

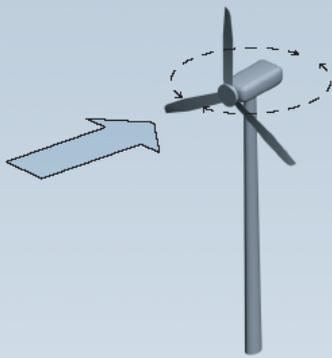
## qr5 VERTICAL AXIS WIND TURBINE

The quiet**revolution** qr5 is an innovative wind turbine designed to work well in the urban environment, where wind directions change frequently and quiet, low vibration operation is critical.

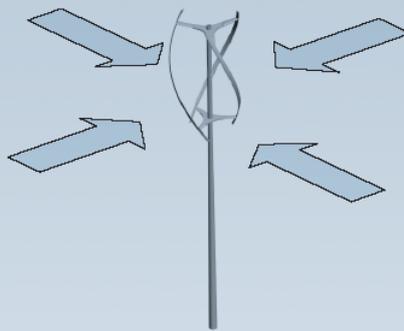
The design is the result of a combination of sound engineering principles and state-of-the-art aerospace technology. Form follows function to create an elegant and visually engaging product that can easily be integrated with both new and existing buildings.

### Key Product Advantages

The quiet**revolution** qr5 differs from a horizontal axis wind turbine (HAWT) in that it doesn't need to change its orientation to track the wind.



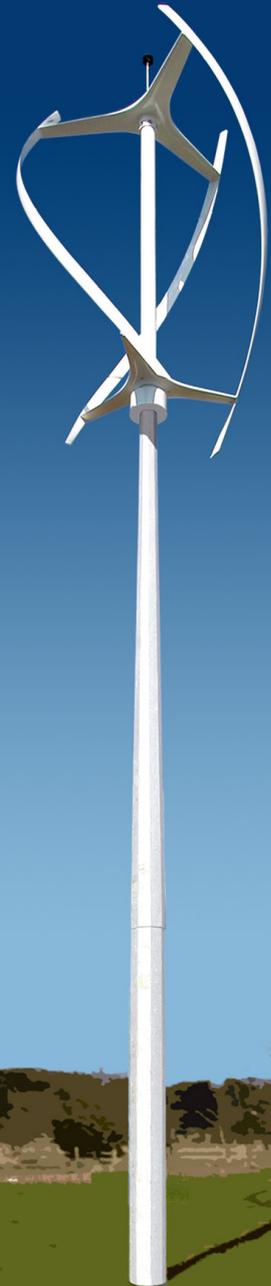
Traditional HAWT has to rotate to track changes in wind direction



quiet**revolution** VAWT collects wind from all directions equally

- The qr5's sophisticated control system employs a patented gust tracking algorithm that takes advantage of the extra energy available in the gusty urban wind environment.
- The qr5 blade tip speed is significantly lower than for a similarly rated HAWT so less noise is produced.
- The helical blade design results in a very smooth operation which minimises vibration and further reduces acoustic noise.
- Cutting-edge computer design and modelling means that the qr5 boasts a light and durable carbon fibre structure.
- The qr5 is easy to integrate into existing structures due to its compact shape.
- The qr5 has a peak power of over 7kW. A typical installation would generate 7000 - 10000 kWhr per annum, equivalent to 10% of the energy requirements of a 600m<sup>2</sup> office building.
- In the UK, this is equivalent to displacing 4000 - 6000kg of annual CO<sub>2</sub> emissions associated with grid-generated electricity.<sup>1</sup>

<sup>1</sup>Source: [www.bre.co.uk](http://www.bre.co.uk)

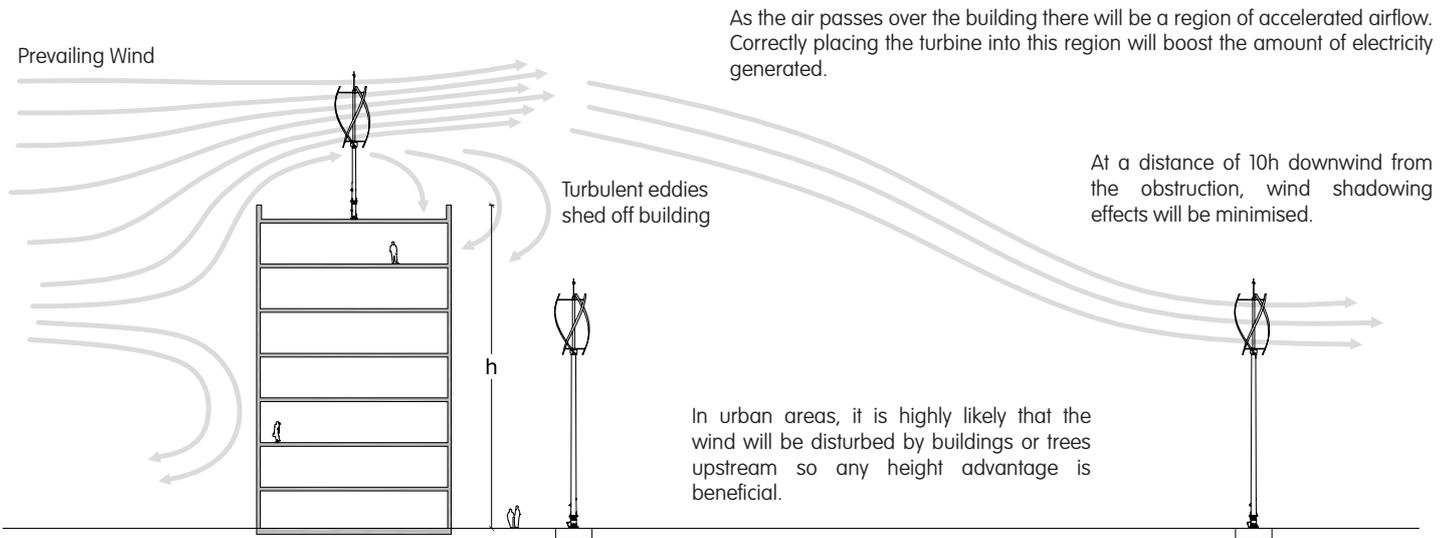


The typical price for the supply and installation of a single grid connected qr5 turbine is around £38,000. This includes the rotor, generator, controls & inverter, mast, installation and commissioning, but excludes foundations which are site specific.

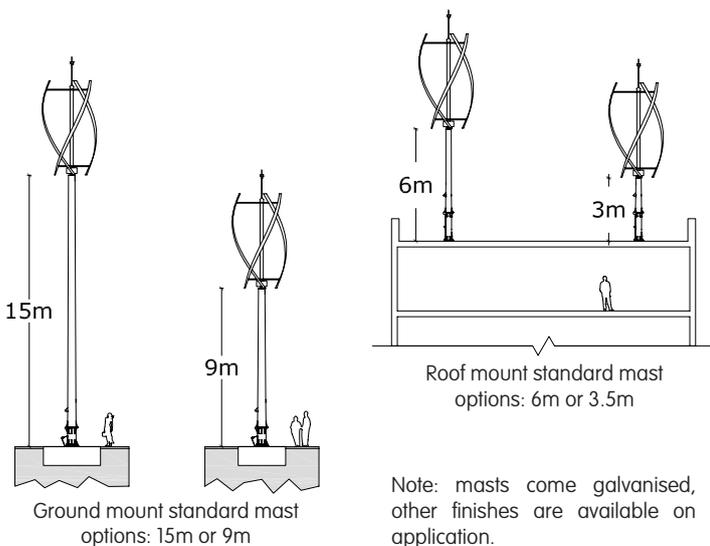
The qr5 has a design life of 25 years and comes with a two year warranty on components.



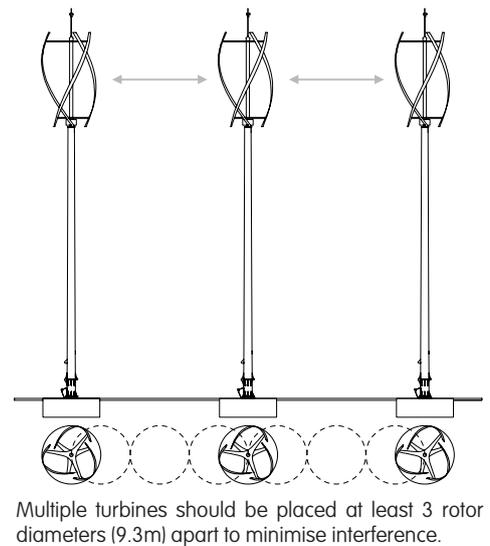
## Optimising Wind Energy in the Urban Environment



## Installation Options



## Turbine Spacing



## Technical Specification

<b>Physical dimensions:</b>	5m high x 3.1m in diameter, weight 450kg
<b>Generator:</b>	Direct drive, mechanically integrated, weather protected permanent magnet generator
<b>Control System:</b>	Fully-automatic gust tracking constantly optimises turbine output for all sites and wind speeds
<b>Operation Mode:</b>	Wind speeds: 4.5 m/s - 16 m/s
<b>Rotor Construction:</b>	Carbon composite blades and connecting spokes
<b>Design Life:</b>	25 years (annual inspections required)
<b>Warranty:</b>	Two years on components
<b>Brake and Shutdown:</b>	Active power throttling above 14 m/s wind speed, auto shutdown in high wind speeds (above 16 m/s). Fail-safe mechanical brake in the event of loss of power

## Costs

Turbine	£25,000
Control Electronics*	£4,600
Masts:	£2,950 - £4,100
Installation:	£4,000 - £7,000
Foundation/Steelwork:	Site specific

\* Including inverter for grid connection

Please note that for multiple turbines, control and installation costs reduce by 30%