

For wind farms

The Windflow 500 offers wind farm developers superior land utilisation, ease of transport and installation, low environmental impact, exceptional grid integration capabilities and cost-effective installation, operation and maintenance.



Te Rere Hau wind farm Stage 1

Te Rere Hau is a 97 turbine wind farm currently under construction in the North Island of New Zealand. NZX listed NZ Windfarms Ltd has selected the Windflow 500 for this development. Investment partners in this Joint Venture include Babcock and Brown Windpower Ltd and NP Power Pty Ltd

For the community

At a site with an annual mean wind speed of 8.5m/s (19 mph), a Windflow 500 turbine will power the equivalent of approximately 200 households.

It can be easily connected into the local network, and export excess electricity. For remote communities, it can also be used in conjunction with a diesel generator and displace expensive diesel fuel when the wind is blowing.

For the farm or business

If your farm or business is located in a windy area and you have a significant energy load, a single turbine may be economic to provide power for your own use with excess energy being exported into the local network.

About Windflow Technology

Windflow Technology Ltd was incorporated in New Zealand in 2001 and is a publicly listed company with international shareholders (NZX:WTL).

Windflow Technology is committed to achieving and maintaining the highest standards in quality management.

The company is working to ISO 9001 and IEC WT 01 (Class 1A) in its design, development, production, installation and servicing activities (certification in process).

Services

Windflow Technology Ltd offers complete wind farm project management.

Services include:

- wind monitoring
- siting
- resource consents
- construction
- training
- maintenance
- operations
- general wind energy consultancy

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Windflow 500

The Next Generation Wind Turbine



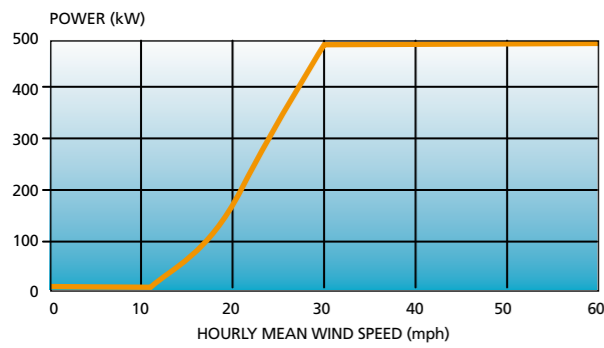
- Cost-effective
- Robust and reliable
- Easy grid integration
- Low visual impact
- Proven performance

www.windflow.co.nz

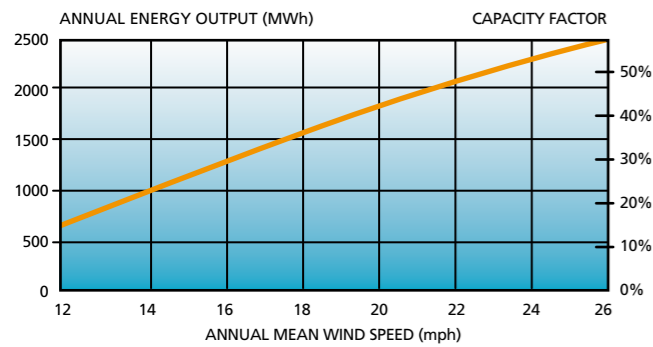
The Next Generation In Wind Turbine Design

The Windflow 500 combines cost-effectiveness, simplicity and reliability in a world leading design. The turbine has been designed to solve the problems of traditional turbine designs and to meet IEC WT 01 (Class 1A) certification – for strong winds and turbulent conditions. Its size, performance and light-weight design makes it suitable for wind farms, islanded power, and single installations.

Windflow 500 Power Curve



Windflow 500 Annual Energy Output



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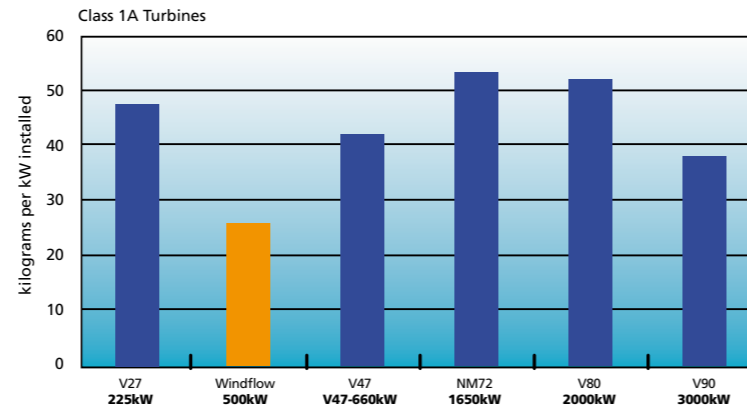


The Windflow Advantage

Reduced weight and loads with two bladed rotor

The two-bladed rotor is mounted on a hinge, allowing it to teeter back and forth slightly as it rotates. The proven advantage of teetering is that it greatly reduces the fatigue loads on the windmill allowing a lighter, and therefore more cost-competitive design.

Turbine tower top weight relative to generator size



Robust Torque Limiting Gearbox design

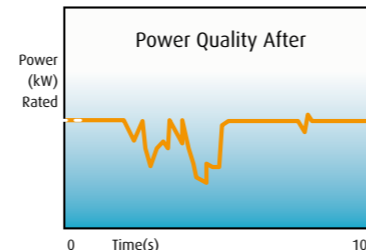
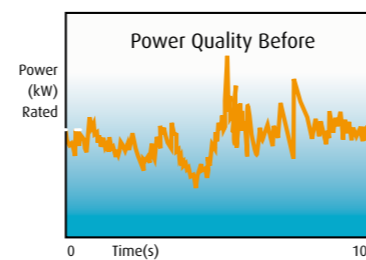
The patented Torque Limiting Gearbox (TLG) is a hydraulic variable speed system which has proven to significantly reduce fatigue loads and provide smooth power output (operating in the UK in the 1990's and in NZ since 2003).

Conventional fixed speed turbines must cope with significant torque fluctuations. This results in increased fatigue loads and necessitates the gearbox being far heavier and more expensive than the TLG.

Conventional variable speed turbines achieve some weight reduction, but not as much as the TLG because of the inertial torques imposed when wind gusts accelerate the generator.

The TLG's hydraulic system effectively eliminates inertial torques by enabling the generator speed to be constant while the wind turbine speed varies. This also avoids the use of power electronics which are relatively more expensive, less efficient, less reliable and can impose significant harmonic and electrical fault torques on the gearbox.

By comparison, the TLG system eliminates overloads on the gearbox by providing almost perfect torque smoothing even in the gustiest conditions.



Cost-effective, simple installation

The light-weight, compact design enables:

- a foundation of between 42 and 84 cubic yards of concrete, depending on the geological conditions
- a maximum delivered component width of less than 8 feet
- a maximum lift during installation of 14 tons to 95 feet

Minimal visual impact

With a hub height of 98 feet (151 to the tip of the blade), the visual catchment of the wind farm (or single turbine) will be less than for taller turbines. It is painted light blue/grey to blend in, and is small enough that it does not require warning lighting under New Zealand aviation regulations.

Quiet technology

Generally, a modern turbine can not be heard above typical background noise levels (40 dBA) at a distance greater than 1/4 mile. Windflow's quiet gearbox technology (patents pending) means that the turbine is quieter than some three bladed designs. The sound power level of the Windflow 500 wind turbine is being verified through the IEC certification process.

Exceptional grid compliance

Unlike other wind turbines, the Windflow 500 uses a synchronous generator with the same electrical characteristics as traditional hydro/gas/coal electricity generators and has been designed to easily integrate into the electrical grid architecture and meet grid codes around the world.

The use of an off-the-shelf synchronous generator directly on line provides exceptional voltage control, frequency control, fault ride through and reactive power capabilities without the need for additional expensive power electronics.

In areas that require reactive power (kVARs), the 500 kW synchronous generator is able to provide 500 - 550 kVARs, depending on duty cycle. The generator can provide this reactive power even when the wind is not blowing by being run up to speed with a pony motor.

1 BLADE	Make Material Air brake Weight	Wind Blades Ltd Laminated wood/epoxy Full-span pitch 2,000 lb
2 ROTOR	Number of blades Rotor diameter Rotor speed Swept area Hub height Orientation Regulation Hub Weight (hub and blades)	2 109 feet 48-51 rpm 9330 feet ² 98 feet Upwind Full-span pitch Teetering (pitch-coupled) 8,800 lb
3 HYDRAULIC SYSTEM	3a. Power unit 3b. Yawing 3c. Pitch actuation 3d. Braking 3e. Torque limiting	7.5 kW axial piston pump 1.3/2°/sec geared motor linear actuator fail-safe caliper radial piston pump
4 GEARBOX	Type Design No of stages Overall ratio Rated torque	Hicks planetary/parallel TLG Wind Gears Ltd 4 30.9:1 (50Hz) 37.1:1 (60Hz) 84,000 ft.lb
5 GENERATOR	Type Nominal power Voltage	Synchronous 500 kW 415 V at 50Hz or 480V at 60Hz
6 TOWER	Type Height Weight	Tubular steel 95 ft 17 tons
CONTROLLER	Make Cut in system Logic system	Bremca Industries Ltd Auto-synch PLC
TOTAL WEIGHT	Nacelle & rotor Total	15 tons 32 tons
PERFORMANCE	Low wind cut-in Rated power at Maximum power High wind cut-out	12.3 mph 30.7 mph 500 kW 67.1 mph