



wind generators



what are they?

Wind generators are devices that produce electricity from the power of the wind. Inside the body of a generator, there is a magnet that rotates inside a coil of wire, which produces an electric current in the wire – a little bit like a dynamo on a bicycle, but with the wind providing the movement, not your legs.

Wind generators come in many sizes and shapes, from small units found on caravans and boats to enormous machines that can power a whole village. Wind farms have many generators which produce a large amount of power. In the UK there are large wind farms in Wales, Cornwall, Yorkshire, Northern Ireland, Scotland and Cumbria. Some people object to wind generators on the grounds that they can be noisy and may be thought to spoil a beautiful view. Recently, wind farm planners and engineers have improved the noise problem considerably. Many people living near wind farms have no problem with their appearance, especially when you consider that they are producing electricity without burning fossil fuels.

Perhaps the ultimate solution is to put wind generators offshore, where winds are strong and there are no neighbours. The UK now has several offshore wind farms, with more in the pipeline. The main drawback is the cost of building in a harsh environment.

The UK has the best wind resource in Europe; we currently produce less than 1% of our energy from the wind, but the potential could be as high as 20%.



Well-positioned wind turbine.

what are the benefits?

Wind generators are the main viable alternative to fossil fuels and nuclear power in the UK: as such, wind power has the potential to replace currently existing generating technologies which cause a wide range of environmental problems. Wind power does not contribute in use to climate change or acid rain, and does not create a hazardous waste storage problem.

Wind generators have a good energy ratio: they generate many times the energy needed to make them. Also, it is easy to decommission wind power installations; most of the materials are easily recyclable using existing technologies.

Greater use of wind power means less dependency on remote fuel sources, with the problems of transport and military involvement that brings.

Wind power is suitable for small installations, unlike many other generation technologies that are only viable on a large scale.

Safety and reliability are good – a properly installed wind generator will operate without problems for 20 years or more, and there is no record of any member of the public ever being harmed by an operational wind turbine.

Some people oppose wind turbines because they can cause bird deaths – it's estimated that wind turbines kill between 20k and half a million birds in the US every year, according to Wikipedia. However, fossil fuel power plants kill around 14 million (and over 20 times the number of deaths per unit of electricity generated); pesticides, 72 million; hunting, over 100 million; buildings, at least 300 million; and cats, probably 1-2 billion. So it's good to get things in perspective. We can and should keep turbines away from major migration routes, but climate change is going to cause more harm to birds, and to nature generally, than wind turbines ever could.



There are courses, like this one at V3 Power, where you can learn to build your own turbine.



what can I do?

It's a good idea to combine wind with solar, to take advantage of all weather conditions (plus the wind blows at night) to provide all, or contribute to, your energy needs. If you want to provide all your needs, first reduce energy use and become more energy efficient, otherwise it will be quite expensive. Wind generators are ideal for boats and caravans, where less electricity is needed, and for remote, off-grid homes, in combination with a diesel generator – especially if heating is solid fuel, and cooking is with bottled gas.

Check the wind speeds for your location, or monitor them yourself with an anemometer, then look at graphs provided by manufacturers for their turbines to see what power (in Watts) you will get for your average windspeed. Divide by 1000 to get kW, and multiply by the number of hours in a year (8760) to find the kWh generated per year (a kWh is a unit of electricity and can be found on your electricity bill). For example, a small turbine costing around £700 (not including batteries, mast, regulator or inverter) will provide around 300 kWh per year. An average family in the UK uses between 3-4,000 kWh per year, so this generator will only contribute a little of that.

When checking manufacturers' graphs, bear in mind that they may use knots. A knot is around 0.5m/s. Talk to your local planners (for a small turbine, this shouldn't be a problem), and choose a site away from trees and buildings (rural areas are much better sites for wind generators).

It's not a good idea to mount turbines on buildings. The turbulence is terrible close to buildings and the noise transmitted through the structure is unacceptable. It's essential to mount a turbine at least 6 metres above any obstruction within a 100-metre radius of the tower. If the site is wrong and for various reasons the output will be low, or if it's too close to neighbours, then it's probably not a good idea. If the site is right but you have close neighbours then go for a small unit that is unobtrusive but on a tall tower.

Decide whether you will use a battery bank, or be grid connected (in effect using the grid as a store instead of batteries). There are environmental problems in the manufacture and disposal of batteries, but you will be autonomous, and power cuts won't affect you. There is a third way, called grid interface. Batteries are used but the grid kicks

in via a transfer switch if the batteries get low. You can slowly add more wind and solar to reduce the need for grid power.

There's much more involved for a domestic installation – e.g. upwind or downwind turbines, battery care, towers, charge controllers, inverters, electrical components – details of which can be found in our publication, *Wind & Solar Electricity*.

You can buy 12-volt domestic appliances, in which case you just need batteries and a regulator, or you can use normal 240v appliances, but you'll need an inverter too. You can self-install or you can employ a professional. If you can't install your own turbine, you can support wind power by switching to a green supplier.

Finally, it's possible to build your own turbine – search online for courses or Lowimpact.org have a manual, but this is only for the enthusiast – if you want to contribute to reducing carbon emissions whilst powering your home efficiently, it's best to go for an off-the-shelf device.

There are currently no government financial incentives for new renewable energy installations.

resources

- see lowimpact.org/wind-generators for more info, courses, links & books, including:
- Andy Reynolds, *Wind & Solar Electricity*
- Michael Daniek, *DIY 12-Volt Solar Power*
- Paul Gipe, *Wind Power Basics*
- renewableuk.com – trade association
- wwindea.org – World Wind Energy Association
- windempowerment.org – locally-built small wind turbines for sustainable rural electrification



Poorly-positioned wind turbine.

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