

14 Juniper Walk Shoreham by Sea BN43 6JE

Overview

Owners: Warren and Bairbre Philips
Type: Semi detached
Age: 1971
Beds: 4
Walls: Cavity walls
Area: 118m ²
Residents: 2 adults, 1 child a large retired greyhound!

Key features

Large solar PV Array
Tesla Powerwall 2 battery
Electric car and 32A charging point

Other features

Smart heating controls
Condensing boiler
TRV's on radiators
Low energy lighting throughout
Loft insulation
Double glazing
Low energy appliances
Low water appliances
Rainwater harvesting

Introduction and approach

If you want to get your head around solar PV, home batteries, electric cars, and how they work with each other, Warren's your man! His philosophy is "make the future we want" and he and his wife Bairbre want to make their daughter's future as secure as possible by being ahead of the game regarding self-sufficiency.

Warren loves technology and he has a wealth of information about solar PV, home batteries and electric cars, all three of which feature in their home, and would be delighted to show you exactly what energy is being generated from the 6.27kW solar array on the roof!

Warren's enthusiasm is so infectious that you will soon be as hooked, as were two of our home owners at our last Eco Open Houses event. They were so sold on solar and Powerwall that they



soon became proud owners of their own system! And that's what this event is about – inspiring others to become more sustainable, resilient and more self-governing, and systems like these help to enable that to happen.

Last year they added a 14kW Tesla Powerwall 2 battery, one of the first in this country, to their house. The Powerwall stores energy produced by their solar PV and is used to power the house when there is no sun. This, coupled with a home that is energy efficient, means that Warren's aim to be 100% energy self-sufficient for the summer months should be achievable, and that includes running an electric car!

Come to our first venture into properties in Shoreham and be seriously impressed!

Energy efficiency measures

Energy and CO2 performance

6.27kW (22 Solar panels)

Lifetime generation to date is over 13MWh

Yearly generation: 6MWh

Yearly consumption: 6.5MWh (House 5.5MWh + Car 1MWh)

Energy supplier – Bulb (100% Renewable Electricity) <https://join.bulb.co.uk/refer/warren2688>

In 2015, when looking at buying a home, Warren prioritised off-street parking for an electric car, and roof space for solar panels. The family moved into Juniper Walk in August and started the process to get energy efficient immediately.

The first priority was to replace all the light bulbs with LED bulbs and replace any light fittings that

needed to be changed to take LED. Warren also fitted a Nest Smart Thermostat to control the heating and hot water systems, and Nest Protect smoke and carbon monoxide alarms as part of the initial work on the house.

In September, the solar array was installed. Knowing electric cars and home batteries were in their future, Warren specified a 22 panel, 6.27kW system - more than double the size needed for the average house of this size. The electric car arrived four weeks later.

Warren then spent the next year researching home batteries trying to find the best fit for their setup. In October 2016, the Tesla PowerWall 2 was announced and Warren had his order in within hours of the site going live. 2017 has seen the PowerWall 2 installed along with a new condensing boiler further reducing their CO2.

Like most people, Warren is replacing as required. Through 2015/16, he replaced taps with eco taps, and cisterns and flushes with eco equivalents. Combined with a water butt for the garden, the family have reduced water usage to around 1/2 the usage for a typical similar household.

Where possible, anything electrical is run when the sun is shining, including the washing machine, dishwasher, and even slow cookers on timers to cook, as the power is provided by the solar panels. With the battery, this is no longer a necessity though this is still the most efficient way to use the power generated by the solar panels.

With all these upgrades, a new EPC rating for the house as done in February. The old rating was 62-D, the new rating is 93-A – what a tangible difference!

Insulation

The house has loft insulation and is double glazed throughout.

Heating and hot water - solar PV and powerwall

With a 22 panel (6.27kW) optimised Solar PV array on the roof, and a 6kW inverter in the loft, the system installed at Juniper Walk is over double the size needed for a 4 bedroom house.

With this array, the house pulls less than 10% of its energy from the grid during the day for 6 months of the year. By adding a battery to store the large excess of energy generated, the house is largely self-sufficient for 6 months of the year, day and night. During the rest of the year, Warren can be confident that they are using

or storing 100% of the energy they generate. In January, their lowest producing month, a quarter of the household electrical power was provided by solar and battery.

The Tesla Powerwall 2 is a 14kW battery, double the storage of the original Powerwall. More importantly it has a much higher output of 5kW with a 7kW peak allowing you to run more appliances at the same time. It has been installed in the garage and linked into the under stairs Consumer Unit. This not only allows the battery to be charged by the solar panels, but with a future software update, will allow changing of the battery at night (cheap rate) to use on a day where there will be little sun.

Further in the future it could also be used to charge at night on a cheap rate, and to sell power back in to the grid at peak times, potentially earning money during the day.

Central heating is from a condensing boiler that can also be used to heat the hot water tank when needed. When there is excess solar electrical power they use an iBoost to divert it directly into the immersion heater for their hot water.

Electric car

Like 30% of households in the UK, Warren's household has two cars. Warren has a traditional family car but for their second car they wanted to be zero emission.

Bairbre's car is a Renault Zoe. They decided to lease the battery, which comes with a warranty, breakdown cover and dramatically reduces the initial cost of the car – approx. £6,000 instead of £10-12,000!!

Fully charged, the Zoe will do 65-70 miles in winter and around 100 miles in summer. The family manages their car usage to ensure they are maximising use of the Zoe, particularly for city driving.

As their electricity provider is 100% renewable, their car truly is Zero Emission and in the summer the majority of the electricity for charging the car comes from their solar panels and Powerwall 2, so it's very cheap motoring.

For a few weeks in the summer all the power for the car comes from the solar panels and Powerwall 2 making driving the car not only Zero Emission, but also Zero Cost.

Lessons learned/further Improvements

Going big on the solar array was a good move, with hindsight Warren feels they should have gone bigger.

They should have replaced the consumer unit in the house early on. They will need to do this to allow improvements to the outside workshop and office.

What's next?

Zappi car charger - push any electricity into the car battery once the Powerwall is full

Battery upgrade for the electric car - increasing the range from 65 - 90 miles (depending on season) to 130 - 180 miles

More efficient second car - replace the old diesel with a more efficient car

More efficient glazing - (triple glazing)

Change Tesla Powerwall Gateway - to allow back-up power option

Induction hob - replace the cooker that was there when they moved in with a super-efficient induction hob

Smart lighting - upgrade the light switches in the house to smart switches

More efficient appliances - as they replace appliances in the house everything will be rated "A" or higher

Wood burner - replace gas fire in the front room with a super-efficient log burner

Office and workshop improvements - solid insulation for office and workshop to make the space usable in the winter

Professional team & technical info

Warren works for Mott MacDonald – check out this video if you want to find out more about this fantastic company who are leading the way in sustainability: <https://www.youtube.com/watch?v=eNjRhnuBads&t=1s>

Solar Install and Maintenance - Stephen and Daniel Collins - Sussex Energy Advisors.
<http://sussexenergyadvisors.co.uk/>

Stephen and his team installed the solar panels and have looked after them since. As part of ongoing maintenance Daniel recently came over to health check and clean the panels.

Powerwall supported and maintained by Tesla UK. www.tesla.com

Condensing boiler, heating upgrades and maintenance - Rich Atkins - Atkins Gas Services
<http://www.atkinsgasservices.co.uk/>

Rich Atkins and his team have worked to replace the old boiler with a new super-efficient Condensing boiler and improve the heating.

General house improvements / maintenance - Danny Mills - Danny Gardening and Decorating
<https://www.facebook.com/Danny-Gardening-Decorating-1451740781796491/>

Putting Warren's theory into practice, Danny has fitted the majority of the water saving features and maintains the house and garden.



After a difficult installation Tesla UK stepped in to resolve the issues directly

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