

1960s Retrofit:













High insulation, Solar PVs, Air Source Heat Pump and Smart heating systems



Overview

Floor Area:	169m ²
Year Built:	1961
Location:	Chew Stoke
Type:	2-Storey Detached
Construction:	Blockwork with Cavity walls

Key Features

-  300L Hot Water Cylinder
-  K3 Radiators
-  Smart Heating Controls
-  Underfloor heating
-  Solar PV Panels
-  Green Energy Supplier
-  Electric Bicycle
-  High Insulation
-  Air Source Heat Pump (ASHP)
-  Garden Pergola
-  All electric kitchen
-  Removal of gas central heating

Introduction

The homeowners moved into the 4 person house in 2009. The house had been completely renovated just before purchase, however the renovation had little to no consideration of energy saving measures.

Initially draught proofing was improved with roof insulation and cavity wall insulation improvements. Solar PV was installed in 2011.

This year (2023) the homeowners undertook some re-modelling and improvements. The works undertaken before we bought the house in 2009 included a small kitchen extension with half glass walls and a glass roof. This small extension was draughty, leaky and poorly insulated. It was very cold in winter and extremely hot in summer. The works undertaken this year removed this extension which has made the house much more comfortable all year round.

Key Principles

- Energy saving measures:
- Multi-foil roof insulation and boarding
- Bonded bead cavity wall insulation

- Rigid insulation foam underfloor insulation
- New high performance aluminium windows (rear of house only)
- 3.99 kW PV panels
- 12kW Vaillant aroTHERM plus air source heat pump
- 300 litre insulated hot water tank
- Underfloor heating through ground floor (except sitting room)
- Oversized radiators (K3) in sitting room
- Smart programmable heating thermostats in every room
- Garden pergola to reduce risk of overheating in summer
- Electric bicycle
- Green energy supplier (Ecotricity)

Key Features

Insulation

Initial works to improve the homes green credentials included improving the insulation in the roof and the cavity walls. This included the following insulation types:

- Multi-foil roof insulation and Boarding
- Bonded Bead Cavity Wall Insulation

PV Panels

In 2011 after 2 years at the property, 3.99kW PV panels installed. The installation was eligible for a feed in tariff which was guaranteed for 25 years. The PV panels are estimated to reduce the electricity consumption by a third.

Up until 2022 the house used about 3270kWh of electricity a year and generated about 3750kWh. About two thirds of the electricity generate goes back to the grid.

Air Source Heat Pump (ASHP)

In 2023 the homeowners installed a 12Kw Vaillant aroTHERM plus air source heat pump. So far the results have been good and the system has easily brought the house to a comfortable temperature.

Underfloor Heating

Underfloor heating and rigid foam insulation installed throughout the ground floor, excluding the sitting room which was unaffected by the re-modelling works.

K3 Radiators

Oversized K3 radiators in the sitting room because the ASHP works best at lower temperatures. The upstairs rooms do not need as much heating so they have not been replaced in the renovation. The system has a seasonal coefficient of performance of 4.88 at 35°C, whereas the old gas boiler working at about 60°C and was about 87% efficient.

Smart Heating Thermostats

Smart programmable heating thermostats in every room. All the rooms have either smart thermostats or smart thermostatic radiator valves. This enables the homeowners to keep warm the rooms they are using at one time.

Performance

Electricity currently costs around four times that of gas per kWh so its expect that the annual bills will be roughly the same as when there was a gas boiler. But although the cost will be greater the carbon footprint will be significantly smaller.

Future Recommendations

Smart Solar Switch

The next steps are to install a smart solar switch which would divert any excess solar power into the hot water tank and provide free hot water through most of the year. The advice is that this would cost about £250 and should save at least £200 a year.

Contacts

Underfloor Heating and Building Work:

Home Arc – 01373 792065

Air Source Heat Pump, Hot Water Tank, Smart Controls:

Pint Heating and Renewable – 01454 605324