

Low carbon case study no. 2: Retrofitting renewables in an Edwardian manor house



About the project

The house is an Edwardian Manor house (not a listed building) on the Wirral and privately owned. The house owner wanted to integrate a range of renewable technologies into the existing heating and hot water system.

Renewable energy technologies installed:

Solar panels

The cells in the solar panels convert daylight into DC electricity. An inverter converts the current into AC electricity and this is fed into the building's main electrical distribution board.

10 Sanyo, 210 wp (watt-peak) solar panels have been installed. This is a 2.1 kWp (Kilowatt-peak) system generating approximately 1800 kWh (Kilowatt-hours) of electricity.

Air source heat pump (ASHP)

the ASHP draws in air from outside of the building. The heat that the air contains, even at low temperatures, is 'stepped up' in a similar process to refrigeration but in reverse. The heat that is produced can be monitored and controlled from within the building.

14 kW Daikin Altherma heat pump have been installed which is estimated to have 50% lower carbon emissions than a conventional heating system.

Wind turbine

The turbine automatically turns to catch the wind which blows across the blades and forces them to rotate. This turns a generator which creates electricity; and

A 6 kW Proven energy wind turbine is installed at the Manor house which can produce up to 20,000 kWh of electricity annually in optimum conditions.

Solar thermal

A solar thermal panel is also installed; the solar panels collect heat from the sun's radiation, a heat transfer system uses the collected heat to heat water which is stored in a hot water cylinder until needed.

The Benefits

- A feed in tariff (FIT) is claimed for every kWh of electricity generated by the solar panels and wind turbine. The house owner saves money by being able to use the free electricity he generates himself and he is also paid for any surplus electricity he exports back to the grid. The ASHP is more efficient and has lower running costs than a conventional heating system. This means that the house owner's electricity and heating is cost-neutral;
- The house is not totally carbon-neutral as some energy still has to be imported from the grid but the renewable technologies have helped to significantly reduce the carbon footprint of the building; and
- The wind turbine installed has been proven to work in a range of geographical conditions and does not need to stop in high wind speeds. This allows energy generation to be maximised.

Key issues to considered

- As the house is not listed, the solar panels could be installed under permitted development rights without the need for planning permission.
- The technologies had to be integrated into an existing Edwardian radiator system which was over 100 years old and this was completed successfully.
- When installing an ASHP the building needs to be as well insulated as possible to maximise efficiency.
- The wind turbine is less than 50 yards from the house but the noise is very minimal.

Further Information

Eco-Environments – the installers of the solar panels, ASHP and wind turbine

www.eco-environments.co.uk

This case study forms part of the CLASP technical support and training programme for North West local planning authorities, delivered by Envirolink, Quantum Strategy & Technology and AECOM (2011).