

Climate change: be part of the solution

Focus on: wind power

Onshore generation of electricity from wind power can represent a significant business opportunity for UK farmers and land managers. Wind power can be harnessed by the installation of a wind turbine or turbines that will generate a clean and renewable source of electricity to be used either on-farm or sold to the Grid. This can displace electricity generated from fossil fuels, thus reducing business costs from rising oil and gas prices, reducing carbon emissions and ensuring a profitable and low-carbon business. On-farm wind turbines must be well sited and have a consistent and adequate wind speed if they are to be a profitable investment.

INTRODUCTION

Wind has been the world's fastest growing energy resource over the past seven years. The UK is committed to generating 15 per cent of all our energy from renewable sources by 2020 and in practice this may mean 35-45 per cent of our electricity. As the UK is the windiest country in Europe, a large proportion of that is expected to come from wind. We currently produce just 1.5 per cent of our total electricity from wind so there is huge potential for growth. With 75 per cent of UK land area in the agricultural sector, farmers and land managers can be well placed to take advantage of wind energy projects.

WHAT IS WIND POWER?

Wind turbines produce electricity by using the natural power of the wind to drive a generator. Conventional electricity generation from the burning of fossil fuels produces greenhouse gases (GHGs) which contribute to climate change. Wind power involves GHG emissions only in the manufacture and installation of turbines, with negligible emissions during operation, so that the 'embodied' carbon cost of production is paid back within 6-12 months.

Wind turbines typically consist of a tower with a hub to which a number of rotor blades are attached. Most turbine blades are on a horizontal axis, and swing passively or by motor when sensors tell the head of the turbine to turn to face the direction of wind. The blades rotate at either fixed or variable speeds, and will be stopped at very high wind speeds to prevent damage. Turbines have a lifespan of 20-25 years, following which they are decommissioned or a second generation is installed.

TYPES OF OPERATION

Wind power can be used in a variety of ways within a farm business: to power a remote farm building, power the entire farm, generate power to sell to the Grid, or you could combine two or three of these options. The higher the average wind speed, and the bigger the rotor diameter, tower height and turbine rating, the more cost-effective the project becomes and the quicker the payback.

- **Small turbine systems.** Small systems can be useful for remote farm buildings. For example, a small turbine sited on a poultry shed roof can charge batteries for a feeding system. A typical 100W system costs around £500-700. However, these kinds of turbines are likely to have a long payback period, and they will be sensitive to turbulence.



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- **Small turbine.** A standalone small turbine from 7-22m in height can typically power a house and farm buildings, cutting your electricity bills. A 6-15kW turbine would likely cost £20,000-50,000, with a payback of 5-10 years depending on site windspeed.
- **Single, or multiple, medium-scale turbines.** A single, or multiple medium-scale turbine project to export energy to the Grid could be an option for diversifying a rural land-based business. At around £150,000-600,000 for 50-500kW of system capacity, they may be affordable for some landowners, or can be built in partnership with a developer with the landowner retaining an equity stake.
- **Single large turbine.** As with medium turbines the energy is exported directly into the Grid. Investment and risk costs are higher. The risk cost is in the site assessment, Environmental Impact Assessment (EIA) and planning permission application. Capital costs would be typically £1.25m for a single 1MW turbine. Risk cost (largely planning and environmental study costs) after initial feasibility study would be around £100,000-150,000, and target payback would be about five years.
- **Hosting a wind farm.** If you have a significant wind resource, you could enter into an option agreement and lease with a wind developer, as capital costs for a 5-50MW wind farm can range from £5-50m. In this case, the developer will fund the installation and maintenance of the wind farm for which you will get a modest rent. If you are approached by a company wanting to develop wind energy on your land, make sure you take professional advice on the proposal from a wind energy expert. Your business advisor, a suitably experienced land agent, NFU, or CLA representative should be able to point you to the right person.

GETTING WIND OFF THE GROUND – WHAT CAN YOU DO?

Before you start

- Do a comprehensive energy audit – start by collecting detailed data on your energy use. There's no point in investing a lot of money in renewable energy if you're wasting most of it through outdated equipment or working practices. See [Farming Future's energy efficiency factsheet](#) and the [Carbon Trust's agriculture pages](#) to find out more.
- Carry out a renewable energy options appraisal to assess which technology would best fit your business. See [Farming Futures' factsheets](#) on other technologies. Talk to your NFU, CLA, FWAG or business consultant to evaluate all the options.
- If you think wind power could be for you check the viability of your site (see below).

Measuring the viability of your site

- Start by getting a rough estimate of your wind speed through the [UK windspeed database](#) on the BWEA's website.
- If your location looks promising, get more accurate data over a period of at least six months at the most promising site on your land (sites only several hundred metres apart can have very different wind speeds). Hire or buy an anemometer mast to do this. Many consultants can organise this for you.
- Wind speed is crucial – the power generated from wind varies as the *cube* of the wind speed, so with just 10 per cent higher wind speed you can generate one-third more energy.
- The ideal site is on a smooth hillside away from obstructions, which cause turbulence and reduce the amount of energy being delivered to the turbine. You should allow at least 20 times the distance (and preferably more) from the height of



any tall object such as a tree or building. Noise levels produced by the turbine will determine distance from neighbouring residences and distance from the Grid connection point will have to be weighed against cabling costs.

- Unless you are in a remote stand-alone location, you need to find out more about your connection to the Grid. To do this talk to your Distribution Network Operator (DNO). Your connection to the Grid can affect your choice of turbine, and upgrading can cost a significant amount.
- With a major development, you may also need to build access roads, so consider the feasibility of this.

Getting planning permission

Before you put in a formal planning application, talk to the people who will be affected by your project, or whose support you will need to make it a success:

- **Local community.** Communicate and be open with your neighbours, local community and local environmental groups or NGOs (such as Natural England, the RSPB, or the Bat Conservation Trust) right from the start. Local resistance to wind projects can be fierce, so take steps to illustrate the realities of what your project might look like, and explain the needs and advantages. 70-80 per cent of people have been found to be in favour of wind turbines whilst a hard core and communicative 5-7 per cent are against. It pays to get to the “neutrals” and “in favours” before the objectors recruit them. If you are planning a big wind farm the developer should consider sponsoring a community fund out of the profits of the project.
- **Local Planning Authority.** All applications for wind turbines require consent so find the appropriate contact and talk to them about your initial plans early on. The Government's Planning Portal is a useful source of initial information. Medium and large-scale projects will require an EIA. Take professional advice if you are not fully conversant with the planning process.
- **The Civil Aviation Authority and the MOD.** Consult with both at an early stage to identify and address any potential problems before you begin the formal planning process. You can find more information and a consultation proforma on the BWEA's website.

Finance and funding

- **Business rates** are payable if you export energy to the Grid, whereas if all the energy you produce is used to power your business, you will probably be exempt. If you are working with a developer, ensure they take on this responsibility.

- **The Renewables Obligation.** Wind generators can receive Renewables Obligation Certificates (ROCs), which are presently worth up to 5p/kWhr. Small-scale wind (<50 kW) earns double ROCs. These are market traded.
- **Climate Change Levy (CCL).** The generation of wind power also qualifies for levy exemption certificates, which reduce your tax bill.
- **Feed-in tariffs (FITs).** FITs are the fixed price paid for electricity generated from renewable sources under 5MW capacity. The Government is currently consulting on new FITs that will come into effect in April 2010. The FIT is different for each renewable technology, but wind is expected to benefit from a substantial increase. FITs cannot be combined with central Government sourced grants, though they can be combined with RDPE grant funding, which is EU sourced.
- **Capital funding.** You may be able to secure some funding under the Rural Development Programme for England (RDPE). Each region has different policies and amounts available, and the amount of grant payable will depend on the business case you make. Contact your local Regional Development Agency (RDA) office for more information.
- **Other funding.** Very small scale or not-for-profit enterprises can benefit from the Low Carbon Buildings Programme (LCBP) grants.

HOW CAN WIND BE PART OF THE CLIMATE CHANGE SOLUTION?

- Wind is a 'clean' and renewable source of energy – it can reduce emissions of carbon dioxide by displacing electricity generated from fossil fuels.
- The UK's installed wind power capacity is presently about 4000MW, and studies show that between 10-20 per cent of our total electricity supply can come from wind before the issue of intermittency becomes a consideration.
- Wind energy can be used at a local level by being fed directly into the distribution network. This means there is less energy lost than with conventional power station distribution, which travels long distances along power lines.

WHAT ARE THE OPPORTUNITIES?

- Once installed, wind turbines use a very small area of land, allowing farming to continue as normal.
- The UK Government's plans for improved FITs will mean the price you get for wind energy sold to the Grid is likely to increase quite substantially (see 'Finance and Funding' above). It can represent a good revenue stream to diversify into.

- The improvement in wind technologies suggests that the cost of wind energy will continue to fall.
- With energy prices predicted to remain volatile and increase in the long term, generating your own can be good business.

WHAT ARE THE RISKS?

- Wind is an intermittent power supply so you will still need a Grid connection and supplier for when the wind drops.
- Forecast output and power curves for some turbines are theoretical. Check that performance claims are based on installed turbines and where possible check with an existing user whose turbine is installed on a site with wind speeds comparable to your site.
- It may be the case that projects which benefit from ROCs or FITs will find it hard to justify grant aid in addition. Consult your business advisor about this.
- If you are approached by a wind farm company wanting to develop your land, research your options thoroughly and take professional advice. This will ensure you get the best deal for your involvement.
- Large wind turbines and wind farms are seen by some as an aesthetic blight on the landscape and fierce local opposition can be a problem.
- Applications for larger wind developments take on average 4-6 years from initial scoping to completion. Be prepared to invest that amount of time.
- Noise pollution.
- Wildlife (particularly birds and bats) can be affected by wind turbines. This will be assessed by your EIA. The location of your turbine/s is critical to its affects on the environment, so discuss your ideas with environmental organisations early on.
- Sunlight passing through the turbine blades can cause a flickering effect to those in the line of sight, though this is minimal and normally can be avoided through good site positioning.
- The cost of getting or upgrading a Grid connection can be a barrier.

- Bigger turbines can cause interference to TV, telecommunications signals and radar. See 'Getting wind off the ground' for more information on this.

GET INVOLVED WITH WIND!

- See the [Llaithddu Windfarm in Wales](#) where a group of farmers have come together to develop their own wind farm.
- See [Windpower Wales](#) – a locally-owned 40MW project in Denbighshire, in which more than 50 farmers, local individuals and businesses are shareholders.
- The [British Wind Energy Association](#) has a comprehensive website with specific information for landowners as well as links to advisors, suppliers and installers.
- The NFU has a downloadable [briefing document](#) on wind power development in agriculture at a number of scales. See the renewable energy section on their website.
- The CLA has written a detailed handbook on wind energy and its costs and benefits for farmers and land managers that you can buy. Phone 0207 235 0511.
- The [Farming and Wildlife Advisory Group](#) can also provide advice on wind energy.
- Visit Intelligent Energy Europe's online [glossary of wind energy terminology](#).
- The Danes are world leaders in wind energy. Take a look at the [Danish Wind Energy Association's website](#).
- The [Department of Energy and Climate Change](#) is responsible for the UK's renewable energy strategy. See their website for details of plans and incentives.
- Read guidance from the [Renewable Energy Association](#).
- Visit Ownenergy's [dedicated website on FITs](#).
- Visit [Farming Futures](#) for other factsheets like this.

FARMING FUTURES

For news, events and links to stories about how other farmers are managing climate change on their farms, please visit: www.farmingfutures.org.uk

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