CLASP. Climate Change Local Area Support Programme

Fact Sheet 1: Micro/Small Wind Turbines

Great Britain is the windiest place in Europe, exposed to prevailing winds from the Atlantic Ocean. Wind turbines harness the power of the wind to produce electricity.

What are micro/small scale wind turbines?

Wind turbines are often used in large-scale wind farms in the countryside or the sea, but there is a growing market for micro or small scale turbines. Small scale turbines are defined as those that are capable of delivering energy at a rate of less than 50kW. This definition covers a range of turbine sizes, from blades half a meter across to around 15 meters across and 30 meter tall towers.

How do they work?

Like an aeroplane in reverse, the wind causes the propeller-like blades to spin. The spinning blades are connected to a generator, which produces electricity. This electricity can be used by the turbine owner or delivered to the national grid. Because the electricity is free, the owner saves money by using it instead of buying electricity from the national grid. MCS Certified wind turbines are eligible for the Feed-in Tariff scheme.

Where do they go?

The harder the wind blows, the more electricity is produced. This is why large scale wind farms are often positioned on top of hills or out at sea. Like larger turbines, small scale turbines will produce the most electricity when they're in the windiest place. However, the wind needs to be "clean" or stable: wind blowing around obstacles like buildings or trees will "swirl" or become turbulent. Turbulent wind can be very strong, but it changes speed and direction often. A wind turbine must align itself with the wind: if the wind is turbulent, the turbine must keep repositioning itself and produces much less electricity. Turbulent wind can also damage wind turbines.

For this reason wind turbines must be positioned away from any obstacles, as high as possible. As a rule, wind turbines placed on roofs, at the side of buildings or next to trees will produce very little electricity.

The height and size of the turbine will affect the energy output; turbines with longer blades will produce more electricity, and taller turbines will produce more electricity. Wind speed is more important than the size of the turbine's blades due to the fact that:

- If you double the length of the blades you will double the amount of electricity.
- If you double the speed of the wind you get eight times the amount of electricity.

What issues need to be considered?

Wind turbines will have a visual impact on the local area. While some people may argue that wind turbines are "ugly" and spoil the landscape, other people may like them. It is important to remember that small scale turbines can help us generate energy locally, and are a lot smaller than the turbines used in commercial wind farms, and have a much smaller impact on the landscape.

Wind turbines produce noise, primarily from the blades as they move through the air. This noise increases as the wind gets stronger, but, in strong winds the noise of the wind can often mask the noise of the wind turbine. The European Wind Energy Association (EWEA) gives the volume of noise from a wind farm 350 meters away as equal to a busy road 5 kilometres away, just louder than a quiet bedroom (around 40 dB).

At certain times of the year when the sun is low in the sky, the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. When the blades turn, the shadow flicks on and off; the effect is known as 'shadow flicker'. It only occurs inside buildings where the flicker appears through a narrow window opening.

The incidence of shadow flicker depends on the position of the sun in the sky. It occurs only at certain times and only affects nearby buildings to the north of the turbine. The likelihood of shadow flicker occurring and the duration of such an effect depends on a range of factors, including the time of the year, the size of the turbine, the direction and speed of the wind and the relative cloud cover. Whilst problems caused by shadow flicker are rare, it will need to be considered when installing small wind turbines near to existing buildings.

Myths

"It takes more energy to make a wind turbine than the turbine will produce in its lifetime."
Renewables UK (formerly the British Wind Energy Association) have calculated that it takes 3 to 6 months for a wind turbine to pay this energy cost back.

"Wind turbines kill birds."
In some cases, birds have been killed by wind turbines. However a study[1] in the US calculated that buildings, domestic cats and cars are responsible for significantly more bird deaths than wind turbines and the Royal Society For the Protection of Birds (RSPB) have stated that if wind farms are located away from major migration routes and important feeding, breeding and roosting areas, there is a strong possibility that they will have minimal impact on wildlife[2].

[1] Ericksonn W., Johnson, G. and Young, D. (2005)
[2] www.rspb.org.uk/ourwork/policy/windfarms/index.aspx

"Wind turbines are inefficient."
Wind turbines are very efficient at converting wind energy into electricity when the wind is blowing, and usually generate some electricity about 70-80% of the time, but the output will depend on the wind speed. Over the year, a typical turbine will generate about 30% of the maximum rated capacity. However, unlike coal, gas or oil, wind is a free, renewable resource that will never decrease or run out, so efficiency is a less important issue.

What are the planning requirements?

Most householders can carry out small extensions or additions to their homes without the need for planning permission. This is known as '**permitted development'**. Permitted development rights currently allow for small domestic wind turbines to be installed without the need for planning permission, providing certain conditions are met. These conditions have been set to ensure that any negative impacts such as visual impact, noise and aviation interference are kept to a minimum.

The planning requirements for wind turbine development in different settings is summarised below:

i. Roof mounted wind turbines on homes

Installing a single roof mounted wind turbine onto the roof of a detached house or onto the roof of a detached building within the garden area of a house or block of flats is permitted development provided that the following limits are met:

- The wind turbine complies with the Microgeneration Certification Scheme (MCS) Planning Standards (or equivalent).
- No other wind turbine or air source heat pump has been installed on the building (additional equipment will require planning permission).
- The blade diameter should be is no more than 3.8 square metres.
- The tip height of the turbine is no higher than 3 metres above the roof (excluding the chimney) or no higher than 15 metres in height (whichever is the lesser).
- The lowest part of any blade must at least 5 metres above ground level and the turbine is installed at least 5 metres away from the site boundary.
- In conservation areas, wind turbines should not be fitted on a wall or roof which fronts a highway.

Planning permission will be required for listed buildings, sites designated as schedule monuments and on land safeguarded for aviation or defence purposes.

ii. Stand alone wind turbines in residential gardens

Stand alone wind turbines within the garden area of a house or block of flats is permitted development provided that the following limits are met:

- The wind turbine complies with the Microgeneration Certification Scheme (MCS) Planning Standards (or equivalent).
- No other wind turbine or air source heat pump has been installed on the building (additional equipment will require planning permission).
- The blade diameter should be is no more than 3.8 square metres.

- The tip height of the turbine is no bigger than 11.1 metres in height.
- The lowest part of any blade must at least 5 metres above ground level.
- The turbine should be sited so it is tip height plus 10% away from any site boundary (e.g. a 10 metre high turbine would need to be 11 metres (10m + 1m) away from the boundary).
- In conservation areas, the wind turbine should be set away from the highway.

Planning permission will be required for listed buildings, sites designated as schedule monuments and on land safeguarded for aviation or defence purposes.

iii. Other wind turbine development

Domestic wind turbines which exceed the permitted development rights limits set out above and non-domestic wind turbines will require planning permission.

There are a number of planning considerations to be taken into account for wind turbine proposals, and often additional information will need to be submitted with the planning application to address these e.g. photographs or technical information. Most suppliers can provide the relevant information on their turbines, but sometimes further surveys need to be done. The most common issues associated with small wind turbines are summarised below:

- Visual impact on the local landscape.
- Impacts on any protected habitats or species that might be present in the locality e.g. birds, bats or newts.
- Impact of the turbine upon neighbouring residents (in terms of causing noise nuisance, creating 'shadow flicker' or its visual prominence).
- Health and safety. If there are any buildings or transport routes where the turbine would be sited, a clearance distance may need to be adhered to on safety grounds (typically the turbine tip height plus 10%).
- Impact on communication and aviation infrastructure may also need to be addressed e.g. wind turbines along a flight path can cause false readings on radar equipment.

There may also be other site specific issues to be addressed depending on the size and specific location of the proposed turbine. All these issues will impact upon the capacity of the site to accommodate a wind turbine. It is important to note that there will be some locations where wind turbines will not be suitable, and it is always recommended that you speak to the Planning Department before submitting an application.

More info

The website of 'RenewableUK', formally the British Wind Energy Association: http://www.bwea.com/index.html

The companion guide to planning policy statement 22 provides more information on the planning and development of renewable energy schemes across England: http://www.communities.gov.uk/publications/planningandbuilding/planningrenewable

Please Note: National planning guidance is currently under review and the companion guide to planning policy statement 22 is referred to for information only.