

Retrofit – work on an existing building to make it more energy efficient.

Example 1 1960's Semi-detached in Garforth
Air Source Heat Pump



What had you done already? (House bought in June 2000)

Double Glazed in December 2000 (10% of heat estimated lost through windows)

Effect: Our windows were fitted just before the FENSA regulations came in but we have been pleased with them. We were able to have the glass replaced in one recently, rather than the whole unit. Although they could probably be improved upon by renewing or switching to triple glazing, we have acted on the basis they are good enough and it would be wasteful in terms of carbon footprint to replace them, as well as expensive.

Loft space insulated as part of loft conversion in April 2003. (25% of heat estimated lost through roof)

Effect: Our loft room is comfortable in cold weather and due to Velux windows allowing a through draught, and blinds, not too uncomfortably warm in hot weather.

New combi boiler fitted in as part of loft conversion when water tank/cylinder removed in 2003.

Effect: Worked well in terms of heating, we hadn't anticipated how much water would be wasted while running it to get warm.

Cavity Wall Insulation in 2007 as part of Government's Green Deal (35% of heat estimated is lost through walls of a house)

Effect: We expected to feel more benefit than we have from this but maybe that was unrealistic of us. Thermal imaging this year didn't show any significant cold corners or dampness so we are presuming it has had a positive effect.

PV Solar panels installed in 2012 resulting in significant reduction in energy bills. As this coincided with retirement we are able to do the washing and ironing when the sun is shining. We can also use a small portable heater free at this time of the year in the daytime and boil a small electric kettle also free.

Effect: These have been totally positive, reducing our demand on the grid, saving us money and reducing our carbon footprint.



What have you considered since taking independent advice?

Switched all lights to LED in 2019

Effect: We used to have the old-fashioned energy saving bulbs and hadn't really appreciated how much more energy efficient the LED ones are until we took independent advice on how to make the house more energy efficient.

Additional measures: Thick curtains in place, some draught proofing tape fitted around doors 2020

Effect: These definitely help. We have found charity shops to be a good source for curtains and also there is a very high-end curtain exchange shop in Boston Spa which can be good for door curtains as a lot come from big houses with large windows!

Smart meter installed in September 2022.

Effect: This has been really helpful in learning how much different appliances cost to run, allowing us to make even better use of the energy available from the solar panels. So now we know that we can run our little electric kettle and small portable heater or towel rail in the bathroom without it costing much especially when there is solar gain from the PV panels.

What are your next steps and why?

The Boiler is now 19 years old and inefficient in terms of carbon emissions, although serviced annually so still efficient in terms of heating, except for the kitchen extension which has the last radiator on the system and is too small for the area. The gas fire was condemned in 2020 and as we were considering options we did not replace it. All of the research we did about reducing carbon emissions pointed to an **air source heat pump (ASHP)**, as we do not have the space for a ground source pump and they are more expensive. ASHPs are being promoted as the way forward for domestic properties, with a £5,000 government grant available towards the cost to incentivise take up. However, there are lots of questions about how viable they are. In order for them to work efficiently, houses need to be well insulated to begin with and there are regulations about how close they can be sited to adjacent houses which might create difficulties for terraced housing. I have not seen this issue addressed in any of the research I have done. The cost is also an issue as even with the grant they are 2.5 -3 times more expensive than a typical gas boiler. Some of this cost is due to the need to have a hot water cylinder reinstalled if there isn't one and sometimes to fit bigger radiators to ensure sufficient warmth.

Uncertain whether our house was sufficiently well insulated we took independent advice which encouraged us to think that it was. There are options to insulate walls and floor, but you need to match the level of insulation with the right amount of ventilation and moisture management, otherwise there are risks of moisture causing rot and other structural problems. Getting the right advice and installer is crucial for this, also whilst cavity wall insulation is very cost effective in terms of the time taken to recoup the cost, the payback period for the other types of wall and floor insulation are much longer as they are more expensive and can be disruptive.

We have decided to invest in an air source heat pump and see how it goes. It is possibly going to be very expensive as electricity is still so much more expensive than gas. Hopefully this will change as we increase renewables production as a country and "decouple" the price of electricity from gas internationally. (I don't really understand this!) Until we live with it, we don't know how much our solar panels will reduce the cost of running the heat pump. An additional saving will be made by using a booster connected to the PV panels which acts as a kind of supplementary immersion heater and will do some of the work of heating the water whenever there is spare electricity being generated by the PV panels. We will give an update on here after six months and share our learning.

We plan to replace our old gas cooker with an electric one with induction hob once we have lived with the ASHP for a while. We want to do a like for like cost comparison between the pump and the gas boiler without adding in the variable of the cooker so we will delay installation of that for 3 months or so but then get the gas meter removed as well and so avoid the standing charge.