

Pinkery Farm Activity Centre

Pinkworthy Pond, Simonsbath, Exmoor

SMALL-SCALE WIND POWER



The Project

Up until 2001 electricity for the 44 bed visitor centre was supplied solely by the 3-cylinder Lister Petter diesel generator with heating and hot water provided using LPG. The site is too far from the existing grid for connection to be viable.

A series of improvements commenced in mid 2001 starting with the installation of a Proven wind turbine and battery storage system. A recent addition has been a 75m² roof covered with Photovoltaic tiles which is connected via a matched control unit to the battery bank.

How it Works

The wind turbine is placed at a suitable distance from obstacles to allow unhindered passage of wind past the blades from the most common wind directions. The turbine is a simple downwind design which naturally aligns itself to the wind direction, and the rotor blades have a passive pitching mechanism



based on rotor speed. This means that mechanically there is very little to go wrong, and there are no external connections other than for the electricity output.

It is important that the system is reliable as usually there are no technical staff on site at the times of greatest demand (i.e. at night).

An underground cable takes the generated DC electricity to a junction box in the generator building, where it is connected via a manual disconnection switch to the turbine control box. From here the power is either fed to the battery bank or is diverted to 'dump loads' if the batteries are fully charged. The 'dump loads' take the form of immersion heater elements in the Centre's hot water tanks and so the energy is not wasted, and actually displaces some LPG use.

Two inverters take power from the battery bank and convert it to usable domestic AC at 230V to satisfy the Center's requirements. If the battery voltage drops below a set level, the generator will start up in parallel.

In this setup the generator use is much less, in fact the operating hours of the generator have dropped from an average of 105 hours per week to 5 hours a week. As the generator is used less, its 12V starting battery is kept charged up from the wind turbine and battery bank so that it is always ready for use.



Alan Bailey - Pinkery Residential Activity Centre

"It's magic! I'm a complete convert and find myself preaching to visitors. The park authority are very keen to duplicate the success of this scheme elsewhere on Exmoor."

"Now that the diesel generator hardly ever runs, you can really appreciate the bird song and the beauty of the site. Previously if someone left the smallest light on, the generator would run all night!"

Maintenance

The lack of a gearbox in the Proven wind turbine means that the only maintenance required is a 6 monthly greasing of the moving parts. This requires the tower to be lowered with the aid of a hand operated winch. Battery levels are checked and topped up periodically. Service periods for the generator are now significantly longer due to a reduced usage.

Owner/Operator's Comments

Initially Western Power Distribution were approached to quote for providing mains cover at the site but responded that they would be unable to supply the site. By way of compensation, a donation was made towards making alternative arrangements. The Park authority are keen to duplicate the success of this project at other sites.

Costing

The Pinkery Centre received funding from the following sources:

- Exmoor National Park.
- Western Power Distribution.
- Department of Environment Transport & the Regions.
- Rural Development Agency.

The cost of the system (excluding the photovoltaics) was £24,000 excluding building works to provide a new generator building to house the battery bank and turbine controls. This figure includes the turbine, storage, inverters, connections and installation. The foundations and ground preparation for the turbine were undertaken by a local firm.

Technical Details

Wind Turbine	Proven WT6000
Generator	6kW DC Permanent Magnet - no gearbox
Cut-in Windspeed	2.5m/s
Rated Windspeed	10m/s
Rated rpm	200
Rotor	3 blades comprising 5.5m diameter
Blades	Mechanical Furling to avoid overspeed
Brake	Mechanical Disc Brake
Storage	24 cell battery bank operating at 48V
Connection	2x 4.5kW Inverters giving AC output
Distance from Buildings	150m
Mast Height	9m
Diesel Generator	13.2kW Lister Petter 3-cylinder

