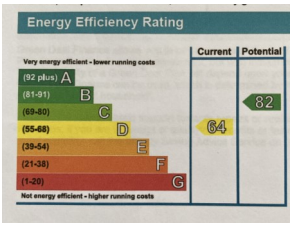
# Our journey towards low carbon living

## *The building*




An 80's three bedroom bungalow with early style double glazing, cavity wall insulation, gas condensing combi boiler, open coal effect gas fire and 200mm of loft insulation. **2019 Energy Performance rating D.**

Concerned by the rather poor energy performance of our new home and wanting to make it more energy efficient, cheaper to run and responsible for fewer carbon emissions we embarked on a two year programme of retrofitting.

Our first target was to change the **electricity supplier** from one that sourced generation mostly from gas and oil fired power stations to a 100% renewable supply. Having already purchased a small electric car our next target was to generate some of our own electricity so we could charge the car battery from sunshine. **12 ground mounted p.v. panels** with a maximum output of 3.4kW were installed after having gained the necessary planning permissions. These are linked to a **smart car charger.** Once the house electrical needs are satisfied, surplus electricity goes to the car battery and when that is fully charged, any surplus is exported into the grid. Over a two year period we have found that during the summer the car was running mostly on sunshine!

With all **lighting changed to l.e.d. units** and most white goods rated at A+ or above we have found that annual electricity consumption is around. 2,000kW, even accounting for car battery charging, and over 1,000 + kW annually exported back into the grid, for which we receive a small payment. Car annual mileage is around 5,000 miles. There is also an electric oven.

The early double glazed units were draughty with many cold spots around the edges of the frames. These were replaced with triple glazing and particular attention paid as they were fitted to ensure there were no voids or missing cavity insulation around the edges.

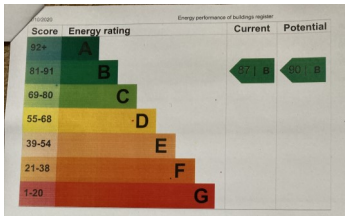
Our next target was loft insulation. Though a nominal 200mm it had been much trodden down by electricians working in the loft. This was topped up to 300mm and some missing pipe insulation replaced. Elsewhere in the house exposed cold and hot water pipes were insulated. (Incidentally insulating the hot pipes has greatly reduced cold run off times as heat is better retained in the pipes.) A simple mechanical two on, two off timer on the gas boiler and a basic room stat were replaced with a "smart" programmable timer / stat which calculates and adjusts the required start up and shut down times according to the weather. The open gas fire was removed and replaced with an inset wood burning stove. Each radiator was fitted with a thermostatic valve (RTV) and including a gas hob the gas consumption is approx 12500kWh per annum.

The concrete floors are uninsulated. As carpets are replaced a thicker special thermal underlay is specified. These floors are now definitely warmer.

Curtains have thermal linings and are length adjusted so they just tuck down behind radiators, which have foil reflectors behind to reflect heat back into the rooms.

When updating the bathroom the bath was removed and a shower installed. The vacated space was used to create an airing cupboard heated by a low wattage thermostatically controlled oil filled tubular heater. There is a second shower in the small en-suite.

The house warms up quickly when the heating comes on and retains heat well. Even in the middle of winter overnight temperature drop between 21.30 – 06.00 has never been more than 4 degree.




At the end of two years of planned retrofitting a **new EPC** has been done. The energy performance has improved from a D (64) to a B (87). To reach an A rating we would have to fully insulate the concrete floors, add solar hot water (which with a combi boiler and no hot water tank is unlikely to work) and ditch the gas boiler.

## *The rest of the story.*

Soon after moving in we discovered the guttering was leaking at the joints and tended to overflow during heavy rain (which is more becoming more frequent with climate change.) It was replaced with a deeper design to better cope with these greater volumes of water. 4 water butts were installed and these generally provide enough rainwater for garden needs through the summer and also give us rainwater via buckets to flush the toilets, (supplemented by saving any saved cold run off from the hot taps.) Both toilets have a dual flush cistern but these are hardly used. Water consumption is generally now just 4 cubic meters a month.

## *The garden.*

The garden was mostly ornamental shrubs. Several small raised vegetable beds were created which provide seasonal salad and green vegetables. All vegetable kitchen waste is composted as are grass cuttings, garden cuttings and fallen leaves. Two dwarf root stock apple trees and a greenhouse have added to the productive side of the garden. Bee friendly flowering plants were introduced and a wild flower area created.

Our Achilles heel is our gas consumption from the gas hob and central heating. These carbon cutting journeys take time and we are researching the possibility of replacing the gas heating with an air source heat pump.

Unfortunately we have no energy consumption figures prior to the retrofit work beginning.

## *Secondary emissions.*

Carbon emissions for energy consumption are relatively easy to measure. More difficult are the emissions created by lifestyle, (our secondary emissions.) What are the carbon emissions of the food and other consumer items we buy, the plane flights we may take, the mobile phone calls, the plastic washing up brush etc? A book by Mike Berners-Lee “How bad are bananas” can be a useful source of information regarding these types of emissions. In it he has calculated the carbon footprint for almost everything. Our food, clothes, consumer goods and different modes of transport, even building materials etc. etc. They can all be measured. Reducing these is another carbon cutting journey. These type of emissions are very difficult to reduce to gross zero unless we lived on a desert island, with a plant based diet and absolutely no imports. To reduce these kind of emissions we have to look at offsetting to achieve a net emissions existence whilst at the same time making choices as to what we buy in order to reduce them as much as possible. This is a whole new and continuous journey.

Shropshire is aiming to reach net zero carbon by 2030! This will be hard to achieve and will need the support of every resident in the county!

October 2020

**Annual energy consumption totals**

| | *12/18 - 11/19* | *12/19 -11/20* |
|---|---|---|
| Green Electricity Import | 1785kW | 1708kW |
| Green Electricity Generation | 2919kW | 2938kW |
| Green Electricity Export | 2097kW | 2268kW |
| Green Electricity consumption | 2607 | 2378 |
| 5% Green Gas consumption | 12049 kWh | 13078 kWh |
| Water usage | 40 $_3$M | 47 $_3$M |
| **Kiln dried logs** | 1. 3 $_3$M | 1. 3 $_3$M |