

The UK wind resource

Wind Energy Fact Sheet 8

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The UK is a very windy country. Our long exposed coastlines and low mountain ranges make the UK wind energy resource the largest in Europe.

How much wind energy does the UK have?

It is theoretically possible to obtain more than 1000TWh of electricity each year from the wind in the UK. This is almost three times the amount of electricity actually used.

To obtain an understanding of the practicable resource, account must be taken of sensible restrictions, such as protected areas and the utilisation of only the more economic sites. ETSU's estimate of the likely practicable resource is something over 50TWh per year on land – for information on the offshore resource see Fact Sheet 1.

What limits our use of wind energy?

Although technically we could generate large amounts of wind energy, the amount will depend upon both what is considered acceptable, weighing environmental and other benefits against local impacts (see Fact Sheet 4 for more information on this), and how much we are willing to pay (see Fact Sheet 3 on wind energy economics). This needs to be considered in the context of all the technologies available, their impacts and economics.

The UK electricity network can be adapted to handle all the wind farms that we are likely to build in the foreseeable future (see Fact Sheet 11 on electrical issues). However, as more wind power is exploited it becomes necessary to increase the capacity to carry electricity between different regions of the UK (eg between England and Scotland) and change the way that we operate our system. Technical solutions are available but it should be recognised that they do have a significant cost and will take time to implement.

Where are the windiest places?

Winds are driven by weather systems. The winds blowing over the UK first build up over the sea. As the winds reach the land, they begin to slow. Some of the windiest places are therefore on the coast. Most of the UK weather comes from the Atlantic, to the west, so generally the higher wind speeds are to the west of the country. In the UK the wind is also generally strongest in winter and weakest in summer, stronger during the day and weaker at night.

Hills and some valleys also cause higher wind speeds. Winds forced to flow over or round hills move faster and have more energy. This is why many wind farms are built on the tops of hills. The windiest places are those with a combination of high mountains and strong winds from the sea.

Wind speeds generally increase with height above the ground. Winds at 50m above the ground are over 75% faster than the wind speed at head height. This is why wind turbines are often mounted on tall towers.

Wind speeds for a site are usually given as the annual mean wind speed. The annual mean is the average wind speed over a year.

How much energy is there in the wind?

The amount of energy in the wind is proportional to the cube of the wind speed. This means that doubling the wind speed results in eight times the energy.

Due to the design of modern wind turbines and the nature of the wind, (see Fact Sheet 13 for details) doubling the annual mean wind speed produces roughly 3-5 times the energy output each year for the same size wind turbine. This is why wind developers try hard to find the windiest sites.

How windy is it where I live?

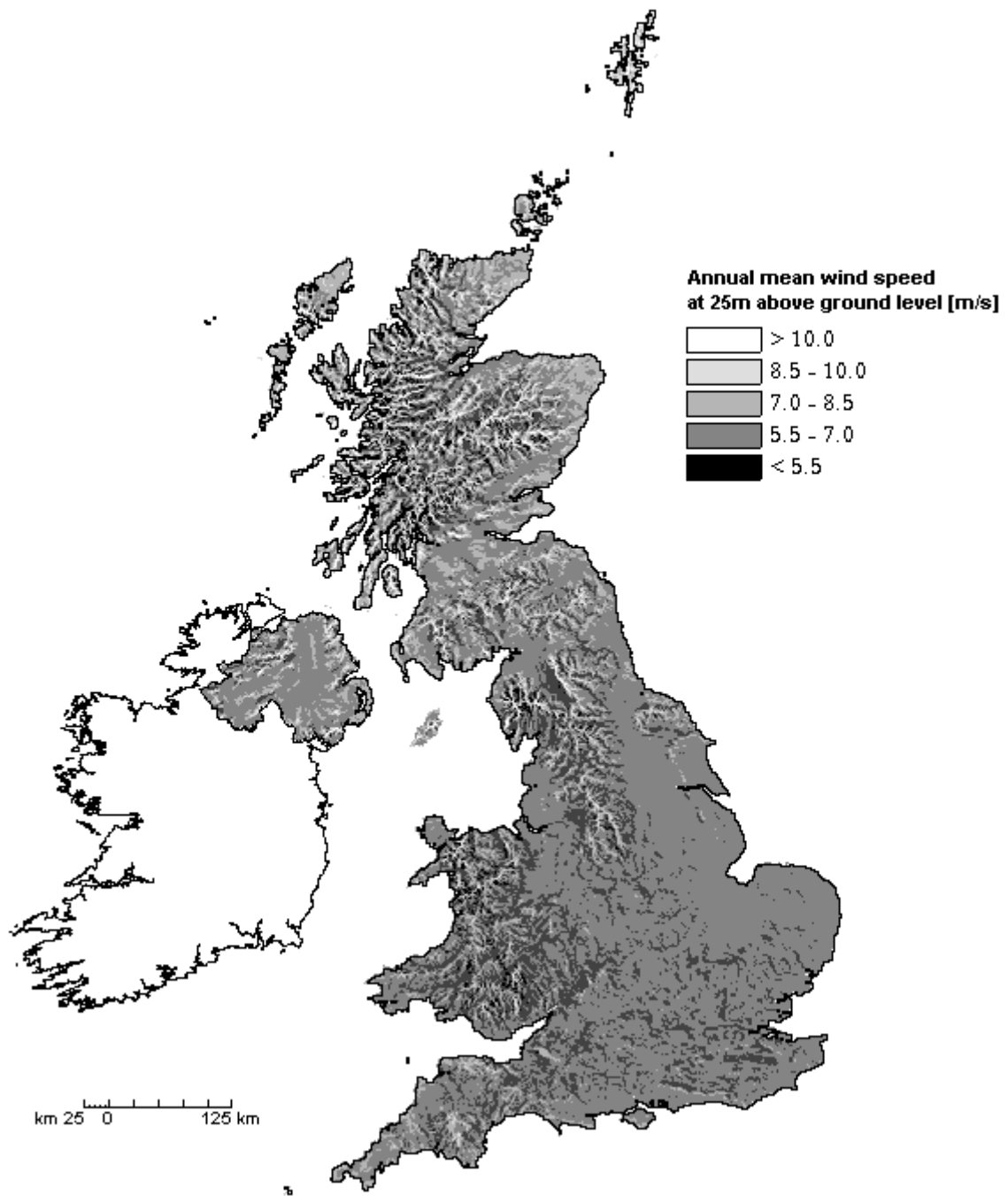
You can get an estimate of how windy it is anywhere in the UK by writing to the Renewable Energy Enquiries Bureau at ETSU (see below) stating the Ordnance Survey grid reference of your site and the name of the nearest town or village. Generally, good commercial sites will have wind speeds above 7m/s at 45m above the ground. For more information on what is involved in developing a wind farm see Fact Sheet 12.

The map on page 3 shows an estimate of the annual mean wind speed at 25m above ground level and highlights the windiest areas of the country.

References

A review of the UK onshore wind energy resource, Fiona Brocklehurst, ETSU R-99, 1997

UK energy in brief, DTI, July 2000



Further information:

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Web at www.dti.gov.uk/NewReview/

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