



# 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 coil of wire and a magnet. When a coil of wire is moved inside a magnetic field, it produces an electric current in the wire - the same principle as a dynamo on a bicycle, but the wind provides 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 think that they enhance the view. Perhaps the ultimate solution is to put wind generators offshore, where winds are strong and there are no neighbours. The first offshore wind generators in the UK were installed recently. The main drawback is the cost of building in a harsh environment (and a very long cable).

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%.



*wind generators work well in combination with photovoltaics; solar provides more energy in summer, wind more in winter.*

## 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 global warming 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 which 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.

## 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, the first task is to reduce energy use and become more energy efficient, otherwise it will be quite expensive. Wind generators are ideal for boats and caravans though, where less electricity is needed, and also for remote, off-the-grid homes, in conjunction with a diesel generator - especially if heating is solid fuel, and cooking is with bottled gas.

Check the BWEA website (see resources) for wind speeds at your location, or monitor them yourself (see *Wind & Sun Design Guide* for equipment), 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 Marlec 913, which costs £500 (not including batteries, mast, regulator or inverter) will provide around 265 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).

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.

You can buy 12V 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 (see courses) or you can employ a professional.

Feed-in tariffs were introduced in April 2010, as a financial incentive for installing renewable electricity generation, including small-scale wind; and the incentives are quite good - see resources.



**installation:** the installer is here connecting the wires that run down the mast to the batteries and inverter. The wind gen will then be fixed to the mast, and the mast raised and fixed in place with guy wires.

## resources

- range of books available from LILI, including:
- Andy Reynolds, 2009, *Wind & Solar Electricity*
- Hugh Piggott, 1997, *Windpower Workshop*
- *Design Guide & Catalogue*, from Wind & Sun Ltd.
- bwea.com - British Wind Energy Association – good FAQ section and wind speed information based on Ordnance Survey co-ordinates (see also [lowimpact.org/wind\\_speeds.html](http://lowimpact.org/wind_speeds.html))
- scoraigwind.com - UK windpower guru, self-build information
- otherpower.com - DIY windpower details
- greenelectricity.org: details and tariffs of green energy suppliers (i.e. how you can buy electricity produced by the wind). UK & abroad

## courses

- LILI (see below) - wind & solar courses
- Centre for Alternative Technology (CAT) - (01654) 702400, [cat.org.uk](http://cat.org.uk)

## feed-in tariffs

- see [feed-in-tariff.org](http://feed-in-tariff.org) or [fitariffs.co.uk](http://fitariffs.co.uk) for more information

## suppliers

- CAT Resource Guide (Wind Power): £3 from CAT (see above)
- National Energy Foundation (Renewables) [nef.org.uk/greenenergy](http://nef.org.uk/greenenergy) – suppliers lists



**self-build:** this 300W wooden wind generator was made from scratch (including the alternator!) at minimal cost using only wood, copper wire and surplus computer hard drive magnets.

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