

Vestas®

V100
1.8 MW

Wind. It means the world to us.™

V100-1.8 MW

Opening up a new world of opportunities

Extracts power from extremely low winds thanks to its 49 m blades

This V100-1.8 MW turbine allows you to increase productivity by opening up low-wind onshore sites that you previously regarded as non-viable. To maximise power output at such locations, this turbine's 100 m rotor squeezes more from the available wind – starting at an incredibly low 3 m/s. Thanks to its 49 m blades, the V100-1.8 MW delivers a remarkable rotor-to-generator ratio that produces a capacity and yield that's higher than was once thought possible at low wind sites.


The platform is tested and tried more than 7,800 times

What's more, the V100-1.8 MW is based on the mature and reliable Vestas 2 MW platform. Vestas has installed over 7,800 of its 2 MW turbines around the world since 1995, which is now enhanced to maximise your output and revenues.

The 2 MW class is the most thoroughly tested turbine on the market, with a proven availability of over 97% in 2009. And now this platform has been improved once again and has a new standard-bearer: The V100-1.8 MW – specifically designed for low-cost energy production at low-wind onshore sites.

+7,800

2 MW turbines installed worldwide
+15 GW installed
+97% availability

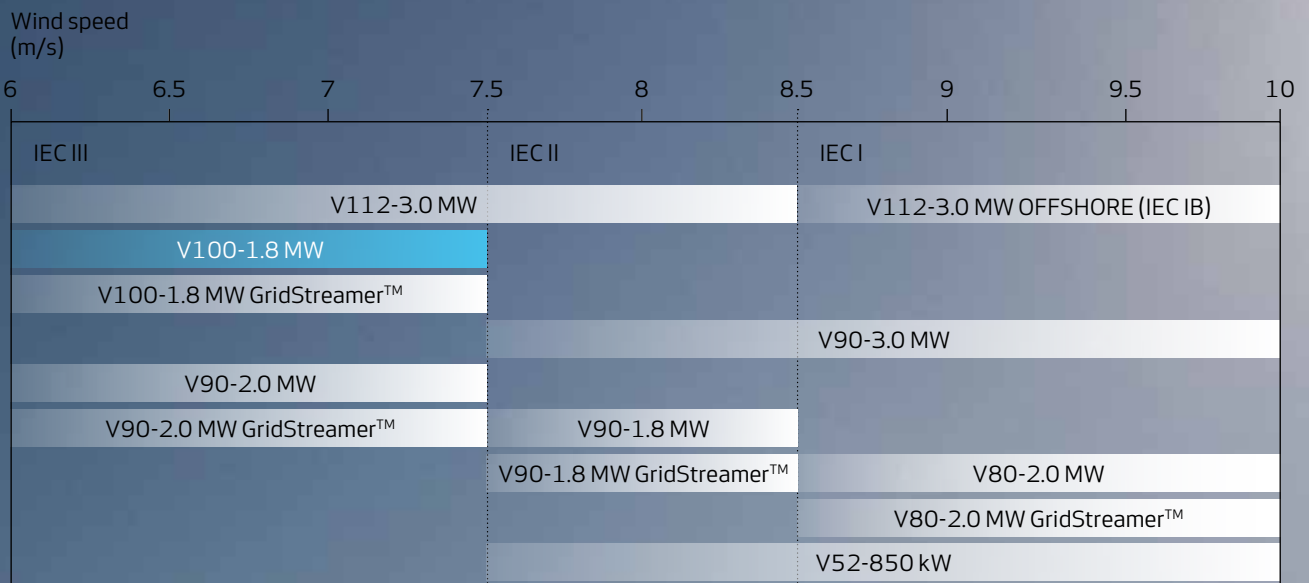


Wind. It means the world to us.™
Wind is all we do. We are relentlessly committed to the success of wind as a source of energy for the world, providing everything you need to succeed in your wind power ambitions.

Low wind
Strong
technology

Unprecedented productivity, reliability and performance

If you want to ensure the yield of your low-wind (IEC IIIA) locations, the reliable V100-1.8 MW is an excellent choice.



- – 100 meter rotor diameter
- – 1.8 MW rated power

Optimise energy production

- Designed for high productivity
- Noise mode that minimises noise at low-wind with minimal impact on power production
- Excellent grid support

Reduce energy costs

- Low Balance of Plant (BOP), installation and transportation costs
- 24/7 remote control with VMP Global®
- Innovative CoolerTop®
- Designed for serviceability

Secure your investment

- Proven technology
- Reliable and robust product
- Redesigned bed frame and main bearing housing
- Improved yaw system

Here's an overview of selected benefits that optimise your energy production, lower your operating costs and strengthen the business case for choosing the V100-1.8 MW.

Industry-leading technology generates **more energy**

Designed for high productivity

To allow you to exploit the low-wind sites that you had to ignore until now, Vestas took on the huge technical challenge of using longer blades without compromising safety or availability. We were able to overcome these issues thanks to a rigorous design process using advanced 3D tools, and the Vestas Test Centre's exhaustive assessment regime, which included both static and dynamic testing.

At 49 m long, the blades of the V100-1.8 MW sweep an area of 7,850 m² – a 23% increase compared to the V90-1.8/2.0 MW. This ensures that the V100-1.8 MW maximises energy production at even the lowest wind speeds, generating a higher capacity and yield compared to other turbines in the 2 MW class.

Noise mode that minimises noise at low-wind with minimal impact on power production

The V100-1.8 MW has various noise modes to meet the operational sound-level restrictions specific to any site.

Thanks to the Vestas Converter System (VCS), the turbine is able to reduce the rotor speed and therefore the noise, which is a significant factor when considering the suitability of the V100-1.8 MW for an onshore site with low winds.

In fact, you can run this turbine in site-specific configurable modes, and keep within defined decibel ranges, without significantly reducing productivity. So even in areas where sound-level restrictions are in place, the V100-1.8 MW is a very versatile option.

Excellent grid support

The VCS inside the V100-1.8 MW delivers a constant and consistent output to the grid. The system is able to maintain grid stability by quickly regulating the turbine's power provision when needed. It swiftly responds to faults and other grid disturbances. The VCS also lessens the load on the gearbox and other key components, reducing wear and tear.





Reduce wind energy cost by design

Low balance of plant (BOP), installation and transportation costs

Just like the other turbines in the Vestas 2 MW series, it's possible to easily transport the V100-1.8 MW (by rail, truck or barge) to virtually any site around the world. In terms of weight, height and width, all of its components comply with local and international limits for standard transportation. This ensures that you incur no unforeseen or unusual costs for getting the turbine on site.

In addition, the V100-1.8 MW can be built and maintained using tools and equipment that are standard within the installation and servicing industries – minimising the ongoing maintenance costs.

24/7 remote control with VMP Global®

To reduce the cost of energy, the V100-1.8 MW is equipped with VMP Global®, the latest turbine control and operation software from Vestas.

Developed to run this latest generation of Vestas turbines, the modular VMP Global® software package automatically manages the turbine around the clock and ensures that you're always able to generate the maximum power from your V100-1.8 MW. In addition, the application supports your site management by monitoring and troubleshooting the wind turbines – both onsite and remotely – to keep maintenance costs as low as possible.

Innovative CoolerTop®

The CoolerTop® installed on the V100-1.8 MW uses the wind's own energy to generate the cooling required, rather than consuming energy generated elsewhere. The fact that the CoolerTop® has no moving parts means that it requires little maintenance, shaving costs once more. In addition, the absence of any electrical components ensures that the cooling system makes no noise and reduces the nacelle's energy consumption.

The CoolerTop® also allows for a temperature range of up to 40° C without de-rating and without needing a high temperature option that would inevitably compromise the amount of space available within the nacelle.

Designed for serviceability

The service crews are helped by the overall design of the V100-1.8 MW, which, like all other Vestas turbines, shields every rotating part and positions components for easy access.

CoolerTop®

- New feature designed for efficient cooling to maximise power production

Gearbox

- Planetary gearbox with combined two-stage parallel gearbox

Main-bearing housing

- One piece
- Stronger construction to absorb higher loads from rotor

Main shaft

- Forged
- All rotating parts shielded provides higher serviceability

Transformer room

- More space available
- 35 kV transformer optional allowing installation up to 2,000 m above sea level in USA/Canada/China

Generator

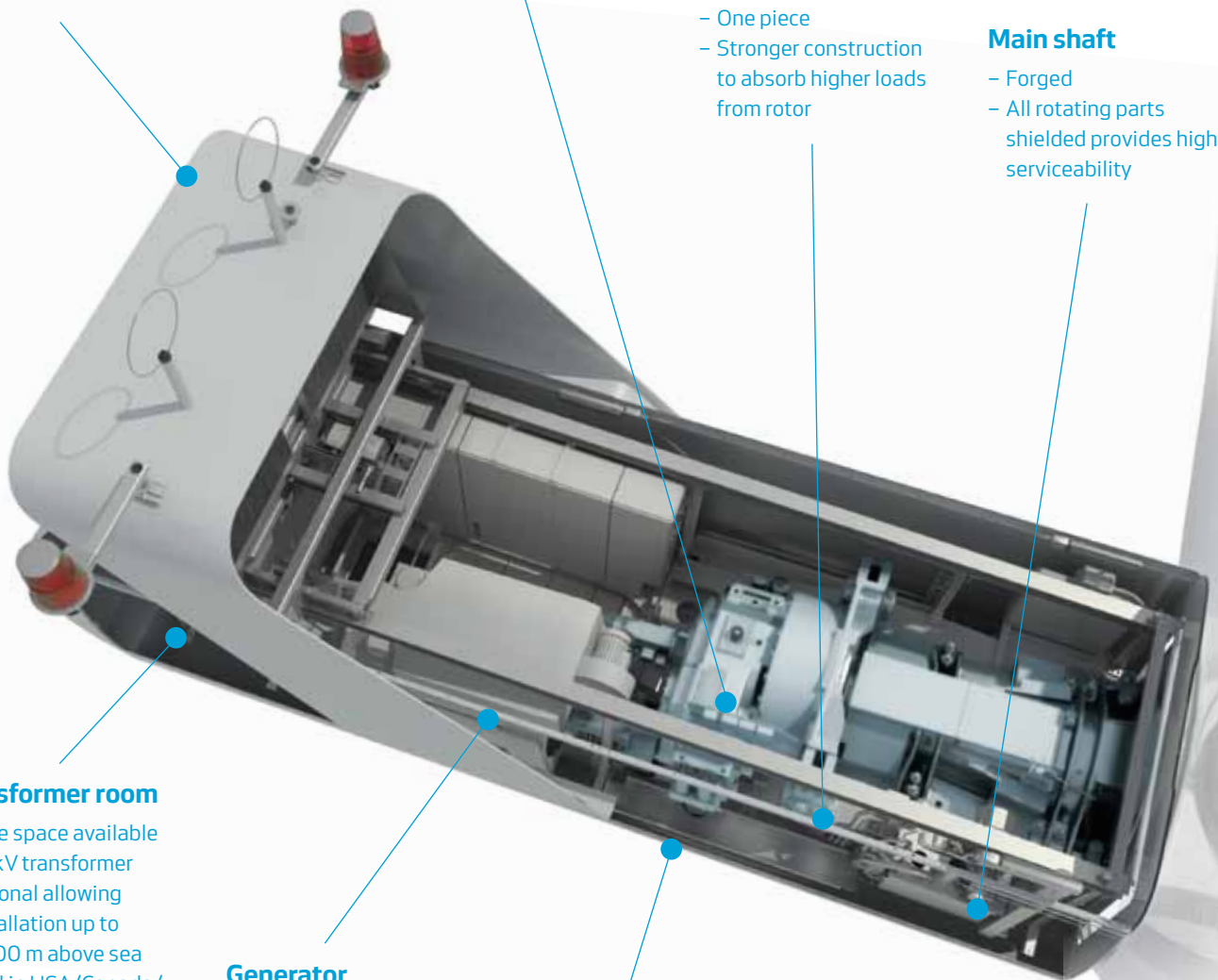
- A reliable slip ring system
- Hybrid bearings with ceramic balls prevent bearing current for improved durability
- Improved generator cooling unit makes cooling effective

Yaw system

- 6 yaw gears
- Automatic lubrication greasing
- Less downtime and higher energy production

Blade

- Market-leading aerodynamic design
- Glass fibre and carbon fibre combination
- Single point greasing system, reducing service time



Our passion and
commitment are
your guarantee
for safer business
investments



Proven technology

The V100-1.8 MW is based upon the proven technologies that underpin the +7,800 2 MW Vestas turbines installed around the world. Using the best features from across the range, as well as some of the industry's most stringently tested components and systems, this turbine's reliable design minimises downtime – helping to give you the best possible return on your investment.

Reliable and robust product

The Vestas Test Centre is unrivalled in the wind industry and has the unique ability to test complete nacelles using a.o. Highly Accelerated Life Testing (HALT) to ensure reliability. At the critical component level, potential failure modes and mechanisms are identified, and specialised test rigs are used to ensure strength and robustness for the gearbox, generator, yaw and pitch system, lubrication system and accumulators.

The Vestas quality-control system ensures that each component is produced to validated design specifications, and performs at site. We also employ a Six Sigma philosophy and aim to perform at Six Sigma levels during 2011. We have identified critical manufacturing processes (both in-house and for sub-suppliers), and we systematically monitor measurement trends that are critical to quality, to identify variation and make changes before any defects occur.

Redesigned bed frame and main bearing housing

Created with future generations of turbines in mind, the new single bed frame and stronger main bearing housing of the V100-1.8 MW provide a better foundation for loads.

The strengthened frame and housing – each made from single-piece castings – work in conjunction to absorb higher loads from the rotor. In addition, the housing ensures correct alignment during bearing assembly, making the process more accurate and efficient, and distributes loads evenly.

These improvements combine to increase the production capabilities of this turbine and to reduce downtime.

Improved yaw system

Previous generations of turbines in the 2 MW class included a four-gear yaw system. But the Vestas commitment to continuous improvement means that the system included within the V100-1.8 MW is even better – it features a six-gear yaw system and 110 mm yaw rim that's been subjected to induction hardening, making it more robust and reliable than ever before.

The maintenance savings associated with this improvement are boosted yet further by the partly automatic yaw lubrication system fitted as standard on the V100-1.8 MW. This partly automated greasing mechanism delivers tangible service savings and raises revenues by increasing your uptime.



Full control through service experts and our surveillance system

Surveillance, maintenance and service

Vestas provides 24/7 monitoring, performance reporting and predictive maintenance systems to improve turbine uptime, production and availability. Operating a large wind power plant today calls for highly efficient management strategies, to ensure that power production is uninterrupted and that operational and maintenance expenses are controlled. The ability to predict when your critical components are most likely to break down is essential to this effort, as it helps to avoid costly emergency repairs and unscheduled interruptions to energy production.

The Vestas Condition Monitoring System performs this predictive maintenance function, assessing the status of the V100-1.8 MW by analysing measured signals such as vibrations and temperatures (e.g. in gearbox bearings and the main bearings). For example, by measuring the vibration of the drive train, the system can detect faults at an early stage and monitor the progress of the damage. This information allows the service organisation to plan and execute the required maintenance work before the component fails, reducing repair costs and production loss.

What's more, our Active Output Management® (AOM) concept provides detailed plans for service and maintenance, online monitoring, optimisation and troubleshooting, and includes a competitive insurance scheme. It is even possible to get a full availability guarantee, under which Vestas pays compensation if the turbine fails to meet the agreed availability targets.

VestasOnline® Business

Vestas wind turbines benefit from the latest Supervisory Control and Data Acquisition (SCADA) system for modern wind power plants: VestasOnline® Business.

This flexible system includes an extensive range of monitoring and management functions that allow you to control your wind power plant in the same way as a conventional power plant. VestasOnline® Business enables you to optimise production levels, monitor performance and produce detailed, tailored reports from anywhere in the world while the system's power plant controller provides active and reactive power regulation, power ramping and voltage control.



Vestas turbines include a range of additional features that give you the control you need to maximise your production and ensure a high return on your investment. Thanks to our superior operations and maintenance capabilities, we also provide a level of service unparalleled in the industry.

V100-1.8 MW

Facts and figures

POWER REGULATION

pitch regulated with variable speed

OPERATING DATA

Rated power	1,800 kW (50 Hz) 1,815 kW (60 Hz)
Cut-in wind speed	3 m/s
Rated wind speed	12 m/s
Cut-out wind speed	20 m/s
Wind class	IEC S (IEC IIIA average wind/ IEC IIA extreme wind)
Operating temperature range	standard turbine: -20 °C to 40 °C low temperature turbine: -30 °C to 40 °C

SOUND POWER MODES

Mode 0: Max sound power level:	105.0 dB (A)
Mode 1: Max sound power level:	105.0 dB (A)*
Mode 2: Max sound power level:	103.0 dB (A)
*) low noise at low wind	

ROTOR

Rotor diameter	100 m
Swept area	7,850 m ²
Nominal revolutions	14.5 rpm
Operational interval	9.3 – 16.6 rpm
Air brake	full blade feathering with 3 pitch cylinders

ELECTRICAL

Frequency	50/60 Hz
Generator type	4-pole (50 Hz)/6-pole (60 Hz) doubly fed generator, slip rings

GEARBOX

Type	one planetary stage and two helical stages
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TOWER

Type	tubular steel tower
Hub heights	80 m and 95 m

BLADE DIMENSIONS

Length	49 m
Max. chord	3.9 m

NACELLE DIMENSIONS

Height for transport	4 m
Height installed (incl. CoolerTop®)	5.4 m
Length	10.4 m
Width	3.4 m

HUB DIMENSIONS

Max. diameter	3.3 m
Max. width	4 m
Length	4.2 m

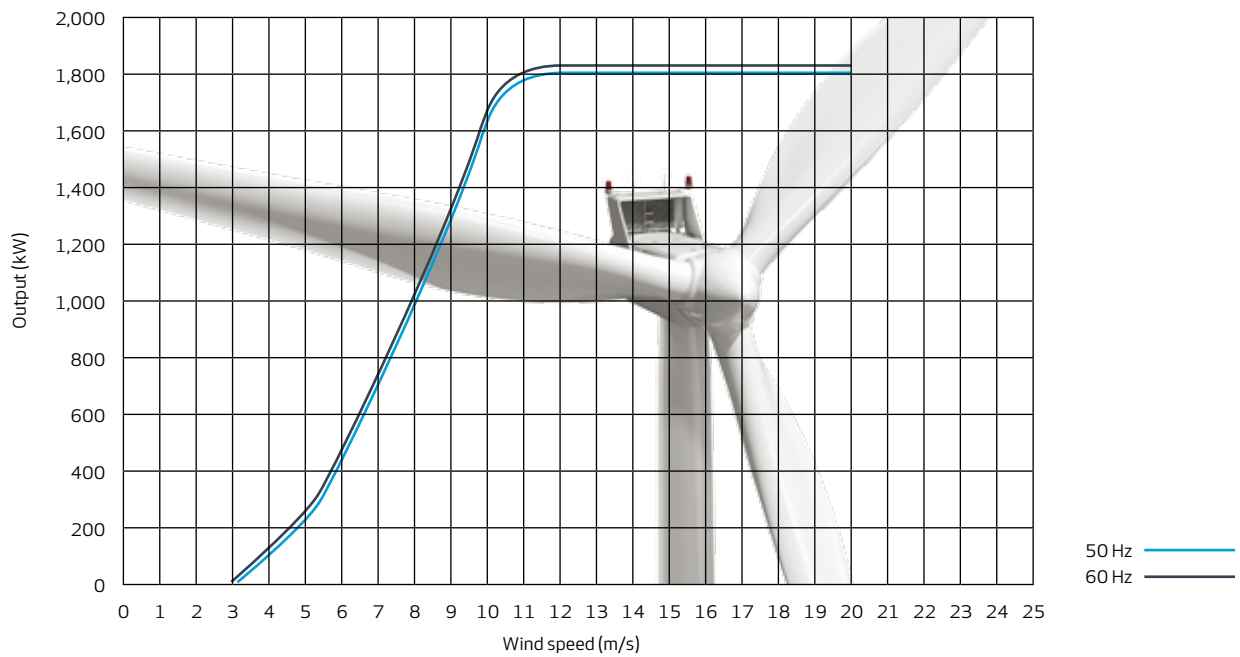
Max. weight per unit for transportation	70 metric tonnes
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+20,000

committed, highly-trained employees around the globe are always ready to help in any aspect of wind power production.

POWER CURVE FOR V100-1.8 MW

Noise reduced sound power modes are available



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