



Small scale wind power



A 2.5kW Proven wind turbine
Marshwood School, Dorset

What is it?

Wind turbines extract power from the wind with a rotor that typically consists of three or more blades which can be mounted on a horizontal axis or nacelle, or a vertical axis. Horizontal axis wind turbines are by far the most common. They range from small 100 watt micro turbines used to charge 12-24 volt batteries to 20 kilowatts (kW) machines which can export electricity

to the grid during times when more electricity is produced than can be used. Smaller models can be roof mounted whilst larger turbines tend to be mounted on masts up to 15 metres high. They are particularly useful where mains electricity is not available or is expensive to connect. There are about 650 small scale wind turbine installations in the UK and approximately 20 in Dorset.

Can I produce all my electricity requirements using this technology?

The annual power output of a turbine depends on the blade length of your chosen turbine, the average wind speed of your site, and the site not being obstructed by other buildings or trees. You can find the average annual wind speed for your postcode from the British Wind Energy Association website (www.bwea.com/noabl). You may alternatively wish to monitor your site with an anemometer which can be bought from companies such as Wind and Sun – see the link in 'More information'.

Wind speed is critical; the power generated, in watts (W) is proportional to the cube of the wind speed; so if the wind speed doubles, the power produced will be eight times as much. The average wind speed

in the UK is 5m/s. Smaller wind turbines can start-up at 2-3 m/s but may not reach their rated power until 12 m/s.

It is difficult to predict the output of roof mounted turbines due to site-specific turbulence. Measurements from 30 building mounted wind turbines monitored in the Warwick Wind Trials (see link in 'More information') have demonstrated actual electrical output in some cases to be only a fraction of that theoretically possible.



1.5 kW Swift turbine blade

Where is the best place to put a turbine?

When assessing the best site for your wind turbine you should consider the following aspects:

- Put the turbine as high as possible. The wind speed increases with height. Small turbines should be around 6-15m above ground level.
- Avoid turbulent wind streams. Locate the turbine away from trees, buildings and other obstacles. The distance should be ten times the obstruction's height if placed behind a building and at least twice the height if located in front. Roof mounted turbines are likely to be subject to plenty of turbulence so you will have to accept a reduction in performance.
- With stand alone turbines locate at least 50m away from your neighbours property to avoid noise or flicker disturbance.
- Look for a clear aspect that faces the prevailing wind.
- Place the turbine as close as possible to the point of use or grid connection point to avoid long cable runs.



Model	Rotor (m)	Rated power	Estimated power output per year at 5m/s	Total cost inc. installation	LCBP Grant
Windsave	1.75	1000W	Site specific	£ 1,800	£ 600
Swift	2.1	1500W	Site specific	£ 5,000	£ 1,500
Proven 600	2.55	600W	1363 kWh	£ 8,000	£ 600
Proven 2500	3.5	2500W	3164 kWh	£ 12,000	£ 2,500
Proven 6000	5.5	6000W	7805 kWh	£ 22,000	£ 2,500
Iskra AT5-1	5.4	5300W	6455 kWh	£ 20,000	£ 2,500

Up to date information the actual performance of roof mounted wind turbines can be found by logging on the www.warwickwindtrials.org.uk

How much maintenance is required?

All wind turbines have an expected life span of 20 – 25 years and should be serviced annually. This usually involves visual and noise checks for blade corrosion and component failure. Some parts may need lubrication, but most systems have sealed bearings requiring no maintenance. For systems that use batteries you will need to keep the electrolyte regularly topped up and grease the terminals, unless they are maintenance free batteries. You should check in advance the cost of maintenance with your installer.



6 kW Proven wind turbine

What does it cost?

Costs vary with the size of wind turbine and manufacturer, but are usually in the range £3,000-£5,000 per kW of rated output. If you intend to export surplus electricity to the grid you will need an export metre costing around £400 and if your turbine is more than 5 kW your grid connection might need strengthening.

These costs are for general guidance only. We would advise getting at least 2 quotes from reputable installers.

Can I get a grant?

Grants are potentially available for households until April 2011 (subject to availability of funding) from the Low Carbon Buildings Programme (LCBP), at £1,000 per kW installed, up to a maximum of £2,500 and

subject to an overall 30% limit of the total installed cost. It is likely that grants for domestic renewable electricity installations will end when the Feed-in Tariff scheme starts in April 2010 (see below)

The installer and the product must be approved and a condition of the grant is that you must already have installed a basic level of energy efficiency measures including wall and loft insulation, adequate heating controls and low energy light bulbs. Community groups can apply to energy companies with green energy funds, the Low Carbon Buildings Programme Phase 2 and to the Community Sustainable Energy Programme (see "More information").

What is the pay back?

Any domestic wind turbine installation commissioned after 17th July 2009 will be eligible for a "Feed-in Tariff" starting from April 2010, even if the installation has received a LCBP grant of up to £2,500. The Feed-in Tariff payments will last for a period of 20 years. For example, ignoring any grant support, a 2.5kW wind turbine generating the equivalent of full power for 25% of the year, assuming 50% the power is exported to the grid and 50% used on site, would produce an annual income from the Feed-in Tariff of £1400. In addition, there would be a saving of approximately £400 per year from the value of electricity used on site, assuming grid electricity costs 14p/ kWh. Total gross financial benefit with the above assumptions would be £1,800 per year, or a simple payback of 6.7 years on a £12,000 investment. Community scale and business sector installations can have even shorter payback periods at suitable sites.



The carbon payback - the time needed to generate enough green electricity to cancel out the total energy used in making the wind turbine- is around 1 year for most turbines.

Are there any planning issues?

Micro wind turbines are not permitted development and you should always check with your local planning authority before installing a system. Typical issues that need addressing include visual impact, noise and possible changes to the character of conservation areas or listed buildings. As a rule small stand alone turbines with mast heights lower than 15 metres do not need an Environmental Impact Assessment (EIA) and may not be ruled out in Areas of Outstanding Natural Beauty (AONBs) and Heritage Coasts as long as there is no serious environmental detriment to the area concerned.

What is the potential for this technology in Dorset?

In the UK we have 40% of Europe's total wind energy, but currently produce only about 0.5% of our electricity from this source. Dorset, as a coastal area, is particularly windy and there is a good potential to harness the wind to bolster our indigenous electricity supplies. Nevertheless, even small scale wind projects should aim to be sensitive to Dorset's unique environment and the heritage value of listed buildings and conservation areas.

Wind installers operating in the South West

In order to receive a grant or the new Feed-in Tariff householders must use an installer registered with the Microgeneration Certification Scheme (MCS) and also an accredited product.

To find an installer see:

www.microgenerationcertification.org

or telephone **020 7090 1082**

The Dorset Energy Group recommends using a local accredited installer whenever possible and to always get several quotes before committing to an installer.



20kW wind turbine
Portland Marina

Note the above information on Feed-in Tariffs was verified with the Department of Energy and Climate Change (DECC) at the time of printing this information sheet, but should be checked before making a financial commitment. In the case of micro wind power systems, each installation's payback will be site-specific and critically dependent on average wind speed.



Pros and cons of small scale wind power

Roof mounted

Pros

- Fairly easy installation
- Reasonably priced

Cons

- Annual maintenance required
- Turbulence can significantly reduce performance and the life expectancy of a turbine
- Vibration can cause problems if connected to brick buildings

Stand alone

Pros

- Stand alone systems should produce enough electricity to export to the grid
- Expensive but potential for a high return on investment in exposed locations

Cons

- Annual maintenance required
- Require ample space away from buildings and trees

More information

British Wind Energy Association:

0207 6891960

www.bwea.com/small

Warwick Wind Trials

www.warwickwindtrials.org.uk

Anemometers/ wind speed measurement:

01568 760671
020 7738 5800

www.windandsun.co.uk
www.bettergeneration.com

Grants

Low Carbon Buildings Programme

0800 9150990

www.lowcarbonbuildings.org.uk

Community Sustainable Energy Programme

0845 3 671 671
0800 915 0990

www.communitysustainable.org.uk
www.lowcarbonbuildings.org.uk/info/permited/

Renewable energy advice for householders:

SW Energy Saving Trust Advice Centre

0800 512012

www.energysavingtrust.org.uk

Renewable energy advice for businesses in Dorset:

Business Link

0845 600 9966

www.businesslink.gov.uk/southwest

Renewable energy in Dorset and advice for community groups:

Renewable Energy Development
Officer, Dorset County Council

01305 228530

p.west@dorsetcc.gov.uk
www.dorsetforyou.com/climatechange

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