Reducing Energy Bills and Climate Impact through Home Solar

Mark Thompson and Karl Strong

With rising energy costs, the Boddington Sustainability Group (BSG) has been looking at one measure parishioners can take to reduce their bills, whilst also reducing their impact on the climate.

Solar systems can be fitted to household roofs and turn sun light into electricity; powering any appliances that are switched on – washing machine, TV and so on – while the surplus is exported to the electricity grid, or stored in a battery for use at night.

The cost of a solar system depends on the size of the array, the type of solar cells used and the ease of installation at a particular site. Typical costs are around £7000 for a 3.5kWp array (about 25m2) with pay back varying between 4 and 10 years. Most systems require little or no maintenance and the panels will last for decades, although it is worth checking that they are not too dirty every year, as this can reduce performance.

The UK energy grid is gradually transitioning from coal and gas to wide- scale use of wind and solar renewables. This reduces the CO2 emitted into the atmosphere that is driving global climatic changes. Installing your own equipment and buying your energy from a renewable source also helps drive that transition.

In this article you will read of our recent experiences of installing solar. If you wish to find out more then please feel free to get in touch - m.thompson@boddingtonpc.uk

Karl's Use Case

As parents of teenage children, the subject of environmental responsibility is raised often. As one of the largest contributors of our family's carbon footprint is the home heating and power usage, we reviewed the common advice for making homes more efficient and made sure we were compliant.

We then needed to plan the future of replacement of our Diesel cars with Plugin-Hybrid models. This led us to conclude the best next step for household and future vehicle power would include some form of home solar power system.

Techie Details Solar photovoltaic (PV) systems turn sunlight into electricity through the 'solar cells' they contain. These cells are made from thin layers of a 'semiconductor' material (silicon) between layers of glass. Electricity leaves the panel as direct current and passes through an inverter that converts it to 240V alternating current, so that it can be used in your home.

Solar PV systems are rated in kilowatts peak (kWp). This is the maximum rate of electricity generation at peak performance (e.g. noon on a sunny day with the panel facing directly south). The kWp of a solar array depends on the size, type and number of panels – but a 3 or 4 kWp array is typical.

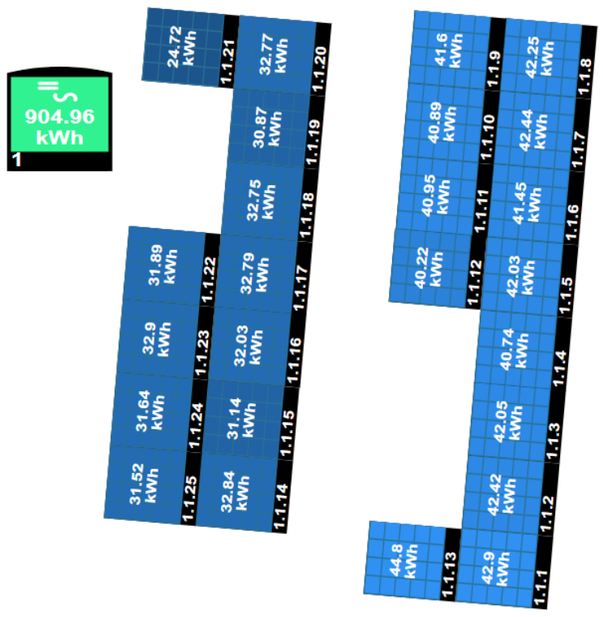
Electrical energy generated by solar panels is measured in kilowatt hours (kWh) – the same unit that is shown on your household electricity bill.

The amount of electricity produced annually is determined by the orientation of the system (i.e. which way the panels face), if there is any shading, how sunny the location is and the size of the system in kWp. You can expect to annually generate between 700 and 900 KWh per KWp installed, but output varies a great deal from season to season. The average household uses around 3,000 kWh a year, but only some of this will be replaced with generated electricity unless you're careful to make the most use of it.

Source: Centre for Sustainable Energy (www.cse.org.uk).

We then contacted the three best rated local Solar Installation companies on Checkatrade and obtained quotes. The initial quoting is easy and includes a view of your roof via googlemaps to confirm size and orientation to the sun. We decided on engaging the company with the best quote (SolarKW Ltd in Oxford) and they visited to perform a physical review and talk through options. As our plans include EV car charging in the future, the sizing was to include that requirement.

In the end we decided on 25 * LG 375W full black solar panels with edge inverters and a SolarEdge main inverter. Our house roof has a West/East orientation, so this is how the configuration was installed:



The installation experience was professional. First, we needed a current version of a smart meter to be installed. The scaffolding was installed the day before the panel installation. The installation day included expert roofers and an electrician who had the physical installation and cabling installed before sun was setting (it was November) which allowed them to test all 25 panels successfully before leaving. The following day the scaffolding was removed quickly.

We are able to monitor activity on our smartphones – the app shows how much the panels are generating, exporting and importing in real time and the smart meter confirmed that most of the daylight hours there were periods where no power was being drawn off the grid.

In conclusion: As the data we have covers the winter months we can already see a large offset on our electricity usage from the grid. We look forward to the spring and summer months as the days get longer and there are less clouds. We can see that the amount of power exported may be best captured by investing in a home battery to address the peak power usage in the evening. We are currently reviewing home battery storage as a future option.

Mark's Use Case

I installed a 2.2 KWp system on my south facing roof around 11 years ago, in which time it has reliability generated around 23,000 KWh of electricity. This year, GreenBuilding Renewables in Daventry installed an additional 4KWp system on my west facing garage, alongside a 17.6KWh Fox ESS battery. Collectively the two systems should generate around 200 MWh over their working life, which is equivalent to £70k worth of electricity at today's prices and saving 53 tonnes of CO2.

We have already swapped our old oil boiler for an air source heat pump and our car to an electric vehicle; so our electricity requirement is higher as a result.

Here is **an example of the solar app this afternoon – with 3kw going into the battery.**