Case Study - Chris and Bobbie

Title:
Chris and Bobbie go fully electric with a Zero Emissions Boiler

- **Home:** Detached, 5 bedrooms, built 1998
- **Insulation:** Cavity wall and loft insulation
- **Windows & doors:** Secondary glazing throughout, plus new double glazing installed in 2024
- **Solar PV:** 15 panels (3.75kW)
- **Battery:** 13.5kWh, AC-coupled lithium-ion battery
- **Heating:** Tepeo Zero Emission Boiler (ZEB); fully electric home with gas disconnected
- **Impact:** Energy use reduced from 16,000kWh to approx. 8,000kWh per year (50% reduction)
- **Savings:** Approx. £1,400 per year



Overview

Chris and Bobbie had previously always lived in older homes, but they needed somewhere new that could accommodate their multi-generational household without renovation – and the house in Emersons Green ticked all the right boxes.

At the time, Emersons Green was still being developed, and Chris and Bobbie hadn't expected the house to become their forever home. But as they found Emersons Green became somewhere they wanted to stay – particularly with the strong sense of

community, good bus connections, and plenty of access to nature – they started to think more about their home and what they could do to reduce their carbon footprint.

They began making changes to their home in 2007, starting with small upgrades like adding thermal lining to their curtains. In 2008 they added solar thermal, their first major retrofit action, going on to install solar PV, a Zero Emissions Boiler (ZEB) and plenty of other energy efficiency measures.

Adding Solar PV and a Battery

In 2011, they installed 15 solar panels with 3.75kW capacity, just a month before the initial Feed In Tariff scheme ended. They'll receive the feed-in tariff until 2035 – which has made a big difference to how quickly the solar panels essentially paid for themselves.

They also installed a 13.5kWh Tesla battery, which lives in their garage. With a connected app, they can monitor their energy usage and control when they export excess electricity to the grid.

Producing and storing their own energy makes it much more economical to charge their electric bikes and EV. They also run their immersion heater for hot water using stored power from their battery.



Improving Insulation and Windows

Chris and Bobbie had assumed that their house, which was built in 1998, already had cavity wall insulation – and were surprised when they later discovered it didn't. They subsequently had cavity wall insulation installed.

They also had secondary glazing installed on their front windows, and have recently replaced the windows at the back of the house with new double-glazed units.

Installing a Zero Emissions Boiler (ZEB)

Chris and Bobbie had been considering installing a heat pump and got a quote from a company. However, the company they approached wanted them to move out of the house for two months while the work was carried out, and had given them a particularly high quote for the installation.

Around the same time, they heard about tepeo's Zero Emissions Boiler (ZEB) through watching the Fully Charged Show. The ZEB is essentially a heat battery that works with a home's existing wet central-heating system.

It uses electricity to heat and store energy in a highly insulated ceramic core, then releases that stored heat through the existing radiators when it's needed. Its smart controls can charge the boiler when electricity is cheaper and greener, helping to keep running costs down.

For some homes, this can be a particularly convenient alternative to a heat pump because it can be installed in place of a conventional boiler while making relatively few changes to the existing heating system.

After installing the ZEB and replacing the gas hob with an induction hob, they were able to come off gas completely.

The Challenges

Knowing where to start

Chris and Bobbie's experience has highlighted how difficult it can be to know what order to carry out retrofit measures in.

They had already built their Douglas fir timber conservatory before installing the solar PV. The conservatory is double glazed, was designed by a craftsman, and is very efficient at helping to heat the house in spring and autumn.

However, having the conservatory in place also made installing the solar panels more difficult, as it made access to the roof more challenging.

Similarly, they'd installed large water butts outside which were used to flush their downstairs toilet. But this made it harder to access parts of the wall when they had cavity wall insulation installed.



The Results

Chris and Bobbie haven't regretted any of the changes they've made to their home.

Their original motivation was to reduce their carbon footprint and move away from fossil fuels. However, they've found that the changes have also had a big impact on their energy bills.

'We haven't regretted any of the things we've done but we did them all because we were trying to save on our carbon footprint and get off fossil fuel. The end result has been it's very, very economical to run the house, but that wasn't what we set out to do – it was a byproduct.'

They also feel that the changes have improved the house as a place to live and that moving away from gas was a lot easier to get used to than they expected – including switching from a gas hob to induction.

What They'd Do Differently

Consider the efficiency and life-span of the energy upgrades

Solar thermal was Chris and Bobbie's first major retrofit measure, which they installed in 2008. However, it didn't fully stand the test of time. Pigeons damaged the connections and, after around 15 years, the system stopped working. They also found that it wasn't particularly cost effective.

Solar thermal can be an attractive option because it uses energy from the sun to heat hot water, but it can be less straightforward than solar PV.

Solar thermal only provides heat for hot water, whereas solar PV generates electricity that can be used in a much wider range of ways – including powering appliances,

heating systems (like their ZEB) or an immersion heater. This can make solar PV a more flexible way of making use of a roof's available space.

Chris and Bobbie don't regret installing the solar thermal system, but their experience has made them more conscious of considering how useful and cost-effective a retrofit measure will be over the long term.

Speak to people who've been through the process

At the time that Chris and Bobbie started making changes to their home, they didn't know anyone who had been through it already.

They think being able to speak to a local person who had made energy improvements to a similar home would have helped them understand what was involved, and given them more confidence in making decisions about their own retrofit action.

'On our journey towards our own installations, there was no one to talk to. We realised there was a whole gap there'

They say talking to someone first might make it easier to plan the order in which to carry out work (e.g. waiting to do their conservatory until the solar PV was installed).

They make the point, though, that sometimes you just need to go ahead and take some action to get your retrofit journey started.

Chris and Bobbie are now involved with initiatives to help share first-hand experiences of retrofit, including taking part in ELCoE's *Green Open Homes Day* to show neighbours the changes they've made at home.

'You don't want to do this stuff feeling alone – if you can talk to someone else who's done it, it helps.'



Next Steps

Chris and Bobbie are now considering future-proofing their home by installing air conditioning using an air-to-air heat pump.

For now, they're using boat sails on the conservatory to protect their grapes!

They're also interested in installing shutters, although the outward-opening windows would make fitting external shutters difficult. They're considering whether internal shutters might be an option instead.