



Case study 'Old Walls' Hydro System Dartmoor

RENEWABLE ENERGY 4
DEVON



Introduction

The Old Walls Farm hydro-plant is a 'run of river' hydroelectric scheme on the West Webburn River on Dartmoor. There had been a smaller hydroelectric scheme on the farm since the 1930's and following the BSE crisis in the early 1990's the farmers, Gail and Miles Fursdon, decided to diversify their farm activities to ensure they were less dependent upon a single market.

How the system works

Water is diverted from the river and travels down a specially constructed leat to the turbines. After passing through either of the turbines to generate electricity the water is then returned to the river. The system is connected to the National Grid and electricity generation is monitored remotely with a radio link. The electricity is sold to a utility supplier under a Non Fossil Fuel Obligation (NFFO) contract, and paid for on a half hourly basis.

Project development

- Miles grew up on Old Walls Farm with the original hydro scheme, so was familiar with the technology. He realised there was potential to develop the scheme further to increase energy capture and generate more electricity. By building a new leat across the whole length of the farm's river frontage he gained additional 'head' (the relative height that the water drops to the turbine) and therefore more pressure behind the water flowing through the turbine.
- In the early 1990's he started to design the new scheme, and began negotiations with the Environment Agency and local planners. It took four years to obtain the necessary consents. Although some outside labour was brought in, Miles undertook most of the construction work himself.
- Because the flow can increase rapidly after heavy rainfall, and diminish as peat bogs dry out in summer two different turbines were installed to ensure flexibility through fluctuations in water levels.
- The project also required construction of a new leat 1.5m deep by 2.5m wide through 460m of existing woodland, necessitating the felling of six mature trees. There had been no history of a similar planning application to Dartmoor NPA so the planners were on a steep learning curve and took some convincing.
- The Environment Agency raised a number of concerns about environmental impacts, but was happy to work with Miles. As a consequence Miles was able to develop some innovative solutions, and the scheme has since received several environmental awards.

Costs and benefits

- **Annual electricity generation is around 450MWh; enough to power over 90 homes, and save 170 tonnes of CO₂ each year.**
- **The whole installation cost about £80,000; less than £1000 per kW of installed capacity, primarily because Miles did most of the work himself.**
- **He received a construction grant of £15,867 from the Farm and Horticultural Development Scheme.**
- **The project's pay-back was 4.5 years, not including Miles' own time and labour.**

Technical details

TURBINE 1

'Cink' crossflow turbine = 800 litres / sec
David Brown gearbox
Marelli 3-phase alternator = 90 kWe

TURBINE 2

'Cink' crossflow turbine = 175 litres / sec
Belt-drive
Marelli 3-phase alternator = 21 kWe

ELECTRICITY POWER REGULATION

GP Electronics controller

INSTALLER

Miles Fursdon, plus local plant operator.
Western Power Distribution carried out the grid connection work

Wider benefits

The scheme received awards from The Royal Bath and West of England Society and Eurosolar UK and were runners up in the 2004 Ashden Awards and the 2007 Devon Diversification Awards. The leat provides a sheltered environment for fish.

Six mature trees in the line of the leat had to be felled, but by agreement 800 new hardwood trees were planted close by to compensate and extend the woodland. Cattle were subsequently excluded from an area of field in the flood plain that was allowed to return to nature and become a nature reserve. Under the new management regime a rare species of butterfly has returned to the meadow.

Following the successful completion of the project two new businesses were developed:

- Waterleat Walks & Talks run guided walks around the site
- Western Renewable Energy is a hydropower consultancy

Further information

"Waterleat Walks and Talks", www.waterleat.co.uk
- guided walk around the site and presentations

"Western Renewable Energy", www.westernrenew.co.uk
- a hydropower consultancy developing and installing hydropower schemes.

Contact RE4D

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For independent advice and support

Image gallery

Automatic fish protection and debris screen



New leat flowing through the woodland



Settlement tank and flood water spillway



The 90Kw crossflow turbine and generator

