



Case study

River Dart Country Park

Dartmoor

RENEWABLE ENERGY 4
DEVON



Introduction

The River Dart Country Park (RDCP) is part of a country estate in the Dartmoor National Park, which includes Holne Park House, a popular venue for weddings and conferences. The park is open to paying visitors during the summer as well as offering a touring and camping site.

Project development

- RDCP has had a hydro electric scheme since the 1920s, when a leat was installed to abstract water from the Dart one mile upstream. The site therefore already had an abstraction license in place for 1.1 cubic metres per second. The original installation was an impulse turbine, which operated for 40 years until mains power reached the site. In 1985 another generator was installed, but after problems with screening it fell into disrepair in 2000.
- Rather than renovating the existing hydro plant, a new design was chosen based on the Archimedes screw, to make best use of the 4.5m head available. Construction work included creating a new turbine channel and powerhouse for the generating equipment and installing an automatic sluice gate.
- The installation was completed by Western Renewable Energy, Castleford Engineering and GP Electronics in January 2007. It was the first example in the UK of an Archimedes screw turbine used for grid-connected power generation.

How the system works

This Archimedes screw system was installed in order to satisfy new demands from the Environment Agency regarding the habitats directive for migratory fish rivers. The screw allows fish to migrate downstream without being damaged by the turbine. The turbine rotates at a maximum rpm of around 30 revs per minute. A toothed flat belt connects the gearbox to the generator. GP Electronics designed a fully automatic Variable Speed Controller to optimise efficiency. The system is grid connected. Electricity is used on site, with all excess power sold.

Costs and benefits

- In the first year of operation the turbine generated 330MWh of electricity, enough to supply over 80 homes and the system saves 168 tonnes of CO₂ pa.
- The electricity generated is worth around £30k a year, RDCP is also able to claim ROC's worth up to £13k.
- The installation cost £150k so has a payback period of less than 5 years.
- RDCP received a grant from Dartmoor Sustainable Development Fund for £15k, and an interest free loan from the Carbon Trust for £75k to be paid back over 5 years.

Technical details

Turbine

48kW Archimedean Screw turbine from Ritz-Atro, Germany

Installer

Western Renewable Energy, Castleford Engineering

Other equipment

Fully automatic Variable Speed Controller to optimise efficiency designed by GP Electronics

Wider benefits

The Archimedes screw turbine was chosen over a more typical design in order to satisfy new demands from the Environment Agency regarding the habitats directive for migratory fish rivers. All the rivers within the Dartmoor catchment area fall under this new directive, but the screw design allows fish to migrate down stream without being damaged by the turbine which rotates at a maximum rpm of around 30 revs per minute. This allows fish to travel through the turbine and continue down stream. RE4D has helped test the system by supporting the fish testing financially with a £5000 grant. This scheme should be recommended as an exemplar for future hydro schemes on Dartmoor and in other similar areas.

River Dart Country Part won a DEBI (Devon Environmental Business Initiative) award in November 2007 for this installation.

Further information

www.riverdart.co.uk

www.westernrenew.co.uk

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For independent advice and support

Image gallery

Close up of Archimedes screw

