
windpods

WINDPODS TECHNOLOGY

Windpods are patented micro wind turbines for on-site power generation in urban environments. Developed in Fremantle, Western Australia, Windpods feature a modular design approach similar to that of a solar plug and play system where consumers buy the number of modules required for the load.

Windpods have aerodynamics designed specifically for variable urban wind environments and offer cost savings and convenience of installation on urban buildings and structures such as roof-top ridge-lines.

The Windpods G1 (commercial model) 500w module has an outer frame size of 667mm high x 2530mm in length. The turbine itself has three sections, each with blade positions offset 60 degrees from the next to provide a very smooth torque curve (effectively as smooth as a 6 blade system) and two G1 units can achieve an output of 1 kW in 12.5 m/s wind speed.

The frame (including top and bottom deflector plates) can be installed horizontally, vertically or any angle in between. This type of flexibility also gives Windpods the ability to be designed into the architectural features of a project and the modularity permits very wide design scope.

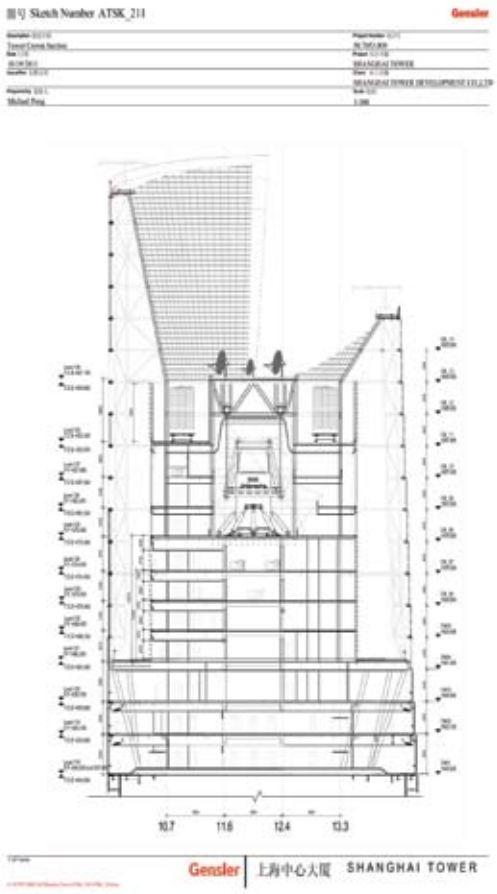
Other importance characteristics of Windpods include :

- Extremely low noise and vibration. The Tip Speed Ratio (TSR) is significantly less than Horizontal Axis Wind Turbines (HAWT's), therefore Windpods have lower noise and vibration.
- Able to operate vertically, horizontally or any angle in-between.
- Able to operate efficiently in gusty and turbulent winds such as typically found in urban environments.
- Able to be modularly mounted onto buildings at low cost in a location where wind is at highest concentration.
- Excellent power production per dollar of cost.
- Slender, elongated turbine tubes of only 460mm diameter that may not require complicated Council planning approvals (depends on individual Council policies).
- Safe to birds. Conventional propeller style (HAWT) turbines can be dangerous to birds because they have no frame surround and feature high TSR thin blades that become virtually invisible when spinning. Windpods have only moderate TSR's and larger, smooth blades plus a complete frame surround (deflectors) and are therefore visually obvious and safe for birdlife.
- In cyclones and extremely strong winds, the Windpods electronic brake system stops the turbine, protecting it from damage.
- Life-span. The only moving parts are bearings and these have a design life of greater than 17 years and replacement of bearings after this time is simple and low cost.
- Compatible with several existing inverter units already on the market such as SMA's Windyboy.

SHANGHAI TOWER

The Shanghai Tower is a 680m tall buiding (construction 2013-14) in the financial distract of Shanghai. At the time of construction it is the 3rd tallest building in the world and consists of offices, hotels, retail, dining and mixed use areas. The Crown section is designed for over 330 Windpods G1 turbines with a capacity of over 165kW. Turbines were slightly modified in order to allow installation in to the building's existing steel frame. Power produced is returned to base load and is used to power common area lighting, elevators, airconditioning and other constant power requirements. This is the first time in the world wind turbines have been integrated in to the design and frame of a tall building during construction. The wind resource at this height is uninterupted and practically constant.

Windpods' unique ability to be installed stacked on top of each other as well as installed side by side allowed Gensler, the building designers, to truly integrate the turbines in to the construction. Also, the low noise and vibration output of Windpods ensures that building occupants will not be disturbed in any way.



PROJECTS

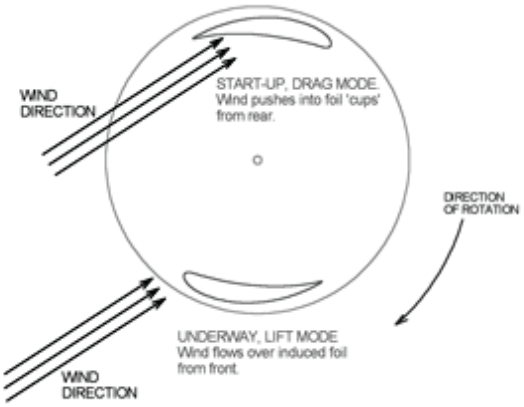
Above and left: Bai Long Gang Water treatment facility in Shanghai, China 80kW installation. The site is located on unobstructed waterfront and experiences winds of up to 50kph/33mph on a regular basis.

Below: Westgate Freeway Melbourne, Australia, Windpods integrated directly in to signage with power generated able to be fed back to lighting. Windpods could also be attached to light poles and other road infrastructure.

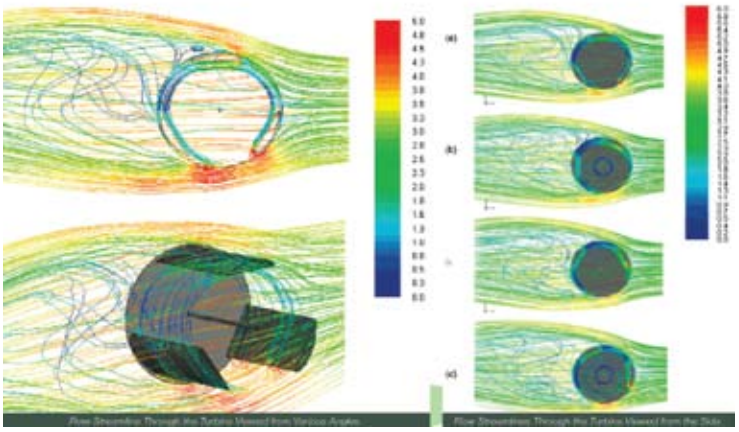
City of Cockburn, Perth, Western Australia. 10kW installation of Windpods, mounted on top of a services room on the rooftop. The footprint of this 10kW Windpods is similar to 2.5kW of solar PV. Also see the inverter bank, switchboard and brake system (to the right of the switchboard), all located undercover in the services room. The switchboard has a manual over-ride for the brake system for high wind alerts or maintenance and servicing.

St. Bartholomews, Perth, Western Australia. 6kW roof top installation on a residential and office building. Turbines have been oriented to face the prevailing wind to ensure the highest return. Windpods and solar PV can work hand in hand, as the sun and wind resource are not cross-effected in any way. In northern hemisphere regions with low sun-hours, Windpods can be particularly effective.

QUIET, EFFICIENT, FASTER THAN THE WIND



CFD SIMULATION OF WINDPOD AERODYNAMICS



Windpods are able to operate aerodynamically under both “Drag” and “Lift” principles. Drag is simply the turbine catching the wind like a sail and being driven by the available resource. Lift allows the turbine to actually spin faster than the wind as it “slips” through the air and uses the wind to increase momentum.

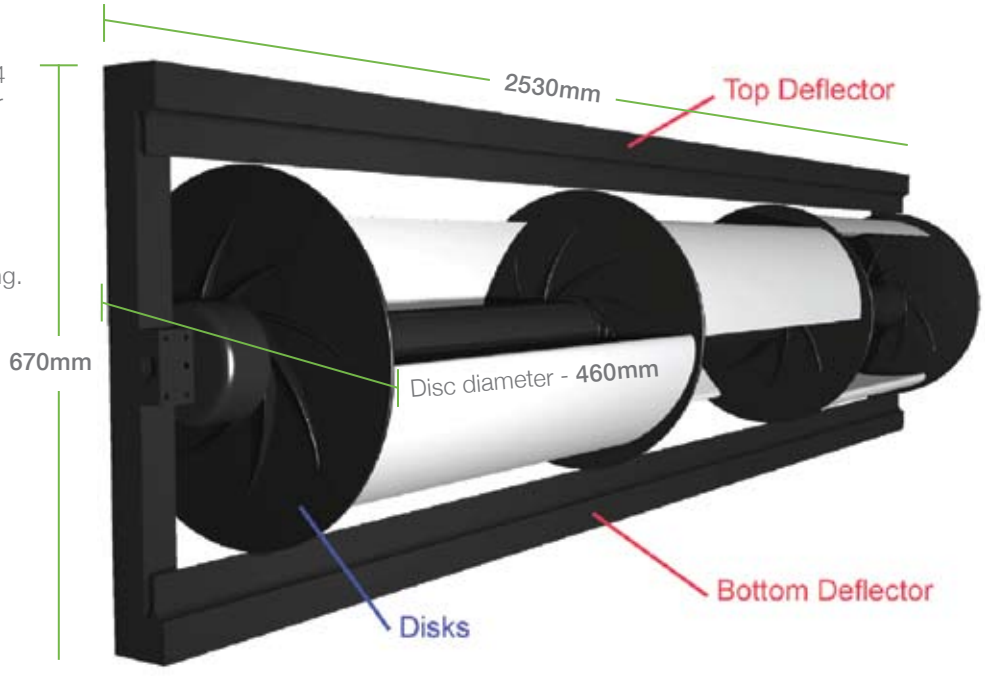
A Computational Fluid Dynamics (CFD) report was conducted on early prototypes of Windpods units. The CFD confirmed there was minimal disturbance of air as it passed through the turbine. This is in part why Windpods are able to run with minimal noise and vibration issues. A typical turbine may emit around 40dB of sound when measured at a distance of 5m/17’

SPECIFICATIONS

Windpods wind turbines are built with a steel outer frame and aluminium/aluminum discs, blades and axis. At a length of 2530mm/99.6”, height of 670mm/26.4”, and disc diameter of 460mm/18.1” Winpods are highly durable and modular in design. Including the steel outer frame a single G1 unit weighs around 55kg/120lb. Multiple G1 units can be installed stacked on top of each other or installed end to end, either in horizontal orvertical configurations, with horizontal being the preferred.

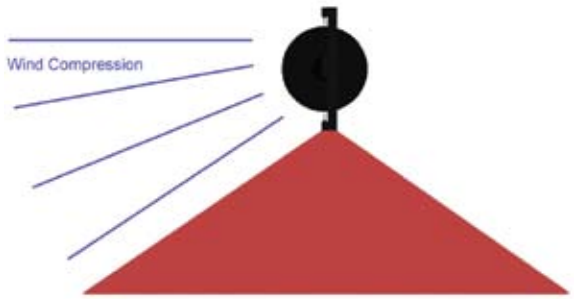
Whilst vertical installation is technically the same as horizontal for the purpose of frame design and cabling, it does however require additional maintenance due to all of the turbine’s weight resting on only one of the bearings as opposed to evenly spread across both bearings when horizontally installed. Maintenance inspections are usially 3-6 monthly, with bearing replacement normally required every 1-3 years depending on conditions. Bearing replacement is simple due to the block mounts.

Each Windpods G1 turbine comes with 4 pre-drilled mounting holes in each corner of the frame.Turbines are mounted on to uprightsthat can be pre-existing or retrofitted. Windpods wind turbines are mounted tothe outer frame via specially designed blocks, that allow for the easy removal of the turbine for on-site servicing.



Windpods G1 model weight approximately 55kg/120lb including frame

WINDPODS CONCEPTS



Windpods can take advantage of pitched roofs to compress wind and concentrate flow in to the turbines. Wind hitting the roof on different angles is still directed to the ridgeline (peak) and can be harvested by the turbines.

Bridges. Installed on the top or underside of bridges, Windpods could harness the often unobstructed and strong wind resource that is available. Windpods could be retrofitted to existing structures or, designed in to new projects and possibly incorporating Windpods in to the design.

Building edges. Wind is pushed to the edges of buildings as it hits the face and moves along the outer walls of structures.

OUTPUT

Windpods have undergone a performance optimization program at the University of Western Australia wind tunnel, over seen by Dr. Kenneth Kavanagh from the School of Engineering, UWA.

Dr. Kavanagh provided independent verification of the results achieved using UWA's wind tunnel.

THE UNIVERSITY OF WESTERN AUSTRALIA