

# Gledpark Farm Wind Turbine and Solar Photovoltaics



Gledpark Farm,  
Borgue,  
Kirkcudbrightshire,  
DG6 4SS  
Farmer – Rupert Shaw  
Date of Farm Visit – 26th February 2014

Rupert Shaw has invested £45,000 into 10kW of renewable energy installations making Gledpark Farm a net exporter of electricity.

## Background

Gledpark Farm is a small deer and shorthorn cattle farming enterprise, situated approximately 2.5 kilometres north of Borgue in Dumfries and Galloway. The farm currently has a 6kW wind turbine and a 4kW roof-mounted solar PV array in place which are both fully operational. These installations supply the farm buildings and operations with power, and export any excess generation to the local electricity grid network. The electricity generation from these two sources makes the farm a net energy exporter.

## Wind Turbine

The wind turbine, a Kingspan K6 model (formerly a Proven P11) supplied and installed by VG Energy, is located 100 metres northwest of the farm steading close to the top of a small hill. The turbine is mounted on a 15 metre mast at an elevation of approximately 65 metres and has been operational since October 2012.

The total cost of the turbine installation, including grid connection, planning and excavation works was £36,525. All borrowing for the project has been confined to a mortgage lent by RBS at a rate of 1.74%, the arrangement fee for which was £1,895.

A breakdown of the different elements of the scheme are detailed in the table below.

Equipment Required	Cost
Kingspan K6	£27,130.00
Kubota Excavator for Groundworks	£6,000.00
Planning Fees	£335.00
SP Distribution Fee	£650.00
Concrete Pours	£2,410.00
<b>Total Capital Cost (approximately)</b>	<b>*£36,525.00</b>

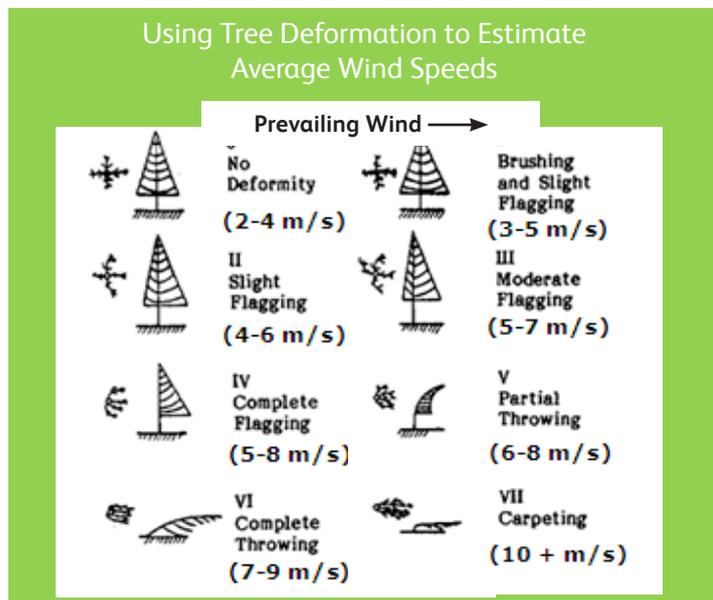
\*All costs exclude VAT

The table details a £6,000 cost for a second hand Kubota excavator. This equipment was purchased after Rupert received a £7,000 quote for the groundwork's to be undertaken by a contractor. This reduced the costs of construction and the excavator is now used for a number of other tasks on the farm.

Prior to the purchase of the turbine, a BERR/NOABL wind speed database query was made in December 2010 which indicated a mean wind speed for the turbine location of

Kingspan KW6 6kW turbine | Hub height: 15 | Rotor diameter: 5.6 | Total height to blade tip: 17.8 | Swept area: 24.6 square

6.2 metres per second at 10 metres height, and 7.0 m/s at 25 metres height. Rupert Shaw was confident enough to proceed with the turbine without obtaining more detailed wind speed data in the form of anemometry or purchasing wind data because a number of trees on the property displayed 'flagging' which indicated potential wind speeds up to 7 m/s (see diagram below).



Subsequent wind data assessment undertaken by the MET office as part of the NFUS RDI open day indicates that wind speeds are likely to be about 5m/s at 10 metres, which is significantly lower than the NOABL data.

The Feed-in Tariff subsidy was secured on the 24th of January 2013 with a retrospective activation date of the 19th of October 2012. The wind turbine produced 8,416kWh in first 12 months of operation, but a faulty installation had caused friction with the cowl until this was rectified on the 31st July 2012.

Having considered the more recent Met Office data along with the first year of recorded data a payback of 12.3 years has been predicted. Based on an estimated 9,000kwh per annum generated, this reasonable return is partly achieved by the majority of the electricity being used by the farm. A breakdown of financial figures is provided in the table below;

	Killowatt hours	Year 1 Income/Saving
FiT payment @28p/kWh*	9,000kWh	£2,520.00
Electricity savings @11.5p/kWh	8,231kWh	£946.55
export payment @4.5p/kWh	770kWh	£34.61
Payback Period		12.3 years

\*NOTE: 2014/15 FIT for a 6kw wind turbine = 17.78pkwh

Due to the wind speeds being lower than originally anticipated, maximising the use of electricity on the farm has been essential to maintaining an attractive payback period. If all the electricity has been exported, the payback period would have been 17.3 years.

The planning application for the wind turbine was made by VG Energy, while an electricity grid connection for the site was agreed with the District Network Operator Scottish Power Energy Networks and a single phase distribution connection sized at 12kW was made on the 8th of October 2012.

## Solar Panels

The 4kW solar installation is made up by 16 solar panels manufactured by Canadian Solar and installed by British Eco at a total cost of £9,000 (the cost of Solar PV panels has come down since the installation). The panels are mounted on the south facing roof pitch (at 30 degrees) on one of the traditional steading buildings and has been operational since May 2012. The panels are insured under the policy for the steading building and are covered by a 6 year repair, replace or refund warranty. No planning permission was required because the scheme was constructed under permitted development rights, and grid connection was shared with the wind turbine, taking the peak sun/wind capacity to 10kw (leaving a spare 2kw for a potential extension).

Based on the first year of recorded data of 3,924kwh, plus over 90% of the electricity being used by the farm a payback period of 6.2 years has been projected for this project. The table below provides a breakdown of income and savings achieved by the project.

	Killowatt hours	Year 1 Income/Saving
FiT payment @ 28p/kWh	3,924 kWh	£1,098.72
Electricity savings @11.5p/kWh	3,582 kWh	£411.93
export payment @4.5p/kWh	342 kWh	£15.38
Payback Period		6.2 years

The prediction of the payback periods allows for FIT to be linked to RPI (assumed to be 3%) and for an uplift in electricity prices at 7% per annum.

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I chose the turbine first, and then the installer - this was key to controlling the overall costs.

Rupert Shaw - February 2014

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