

# SMALL-SCALE WIND SYSTEMS

## A REFERENCE GUIDE

A PUBLICATION FOR THE RES-E PROJECT

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mid wales energy agency  
asiantaeth ynni canolbarth cymru

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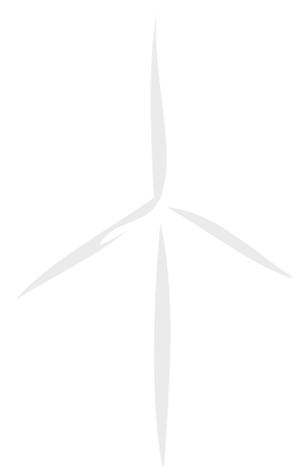
# 1. Introduction

To the general public, the process of installing a wind turbine on their house, on their business or on their land might seem a difficult process. There is a wealth of information available about the necessary procedures, but it rarely seems to be in one place, and the information can seem dated after successive changes to policy or legislation.

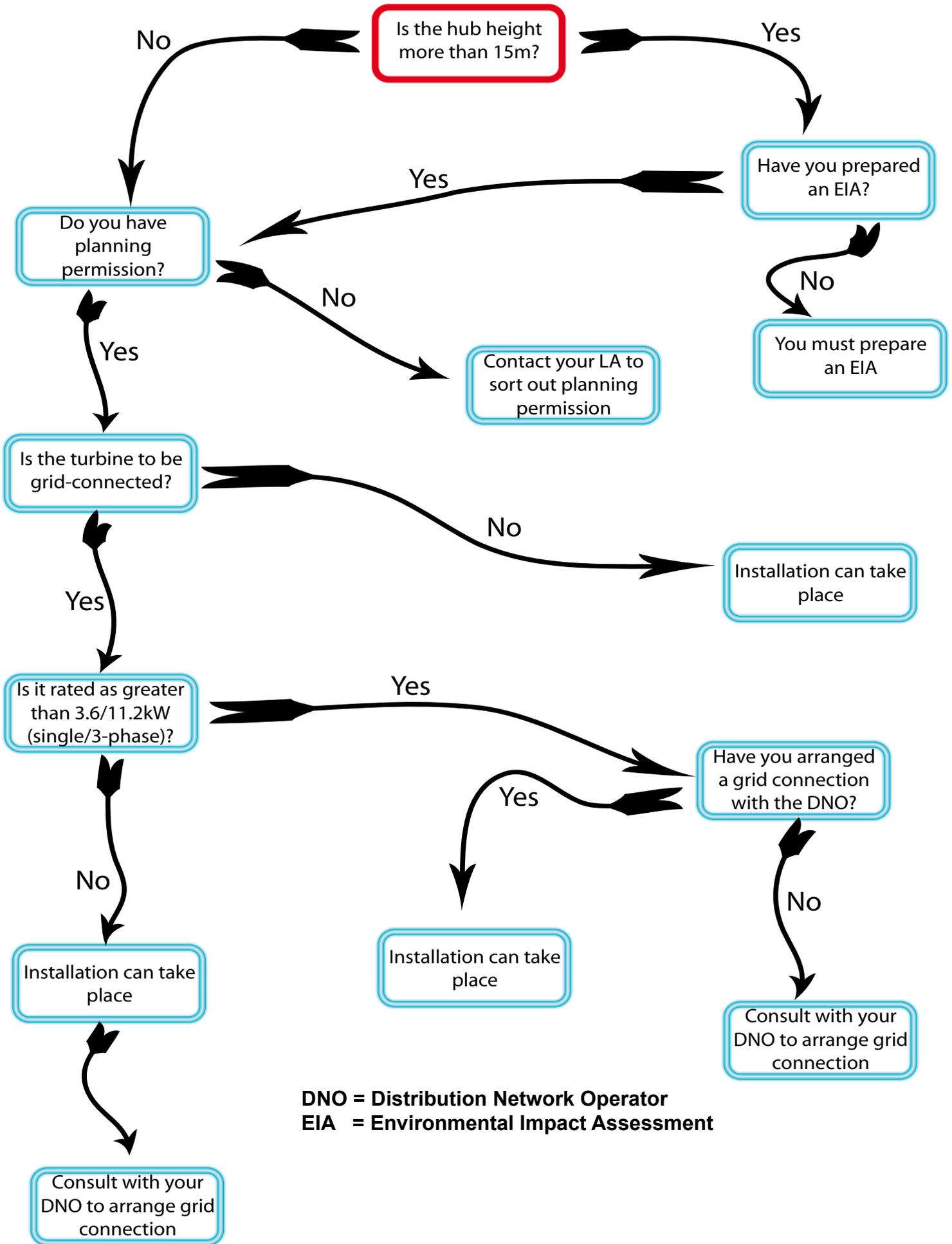
This document aims to put in one place many of the things that might prove useful to an individual or business hoping to install a small wind turbine. Links are provided to sites or documents which can provide further assistance. There is also a list of recommended Wales-based installers, and UK-based turbine manufacturers.

If further information on small-scale wind turbines is required, the installers or manufacturers can often provide useful and accurate information. For independent advice the energy saving trust, or an energy agency, can be a very useful port of call.

In the event of a decision being made to install a turbine, it is good practice to get quotes from three different installers/consultants, along with estimates from each of potential yield from the turbine.



## 2. Planning Flowchart



## 3. The Steps in Detail

As suggested from the flowchart, smaller wind installations (typically less than 15m height and 11kW rated power) require little in the way of paperwork before connection to the grid. Any wind turbine with a hub height of greater than 15m will require an Environmental Impact Assessment (EIA) before installation. An EIA is typically obtained by employing the services of a consultant. Prices will vary according to location, size of turbine etc, but will be in the region of several thousand pounds for a relatively small turbine, up to several hundred thousand pounds for a major (10's of MW) windfarm.

For wind turbines of less than 15m hub height, which probably includes the majority of roof-mounted wind turbines as well as many other types, there is no requirement for an EIA. Planning permission would still need to be sought, however, and this is highly dependent upon the size of turbine, location, sound levels, nearest neighbours etc. With so many variables it is almost impossible to state hard-and-fast rules as to successful applications.

Notwithstanding the above, it is likely that as small wind turbines become more common in both rural and urban landscapes across Wales, there will increasingly be simplified structures in place to deal with this specific planning issue. It is also worth bearing in mind that all local authorities have to consider climate change in relation to all their planning activities, which helps weigh the argument with planners in favour of installing renewable generating capacity.

The 5 phases of project preparation are as follows:

- Project planning
- Information
- Design
- Construction
- Testing and commission

A brief outline of the necessary steps follows, but for detailed information the complete document the “Technical Guide to the Connection of Generation to the Distribution Network” ([www.energynetworks.org/pdfs/FES\\_00318\\_v040211.pdf](http://www.energynetworks.org/pdfs/FES_00318_v040211.pdf)) should be accessed.

Naturally, all installers will be aware of the necessary steps, and can provide you with the information you need to determine your next action.

**Project Planning:** The developer formulates plans for the scheme and consults published information (e.g. DNO long term development statements LTDSs) to determine opportunities for grid connection.

**Information:** Developer submits information about the proposed plant to the DNO. The DNO then explains the configuration of the distribution network in the vicinity of the proposed site, and potential design issues and costs involved with grid connection at that point.

**Design:** Developer submits a formal Connection Application to the DNO. The DNO produces detailed connection designs and costings and identifies how much of the construction work could be done by a third party, and how much must be done by the DNO.

**Construction:** Developer enters into contracts with the DNO and, if desired, a third party contractor for connection construction. The physical works are carried out.

**Testing & Connection:** DNO and developer complete the necessary Connection and Use of System Agreements. Developer tests and commissions the generating plant (the DNO may wish to witness the tests). DNO carries out the necessary tests on the connection and energises it.



## 4. Successful Projects



<b>Location</b>	Carmarthenshire
<b>Installer</b>	Sustainergy
<b>Turbine</b>	Proven 6kW
<b>Type</b>	Grid-connected
<b>Total Cost*</b>	£12,000
<b>Payback time</b>	6-9 years

This turbine was installed at a farm in Llanboidy, and will be used to offset most of the electricity requirements of the farm.

Maintenance is no more than a few hours a year to re-grease the nuts, and can be done by the owners.

Every ten years the blades will need to be renewed, at a cost of about £700.

A deal has been struck with NPower to get 5p/unit for ROCs. This will generate approximately £600/yr, quite apart from any value obtained from the electricity itself, which can be between 3 and 8p/unit, depending on how it is used.



<b>Location</b>	Carmarthenshire
<b>Installer</b>	Sundance Renewables
<b>Turbine</b>	Proven 2.5kW
<b>Type</b>	Grid-connected
<b>Total Cost*</b>	£7,500
<b>Payback time</b>	18 years

Installed at a housing co-operative in Llangyndeyrn which is open to visitors and which demonstrates sustainable living and runs educational activities. The co-operative has solar water heating, also installed by Sundance, and runs all its vehicles off Sundance-manufactured biodiesel.

The turbine will offset about £400/yr from the electricity bill of the co-operative, and the payback time is likely to be less than 18 years as the price of electricity and the value of renewable energy increases.

\*Including clearskies grant



## 5. FAQ's

### Q: What is the pay-back time for a typical wind turbine?

A: There are so many variables that this question is difficult to answer. In a good site (upwards of  $6\text{ms}^{-1}$  average windspeed) the payback on a small (1-15kW) system might be 5-10 years. A specialist will be able to give you a more accurate assessment after examining the proposed site.

### Q: Will I be able to sell my electricity to the grid?

A: Again, there are no hard-and-fast rules. For small turbines the expense of getting necessary paperwork and metering arrangements means this is probably not practical. Once a certain size turbine is reached (e.g. 5kW) it becomes much more feasible.

### Q: What are ROC's, and can I claim them?

A: ROC stands for Renewable Obligation Certificate. There is a requirement on all electricity producers to source an increasing proportion of their electricity from renewable sources. This gives renewable electricity a premium which must be paid by the power companies. In general, the same argument applies to obtaining ROCs as for selling the electricity, so will depend upon the turbine size and windspeed.

It is likely that this situation will change over the coming years as smart metering becomes encouraged and it becomes easier to monitor electricity production.

### Q: Are there any grants available?

A: There are grants available, but the system is currently undergoing change. The Energy Saving Trust, your renewable energy consultant or your local energy agency should be able to provide you with information to help maximise grant potential.

### Q: How much will a system cost?

A: Again, this depends on the size and type of turbine. A ballpark figure of turbine plus grid connection might be £50,000 for a 15kW machine, or as little as £3,500 for a 1kW machine.

### Q: How much of my annual electricity requirement will my wind turbine supply?

A: The less energy you use, the less you need to generate, so the first step in considering your energy use is to minimise it! However, a very general rule of thumb for the size of turbine needed for one household in an average wind site ( $5.5\text{ms}^{-1}$ ) is about a 2.5kW machine<sup>1</sup>.

<sup>1</sup>Sources: [www.dti.gov.uk/energy/environment/energy\\_impact/energy\\_impact\\_summary.pdf](http://www.dti.gov.uk/energy/environment/energy_impact/energy_impact_summary.pdf); Proven turbine datasheet



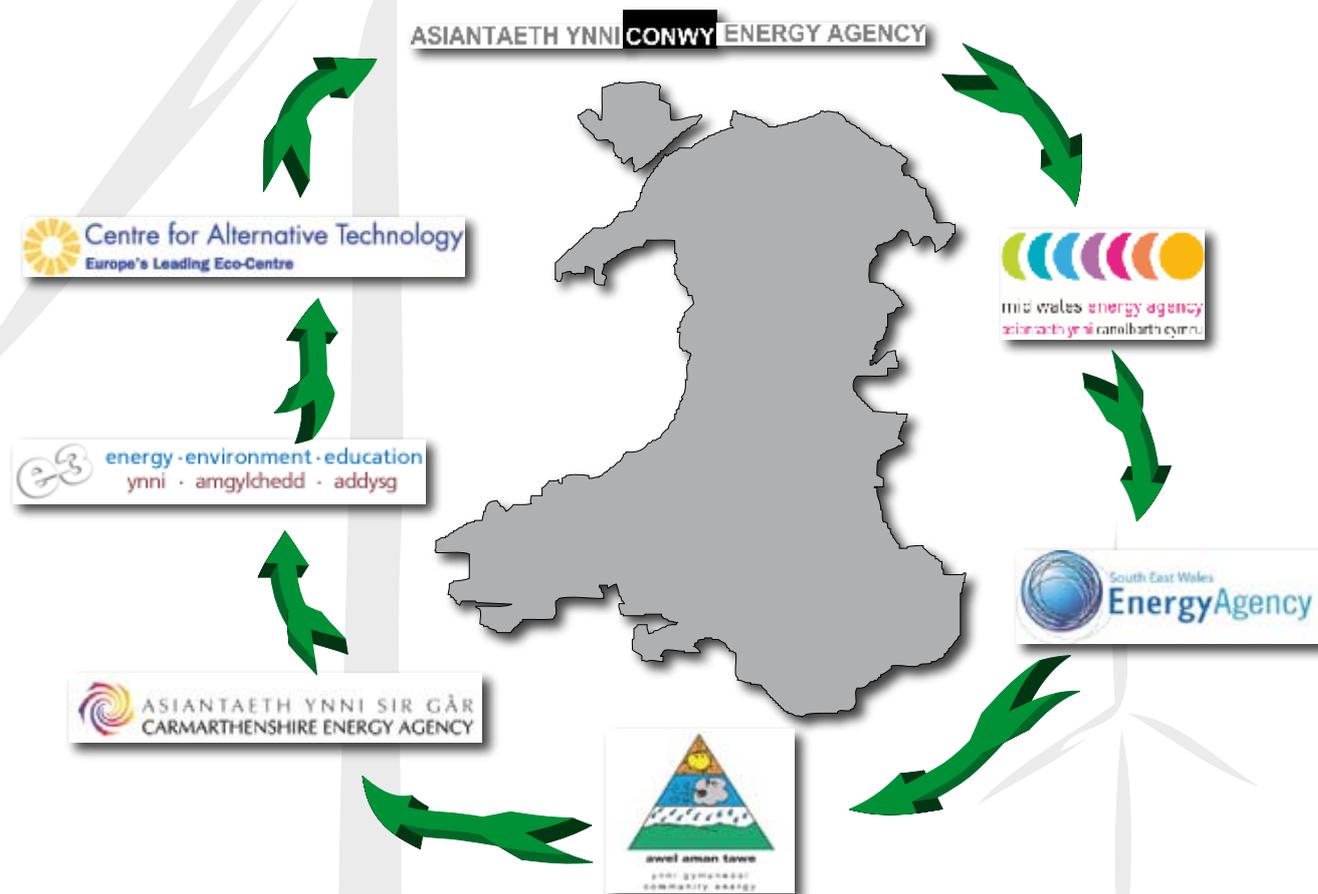
## 6. List of Consultants

All of the following consultants are accredited by clear skies. It is likely that all on the list will consider work in any part of Wales, although their general location has been indicated.

Website	Specialities	County
<a href="http://www.sustainergy.net/">www.sustainergy.net/</a>	PV, wind	Pembrokeshire
<a href="http://www.dulas.org.uk">www.dulas.org.uk</a>	all renewables	Powys
<a href="http://www.energytech.co.uk">www.energytech.co.uk</a>	all renewables	Swansea
<a href="http://www.greendragonenergy.co.uk">www.greendragonenergy.co.uk</a>	PV, wind, hydro	Swansea
<a href="http://www.sundancerenewables.org.uk">www.sundancerenewables.org.uk</a>	all renewables	Carmarthenshire
West Wales Renewable Energy (01974 298851)	PV, wind	Ceredigion

It is possible that this list will change over time. The most up-to-date version should be available from the clear skies website ([www.clear-skies.org](http://www.clear-skies.org)).

### Energy Agencies



- Awel Aman Tawe [www.awelamantawe.org.uk](http://www.awelamantawe.org.uk) 01269 822954
- Carmarthenshire Energy Agency [www.ynnisirgar.org.uk](http://www.ynnisirgar.org.uk) 01994 230003
- Centre for Alternative Technology [www.cat.org.uk](http://www.cat.org.uk) 01654 705950
- Conwy Energy Agency [www.conwyenergyagency.co.uk](http://www.conwyenergyagency.co.uk) 01492 651024
- Mid Wales Energy Agency [www.mwea.org.uk](http://www.mwea.org.uk) 01654 703064
- South East Wales Energy Agency [www.sewenergy.org.uk](http://www.sewenergy.org.uk) 01633 267824
- West Wales ECO Centre [www.ecocentre.org.uk](http://www.ecocentre.org.uk) 01239 820235

## 7. List of UK-based Small Turbine Manufacturers

Manufacturer	Turbine Size (kW)	Website	Type
Ampair	0.3, 0.6	<a href="http://www.ampair.com">www.ampair.com</a>	HAWT
Eclectic Energy	0.275	<a href="http://www.eclectic-energy.co.uk">www.eclectic-energy.co.uk</a>	HAWT
Eurowind	1.3, 5, 10.8, 30	<a href="http://www.eurowind-uk.net">www.eurowind-uk.net</a>	VAWT
Gazelle	20	<a href="http://www.northenergy.co.uk/gaze.html">www.northenergy.co.uk/gaze.html</a>	HAWT
Iskra	5	<a href="http://www.iskrawind.com">www.iskrawind.com</a>	HAWT
Marlec	0.025-0.42	<a href="http://www.marlec.co.uk">www.marlec.co.uk</a>	HAWT
Proven	0.6, 2.5, 6, 15	<a href="http://www.provenenergy.co.uk">www.provenenergy.co.uk</a>	HAWT
Quietrevolution	6	<a href="http://www.xco2.com">www.xco2.com</a>	VAWT
Renewable Devices	1.5	<a href="http://www.renewabledevices.com">www.renewabledevices.com</a>	HAWT
Windsave	1	<a href="http://www.windsave.com">www.windsave.com</a>	HAWT

HAWT = Horizontal axis wind turbine ('hollow cylinder' appearance)

VAWT = Vertical axis wind turbine (traditional 'windmill'-type appearance)

The above list features only those turbines manufactured in the UK, none of which are based in Wales.

The market for small wind turbines is growing extremely quickly, and it is possible that there are some who have not been included. Nevertheless, it is an indicative list, and the UK is very much at the forefront of development of small wind technology. It is highly likely that new designs and products will continue to be developed at a fast pace of the coming years, as there is a huge potential market for such devices.



## 8. Useful Links

**[www.res-e-cymru.org.uk/content/pubs.php](http://www.res-e-cymru.org.uk/content/pubs.php)**

Several publications with information about installation of renewable energy plant, and a document examining the new Windsave and Swift roof-mounted systems.

**[www.bwea.com/you/siting.html](http://www.bwea.com/you/siting.html)**

An excellent website providing general information on siting wind turbines

**[www.bwea.com/ref/generating.html](http://www.bwea.com/ref/generating.html)**

Information on grid connection

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

Information and advice on renewable energy and energy efficiency, including sources of grant funding

**[www.dti.gov.uk/renewables/renew\\_1.1.2.2.htm](http://www.dti.gov.uk/renewables/renew_1.1.2.2.htm)**

DTI website with a list of facts dispelling the myths about wind power

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