

# Vertical axis wind turbines : a relevant solution for urban areas

The windmill market is growing at about 25% a year in power capacity. This trend will not stop soon, as many windy areas are not yet equipped with wind turbines. Urban areas and private needs are often neglected due to technical reasons such as blade size or obstacles in the prevailing wind direction, or to objections to the turbines' noise and visual impact. A British company, Quiet Revolution, has solutions to overcome these problems.

**S**ustainable development involves the use of renewable energies. Wind is one of them. Solutions have been found for rural areas, and now others are appearing for urban environments.

In 2000, Robert Webb and Richard Cochrane founded XCO2, an engineering and design studio providing low-carbon solutions for the urban environment, and in 2005, they created Quiet Revolution (QR) in London to provide sustainable energy solutions. Dr. Tamás Bertényi, with a PhD in the aerodynamics of vertical axis wind turbines (VAWT), joined them to develop new models. Many studies were carried out at the University of Cambridge.



The QR 5 prototype.

## Construction

The "QR" wind turbine was designed in response to increasing demand for urban turbines, where wind speeds are lower and wind directions change frequently. Vertical axis and helical design were chosen to ensure low noise and vibration, satisfactory visual impact, and robust performance even in turbulent winds. While traditional horizontal axis wind turbines that are windmill-shaped have to rotate to track wind, VAWTs collect wind from all directions without tracking. According to QR modelling, the invention produces 20-40% more energy than a traditional turbine of similar size. Moreover, vertical axis design has much lighter loads than its horizontal counterpart.

This new wind turbine consists of a mast and a rotor. The blades and connection arms are made of carbon fibre and epoxy resin, optimised for strength and weight. Like helicopter blades, they are fail-safe. The rotor is designed with a high-tensile wire running through all its component parts, to minimise the risk of broken parts being flung from the structure. The turbine also has integrated electronic control mechanisms that constantly monitor the speed and can stop it or switch it off in case of high-wind events or accidental damage.

The first model, named QR5, will

## 👉 Main characteristics ...

**Model:** QR5

**Dimensions:**

5m high x Ø3.1m + mast

**Operation:** wind of 4 to 16 m/s

**Cost with installation:** USD65,000

**Design life:** 25 years

**Payback period:** 18 years

**Annual energy:** 10,000 kWh

**Assumption:**

average wind of 5.9 m/s

generate around 10,000 kWh. This is equivalent to the electricity demand from 5 low-energy houses, or to the needs of a twenty-man office (lights, computers, etc.).

## Market

Renewable energy is growing because of diminishing petroleum resources and the need to reduce CO2 emissions. New buildings will have to be environmentally friendly, with a growing share of energy coming from renewable sources. This new kind of wind turbine is easier to implement in an urban landscape, on the ground or on building roofs, offering new development opportunities for the whole wind-energy sector.

Other models for domestic installations and buildings are under development. ■

**More information:**  
[www.quietrevolution.co.uk](http://www.quietrevolution.co.uk)