

Open Home Profile

### Homeowner Information

* **Name:** George Mirams
* **Contact (optional):** george.mirams@hotmail.co.uk
* **Location:** 82 Chessel St, BS3 3DN

### Home Overview

* **Home Type:** Mid-terrace
* **Year Built:** 1900
* **Size:** ~100m2 / 3 bed
* **Renovation History:**

2000s (previous owner) - small kitchen extension
2014 (previous owner) - loft conversion
Nov 2023 - ASHP installation, induction hob installation, house becomes fossil fuel free
Jun 2024 - PV / Battery installation

### Green Features

#### Energy Efficiency

* **Insulation:** Minimal. Solid brick walls. Suspended ground floor. Loft insulation to eaves (self-installed). Don’t let anyone tell you you need to spend thousands of pounds on insulation for a heat pump to be viable!!!
* **Windows and Doors:** All double glazing apart from front door. Other than kitchen extension and loft conversion, windows are old (20-30 years).
* **Heating System:** Vaillant Arotherm Plus 5 kW Air Source Heat Pump supplying new radiators and 200L hot water cylinder. Vaillant thermostat. Weather compensated flow temperature (eg lower flow temperature when warmer outside). No smart controls (beyond myself!).
* **Cooling System:** None, though theoretically ASHP can be run in cooling mode with cheap modification. House does not need it though.
* **Lighting:** Generally LED lighting or halogen spots, replacing with LEDs as and when the bulbs go. But don’t let anyone tell you LED lighting (on its own) is going to save the world!!!
* **Appliances:**

1no. 32” LCD TV (old).

1no. dishwasher (old - bought with house, not very efficient).

1no. washing machine (newish - secondhand off Facebook marketplace).

1no. induction hob (newish - secondhand off Facebook marketplace).

1no. electric oven (old - bought with house, no bells and whistles).

* **Smart technologies**: Import/export meter.

#### Renewable Energy

* **Solar Panels:** 5no. REC 405W panels, 2.02 kWp, south west facing, 3.7kW Fox Hybrid inverter.
* **Battery Storage:** Fox ECS4800, total 9.32 kWh storage, expandable (though limited by space to probably 13.48 kWh.
* **Other Renewable Sources:** None

####

#### Indoor Environmental Quality

* **Air Quality:** Not monitored/controlled beyond temp/RH sensor.
* **Ventilation systems:** Some windows have trickle vents, some don’t. Air bricks to suspended floor. Heat recovery extract fan in bathroom, through penetration for old boiler flue! Vent Axia Lo Carbon Tempra (as new, off eBay)
* **Natural Lighting:** Pretty standard for a mid-terrace with loft conversion - windows front and back, 3no. rooflights to loft (PVs fitted around one of them), rooflight to kitchen extension.

#### Other useful information:

* (Water Conservation, Waste Reduction, recycled materials, EV charging station, bike storage, carpooling initiatives): Our approach is just not really buying stuff if possible! Then if needed, buying second hand. Would like to get an EV at some point, but Bedminster parking situation makes that difficult - plus current (small, petrol) car runs fine.

#### Performance and Savings

* **Energy Savings:**

This is a tough one.
When we had a boiler and a gas hob, I hated using them, so sacrificed comfort for burning fewer fossil fuels.
With an air source heat pump and PV, there is no “guilt” associated with using the heating, so we use the heating more than we used to (but probably still less than most).

So we definitely use less ENERGY, but at the same time have also greatly improved our COMFORT.

This is also complicated by the fact that now we have PV, battery storage and an appropriate tariff, so we can be paid to use electricity at certain times. Therefore we sometimes import electricity to charge up the battery when it is cheap, free or negatively priced (yes, really!) and then either use it ourselves later or export it back to the grid, for which we are paid. So a lot of our grid electricity consumption is “arbitrage” or “load balancing” rather than because we need the energy.

Comparing the periods Jan-Aug 2023 to Jan-Aug 2024:

Our TOTAL energy consumption has gone down from
4343 kWh (3538 kWh gas + 805 kWh electricity) to
1920 kWh (all electricity)
a reduction of nearly 60%.

And for the three months we have had PV installed (Jun-Aug 2024), the solar panels and battery have reduced our grid electricity consumption by 60-80% (albeit this is over summer, when production is at its highest and consumption is at its lowest).

Over a full year, I would expect us to use approx 3,500 kWh of electricity, with 2,000 of that coming from the grid and 1,500 kWh coming from the PV array. I would also expect to export around 500 kWh. For context, a typical 3 bed house in the UK would use 2,700 kWh electricity and 11,500 kWh of gas (total energy consumption 14,200 kWh). So we are using a quarter of that.

* **Carbon Footprint Reduction:** (Estimate of CO2 reduction - this can be a useful tool to use <https://www.carbonfootprint.com/calculator.aspx>)

This is even more complex than the energy savings to estimate.

The reason being that the carbon content of electricity varies both with TIME and with LOCATION.

Scottish electricity is very low carbon, due to a lot of wind power.

South west electricity is very high carbon (for the UK at least).

In January 2024, the carbon content of Scottish electricity was ~50g per kWh, for the UK as a whole (including Scotland) it was ~180g per kWh, but for the South West it was over 300g per kWh. For reference, the carbon content of gas is pretty fixed at around 200g per kWh. (Sadly, yes, that does mean for the moment that the electricity in the South West is worse than gas. For heat pump installations this is more than mitigated for by the efficiency of heat pumps being 3-5x better than boilers.)

To further complicate matters, having a battery allows me to offset the time at which I take energy from the grid and when I use it. This allows me to charge the battery at times when grid electricity is cheap, which is also (usually) when it is at its lowest carbon. This tends to be overnight (when demand on the grid is lower) and/or when there is excess solar and wind energy being generated.

With all that being said, comparing the same periods Jan-Aug 2023 and Jan-Aug Aug 2024, the carbon associated with my home has reduced from:

1.15 tonnes (1 tonne from gas + 0.15 tonnes from electricity) to
0.35 tonnes (all electricity)
a reduction of nearly 70%.

And for the three months we have had PV installed (Jun-Aug 2024), the solar panels have reduced our grid electricity consumption (and therefore also the associated carbon emissions) by 60-80%.

Over a full year, I would expect to generate approx 0.4 tonnes of carbon from our home energy consumption. For context, a typical 3 bed house in the UK would generate 2.5 tonnes of CO2 per year from burning gas and a further 0.5 tonnes of CO2 per year from grid electricity, so we will be generating 80-90% lower emissions.

* **Financial Savings:**

No one asks what the payback is for:

* a holiday
* a new car
* a new kitchen
* a new bathroom
* a new boiler (!)
* replacing a leaky roof
* private school
* anything else they ever buy

Why should energy saving measures be any different?

Comparing Jan-Aug 2023 and Jan-Aug 2024, my energy bills are £330 lower, which over a year would extrapolate to ~£500/year (equivalent to a 40% saving).

This would equate to a 30-40 year “payback” for the ASHP + PV. However, this only includes 3 months of PV generation and does not account for future energy price inflation, or other non-quantitative aspects such as improvements in home comfort.

The biggest part of my energy bill for Jun-Aug 2024 has been my electricity standing charge.

Over the year, I expect my energy bills (including income from PV export) to be ~£800, of which over £200 will be the electricity standing charge.

#### Challenges and Solutions

* **Challenges Faced:**

ASHP:

- Finding appropriate installers

- Requirement of Boiler Upgrade Scheme to use an MCS accredited installer

- Installation is a couple of weeks of upheaval (no worse than bathroom/kitchen/loft renovation/extension)

- Issue with circulation pump seizing in January and Vaillant not having enough engineers to come and fix it for ten days ( :O )

PV:

- Space for inverter and batteries

- Recent recommendations to not install inverters and batteries in certain locations (PAS 63100:2024)

* **Solutions Implemented:**

**-** Use heatgeek website to find local installers
- Use my own and colleagues’ knowledge

#### Future Plans

* **Upcoming Projects:** Nothing currently in the pipeline…
* **Long-Term Goals:** Potentially replace windows, though is a high cost for a limited carbon saving - https://www.maxfordham.com/practice-people/journal/heat-pump-mythbusters-commentary-will-i-need-to-spend-a-lot-insulating-my-home-to-get-a-heat-pump