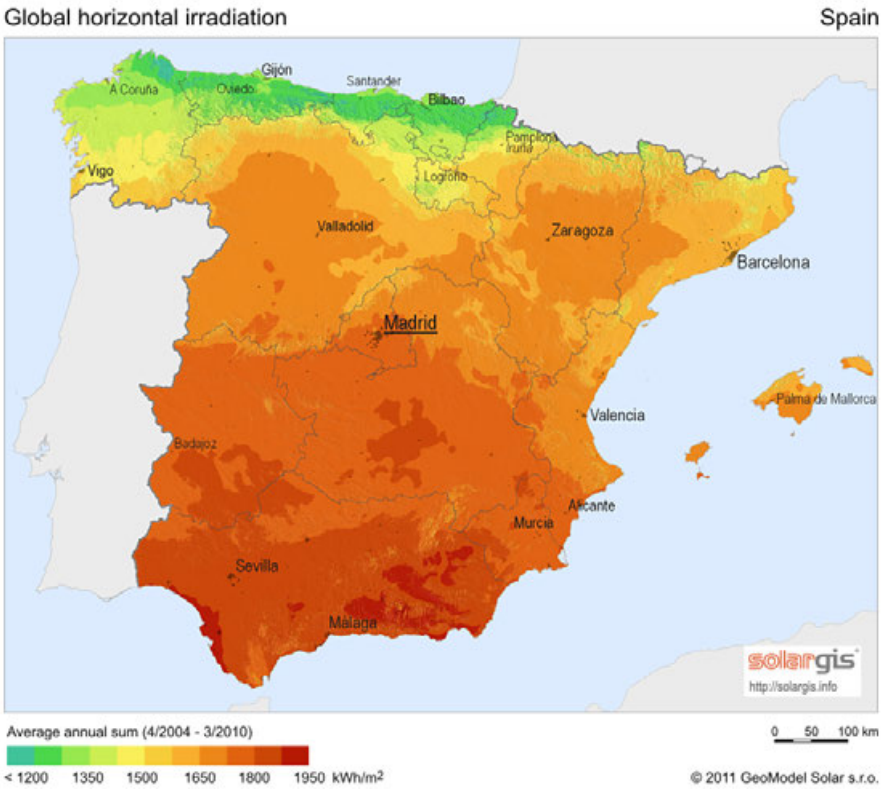
01. SUN

Spain is one of the most advanced countries in the development of solar energy, since it is one of the countries of Europe with more hours of sunshine. The Spanish government committed to achieving a target of 12 percent of primary energy from renewable energy by 2010 with an installed solar generating capacity of 3000 megawatts (MW). Spain is the fourth largest manufacturer in the world of solar power technology and exports 80 percent of this output to Germany. Spain added a record 2.6 GW of solar power in 2008, increasing capacity to 3.5 GW (Couture 2011). Total solar power in Spain was 4 GW by the end of 2010 and solar energy produced 6.9 terawatt-hours (TW·h), covering 2.7% of the electricity demand in 2010.

Through a ministerial ruling in March 2004, the Spanish government removed economic barriers to the connection of renewable energy technologies to the electricity grid. The Royal Decree 436/2004 equalized conditions for large-scale solar thermal and photovoltaic plants and guaranteed feed-in tariffs. In the wake of the 2008 financial crisis, the Spanish government drastically cut its subsidies for solar power and capped future increases in capacity at 500 MW per year, with effects upon the industry worldwide.



Converting the sun's radiation directly into electricity is done by solar cells. These cells are made of semiconducting materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the

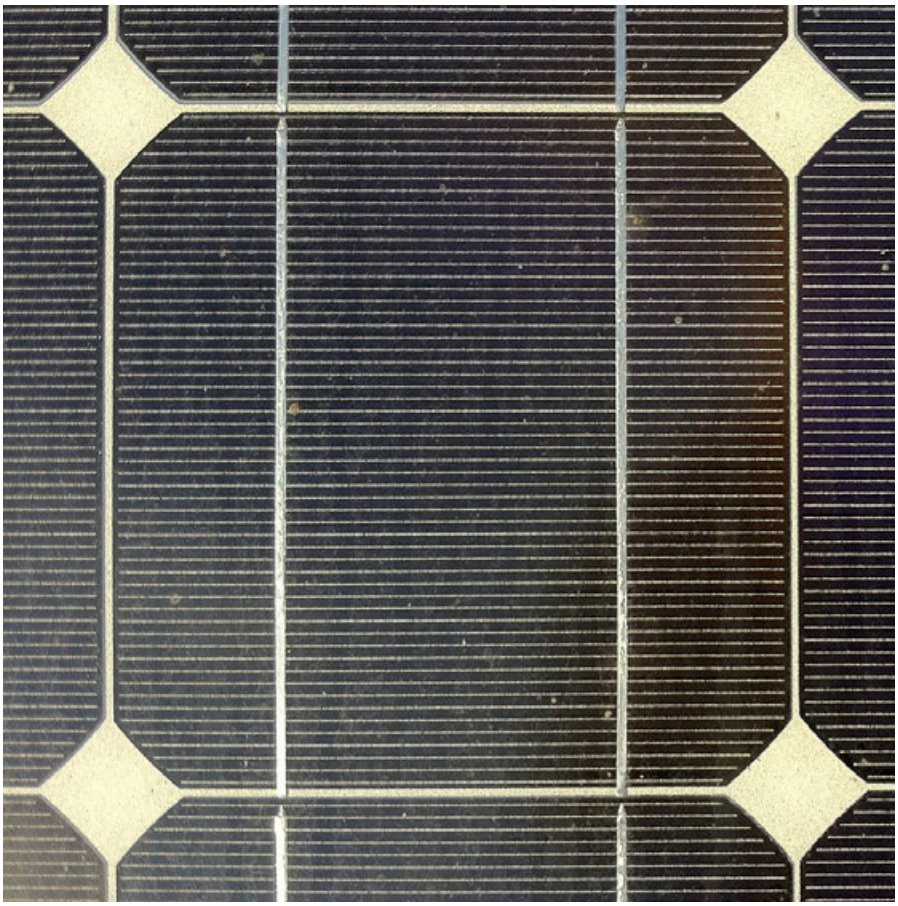
photovoltaic effect. Photovoltaics (PV) is thus the field of technology and research related to the application of solar cells that convert sunlight directly into electricity.

The solar energy is already being exploited in the hotel, through a set of solar panels placed on the rooftops of the building. This set produces enough energy to power four SMA (Sunny Mini Central) transformers, of about 15 kW each, this are placed beside the panels.

This energy is not consumed directly in the building, as established by law; it is redirected to the general energy company, who pay for it.

(Photovoltaic Panels in the lower rooftop of the Hostal Empuries, 27/11/2011)

(Photovoltaic Panels in the higher rooftop of the Hostal Empuries, 27/11/2011)



(Photovoltaic Panels of the Hostal Empuries, 27/11/2011)

(SMA Panels in the lower rooftop of the Hostal Empuries, 27/11/2011)

Links

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http://solar3d.com/technology.php

02. OCEAN

Marine energy or marine power (also sometimes referred to as ocean energy or ocean power) refers to the energy carried by ocean waves, tides, salinity, and ocean temperature differences. The movement of water in the world's oceans creates a vast store of kinetic energy, or energy in motion. This energy can be harnessed to generate electricity to power homes, transport and industries.

The term marine energy encompasses both wave power, power from surface waves, and tidal power, obtained from the kinetic energy of large bodies of moving water.

Waves are caused by the wind blowing over the surface of the ocean. In many areas of the world, the wind blows with enough consistency and force to provide continuous waves. There is tremendous energy in the ocean waves. **Wave power devices** extract energy directly from the surface motion of ocean waves or from pressure fluctuations below the surface.

This is another energy source to consider taking advantage of, because of the obvious position of the hotel in front of the sea.

There exist a series of considerations to take in mind before choosing any ocean energy production method, such as the possible impacts on the shape and aesthetics of the beach, very important because the main attractor of the hostel is its beautiful environment, and its alteration might bring with it a serious economic impact, so any method that permanently alters its context should be avoided.

Another important consideration is the intensity of the waves, which is relatively low in l'Escala, so it should be considered to apply a proven ocean energy production system that suits the place particular movement.

(Ocean view from the rooftop of the Hostal Empuries, 27/11/2011)

Wave power – potentials and challenges

Wave power is an unexploited renewable energy source that has several attractive

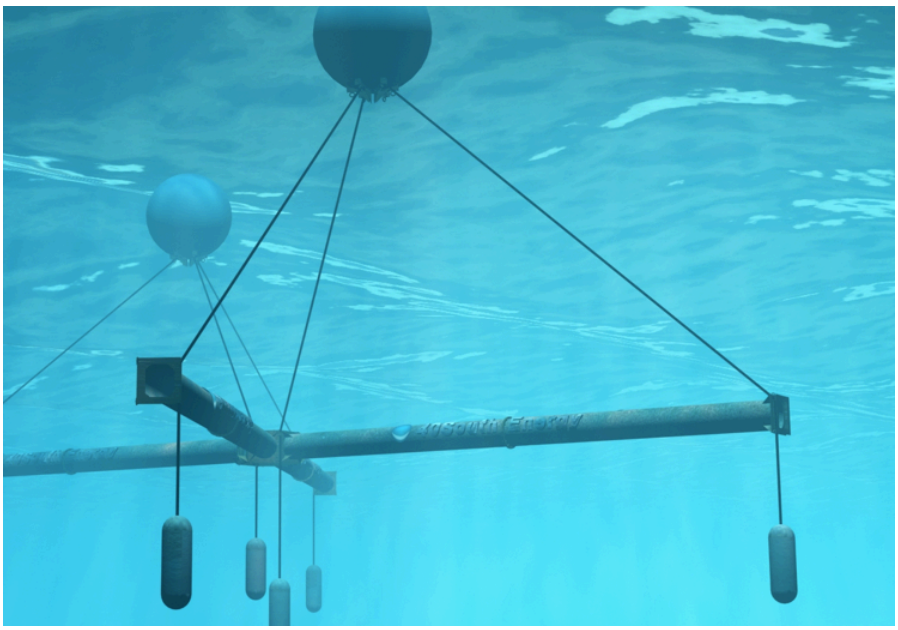
features:

- There is a huge global theoretical potential for energy from the waves, in the order of several thousands of TWh. Even if only a small part of wave potential can be exploited this will still mean potential of several hundreds of TWh. As a comparison, the total annual electricity production in Sweden is approximately 150 TWh.
- Waves have a longer duration than winds, and tend to shift in their incidence to a greater extent compared to winds. This means that electricity can be generated from the waves after winds have died out. It also means that wave power complements, rather than competes with wind power.
- The environmental and visual impacts of offshore wave power farms are expected to be low.
- Nonetheless, wave power is still an immature technology, and challenges lie ahead. The sea is a harsh environment and the demands on any successful wave power device will be severe. Devices must be able to survive the worst storms, and be able to function with a minimum of maintenance, since weather conditions will limit access. They also need to have an acceptable economic performance to be commercially viable.

Possible Methods
Wave energy Machines

40 South Energy

40South Energy have the expertise to turn ocean wave energy into useful work. Exploiting wave energy correctly lets you generate electricity, run a desalination process, or pump water, among a host of other tasks.

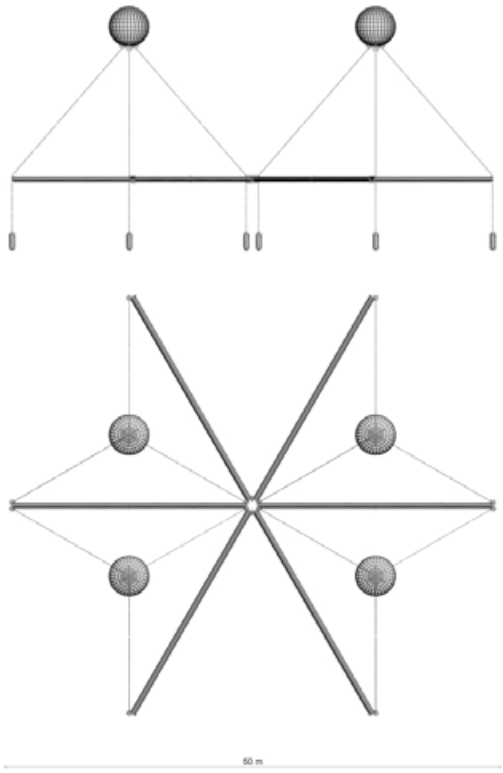


(www.40southenergy.com)

Most experts believe that converting sea and ocean wave energy is, along with photovoltaic (PV) energy, one of the best options for the future production of renewable energy. This is why scientists and inventors have been trying for decades to find ways to capture the energy in ocean waves.

The 40South Energy wave converters comprise one fully submerged section called Lower Member, and energy interceptors called Upper Members at different depths. The relative motion of the Lower and Upper members is converted directly into electricity on the machine. The depth of the machines is controlled automatically to respond dynamically to changing sea conditions.

This ability to vary depth dynamically and automatically in response to any changes in the state of the sea also guarantees that the same machines can operate across the globe.



(www.40southenergy.com)

Characteristics (www.40southenergy.com)

Completely Underwater and with Automatic Depth Control

Because our wave energy conversion machines are below the surface and regulate their own depth automatically, it means:

- The wave machines are unaffected by even the harshest of conditions;
- They maintain a very high level of efficiency;
- They respond automatically in real time to the prevailing sea conditions;
- The wave energy machines pose no threat to surface navigation;

- There is negligible environmental impact; and all maintenance of 40South Energy wave energy machines can be performed on the surface.

Quick Deployment in Water Over 35m Deep

We can deploy your 40South Energy wave machine within days, thanks to our testing processes and the fact that the machine has the same operational limits no matter where it is deployed. This means:

- Low installation costs;
- It's possible to install a complete wave park within weeks; and every coast in the world becomes a possible deployment site for 40South Energy wave energy machines.

Modular Design and Built with Commercial, Off-the-shelf Parts

The design and build of our wave energy machines guarantees you:

- Low maintenance costs.
- The wave energy machines can be shipped anywhere in the world via container;
- Maintenance can be carried out locally; prices that are competitive with offshore wind.

How 40South Energy Wave Energy Machines are used

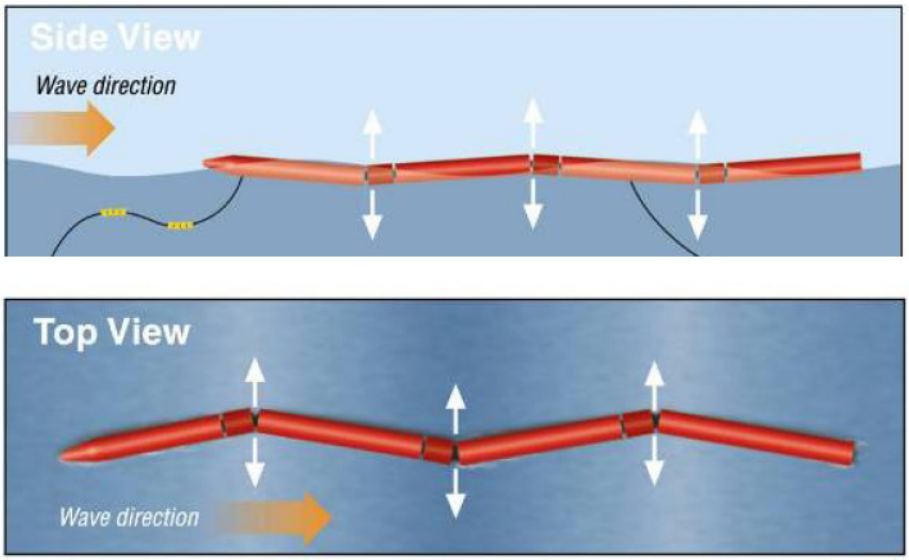
The flexibility and cost-effectiveness of the 40South Energy wave energy machines mean that potential uses of the machines are many and varied. Here are just some of the ways they can be put to use:

- In Wave Parks, where they can produce energy to be sold through the electricity grid. All our F6 machines are perfect for this because they achieve a final energy cost, in almost all wave conditions, that is competitive with offshore wind.
- In front of harbors that adopt cold ironing to supply clean and cheap energy to the ships at berth.
- In association with desalination plants, even in the absence of connection to the grid to produce desalinated water. This deployment has the added advantage that water is easily stored (as opposed to electricity), so that an installation can rely completely on our wave energy machines for its water needs and use the stored water when there is insufficient energy in the sea.
- In association with backup power sources, wave energy machines can provide all the energy needs of isolated communities in areas far from the grid. Use of fuel cells to produce energy from hydrogen when sea conditions mean wave energy is insufficient and to produce hydrogen from water when wave energy is abundant, it's possible to create a closed loop configuration with no need for external fuel sources. A special case of this use is in oil rigs (active or decommissioned) and offshore structures in general: in this case the final cost of the energy or desalinated water produced with wave energy is even lower than in other situations.

Attenuators

Attenuators are long multisegment floating structures oriented parallel to the direction of the waves. The differing heights of waves along the length of the device causes flexing where the segments connect, and this flexing is connected to hydraulic pumps or other converters.

(Ocean Power Delivery, Ltd.)



Pelamis Wave Energy Converter (Source: Ocean Power Delivery Ltd. 2006)

Links

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http://www.40southenergy.com/

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03. WIND

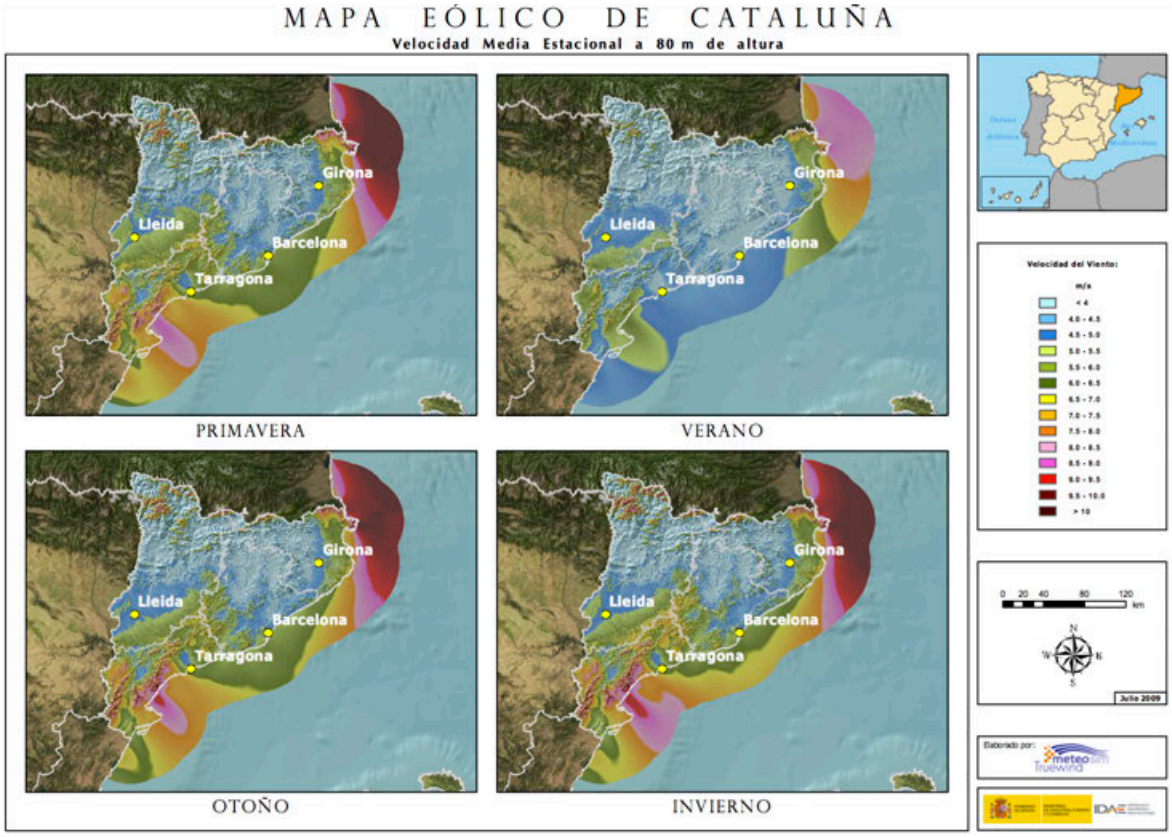
Spain is the world's fourth biggest producer of wind power, after China, the United States and Germany, with an installed capacity of 19,959 megawatts (MW) at the end of 2010, a rise of 1,609 MW for the year (International Energy Agency, 2009). Wind energy has consolidated as the third technology of the Spanish power system in 2010, having reached an output of 42,976 GWh, only overtaken by thermal gas combined cycle at 68,828 GWh and nuclear that reached 61,944 GWh. In 2009, for the first time in the annual calculation, wind overtook coal that produced 33,844 GWh. In 2010, wind energy has covered 16% of the demand, compared to 11.5% in 2008 and 13.8% in 2009 (www.aeeolica.es).

Wind power was put to use in Spain as early as the 1940s. However, as Pedro Rodríguez, Professor of Electrical Engineering at the College of Electrical Engineering of Terrassa, explains, "the first applications were small-scale and highly experimental. The earliest beneficiaries of wind power were probably land workers, who used it to pump water from wells". From these primitive beginnings, wind power has developed into a major research area, and companies are increasingly interested in the potential of this new sector.

Twenty-five years ago, Catalonia saw the installation of the first wind turbine in Spain used to supply public electricity. Josep Maria Guerrero, of the Department of Automatic Control, explains that, "in the early 1980s, Catalonia was at the forefront of the development of wind power in Spain. The turbines in use at the moment can produce up to 420 MW of power, and this figure should increase considerably over the coming years with the creation of new small scale wind farms".

Despite its prominence in the introduction of wind power to Spain, Catalonia is now ninth in the national ranking for electricity generation from wind power. According to experts, recent years have seen a change in mentality, and wind farms have become an increasingly popular solution to the energy problem. "Certain objections, focusing on the environmental impact of wind power infrastructures and a lack of adequate

public planning, have slowed progress in this sector in Catalonia", explains Pedro Rodriguez. According to Esteve Codina, of the Department of Fluid Mechanics at the School of Industrial and Aeronautic Engineering of Terrassa, "the wind power sector has benefitted from the introduction of generous subsidies over the last few years, and has become an attractive business opportunity".



(Servei Meteorològic de Catalunya, **meteo.cat**)

qr5

The quiet**revolution** (QR) was designed in response to increasing demand for wind turbines that work well in environments close to people and buildings.

The elegant helical (twisted) design of the qr5 ensures a robust performance even in turbulent winds. It is also responsible for virtually eliminating noise and vibration.

At five meters high and three meters in diameter, it is compact and easy to integrate, and with just one moving part, maintenance can be limited to an annual inspection.

(www.quietrevolution.com)

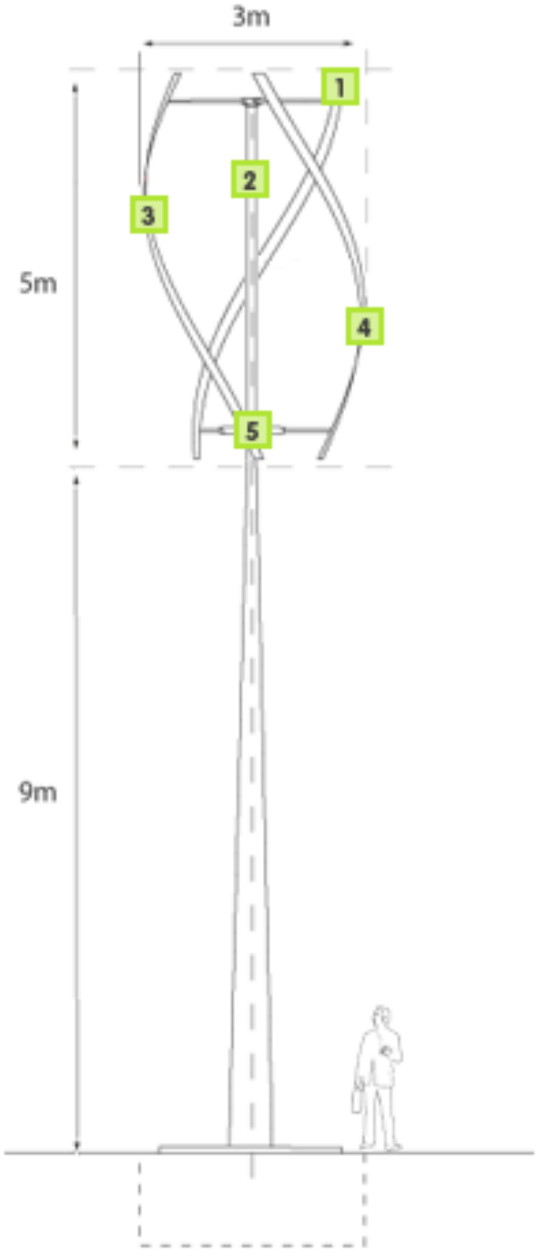
Features

- Three ‘S’ shaped blades are tapered to shed noise
- The vertical axis is easy to integrate with existing masts and buildings
- The helical (twisted) design captures turbulent winds and eliminates vibration
- The blades, spars and torque tube are made of robust carbon fiber, and all moving parts are sealed to minimize maintenance
- The direct drive in-line generator has auto-shutdown and peak power tracking and is incorporated into the mast.

(www.quietrevolution.com)

Specifications	
Physical dimensions	5.5m tall, 3.1m diameter
Generator	Direct drive, mechanically integrated, weather sealed permanent magnet generator
Power control	Peak power tracking constantly optimizes turbine output for all sites and wind speeds
Power	The projected peak power at 16m/s is: 8.5kW aerodynamic; 7.0kW DC; 6.5kW grid
Annual energy yield	4197 kWh at 5m/s to BWEA standards; Up to 12,729 kWh at 7m/s No reduction in power output at up to 40% turbulence intensity.
Operating wind speeds	Cut in at sustained 5m/s; Cut out sustained 26m/s
Design life	25 years (annual inspections recommended)
Rotor construction	Carbon fiber
Power Regulation and shutdown	Power regulation above 13.5m/s wind speed, auto shutdown in high wind speeds (above 26m/s)
Roof mounting	6m mast
Tower mounting	18m mast

Remote monitoring	Event log can be accessed via PC. Remote monitoring stores operation, average wind speeds and kW hours of electricity generated
Warranty	Two years on components



(www.quietrevolution.com)

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General

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