GE Energy

1.5 MW
Series Wind Turbine

ecomagination℠
a GE commitment

imagination at work

Gatun, Spain
33 x 1.5sl
total capacity: 49.5 MW

Cefn Croes, Wales
39 x 1.5se
total capacity: 58.5 MW

When it comes to "megawatt-plus" technology, our proven 1.5 MW wind turbine continues to raise the bar. From ongoing technology investments in reliability and dependability, to more cost effective and versatile configurations, it need not rest on its past successes. Today, with over 3,300 units in operation worldwide, the 1.5 MW continues to be one of the world's most widely used wind turbines in its class.

Active yaw and pitch regulated with power/torque control capability and an asynchronous generator, the 1.5 MW machine utilizes a bed-plate drive train design where all nacelle components are joined on a common structure, providing exceptional durability. The generator and gearbox are supported by elastomeric elements to minimize noise emissions.

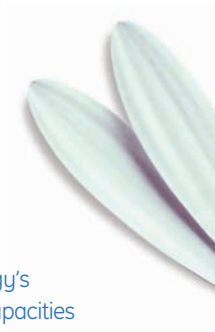
Haute Lys, France
25 x 1.5s
total capacity: 37.5 MW

The 1.5 MW wind turbine also employs a variety of features inherent in GE's full line of wind turbines which range from 1.5 to 3.6 MW, for both on and offshore use.

GE's Fleet-Wide Features and Benefits

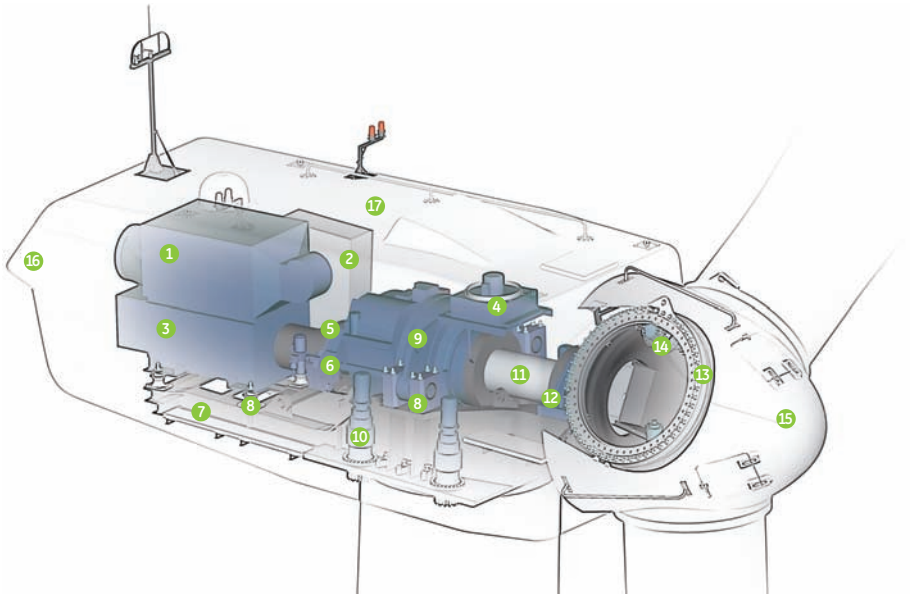
Feature	Benefit
Variable Hub heights & rotor diameters	Provides versatility/adaptability to a wide variety of project sites
Variable Speed Control and Advanced Blade Pitch	Enables aerodynamic efficiency and reduces loads to the drive train, thereby reducing maintenance cost and providing longer turbine life
WindVAR (optional) (Wind-Volt-Amp-Reactive "WindVAR")	GE's unique electronics provide transmission efficiencies and enable harmonious function within the local grid
Low Voltage Ride-Thru (optional)	Allows wind turbines to stay on line generating power, even during grid disturbances.

New Mexico Wind Energy Center, USA
136 x 1.5s
total capacity: 204 MW



As one of the world's leading wind turbine suppliers, GE Energy's current product portfolio includes wind turbines with rated capacities ranging from 1,500 to 3,600 kilowatts and support services extending from development assistance to operation and maintenance. We currently design and produce wind turbines in Germany, Spain and the U.S.

Our facilities are registered to ISO 9001:2000. Our Quality Management System, which incorporates our rigorous Six Sigma methodologies, provides our customers with quality assurance backed by the strength of GE. We know that wind power will be an integral part of the world energy mix in this century and we are committed to helping our customers design and implement energy solutions for their unique energy needs. Every relationship we pursue bears our uncompromising commitment to quality and innovation.

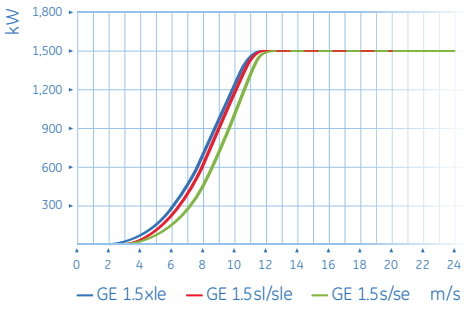


1 Heat exchanger
2 Control panel
3 Generator
4 Oil cooler
5 Coupling
6 Hydraulic parking brake
7 Main frame
8 Impact noise insulation
9 Gearbox
10 Yaw drive
11 Rotor shaft
12 Bearing housing
13 Rotor hub
14 Pitch drive
15 Nose cone
16 Ventilation
17 Nacelle

Technical Data

	1.5s	1.5se	1.5sl (50Hz only)	1.5sle	1.5xle
Operating data					
• Rated capacity:	1,500 kW	1,500 kW	1,500 kW	1,500 kW	1,500 kW
• Cut-in wind speed:	4 m/s	4 m/s	3,5 m/s	3,5 m/s	3,5 m/s
• Cut-out wind speed (10 min. avg.):	25 m/s	25 m/s	20 m/s	25 m/s	20 m/s
• Rated wind speed:	13 m/s	13 m/s	14 m/s	14 m/s	12,5 m/s
• Wind Class - IEC:	IIa	Ib	–	IIa (V_{e50} = 55 m/s)	IIIb (V_{ave}= 8.0 m/s)
• Wind Class - DIBt WZ:	II/III	–	II	–	II
Rotor					
• Number of rotor blades:	3	3	3	3	3
• Rotor diameter:	70,5 m	70,5 m	77 m	77 m	82,5 m
• Swept area:	3904 m²	3904 m²	4657 m²	4657 m²	5346 m²
• Rotor speed (variable):	12,0 – 22,2 rpm	12,0 – 22,2 rpm	11,0 – 20,4 rpm	11,0 – 20,4 rpm	10,1 – 18,7 rpm
Tower					
• Hub heights - IEC:	64,7 m	54,7/64,7 m	–	61,4/64,7/80 m	58,7/80/100 m
• Hub heights - DIBt:	64,7 m	–	61,4 to 100 m	61,4/64,7/80/85/100 m	58,7/80/100 m
Power control	Active blade pitch control	Active blade pitch control	Active blade pitch control	Active blade pitch control	Active blade pitch control

Power Curve



Gearbox
- Three step planetary spur gear system

Generator
- Doubly fed, three-phase induction (asynchronous)

Converter
- Pulse-width modulated IGBT frequency converter

Braking system (fail-safe)
- Electromechanical pitch control for each blade (3 self-contained systems)
- Hydraulic parking brake

Yaw system
- Electromechanical driven with wind direction sensor and automatic cable unwind

Control system
- PLC (Programmable logic controller) with remote control and monitoring system

Noise reduction
- Impact noise insulation of the gearbox and generator
- Sound reduced gearbox
- Noise reduced nacelle
- Rotor blades with minimized noise level

Lightning protection system
- Lightning receptors installed along blades
- Surge protection in electrical components

Tower design
- Multi-coated, conical tubular steel tower with safety ladder to the nacelle
- Load lifting system, load-bearing capacity over 200 kg

Operating limits (outside temperature)
- cold weather extreme: -30° C to +40° C / -40° C to +50° C survival without operation
- standard: -15° C to +40° C / -20° C to +50° C survival

www.gewindenergy.com

Subject to technical alterations, errors and omissions.

*only for WZII

(9/05)