

Introduction |

Small/micro wind energy systems can be an effective method of generating renewable electricity on-site and an increasing number of different products are now available. As with other forms of on-site renewable electricity generation, micro wind avoids carbon dioxide emissions resulting from the use of fossil fuels to generate electricity. This is especially significant due to the low conversion efficiency from some power stations and electricity transmission losses. Onsite wind energy generation brings additional advantages of increased security of supply for non grid-connected machines and some protection against electricity price rises.

Technology |

Small/micro wind turbines cost significantly more than large turbines per kilowatt of capacity installed, but can help to reduce carbon emissions and can still be economically viable in some situations. These systems are now readily available including some that are designed to be mounted on a building rather than a freestanding tower. They can be used to generate electricity for homes, public buildings or businesses.

If a turbine is mounted to a building, the building structure should be checked to see if it can cope with the additional stresses and vibration generated by the turbine. Some types of building materials such as lime mortar are unsafe for the installation of turbines. Manufacturers specifications should make it clear if your building is suitable. Installed turbines should be pull-tested to check the structure they are mounted on is able to withstand the forces which will result from the turbines operation.

Wind turbines are available in a wide range of different sizes. The main factors affecting the amount of electricity generated are the size of the machine and the average wind speed. This varies across the UK and increases with the height of the turbine above ground level. Local topography can significantly alter the expected wind speed. A small difference in wind speed will make a large difference to output, so it is advisable to monitor wind speed for at least six months before installation, particularly for larger turbines. As a first estimate, the database on www.bwea.com can be used to predict the approximate wind speed at a particular set of co-ordinates at different heights. However it is also important to consider the sheltering effect of surrounding features such as trees and buildings which can dramatically reduce windspeed and increase turbulence.



Examples of the types of turbines available can be seen opposite

Issues |

Planning Permission

Under current planning law, planning permission will be required to erect domestic scale wind turbines. Permitted development rights are being reviewed, but planning issues such as noise, visual impact and conservation issues mean that it is always best to contact your local authority to check whether you need planning permission.

Connecting to the grid

Small-scale installations can be connected to the grid via the consumer unit (fuse box) of a house. When there isn't enough electricity being produced by the turbine, electricity is imported from the grid, when there is more than needed, it is exported. By buying an export meter (for a cost of around £150) this surplus can be sold to an electricity purchasing company for around 2.5p per kWh. In addition, Renewable Obligation Certificates (ROCs) can be received for the electricity generated. Some suppliers have home power tariffs for households with their own renewable electricity systems. These tariffs usually credit the householder for the renewable electricity generated and deal with electricity and ROC trading on their behalf.

For safety reasons, if there is a power cut the turbine stops supplying electricity into the home. Small turbines can be used to charge batteries instead of being connected to the grid, although this is normally only done by those not already connected to the grid and currently using a diesel generator. The batteries can typically store two to three days worth of electricity. Another possibility is to use the electricity to pre-heat the water in your central heating system.

Care must be taken if a system is to be fitted to a property with a pre-payment meter, as some meters do not allow the export of electricity and can be damaged if this is attempted.

Finance |

Estimating the Potential of the Site

As with any micro-renewable energy project, the first stage is to estimate the demand for electricity, which can be done using electricity bills. The next stage is to try to minimise demand through energy efficiency measures (such as low energy lights and appliances and turning off unused equipment). The wind turbine system can be sized to meet the reduced maximum demand of the building, or a proportion of it.

The average household electricity use across the UK is around 4,400 kWh per year, however an energy efficient home might use around 2-3000 kWh or less. Accurate electricity use data can be collected from electricity bills. Most wind turbine manufacturers provide performance data for their turbines. It is important to look at the assumptions behind the performance data, in particular the average wind speed that has been used for the calculation. This can then be compared with any information you have on wind speed at your site, such as on-site monitoring data or information from the national windspeed database (www.bwea.com).

Sizing tools |

A simple approximate sizing tool for schools is available for free download from The Centre for Energy and the Environment www.ex.ac.uk/cee/re. For homes and other buildings, a more complicated but accurate free sizing tool can be downloaded from RETSCREEN www.retscreen.net/ang/t_software.php.



2.5 KW Proven turbine |

Costs |

Prices vary, but expect to pay £1,000 - £7,000 per kW installed for small/medium scale systems. Suppliers should be contacted for up to date costs. The Low Carbon Buildings Programme from the DTI can offer a maximum £1,000 per kW installed, up to a maximum of £5,000 subject to an overall 30% limit of the installed cost (exclusive of VAT) for home owners; for larger buildings a maximum of 40-50% of total costs (excluding VAT) can be recovered.

For more details see Grants section.

| 250W Aerogen turbine



Useful Links |

"Small scale wind", BWEA Briefing with a list of UK manufacturers and installers

www.bwea.com/pdf/briefings/smallsystems.pdf

Regen SW has a list of suppliers on its website

www.regensw.co.uk/directory