



The SUSTAINABLE HOMES NETWORK

Case study: mast mounted wind turbine
Location: Little Henham



Background

Father and son Vernon and Paul Muskett had always recognised that the family farm in Little Henham was one of the windiest places in the area. With the growing profile of renewable energy in the media, they decided to make the most of it and install a mast mounted wind turbine. They knew the project was a long-term investment but thought it important that they 'do their bit'.

The Musketts began by contacting two leading suppliers of small scale wind turbines in the UK. One of the two, Segen, and their regional manager Lee Baxter, was enthusiastic about the project and helped them apply for planning permission so this was the company that they chose.



Above: Vernon and Paul Muskett and their turbine

The site chosen was in a field with a good south westerly aspect, located 70 metres from the house where the electricity would be supplied to and 30 metres from farm buildings where the necessary electrical equipment was to be installed. As well as wind access, considerations included safety in the event of a collapse and minimising losses in the electrical connection. Planning permission was successfully obtained from Uttlesford District Council, with a condition regarding the turbine's colouring.

The Musketts made contact with the distribution network operator (DNO) EDF Energy, who worked with them to enable export of excess electricity generated by the turbine to the grid.

Technology

The wind turbine used was a 5kW peak DC turbine manufactured by Iskra, which was mounted on a 12 metre mast. The turbine is connected to two Windy Boy inverters which also regulate the electricity draw off from the generator, which in turn modifies how fast the turbine rotor spins. In very high winds spring-loaded weights in the rotor hub, driven outwards by centripetal force, automatically feather the blades and prevent damage to the turbine.

In the event of a power failure, grid connected turbines are designed to shut down for safety reasons. The Musketts' turbine however can be isolated from the grid and in concert with a small diesel generator can continue to supply electricity to the house.

Key Characteristics

Turbine: Iskra AT5-1

Rated output: 5kW peak (11 m/s)

Rotor diameter: 5.4 m

Turbine hub height: 12.0 m

Inverter units: 2x Windy Boy 2.5kW

Power cable: 5 mm diameter steel wire armoured

Estimated annual output:
13,100 kWh (6m/s mean annual windspeed)

Costs

The cost of the entire installation was £18,000, including all equipment and installation. As the turbine, inverters and Segen were government accredited; a £5,000 grant towards this cost was obtained from the Low Carbon Buildings Programme.

Paul Muskett estimates that only a third of the project cost was the turbine itself, meaning that when it needs to be replaced the cost incurred will be far less as the entire supporting infrastructure will be in place and reused.

The Musketts sell back electricity to EDF Energy for 7.64 pence per kWh. Payback on the turbine is estimated to be 12 years.

Outcomes/lessons

Despite significant initial interest from a variety of energy companies, the Musketts found the companies would only buy back electricity from installations in areas where they were the DNO. Hence the Musketts could only sell their excess electricity to EDF Energy.

Although they had no problems themselves, the Musketts learned that the tolerances on the foundations for the

turbine were very fine – the anchors for the guy-lines had to set in concrete within 2mm accuracy.



Above: Control panel and inverter units

The National Air Traffic Service (NATS) put a block on the planning approval for the turbine because of their proximity to Stansted Airport, but after 2 months it was cleared. NATS have the right to do this for any wind turbine application within 15 miles of an airport.

The turbine has been operating since January 2007. Paul and Vernon are pleased with the final result. Of the project, Paul says: "once you've done it, it looks a reasonably simple process, but it can look daunting from the beginning".

For more information see:

www.sustainablehomes.org.uk

www.segen.co.uk

www.lowcarbonbuildings.org.uk

www.edfenergy.co.uk

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