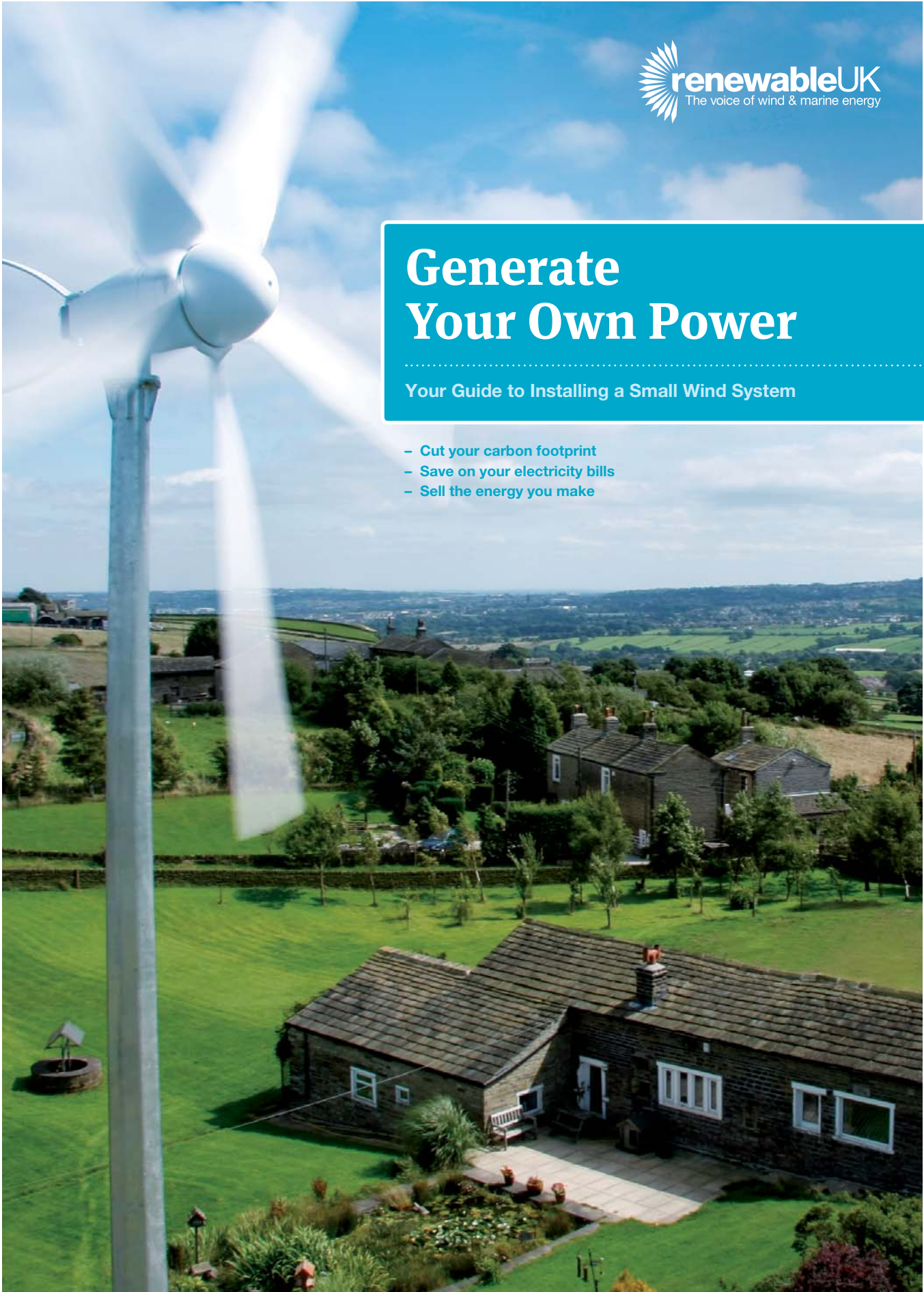


# Generate Your Own Power

Your Guide to Installing a Small Wind System

- Cut your carbon footprint
- Save on your electricity bills
- Sell the energy you make





# Saving carbon and making money

**Plenty of people like the idea of generating their own energy, attracted by the prospect of cutting their carbon footprint and reducing their bills.**

The combination of a new government incentive scheme and the availability of accredited installer companies means it has never been easier or more cost-effective to install a small wind turbine, capable of generating enough electricity to power the average home.

There are now a large number of small wind systems available that vary enormously in height and output.

In short, if you have access to a windy location and have a reasonably large garden or field, then there is a wind turbine suitable for you.

And what's more, small wind systems can provide an attractive return on your initial investment. As a result of a new government incentive known as the Clean Energy Cashback scheme, energy companies are obliged to pay you for the energy you generate. A small wind turbine can deliver thousands of pounds a year in tax-free income, whilst also cutting your current energy bills.

So, if you've already bought a bike and changed your light bulbs, but are unsure how you can cut your carbon footprint further, wind turbines could be the answer. In fact, the environmental and financial benefits of installing a small wind system are becoming increasingly difficult for environmentally conscious landowners to ignore.

# What is a small wind system?

Mention wind turbines and people often think of the turbines erected on hills or out at sea that stand up to 200 metres tall and produce enough power for thousands of homes.

However, the UK is currently home to many of the world's leading producers of small wind systems that typically stand just 10 to 50 metres tall, often making them roughly the same height as a large tree, house or agricultural outbuilding.

Small wind systems vary in their design, size, power and cost, but can be broken down into the categories shown in the table above.

Small wind systems harness the power of the wind to generate clean renewable energy and can be connected to mains electricity supply (on grid) or alternatively used to charge batteries (off grid). The two main designs are horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT). Small wind systems are predominantly installed on free-standing masts in open and exposed locations.

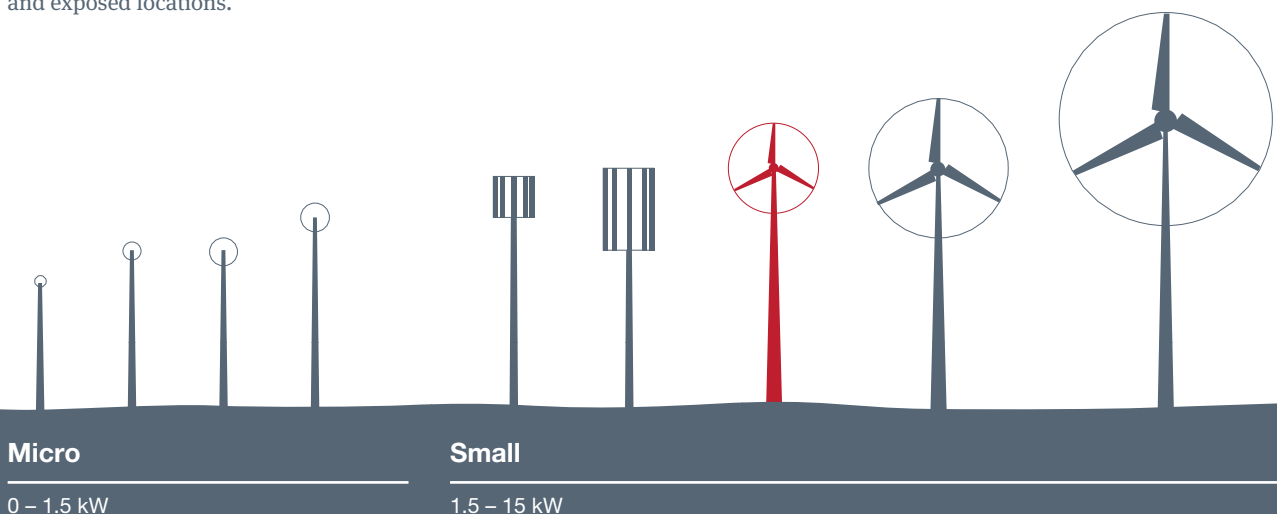
Small wind systems	Power (kW)	Annual energy production (kWh)	Total height (m)	Total installed cost (£)
Micro wind	0-1.5	Up to 1,000	10-18	0.5 - 5k
Small wind	1.5-15	Up to 50,000	12-25	2 - 50k
Small-medium wind	15-100	Up to 200,000	15-50	50 - 250k

Note: The average UK domestic household consumes approximately 4,400 kWh per year.

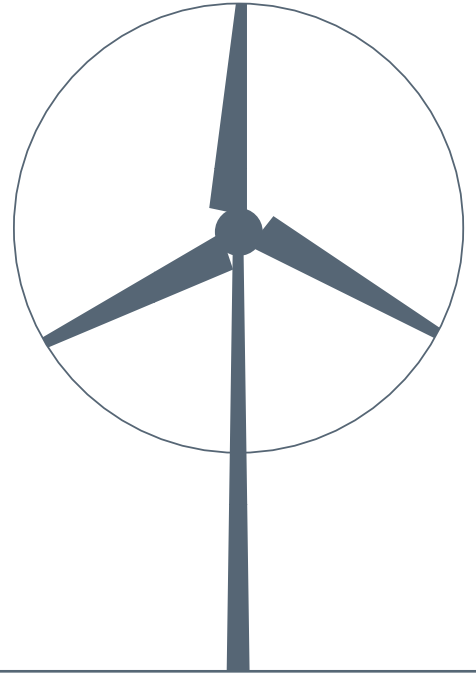
All of these turbines may be a lot smaller than their larger cousins, but they still pack a hefty punch. Even the smallest of wind turbines can produce several hundred kilowatt-hours (kWh) a year, equivalent to between 5% and 20% of an average UK home's annual needs.

In the right location, a larger 20 metre-tall free-standing turbine can generate tens of thousands of kilowatt-hours a year, producing the vast majority of the power your building uses.

A small-medium turbine of 50m in total height could supply enough energy for 60 homes, or equal to the needs of a factory, small business or farmstead.



It's not just the size difference; small wind turbines have different operational characteristics and are sited in different locations. This 3MW large wind turbine will cost millions to construct and install, and can generate enough energy to meet the electricity demands of approximately 2,000 homes a year.



- 45m
- 40m
- 35m
- 30m
- 25m
- 20m
- 15m
- 10m
- 5m



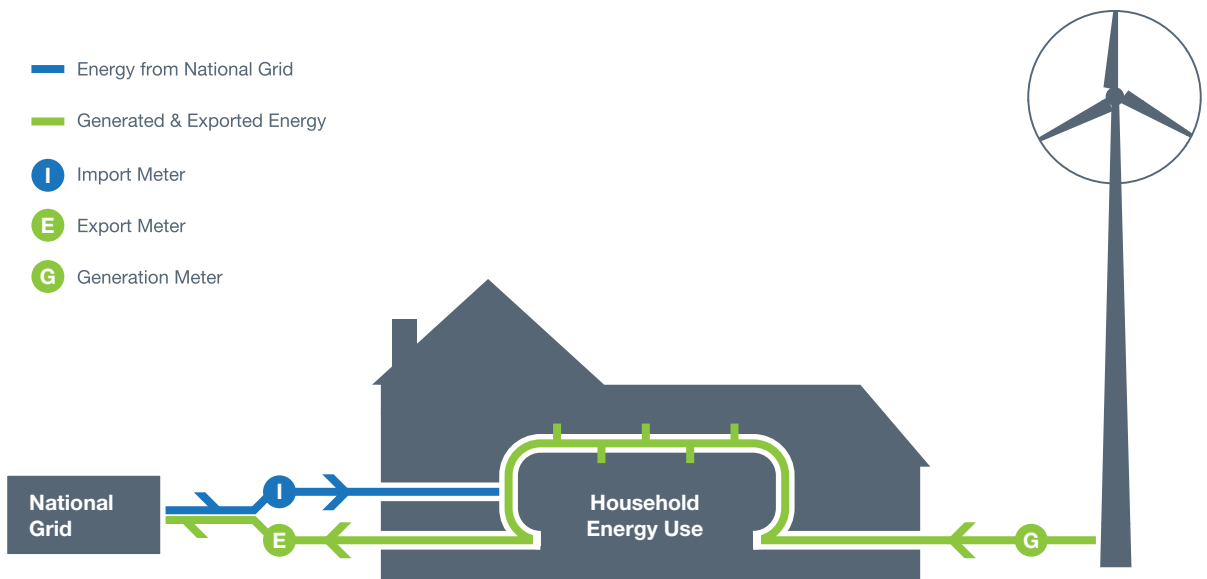
**Small - Medium**

15 - 100 kW

# Making money from thin air

Small wind systems have always made sense from an environmental perspective, but this year a major change to the government's renewable energy incentive scheme means they now make sense from a financial perspective as well.





The Clean Energy Cashback scheme, otherwise known as ‘Feed-in Tariffs’, is a new government financial incentive that promises households and businesses financial payment for producing their own renewable energy. It works by guaranteeing a set price for the energy they generate as well as an additional set price for any surplus electricity that is exported to the grid.

As a result you can accurately predict how much money you can generate from a renewable energy system, making it easier to justify the upfront cost of installation.

### Clean Energy Cashbacks

Accessing the Clean Energy Cashbacks (Feed-in Tariffs) is remarkably simple. In England, Scotland and Wales, all you have to do is select an approved technology, such as a wind turbine that has qualified for the Microgeneration Certification Scheme (MCS), and install it using an MCS-accredited installer.

Your energy company is then obliged to enter your installation into the scheme and pay you for the energy you generate and that which is exported, providing fixed payments for years to come. If you are a domestic customer, this payment is tax-free income.

Small wind systems			
	Power (kW)	Generation tariff* (p/kWh)	Export tariff† (p/kWh)
Micro wind	0–1.5	34.5 pence	3 pence
Small wind	1.5–15	26.7 pence	3 pence
Small-medium wind	15–100	24.1 pence	3 pence

Notes:

\* These tariffs are accurate for new installation until March 2012.

† Some energy supplier will offer over and above the guaranteed minimum of 3p/kWh.

The levels of generation tariffs vary based on the size of technology you install, so a 1.2kW micro wind turbine will be paid just over 34p for every kilowatt-hour produced, while a 6kW small wind turbine will receive slightly less per unit of electricity, 26.7p. Thirty four pence might not sound like a lot of money, but the kilowatts soon add up.

Everything depends on the wind, but a typical small wind turbine with a capacity of 15kW can generate tens of thousands of kilowatt-hours a year – under the clean energy cashback that could equate to over £10,000 a year.

All the tariffs are also index-linked, so once your wind turbine is installed payments rise each year with inflation. And there is an export tariff that guarantees you an extra payment for any energy you don’t use and export back to the grid.



# Case Studies

## Annual economic benefit – A typical 11kW small wind turbine

Generation	0.267p x 28,000 kWh (Generation Tariff x Total energy)	£7,476
Export (50%)	0.03p x 14,000 kWh (Export Tariff x Exported energy)	£420
Reduced bills	0.15p x 14,000 kWh (Retail price x Onsite use)	£2,100
Annual maintenance		- £250
Total yearly earning		£9,746

## “We’ll export about half the power and use the other half to power the farm”

Scottish farmer John Zimmerman reckons his new 11kW wind turbine could quickly turn into ‘a wee goldmine’ thanks to the new Clean Energy Cashback scheme.

John installed the 18-metre-tall Gaia-Wind turbine at his farm near Montrose back in December, and has signed a Feed-in Tariff agreement with Scottish Power that will see him paid 26.7 pence for every kilowatt-hour (kWh) the turbine generates, and a further three pence for each kWh he exports to the grid.

‘Everything depends on the wind, but we should get about 2,000kWh of power a month’, he says. ‘January was a bit quiet, but apart from that every month has been around the expected level and we’ve generated 7,500kW so far.’

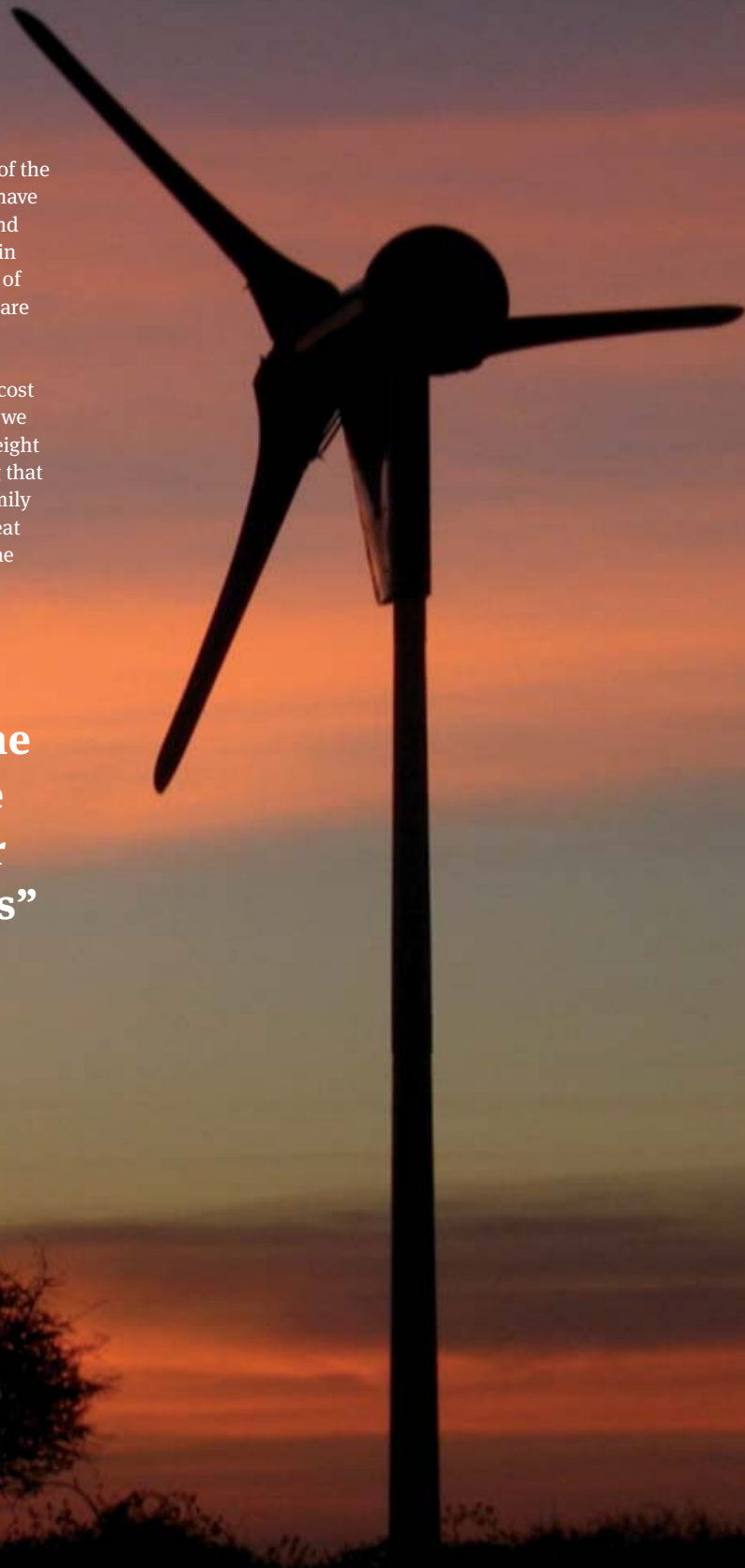
The net result will be a hefty windfall for John and his family. ‘We’ll export about half the power and use the other half to power the farm and the potato store’, he says. ‘Overall, we should make around £10,000 a year, and in a good year for wind it could be more.’

The Feed-in Tariff is index-linked so payments will rise each year. With energy prices expected to climb it is likely his returns will increase over time. ‘We spent £55,000 installing the turbine this winter, but it’s an investment’, he says. ‘It should last 25 years and we’ll get a payback pretty quickly.’

It is a similar story at the other end of the country, where the Felstead family have installed a 6kW capacity Proven wind turbine at their home near Ashford in Devon. They are now in the process of signing up to the Feed-in Tariff and are expecting some handsome returns.

'Including foundations the turbine cost £23,000, but with the Feed-in Tariff we expect it to pay for itself in around eight years', says Louise Felstead, adding that the turbine is already saving the family money on their energy bills. 'It's great to watch the turbine working and the electricity meter going backwards.'

**“It’s great to  
watch the turbine  
working and the  
electricity meter  
going backwards”**



# What you need to know about installation

There are a number of important planning and technical issues that anyone wanting to install a small wind system needs to address before they get started. But don't worry – none of the paperwork is onerous, and most of it is simply designed to ensure your wind turbine delivers as expected.





### Planning

Currently all small wind systems require planning permission. Your MCS-accredited installer will have had plenty of experience of planning rules and will be able to guide you through the process. The more data and photographs you can include of the turbine, its proximity to buildings and its acoustic characteristics the better. You should speak to neighbours and inform them of your plans as early as possible, and talk to your local authority at the earliest opportunity.

### Connection

For on grid applications, your wind turbine is only useful if it is connected. You need to consider how the turbine will be connected to the appropriate building or the local distribution network before going ahead with the project. Underground cabling is likely to be required and this could affect where the turbine can be located. The more cabling that is needed, the more the project is likely to cost, so talk to your MCS-accredited installer to make sure you have chosen a site where connection is cost-effective.

### Operation and maintenance

Modern small wind systems are remarkably robust; after all, they are designed to cope with gale-force winds. They are also very easy to operate – it really is a case of plug them in and watch them go. But turbines have moving parts and are designed to last up to 20–25 years, so they will require occasional maintenance. As with all building improvements, it is worth checking the terms of the warranty and putting in place a maintenance agreement with your supplier.

### Industry standards

The UK's leading small-scale renewables standard is the Microgeneration Certification Scheme (MCS), which requires all turbines carrying the MCS label to undergo intensive testing so as to provide customer assurance on product performance, reliability and design. Any MCS-approved products will have detailed information on annual energy production and acoustic characteristics.

MCS accreditation can also be secured by installers, who are similarly tested to ensure they have the skills and understanding to install small wind systems in line with industry best practice.

### Has your wind turbine got MCS approval?

MCS applies to installations (product and installer) in the 0–50kW range.

Checking that the small wind system and installation company you are using has MCS accreditation is essential, and best done at the very outset of any project.

Remember, clean energy cashbacks (Feed-in Tariffs) are only available to those installations using MCS-approved products and installation companies.

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

# Location, Location, Location

Are small wind systems right for you?

The best wind turbine in the world is only as good as the wind that turns it. If you are going to get the most out of your wind turbine it is vital to select a windy location. For a wind turbine to be worthwhile your site's annual average wind speed needs to be at least 4.5 metres per second; any slower and a wind turbine is not for you.

Thankfully, the UK has some of the strongest and most consistent winds in Europe, so if you have an exposed rural site or access to a hilltop, then there is a good chance the winds will be strong enough.


There are a number of online windspeed databases that will give you a good indication of local windspeeds.

Once you've established that you may have a good site it is worth installing a wind gauge (your turbine installer can help you do this) to double-check the strength of the wind. The more wind speed data you can collect the better, but three months should be long enough to establish whether you have a good site or whether you need to reconsider.

So if you have the right location, small wind systems can be the most effective means of generating your own energy. They are a proven and reliable technology, easy to install and maintain, and can generate sizable amounts of electricity.

## Top tips for selecting the right site

- Identify an exposed site, clear of nearby obstructions.
- Contact an MCS-accredited installer for advice on whether you have picked the right location.
- Check the online UK wind speed database and other wind estimation tools.
- Consider installing a wind gauge for at least three months to check the wind speed – you want an average of at least 4.5m/s.
- Check you can connect the turbine to your property and the grid.
- Remember: the higher you get, the better the wind. Raising a turbine by just five metres can improve energy output by around 30%, so think big.
- Contact the local authority to check if there are any planning restrictions.



**“...the strong winds used to be a detrimental feature of our property, they are now a plus”**

Wyn Jones, who lives in Powys, Wales, and actually works for the renewable energy team at property firm McCartneys, helping people install wind turbines for a living, took a well-trodden approach to assessing his home's suitability.

He installed a wind meter to check the wind speed in the field by his family's home after the online database of wind speeds suggested it may not have been a good location. 'The database said the average wind speed in our area was 4.2m/s, which is not really fast enough', he explains. 'But the database is just a guide that shows wind speeds for one-kilometre-square areas - we knew we had a windy site because the wind whips up the valley.'

The wind meter confirmed the Jones family's intuition, revealing the average wind speed for the site was over 5m/s. The family has since installed a 6kW Proven wind turbine and expects to generate over £2,500 a year through the Feed-in Tariff. 'Whereas the strong winds used to be a detrimental feature of our property, they are now a plus', says Wyn Jones. 'It's great when you see the wind blowing and the turbine generating power.'

# Small Wind Checklist

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## 1 Make sure you have the right site

For a wind turbine to work you need an exposed, windy site not too close to buildings.

## 2 Double- and triple-check the location

No one wants to waste money on the wrong site, so check the national wind speed database and preferably put up a wind meter for at least three months.

## 3 Can you connect?

Check with your installer that the turbine can be connected to your property and the grid.

## 4 Apply for planning permission

Like many building improvements you will need planning approval. Talk to your neighbours and local authority about the project early on, and work with your installer to ensure you get the application right.

## 5 Check for MCS approval

If you want to make money through the clean energy cashback scheme (Feed-in Tariffs), you need to use an MCS-approved wind turbine and installer. MCS applies to installations (product and installer) in the 0-50kW range.

## 6 Go ahead!

There has never been a better time to install a wind turbine. A well-located wind turbine will pay for itself within eight years, add value to your property, reduce your energy bills and, perhaps most importantly, ensure you are doing your bit to help the planet. So, what are you waiting for?

## Links

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### Wind speed database (NOABL)

[www.renewable-uk.com](http://www.renewable-uk.com)

### Carbon Trust – wind tool

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

### Energy Saving Trust – wind tool

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

### Department of Energy and Climate Change (DECC)

[www.decc.gov.uk](http://www.decc.gov.uk)

### Microgeneration Certification Scheme (MCS)

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

# Suppliers

The UK is home to a growing number of small wind turbine manufacturers and installers. Over 20 manufacturers and more than 30 installation firms are members of trade association RenewableUK. If you live in a windy location then there is a supplier to suit you not too far away:

## RenewableUK Manufacturers/Product Companies

Ampair Energy Ltd  
Bergey Windpower Co.  
Better Generation Ltd  
Eclectic Energy Ltd  
Endurance Windpower Inc.  
Evance  
Evoco Energy Ltd  
Gaia-Wind Ltd  
Gendrive Ltd  
Llumarlite Energy Systems Ltd  
Proven Energy Ltd  
Marlec Engineering Co. Ltd  
Nheolis  
Northern Power Systems  
Quietrevolution Ltd  
SEaB Energy Ltd  
Tradewind Turbines Ltd  
Vertical Wind Energy Ltd  
Wind Energy Solutions B.V.  
Windsave Holdings Ltd

## Installers

ACE Access  
Aeolus Power Ltd  
Ardenham Energy Ltd  
Biotec International Ltd  
Blue Flag Ltd  
Brumac Wind Energy Ltd  
Le Carbone (GB) Ltd  
Day Cummins Ltd  
Dulas Ltd  
Eagle Power (Gumbley & Company Ltd)  
Encraft  
Enviko Ltd  
Enviroeng Limited  
Exchange Consulting  
Freewatt Ltd  
The Green Company (Europe) Ltd  
Highland Alternative Energy  
ICE Renewables Ltd  
IMS WindPower  
D Mack Limited  
Next Generation Turbines  
Ocip Energy Ltd  
Bryan J Rendall (Electrical) Ltd  
Safe Energy Consultants  
ScrewFast Foundations Limited  
Segen Ltd  
SMI (Electrical) Ltd  
Solar Solutions  
Southern Renewables Ltd  
Sustainable Energy Systems  
Torchwood  
Windcrop Ltd  
Zytech Ltd

## Testing/Certification/Consultancy/ Utility/Academic

Building Research Establishment (BRE)  
Centre for Alternative Technology  
Centre for Sustainable Energy  
CREST  
Ecotricity Ltd  
Patrick Farfan Associates Ltd  
Good Energy Ltd  
Intertek  
Narec  
Open University  
Pegasus Planning Group  
Queen Mary University of London  
Reactec Ltd  
RWE Npower  
STFC Rutherford Appleton Laboratory  
Sustainable Energy Consultants  
TUV NEL Ltd  
University of Birmingham  
University of Edinburgh  
University of Exeter  
University of Glasgow  
University of Nottingham  
University of Southampton  
University of Strathclyde  
University of the West of England

For full small wind membership listing,  
please visit our website

**[www.renewable-uk.com](http://www.renewable-uk.com)**

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