

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
(Courtesy NZ Windfarms)

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.

About Windflow Technology

Windflow Technology Ltd 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 ISO 9001 in June 2008 and is working towards IEC WT 01 (Class 1A) in its design, development, production, installation and servicing activities.

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

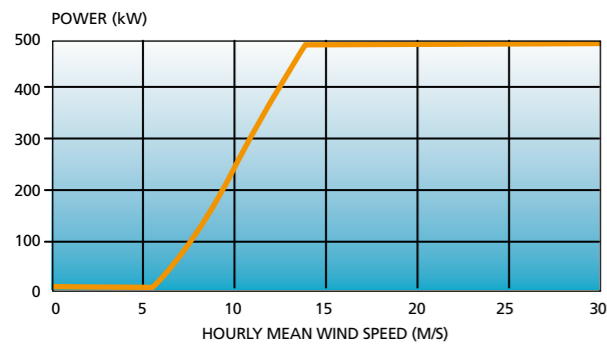
The next generation in wind turbine design

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

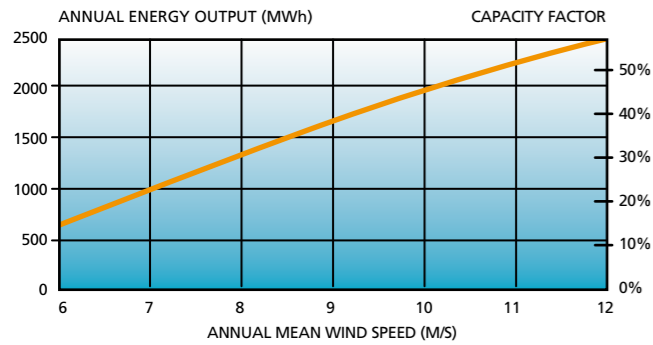
The Next Generation In Wind Turbine Design

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 – 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 Calculated Power Curve



Windflow 500 Annual Energy Output

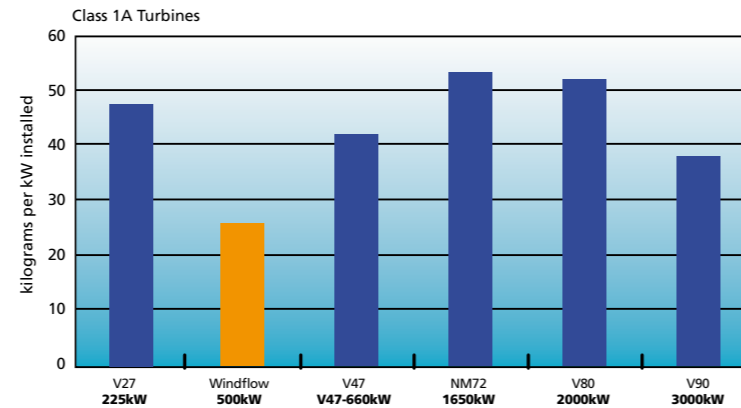


The Windflow Advantage

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

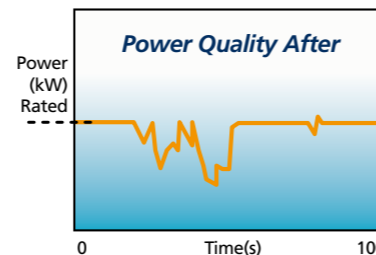
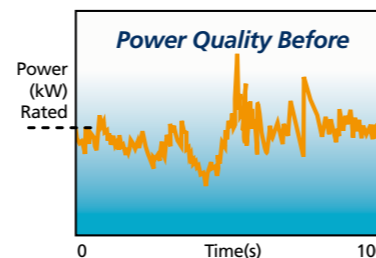
The patented Torque Limiting Gearbox (TLG) is a hydraulic variable speed system which has proven to significantly reduce fatigue loads and provide smooth power output (operating in the UK in the 1990's and in NZ since 2003).

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 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 550 kVARs (110%). 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 | 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 |

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|---------------------------|--------------------------|
| 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 |
| Design | Wind Gears Ltd |
| No of stages | 4 |
| Overall ratio | 30.9:1 |
| Rated torque | 114 kN.m |

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

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

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

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

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|--------------------|----------|
| 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 |