

Issue 1=

RESTATS GAP ANALYSIS - Small Scale Wind turbines



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1. Introduction

The use of wind power in the UK is growing at a rapid pace and the number of small-scale wind turbines installed is increasing as costs fall, energy prices rise, and planning policy changes take effect. With this growth of the small wind market and more rapid growth predicted as government policy encourages more micro generation, it is important to establish the current baseline of installed capacity. To do this, a gap analysis survey of small-scale wind turbines was undertaken in 2005/6, which included turbines up to 100kW in size.

For the purposes of this study, small scale wind Power is split into 3 categories:

- Tiny wind turbines (Up to 100W)
- Micro turbines, including building mounted turbines (from 100W to 6kW)
- Small-scale turbines (from 6kW to 100kW)

2. Data collection

Complete data on small-scale wind turbines is not readily available and so data from a variety of sources was required to ascertain the current installed capacity of small-scale wind turbines in the UK. The following data sources were used:

- Clear Skies funded turbines, data provided by BRE
- Scottish Community and Householder Renewables Initiative (SCHRI) funded turbines, data provided by SCHRI
- Action Renewables funded turbines in Northern Ireland, data provided by Action Renewables
- Existing RESTATS database
- Discussions with turbine suppliers and installers
- ROCs data on accredited generating stations

The information in Appendix A was requested from BRE, who manage the Clear Skies Programme on behalf of the DTI. Similar requests were made to SCHRI and Action Renewables who run equivalent renewable energy grant programmes in Scotland and Northern Ireland respectively.

Data was also taken from the ROCs accredited generating stations list and from that already existing in the RESTATS database.

In addition to the above, turbine manufacturers/suppliers were contacted to ascertain the number and size of turbines they had installed/sold.

3. Methodology

The data collected was incorporated into the RESTATS database and where possible verified using Internet sources.

For the tiny turbines, those under 100W, where data is patchy and difficult to verify, the best information available was from the manufacturers themselves. An estimate of the number of turbines operational in the UK was made through discussions with the three main manufacturers of tiny turbines; Marlec; Ampair; and LVM. They also provided information on typical turbine annual yield and for the purposes of this study an estimate of 215kWh p.a. per turbine was used.

The information received from BRE on the Clear Skies grant programme included data on turbine output. An estimation of the annual generation was made at the time of application for funding by the installer and that figure has been used in compiling these statistics.

In the cases where generation data was not available an estimate was made using the capacity factor calculated from known metered data from onshore wind farms. This was applied on a country basis to the schemes with no generation data. The capacity factors used are displayed in the table below:

Country	Capacity Factor
Northern Ireland	0.34
Scotland	0.29
England	0.27
Wales	0.25

Due to the low hub height of small wind turbines, it is acknowledged that these capacity factors maybe an over estimate but in order to remain consistent with other data in the RESTATS database the same capacity factors were used for estimating turbine output regardless of size and height above ground. In some cases the actual yield would likely be higher than the estimate (such as in northern Scotland) but in general one would expect lower capacity factors from the smaller machines. However, as it is unlikely that this study includes every small-scale turbine in the UK, any over estimate should allow for those turbines that were not identified in this study.

There maybe some overlap between the data received from Clear Skies, that already in RESTATS and that obtained through other sources because the Clear Skies data was released without the site name and address making reconciliation of the data impossible.

4. Results

A summary of the results is presented below. Due to the vagueness of some of the data it is not possible present the results by country.

Category	Size Range	Number of turbines	Installed capacity (MW)	Annual Generation (MWh)
Tiny wind turbines	≤100W	22,000	2.20	4,730
Micro wind turbines	>100W - ≤6kW	808	1.56	3059.56
Small wind turbines	>6kW - ≤100kW	123	3.63	7973.57
Total		22,931	7.12	15,763

5. Conclusions

This study has collated data on small wind turbines and provides a good guide to the current status of installations in the UK. The main conclusions are that:

- There is limited information available on installed small wind turbines in UK and therefore accurate data are difficult to obtain.

In light of the above, the figures in this study should be taken as a ‘best guess’ given the quality of the data available.

- There are 931 turbines between 100W and 100kW operational in the UK
- There are approximately 22,000 tiny turbines (≤100W) in the UK
- Altogether small wind turbines (sub 100kW) contribute over 15 GWh p.a. to the UK renewable energy generation mix from a total installed capacity of 7MW.

6. Further Work

This gap analysis of small-scale wind turbines has been a valuable exercise and it is recommended that it be repeated fully in five years time when it is expected that micro-generation uptake and the number of small turbine installations will have increased.

APPENDIX A

Details required for small wind turbine survey

- Name and address of site
- Type of building/site - residential dwelling, community housing, other community building - village hall, school, hospital etc
- Turbine Manufacturer
- Turbine Model Name/Number
- Turbine Capacity (kW)
- Number of turbines installed
- Ground or building mounted
 - Height of tower
 - Height of building and height of mast/tower above building
- Hub height if different from tower height
- Size of turbine - blade length or rotor diameter
- Name of installer
- Site mean wind speed (state data source)
- Grid connected or off grid
- Estimated annual energy yield
- Actual annual energy yield from meter readings

Costs

- Cost of turbine
- Cost of tower
- Cost of inverter, controls, specialist equipment
- Cost and Type of meter
- Installation cost
- Other costs - grid connection etc
- Total cost
- Grant contributed by DTI