

## Roof-top Wind Turbines

### Large Potential - But Can They Deliver?

## Delta Research Brief

September 2006

Wind turbines are starting to appear on roof-tops, particularly in the UK and the Netherlands, and are generating considerable excitement in the media. High profile politicians are even installing them.

Building-mounted wind turbines have the clear potential to become high profile mass market products, but this will depend on a number of unresolved questions including their cost, performance and energy outputs.

These issues are analysed in detail in a new Multi-Client report by Delta Energy and Environment: *Roof-top Wind Turbines: A Product for Mass Markets?*

More than twenty companies in North America, Europe and Japan are manufacturing or developing building mounted micro-wind systems for households or commercial buildings. A number of these have their eyes on volume production and mass markets. And some UK utilities are starting to test products, with one already selling them on a limited basis.



**Figure 1: The SWIFT Micro-Wind Turbine.**

Renewable Devices, an emerging manufacturer of micro-wind turbines for households, installed these two turbines on a UK house. UK utility Scottish & Southern are currently selling SWIFT turbines.

*Source: Renewable Devices*

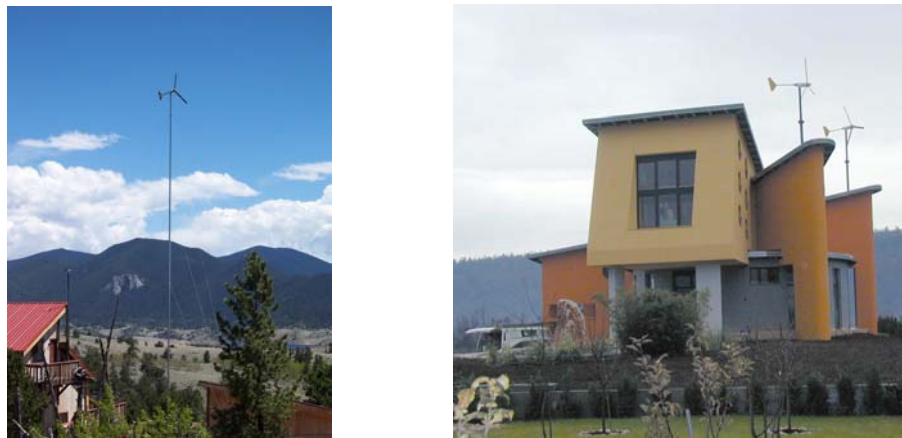
The idea is exciting – offering millions of households a very visible way to generate their own electricity. With developers aiming to achieve installed costs at £1,500 (€2,200, US\$2,850) per kilowatt and less for high volume production, the product may well appeal to a large proportion of home and building owners.

But uncertainties about several issues make future market growth difficult to predict. Unknown energy output is one of the most significant issues. Wind speeds over roof tops are not sufficiently

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well understood to enable accurate predictions of energy outputs. Some established manufacturers of micro-wind turbines are cautious about putting their products on buildings for this and other reasons and currently install the vast majority of their products on free-standing poles rather than on buildings.

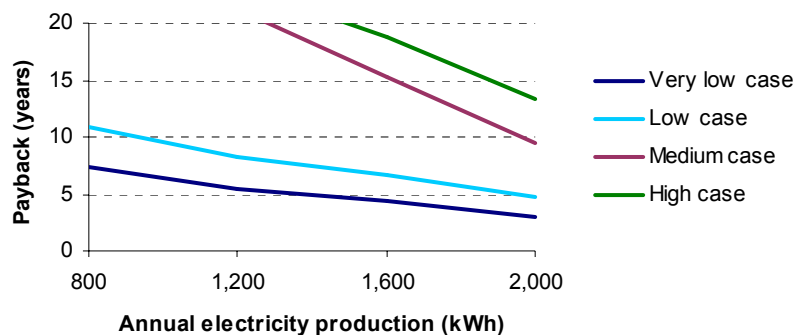


**Figure 2: Micro-Wind Installations from Bergey Windpower.**

Bergey Windpower, one of the leading manufacturers of 1 kW to 10 kW wind turbines, typically installs its turbines on free-standing poles (on the left), although some units have been installed on buildings (on the right).

Source: Bergey Windpower

Estimates of annual energy outputs for building mounted micro-wind made by manufacturers, developers and others vary significantly, from around 800 kWh at the lower end, to as high as 3,000 kWh for 1 kW rated products. Analysis by Delta suggests outputs will mostly lie towards the lower end of this range. If so, this may push the payback period beyond acceptable levels for the majority of householders. Figure 3 shows how paybacks—in the UK—vary under four different scenarios developed by Delta.



**Figure 3: Payback for Micro-Wind Installations**

Delta has modelled paybacks - under four scenarios - for building mounted, 1 kW rated micro-wind turbines in the UK.

Only once data is readily available from significant numbers of roof-top wind turbine installations will the amount of electricity produced be better understood. Even then, a variety of factors will influence electricity production. These include the influence of the roof shape on wind flow over the building, how high above the roof - and where above the roof - the turbine is sited, and the influence of nearby buildings and trees.

The UK, and to a lesser degree the Netherlands and Japan, is the focus of much of the attention and efforts to put micro-wind turbines on buildings. Companies targeting these markets and such applications include Renewable Devices, Wind-save, Turby, Windwall, Eclectic Energy, Zephyr and Proven Energy together with a rapidly growing list of others. Free-standing micro-wind turbines, meanwhile, are much more common in other countries, with established and growing markets in countries such as U.S, Japan and China.

The attraction of mounting wind turbines on buildings is the potential to open up mass market opportunities. For large markets to develop, significant proportions of home and building owners will need to be attracted to these systems.

Specially commissioned Delta market research with homeowners demonstrates that the concept of roof-top wind turbines generates considerable excitement. But there is a clear split in acceptable paybacks and capital costs between those with strong environmental motivations and the mainstream market. The Study contains detailed findings of Delta's research and highlights the degree to which consumers are prepared to pay an environmental premium for the micro-wind.

This Delta Multi-Client Study has been produced for utilities, product developers, investors and other organisations requiring independent, objective analysis of this emerging market. Now available for purchase, the Study analyses the key issues affecting how quickly and to what size these markets are likely to develop. Activity and potential in North America, Europe, and East Asia is examined, with a focus on the UK.

A brochure describing the Study is available on Delta's website, [www.delta-ee.com/delta\\_research\\_micro\\_wind.asp](http://www.delta-ee.com/delta_research_micro_wind.asp), and a contents list available from Jon Slowe (contact details below).

## Contact

**Jon Slowe**  
Director, Delta Energy & Environment  
E: [jon.slowe@delta-ee.com](mailto:jon.slowe@delta-ee.com)  
T: +44 141 227 3982  
[www.delta-ee.com](http://www.delta-ee.com)

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