



Case study Metherall Cottage Dartmoor



Introduction

Metherall Cottage is a three bedroom, domestic detached property located near Chagford on Dartmoor. The house is off-grid due to its remote location, 3km away from the nearest grid connection, so a stand-alone diesel generator supplied electricity. The owners, John and Anna, began to investigate alternative power sources in 2000, due to the increase in fuel prices and the emerging threats to future supplies of fossil fuels. "More importantly we were concerned about climate change" said Anna.

Project development

- The owners carried out a feasibility study, and analysed electricity consumption to assess any seasonal differences. They then made the house more energy efficient, installing extra loft insulation and using low energy light bulbs and other energy saving appliances.
- The amount of wind and sun available at Metherall was calculated. This involved four months of data logging using a home weather station to record wind-speeds, to find the windiest location. They also determined the sunniest south-facing spot with minimal shading from trees and buildings.
- They visited the Centre for Alternative Technology in Wales and other domestic properties with renewable energy systems to learn from other installations.
- They then designed a system that would produce enough electricity to match their energy requirements. They produced a business case to justify their investment, including installation costs, maintenance costs, grant availability and pay-back. The system was installed in Spring 2006.

How the system works

The bulk of electricity is provided by a wind turbine over the winter and solar photovoltaics in the summer. The PV array is ground-mounted, facing south on a wooden frame that can be tilted according to seasonal variation in the sun's elevation. Both are installed at 24v, and trickle feed via charge controllers into batteries. This provides all the household requirements at 230v ac via an inverter. The batteries, inverter and charge controllers are located in an outbuilding to ensure that hydrogen gas emitted from the batteries whilst charging does not contaminate their electrical components. The batteries are enclosed in an insulated chest to protect from contaminants and the cold. A control unit mounted in the kitchen enables monitoring of power consumption and battery status, and full control of the battery charging system and back up diesel generator.

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Costs and benefits

- The wind turbine produces up to 1000kWh pa, and the PV array up to 800kWh pa, giving a total potential output of 1800kWh. Anna and John's electricity consumption is 1400kWh pa, 96% of this is met by the wind turbine and PV. The remaining 4% is generated with the diesel generator, mainly at times to equalise or condition the battery bank, which is carried out once every two months.
- The PV, wind and solar water heating saves approximately 4 tonnes of CO₂ pa.**
- The whole system cost around £15,000, they kept costs low by doing much of the labour and groundwork themselves.**
- John and Anna received a £2500 grant from the DTI's Photovoltaic Demonstration programme (now part of the Low Carbon Buildings Programme), and £4000 from Dartmoor National Park's Sustainable Development Fund.**
- At current diesel prices the pay back is estimated to be 8.5 years (without the grants).**

Technical details

Wind turbine	1kW Air Dolphin, on a 12m guyed galvanised steel mast
Solar PV	1kW Sharp mono-crystalline
Inverter Installer	3kW Outback inverter
Battery storage	1150ah deep cycle, unsealed, lead acid, battery bank
Installer	Cholwell Energy Systems, (now part of Beco Solar) Magrec Ltd. subcontracted for the turbine installation
SHW	Navitron evacuated tubes – DIY installation with help from local plumber

Wider benefits

Also installed at Metherall is a solar thermal installation for hot water generation, providing 100% of hot water needs between April and September. Winter space-heating and hot water requirements are met by a wood fuelled range. By generating electricity on site Metherall was able to remain off-grid and John and Anna could avoid spending £45,000 on grid connection.

The Dartmoor National Park planning authority required a full planning application, but early negotiation with DNPA enabled John and Anna to design their system according to local guidelines. Full plans were submitted and Chagford Parish Council made a site visit. The key concern was the impact of the wind turbine on the skyline, but this was actually minimal as a backdrop of trees reduced the impact on the surrounding landscape.

"The help, advice and enthusiasm of local installers made it a great project to undertake" **John Baker**

Further information

John and Anna are happy to host visits by appointment, please contact RE4D for details.

Beco Solar

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Contact RE4D

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For independent advice and support

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