. Sales of heat pumps are on track for a record high of more than 26,000 this year, according to data from the Microgeneration Certification Scheme (MCS), which registers installations. Despite a gas boiler ban on new homes from 2025 and an aim of 600,000 annual heat pump installations by 2028, Britain lags far behind Europe. The French bought 537,000 heat pumps last year. In Norway, heat pumps supply 60 per cent of heating, the European Heat Pump Association says.

New schemes aim to bring heat pumps to the masses. With the £5,000 government grants, cash rewards for mortgage borrowers at Barclays and Halifax could make a heat pump cheaper than a gas boiler for some homes. Here is our ultimate guide:

What is a heat pump and why should I choose one?

Heat pumps have been around since the 1850s. A pump captures heat from the outside (from the air or ground) and increases it to a higher temperature to warm your home — it's similar to how a fridge works, but in reverse. Ground source heat pumps tend to be more efficient than air source but they are also more expensive to install.

"It's the most efficient heating device you can buy today. It turns one unit of energy into three, four or five

units of heating for your home — compared to 0.9 for the best gas boilers," says Ian Rippin, chief executive of MCS (Microgeneration Certification Scheme). "That's the magic inside the heat pump. It turns one into many."

This offsets the higher price of electricity (34p/kWh), which is at present more than three times higher than gas (10p/kWh). Once electricity becomes cheaper and gas more expensive, as the government has promised, savings will increase.

Shouldn't I wait for hydrogen?

It sounds seductively simple. Proponents say clean-burning hydrogen could be piped to homes — instead of natural gas, or blended with it — without replacing boilers. But too many technical difficulties make this impracticable, a review of scientific papers concluded this autumn. Even if it was possible, it could almost double the cost of home heating compared with gas, the leading energy analysts Cornwall Insight found.

Do heat pumps work in older homes?

Having fitted a 7.5kW array of solar panels (£6,500) at their 400-year-old barn in Matlock, Derbyshire, last year, John and Christine Taylor added an air source pump in September. Last month John, 71, found himself testifying about their heat pump in the House of Lords. Why? "I'm trying to help my [four] grandchildren have a better planet without 40 or 50-degree temperatures here in 30 years' time," the retired insurance broker says.


John Taylor

The barn's thick stone walls needed no extra insulation. John topped up the loft insulation and got a plumber to replace their nine radiators with bigger ones from Screwfix for £1,600. The 7kW Vaillant aroTherm Plus heat pump stands outside, clad in vinyl to resemble the grade II listed exterior. It is connected to a 200-litre cylinder in the cupboard under the stairs inside.

"There's a lot of bad press about heat pumps. 'Oh, they don't work.' They do if you get the right people to install it. Plumbers are not the right people. You need a specialist heating company," Taylor says. His system, fitted by IMS Heat Pumps, cost £11,260, of which the boiler upgrade grant covered £5,000.

Will I need new radiators?

Heat pumps run most efficiently (and cheaply) when the temperature of the water flowing through your radiators is 35C to 45C, compared with about 75C for a gas boiler. So, yes, you may need bigger radiators or, best of all, underfloor heating.

That does not mean you have to upgrade every radiator, says Emma Bohan of IMS Heat Pumps. "Although you may choose to — we've all lived with those radiators that have been painted 32 times. Even if you kept your gas boiler and swapped out 30-year-old radiators, you will get better efficiency." A good installer will assess your home and calculate what size radiator you need in each

room for the optimum flow temperature. Find a registered installer at mcscertified.com.

"Because gas has been cheap, you've not really had to worry about the gas boiler not running efficiently," Rippin says. "With heat pumps, it's more important that you choose the right size. If you've undersized or oversized, you risk having either a cold home or high electricity bills. Nobody wants that . . . It's got to be designed properly for your home."

At her Victorian terrace, Sunderland had already fitted underfloor heating as part of a ground-floor kitchen extension. But she did not have to replace any of the upstairs radiators to add a heat pump. "We have been surprised at how warm the upstairs has been. We spent the first few days being, if I'm honest, a bit too hot. We adjusted the system to deliver less heat and are comfortable now, but it's good to know that when it gets colder we will likely be fine," she says. Her system included a controller, hot water storage tank and a back-up electric boiler.

Should I insulate my home first?

Last year Sunderland insulated her end-of-terrace external wall, funded by the short-lived Green Homes Grant. A thermal imaging survey by her local co-operative, South East London Community Energy (selce.org.uk), showed the wall leaked heat like a "massive reverse radiator", she says. "It was so helpful. They go around every nook and cranny of your house and tell you where the cold spots are." The roof insulation was upgraded as part of a mansard extension in 2012. "It was not one big renovation. We did bits as we had money."

Ben Bolland has recently moved into a new Somerset home with a heat pump
NEIL PHILLIPS

While upgrading insulation first "is a very good approach, it is not a prerequisite to installing a heat pump successfully," says Bean Beanland of the Heat Pump Federation.

However — as with a gas boiler — poor insulation will mean you are likely to need a bigger heat pump, Bohan says. The next size up of gas boiler typically costs £500 more, but with a heat pump the difference can be £2,000 to £3,000, she adds. "And it's going to be working harder and costing you more."

What else can I do?

For some homes, it may be cheaper to fit a "weather compensated" heat-pump system, Beanland says. New air source heat pumps, like the Taylors' Vaillant, can heat radiators to 75C. But keeping it that high pushes up your electricity bill. Instead, you can fit a temperature sensor outside the home to automatically run the radiators that hot only on very cold days. For the rest of the winter, lower water temperatures will provide enough heat (and save on energy bills).

"You can also start with a high-temperature heat pump, gradually replace radiators and run the system cooler and cooler," Beanland says. Another option is a hybrid system with a back-up boiler that kicks in only when it is freezing.

Do I need a hot water cylinder?
Unlike a combi boiler, a pump cannot heat water quickly on demand, so you will need a separate device to supply hot water. In most cases, this is an indoor hot water cylinder — about the size of a tall fridge — designed to work in conjunction with the heat pump.

If you lack space, consider a heat battery from Sunamp (invented in Scotland), which can store the same amount of heat as a water cylinder but in a quarter of the space. Like the gel in a pocket hand-warmer, the phase-change material inside the battery absorbs, stores and releases thermal energy when changing between solid and liquid.

Or you could keep a combi boiler solely to provide hot water.

Where should I put the pump?
You can fit one air source heat pump without planning permission, as long as it at least one metre within the boundary of your property. The pump is about the size of an outdoor air-conditioning unit. Its back should be at least 60cm from the outside wall so you don't "throttle the air supply", Beanland says. Leave enough space in front of it for colder air to disperse freely. "You don't want to point the machine at the fence because the fence will bounce the cold air back and the machine will start sucking that." To cut down on installation costs, place it as close as possible to the indoor unit.

Could I fit one in a flat?
It's possible. Of the 144,509 air source heat pumps in British homes, 12 per cent are in flats (source: MCS).

One solution for flats and small homes is air-to-air heat pumps. Instead of transferring heat from the air outside to water in radiators (air-to-water), they warm air that is then blown into your home. Often called air-conditioning units, they can also cool indoor air. Although they are "quite unusual" in Britain, air-to-air systems dominate recent heat-pump sales in France, "predominantly because it's cheaper to install", Beanland says. They cannot supply hot water so are often paired with immersion water heaters in flats.

Should I replace any pipes?
Probably not, Bohan says. Most homes have suitable 15-22mm copper pipes. Large, newly built homes with very small "microbore" plastic pipes may need to be replaced, however.

How much does it cost?
The average installation cost for an air source heat pump in 2022 (including the cylinder, radiator and pipe upgrades) is £11,083, MCS data shows. They can last for 20 years. About 3,200 ground source heat pumps have been fitted so far this year, at an average installation cost of £17,583.

The £450 million boiler upgrade scheme will refund £5,000 of these costs for an air source heat pump, or £6,000 for a ground source heat pump — if it replaces a fossil fuel system. Custom and self-builders also qualify. By the end of last month, almost 9,000 homes had applied.

On Tuesday Barclays announced £2,000 cash rewards for new and existing mortgage customers who fit heat pumps in their homes. It also offers £1,000 cashback on solar panels and £500 on insulation or double glazing. No additional lending is required. In a separate scheme, Halifax mortgage borrowers who fit heat pumps via Octopus Energy can get £1,000 cashback.

How loud is a pump?
Many are now Quiet Mark certified. "They are generally between 45 and 65 decibels — 42 is the background noise of a library, 47 is your fridge firing up," Bohan says.

Sunderland was pleasantly surprised at how quiet her new heat pump is. "It makes a similar amount of noise to the boiler flue."

Nibe heat pumps exhibit at the Homebuilding & Renovating Show. Get free tickets at homebuildingshow.co.uk/pr-thetimes ■