

# Exploiting the force of the wind

## Introduction

Modern wind turbines, like windmills, generate energy via the rotation of arms or sails. But their energy is electrical rather than mechanical, allowing the transmission of power across great distances. The horizontal bladed turbine is the one seen across the world today and in the illustration below. A turbine with a vertical axis exists but is little used commercially, as it is less efficient and takes up more ground space.

## Large-scale wind farms

Wind farm construction in the UK has proliferated over the last few years. Over 600 Megawatts

But larger land-based schemes are finding it harder to get planning permission. Amongst the complaints from local residents are: noise, visual impact, destruction of habitat and danger to wildlife. However, most people respond favorably to wind farms with surveys showing that 90%, even those living near the turbines, find them attractive or neutral. The planning system helps avoid the most sensitive areas.

Furthermore, turbines are being increasingly located at sea, particularly off the coasts of North Wales, Norfolk and Kent. By 2010 there should be 7000MW offshore capacity including 1000MW from a planned development in the Thames Estuary. This will be the world's

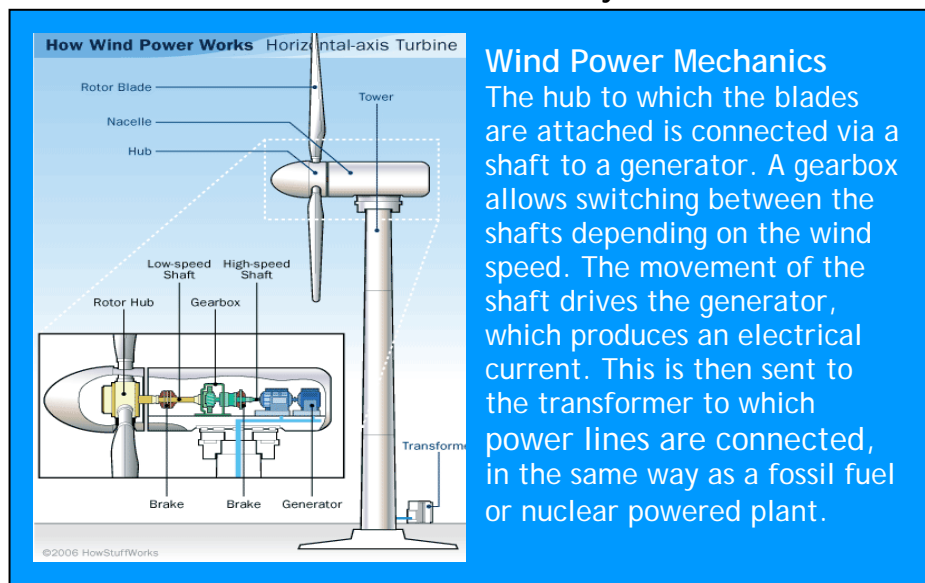
25% of London's domestic use.

Highest capacity totals in (MW)		
	2006	2007
Germany	20,622	22,247
Spain	11,615	15,145
USA	11,603	16,818
India	6,270	8,000
Denmark	3,136	3,125
UK	1,963	2,389

## Micro-wind turbines

Small wind turbines are described by the British Wind Energy Association (BWEA) as being 4m diameter or approximately 3.5 Kilowatt (KW) capacity or smaller. With the large increase in electricity prices over the last couple of years, sourcing our energy from small systems independent of the national grid is becoming a more attractive idea.

Conservative Party leader David Cameron is a high profile person who has installed a turbine in his home. However, these systems are not cheap. According to the Energy Saving Trust, the cost of a 1KW turbine is from £1500, whilst a larger system of 2.5 - 6KW costs between £10,000 and £25,000. The cost of installation is included and turbines will last about 20 years. Grants are available from the government's



### Wind Power Mechanics

The hub to which the blades are attached is connected via a shaft to a generator. A gearbox allows switching between the shafts depending on the wind speed. The movement of the shaft drives the generator, which produces an electrical current. This is then sent to the transformer to which power lines are connected, in the same way as a fossil fuel or nuclear powered plant.

(MW) were installed in 2006, ten times the level of five years ago, and over 400 Megawatts in 2007.

largest offshore wind farm with 341 turbines and should meet 1% of the UK's electricity needs and

low carbon buildings programme, but they tend to get used up quickly.

To make the most of the wind, the best site would be at least 100 meters horizontally away from surrounding objects or 11 meters above. The turbine should face the prevailing wind (westerly) on either the side or top of the roof (pitched or flat equally as effective).

Another option is to join a cooperative and buy a share in the project. Oxfordshire Westmill Co-op is the first community owned Wind Farm in the UK with 2000 local people investing in the venture. When constructed, the five turbines will have a 6.5MW capacity and provide electricity for 2500 homes.

## Is it worth it?

The energy generation claims of turbine manufactures and the stores that sell them are sometimes misleading. Some claim they generate as much as 50% of a household's energy needs, but climate campaigner George Monbiot points to research indicating that a typical turbine size of 1.75m diameter produces only 5%. The main reason for this disparity is turbulence caused by the proximity of buildings, trees and other structures resulting in the blades rotating fitfully. A larger turbine of 4 m diameter could generate the 50% needed but the force of its rotation would damage most household roofs.

## Local wind energy

Ormiston Wire, a small-scale wire making business, installed a solar and wind scheme in 2003. The 2.5KW wind turbine is 3.5m

in diameter. However, the company struggled with planning: it took ten months rather than eight weeks for permission to be granted. Hounslow Council cited the unique nature of the application (the first wind turbine in the Borough) and wanted to be sure of the correct decision.

## Conclusions

A wind turbine on your roof is a nice idea for anybody concerned about preventing climate change. But the evidence suggests caution in proceeding. Unless you live on top of a hill or some way from anyone else, it might not be as effective as you hope. On the other hand, it does make a statement of intent and if it gets people talking about ways to cut energy use it's all to the good.

As the annual mean wind speed in an urban area is low, the real scope for energy generation lies offshore, where wind power comes into its own, literally harvesting energy from the air. Wind turbines will never make the UK completely self-sufficient. Even in such a windy country as ours, calm wind-free days are common and that's when a back up source is needed. But it does mean a saving for our coal and gas as these big generating plants won't need firing up so often.

## Contacts

**British Wind Energy Association**  
News, overview of wind farms, reports and studies.  
[www.bwea.com](http://www.bwea.com)

### Energy Saving Trust

Advice on cutting energy use and encouraging the use of renewables.

[www.est.org.uk/](http://www.est.org.uk/)

### Energy 4 All

Advice on investing in a community wind scheme.

[www.Energy4all.co.uk](http://www.Energy4all.co.uk)

### Government's Low Carbon Buildings Programme

Help with applying for a grant for Micro-generation technologies.

[www.lowcarbonbuildings.org.uk/home/](http://www.lowcarbonbuildings.org.uk/home/)

### B & Q

One of the UK's largest DIY chains has started selling wind turbines.

### Ormiston Wire

[www.ormiston-wire.co.uk/](http://www.ormiston-wire.co.uk/)

### Wind turbine made by Proven

[www.provenenergy.com](http://www.provenenergy.com)

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All recommendations within this leaflet are offered in good faith, with the benefit of related experience and knowledge. However, if you choose to carry any of them out, you do so entirely at your own risk. REN are unable to accept any responsibility for loss or damage resulting from such action.

## Richmond Environment Network

Linking, supporting, developing & promoting local environmental and sustainability activities.

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