



Home Energy Case Study

Changing to an air source heat pump in a 1948 3-bed semi-detached home & adding a battery to existing solar panels

About the home

A 3-bedroom semi-detached home, built in 1948, with cavity-filled brick walls. We had installed solar panels on our SSW-facing roof in 2011. Over the previous few years we replaced most of our 1970s/80s double-glazed windows with modern windows, replaced our front door and increased loft insulation

What had to be right for the pump/battery to go ahead?

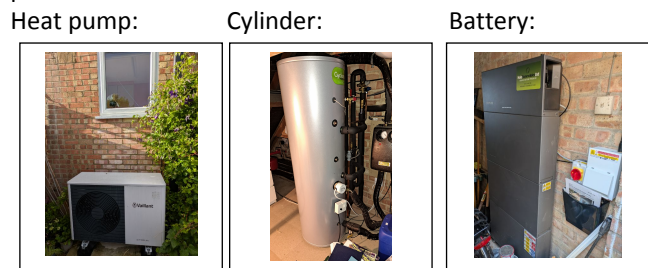
- Suitable space outside for the heat pump unit itself, requiring the **replacement of the kitchen door with a window and removal of steps to the patio** to conform to the safety requirements and make space for the unit. We intended to do this as part of a new kitchen.
- As our existing heating system dated back to the 1960s/70s, we had to **replace all the radiators** with new, more efficient ones and, as the system was so full of sludge, we decided to **replace all the pipework** too, which added a lot to the cost. However, this would also have been required if we'd installed a condensing gas boiler and, as part of a green energy project, attracted no VAT.
- Replacement of our twin-coil solar and gas HW tank in the bathroom airing cupboard with a taller twin-coil solar/heat pump one in the loft. As we had recently insulated and boarded the loft this wasn't a problem.
- Space for the battery system which we found in the garage

What motivated the retrofit?

The main motivations were to reduce our CO2 emissions, to remove gas from our heating & hot water system, and to maximise the use of our own solar power, so reducing our use of power from the grid. Our 19 year-old non-condensing gas boiler was also at the end of its life, so we didn't want to replace this and it was a perfect time to switch to an ASHP.

Our air source heat pump installation

A heat loss survey of our house showed a loss of 5kW at 21C inside and -5C outside. A 5 kW Vaillant air source heat pump was installed for heating our new radiators and providing hot water to the new tank (when the solar HW system falls short). The system runs with weather compensation and in 2025 achieved 383% efficiency (SCOP). The unvented cylinder supplies hot water at mains pressure so we now have a "Power shower" over the bath!



The cost of installation and operation

Heat pump, installation, new hot water tank, monitoring system and 7 new radiators cost £21,740 (July 2024). **Building work** to replace window and steps and lay a foundation and soakaway for the pump **cost an additional £2,030**, giving a **total of £23,770**. The government grant was **£7,500 in 2024**. So, we paid a net total of **£16,270**.

15kWh Battery plus AC-coupled Inverter cost an extra £7,000 Having a battery has enabled us to move to an Octopus Cosy Tariff in winter, through which we get 3 lower cost periods each day. In winter we charge our battery then, which covers other more expensive periods. Net energy costs and kWh use for heating and hw are shown below for, complete calendar years.

Year	Energy/Equipment	Net £	Net kWh
2023	Gas excl £95 stand. charge	£550	8070
2025	Elec: ASHP, Solar & Battery	£150	1978/ 1088*

At a glance...

No more direct fossil fuel use for heating/HW, reducing CO2; power (kWh) use has reduced to 25% of previous usage (*and on average only just over half of that is coming from the grid).

So quiet – we can barely hear our pump! Much quieter than the old boiler and pump system!

Running the ASHP almost 24 hours/day **we have a nice warm home** with constant 20c temps

A lower energy bill combining the ASHP with our solar array, battery storage and the right tariff.

With the battery we use almost 84% of our own solar power as opposed to only 31% before.

An unexpected benefit: our over-bath shower now feels like a power shower!

Want to know more?

All the issues and the steps behind this case study?
See the detailed how-to guide

Get started with your home energy transformation