

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.

Being a mid-size wind turbine it is:

- Small enough that its size is not a major planning and logistic issue
- Big enough that it produces commercial quantities of electricity



Te Rere Hau wind farm

About Windflow Technology

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

It is ideally positioned to provide turbines throughout Australia, New Zealand, and the Pacific for wind farms or single installations in remote areas.

Windflow Technology is committed to achieving and maintaining the highest standards in quality management. The company gained IEC 61400-1 (edition 3), Class 1A for the Windflow 500 turbine in September 2010. In June 2008 it achieved ISO 9001 for its design, development, production, installation and servicing activities.

Services

Windflow Technology 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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For the community

At a site with an annual mean wind speed of 8.5m/s (30km/h), 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.



Windflow 500

The next generation
in wind turbine design

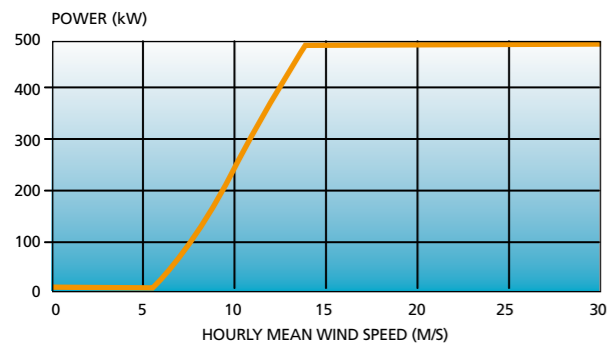
- Cost-effective
- Robust and reliable
- Easy grid integration
- Low visual impact
- Proven performance

The Next Generation In Wind Turbine Design

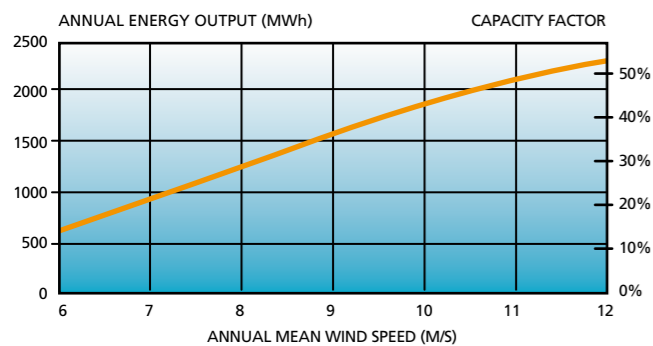
The Windflow 500 combines cost-effectiveness, simplicity and reliability in a world leading design. The turbine has been designed to solve the problems of traditional turbine designs and to meet IEC WT 01 (Class 1A) certification. Its size, performance and light-weight design makes it suitable for wind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

It is IEC Class 1A (edition 3) certified by Lloyds Register. Class 1A Certification attests that the Windflow turbine will operate for more than 20 years in the strongest, most turbulent wind regime in the IEC classification.

Windflow 500 Calculated Power Curve



Windflow 500 Annual Energy Output

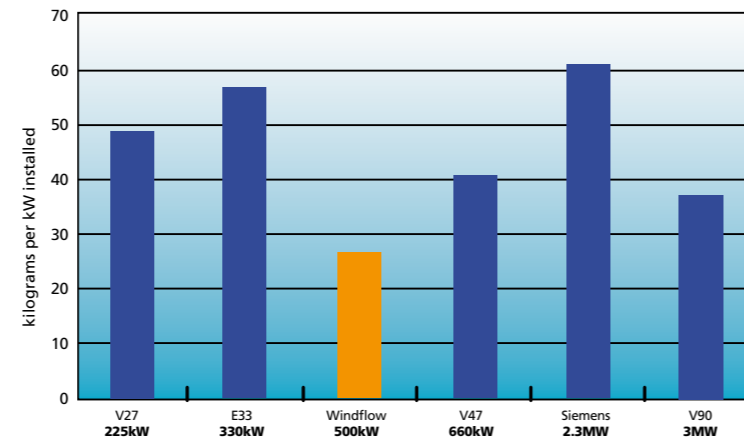


The Windflow Advantage

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

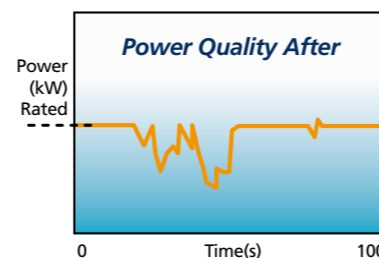
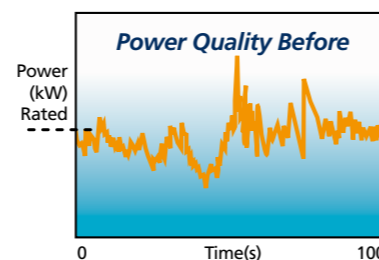
The patented Torque Limiting Gearbox (TLG) is a hydraulic variable speed system which has proven to significantly reduce fatigue loads and provide smooth power output (operating in the UK in the 1990's and in NZ since 2003).

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 pad of between 32 m³ and 64 m³ of concrete, depending on the geological conditions
- components transportable with standard trucks on 4 metre wide roads
- nacelle and rotor to be installed in one easy lift with 80 tonne truck crane

Minimal visual impact

With a hub height of 30 metres (47 metres 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 400 metres. Windflow's patented quiet gearbox technology means that the turbine is quieter than some three bladed designs.

Grid friendly synchronous generator

Thanks to its torque-limiting gearbox, the Windflow 500 drives a grid-friendly synchronous generator, which is synchronized directly on line through a voltage transformer. Like the synchronous generators in nuclear, fossil fuel or hydroelectric power plants, the Windflow 500 synchronous generator requires no power electronics for frequency conversion, enabling wind farmers to avoid the capital and maintenance costs associated with power conditioning equipment.

The Windflow 500 synchronous generator can also provide grid voltage control by delivering reactive power on demand. Even when the wind is not blowing, the Windflow 500 generator can be rotated by a small pony motor and operated as a synchronous condenser with a continuous dynamic reactive power range of 200 to + 300 kVAR. These reactive power capabilities enable wind farmers to meet grid requirements while avoiding the costs of DVARs or capacitor banks for reactive power support.

1 BLADE	
Make	Wind Blades Ltd
Material	Laminated wood/epoxy
Air brake	Full-span pitch
Weight	900 kg

2 ROTOR	
Number of blades	2
Rotor diameter	33.2 m
Rotor speed	48-51 rpm
Swept area	866 m ²
Hub height	30 m
Orientation	Upwind
Regulation	Full-span pitch
Hub	Teetering (pitch-coupled)
Weight (hub and blades)	4,000 kg

3 HYDRAULIC SYSTEM	
3a. Power unit	7.5 kW axial piston pump
3b. Yawing	1.3/ 2°/sec geared motor
3c. Pitch actuation	Linear actuator
3d. Braking	Fail-safe calliper
3e. Torque limiting	Radial piston pump

4 GEARBOX	
Type	Hicks planetary/parallel TLG
No of stages	4
Overall ratio	30.9:1
Rated torque	114 kN.m

5 GENERATOR	
Type	Synchronous
Nominal power	500 kW
Speed	1,500 rpm
Voltage	415 V
Frequency	50 Hz (60 Hz also available)

6 TOWER	
Type	Tubular
Height	29 m
Weight	15,400 kg

CONTROLLER	
Make	Bremca Industries Ltd
Cut in system	Auto-synch
Logic system	PLC

TOTAL WEIGHT	
Nacelle & rotor	13,700 kg
Total	29,100 kg

PERFORMANCE	
Low wind cut-in	5.5 m/s
Rated power at	13.7 m/s
Maximum power	500 kW
High wind cut-out	30 m/s

CERTIFICATION:	
Type approval	Lloyd's Register
Turbine design	IEC 61400-1 (edition 3) Class 1A
Quality accreditation	ISO 9001: 2008