



CLASP

Cumbria Factsheet | Wind Power

An Introduction to Micro and Small Wind Power

What is a wind turbine?

A wind turbine can turn power from the wind into electricity. The electricity can then be used within a property, with any excess exported to the grid or to an energy store such as batteries. Turbines can be mounted on buildings, but more electricity is likely to be produced by free standing turbines mounted on towers that are sited away from buildings. The amount of electricity produced by a turbine is largely governed by its turbine size, tower height, blade diameter, proximity to buildings, terrain and the amount of wind available.

- *Micro turbines* are rated up to 1.5kW peak output and are usually 5-7m high to the top of the blade. They could provide enough electricity to cover most of an average household's needs.
- *Small wind turbines* are rated between 1.5 to 15kW and are around 6 – 20m high. A 10kW turbine could provide enough electricity to support a small family farm.

There are two types of micro and small wind turbines:

- *Horizontal Axis turbines* with two or three blades. These are more effective in open sites.
- *Vertical Axis turbines* which look like an egg whisk. These can be more effective in urban areas where the wind is often more turbulent and unpredictable.

Why install this technology?

Wind turbines will save electricity and reduce carbon emissions. The Government has incentivised installation of this technology through the Feed in Tariffs (FIT) scheme. This will pay for each kWh of electricity generated from a wind turbine for 20 years. Any excess electricity that is not used by a property can also be sold to the grid for an extra 3p per kW hour. To qualify for FITs you need to purchase accredited equipment and have it installed by a [Microgeneration Certification Scheme](#) (MCS) installer. After 31st March 2012, a revised set of Feed-In-Tariffs will apply, which are due to be announced by the government in late 2011. Information regarding these schemes is available from the [Energy Saving Trust](#) and [Department for Energy and Climate Change](#) (DECC).

How do I know if a site is windy enough?

The relationship between wind speed and power generation is important, with turbines requiring a good windy site for viable energy generation. As an indication if trees and hedges are leaning with the prevailing wind then a site has potential. Ideally the site should:

- Have an average wind speed of 5m/s as a minimum.
- Be free from obstructions; buildings, trees etc.
- Be orientated to the prevailing wind direction which is usually S and SW.

A turbine should preferably be sited at least 10 times the height of any obstruction away from the obstruction, or on a tower that raises the blades above the height of the obstruction. For example, if a 10m tall building is near to a turbine, it would be sited 100m from the building, or be sited some distance away from it and be on a tower that is higher than 10m.

In all cases, planning issues will need to be considered to decide where to site a turbine and what its height might be. If it can't meet the criteria, alternative renewable technologies may need to be explored.

Entering a site's grid coordinates into the [national wind speed database](#) can indicate if it has a good wind resource or not. However, measuring the wind speed with an anemometer is the most reliable way to determine if a site has a reliable wind resource. Monitoring should be done over a period of time and on a mast similar in hub height to the proposed turbine. Planning permission will be needed for the mast and the monitoring may not be cost effective in the case of smaller turbines. You should seek advice from a reputable installer/manufacturer on determining the wind speed on your site.

What about connecting to the grid?

Small wind turbines can be connected to the local electricity network (grid). As a general rule properties that have a 3 phase connection should be able to connect to the grid. For those without 3 phase connections, you can connect up to 16 amps to the grid. This means you could potentially have up to a 4kW turbine on a domestic connection. However, the local grid system can sometimes be weak in rural locations and expensive work may be needed to upgrade your connection. Advice should be sought on this from an installer or the [District Network Operator](#) at an early stage as it could influence wind turbine choice and the cost of installation.

Do I need any permissions?

All free standing and building mounted wind turbines require full planning permission. Listed building consent may be required for turbines erected within the curtilage of, or on, a listed building. Please check with your Local Planning Authority (LPA).

Careful consideration is required regarding the siting and height of a turbine and impact of the development on the character of the local and wider landscape area, especially in areas subject to landscape character designation including a Conservation Area, National Park, Area of Outstanding Natural Beauty or World Heritage Site.

Planning issues that need to be considered when deciding on a location for a wind turbine include:

- Landscape and visual impacts, including shadow flicker (from blades turning in the sun);
- Noise;
- Vibration (if mounted on a building);
- Effects on birds and bats and other biodiversity interests;
- Electrical interference (with TV aerials);
- Safety, including proximity to roads/footpaths and effects on radar.

Landscape and visual impacts are a re-occurring planning issue with small wind turbines, as sites with a good wind resource are often open and prominent. Usual approaches to screening tall structures and reducing visual impacts might include siting them near buildings or trees or reducing the height of the structure. However, all of these approaches could significantly reduce the amount of electricity a wind turbine can produce.

If specified by planning, the costs associated with the production of the noise, vibration and landscape impact assessment reports can significantly increase the cost of installation and in some instances may render schemes unviable financially.

Early discussion is recommended with your Local Planning Authority about your project. Please be aware that Authorities may charge for pre-application advice. Many successful applicants have also discussed their plans with neighbours before a formal application is made.

What should I do next?

- Dig out your energy bills, ideally for a year, so that you and your installer know how much electricity you use and when.
- Consider what other energy saving or renovation work you could do at the same time. E.g. roof/loft insulation and electricity saving measures.
- Check the [wind speed database](#) to see if your site is windy enough but understand this can only estimate your wind resource.

- Contact your local planning department to discuss planning issues
- Get quotes from [REAL Assurance Scheme](#) registered installers. Ask for a leaflet about the scheme, its code of conduct and its insurance scheme.
- If you wish to be eligible for FITs, make sure your supplier and equipment is [MCS accredited](#).
- Ask for an estimate of potential electricity generation for your property in writing from your installer as well as a quote for the works before you sign a contract to install the equipment.
- Check if your property or plant and equipment insurance will cover a wind turbine.

What should I ask my installer?

- What turbine would be best for the location and how to measure your wind resource.
- Whether they will apply for planning permission.
- Whether your grid connection will be good enough or what it will cost to upgrade it.
- What maintenance will be required.
- The life expectancy and warranty of the system, its parts and the installers workmanship.
- About the arrangements needed for installation. i.e. will they arrange the scaffolding, digging trenches etc and will there be any disruption to you electricity supply and for how long.
- Whether you need a 'smart' meter to measure the amount of electricity that is exported to the grid and claim FITs, or whether your exported electricity will be 'deemed'. Ask them to explain the difference.

Local case studies

Case Study 1: Solway Coast

Proven 2.5kW; 6m mast; 3.5m blade diameter.

- Location: Garden of property
- Produces around 3,000kWh/ year, slightly less than anticipated
- Would cost approximately £16,000 to install

Issues that needed to be addressed through planning resulted in a lower tower height and the turbine being sited closer to the house. This reduced the amount of energy produced from that originally expected.

Case Study 2: National Park, West Cumbria

Proven 6kW; 15m mast; blade diameter 5.5m.

- Produces about 9,000kWh/yr, slightly more than anticipated
- Would cost approximately £25,000 to install

No planning issues to address, but close to pylons.



Proven Turbine – Case Study 2

Case Study 3: Rosewain Farm. Nr Wigton

Gaia 11kW; 18m mast; 13m blade diameter.

- Produces about 23,000kWhrs/ year which is slightly less than anticipated.
- Would cost approximately £45,000 to install
- Had to pay additional £15,000 for 3 phase grid connection

Issues that needed to be addressed through planning included visual impacts and interference to mobile phone masts.



Visit case studies like this during the annual [Cumbria Green Build Festival](#).

For case study information from across the North West visit the Climate Change North West online map. <http://www.climatechangenorthwest.co.uk/northwest-map.html>

Where can I find out more information?

Energy Saving Trust 0800 512 012 www.energysavingtrust.org.uk	Microgeneration Certification Scheme www.microgenerationcertification.org	Department for Energy and Climate Change www.decc.gov.uk
Centre for Alternative Technology 01654 705989 www.info.cat.org.uk	Cumbria Action for Sustainability www.cumbriagreenbuild.org.uk Local suppliers, site visits and training	REAL Assurance Scheme www.realassurance.org.uk



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Please note: the information provided in this factsheet is guidance only, for use at the client's discretion. We in no way guarantee that should the information be acted upon, that planning permission would be granted or refused. It is recommended that you consult with your local planning authority to ensure that local planning requirements are fully addressed prior to any renewable energy installation.

Factsheet produced by Danny Frost Ltd on behalf of CAFS. Email. timber@dannyfrost.co.uk Tel. 016873 71075 Published July 2011
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