

GE Renewable Energy

GE's 2MW Platform

A CUSTOMIZABLE
PLATFORM TO ENHANCE
SITING EFFICIENCY



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Since entering the wind industry in 2002, GE Renewable Energy has invested more than \$2 billion in next-generation wind turbine technology to provide more value to customers—whether at the turbine, plant or grid level. Through the use of advanced analytics, GE Renewable Energy is redefining the future of wind power, delivering with proven performance, availability and reliability. With the integration of big data and the industrial internet, we can help customers manage the variability that comes with this resource for smooth, predictable power. Our onshore product portfolio includes wind turbines with rated capacities from 1.6-3.4 MW and flexible support services that range from basic operations and maintenance to farm- or fleet-level enhancements.

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2.0-2.4 MW Platform

GE's 2.2-2.4MW, 107m rotor wind turbine is an advanced evolution of the 1.x series, providing an up to 35% increase in Annual Energy Production (AEP) over its predecessor, the 1.85-87 (at a 2.4 rating). Configured for medium wind speeds, the 2.2-2.4MW turbine provides a 51% increase in swept area with the 107-meter rotor, and an extra 350-450 kW output at rated wind speed compared to the 1.85-87 turbine, improving project economics for wind developers. GE's proprietary Advanced Loads Control combines drivetrain sensors with Mark* VIe turbine controller capabilities to individually pitch the blades and improve load handling performance.

GE's 2.0-2.3MW, 116-meter rotor wind turbine offers a 27% increase in swept area when compared to the 1.7-103 turbine, resulting in an up to 26% increase in Annual Energy Production (AEP) at 7.5 m/s (at a 2.3 rating). This increase in blade swept area allows greater energy capture and improved project economics for wind developers[†]. GE's 2.0-116 turbine has a 53.3% gross capacity factor at 7.5 m/s, a class leading performance. GE's proprietary 56.9-meter blade is specifically for the 2.0-2.3MW rating of this platform, enabling longer length, lower loads and improved performance.

GE's stringent procedures result in a turbine engineered for high performance and availability. The use of selected components from both the 1.x and 2.x platforms ensures the consistent workhorse performance and reliability that GE wind turbines are known for. The 2.0-2.4MW platform utilizes the same drivetrain and electrical system architecture as GE's 1.x series, with both systems scaled and upgraded to provide improved performance along with greater wind turbine energy production. Other critical components have been scaled from the existing platforms to meet the specific technical requirements of this evolutionary turbine.

Ensuring consistent performance, reliability and efficiency, GE's new 2.0-2.4MW platform of wind turbines is an advanced evolution of the 1.x platform series, scaling and developing 1.x platform electrical system upgrades to increase the rating of the turbine from 1.7 MW to range from 2.0-2.4 MW, allowing higher energy production.

[†] Comparative statements refer to GE technology unless otherwise stated.

Building Upon the Proven 1.x and 2.x Platforms

The evolution of GE's 1.5 MW turbine began with the 1.5i turbine introduced in 1996. The 65-meter rotor diameter turbine soon was increased to 70.5-meters in the 1.5s, then to 77-meters in the 1.5sle turbine that was introduced in 2004. Building on the exceptional performance and reliability of the 1.5sle, GE introduced the 1.5xle with its 82.5-meter diameter in 2005. Subsequent improvements led to the introduction of the 1.6-82.5 turbine in 2008—followed by the 1.6-87 in 2011, and ultimately the 1.85-82.5 and 1.85-87 in 2013. Ongoing investment in the industry workhorse resulted in the introduction of GE's 1.6-100 and 1.7-100, wind turbines with a 100-meter rotor. This product evolution provides increased capacity factor while increasing AEP by 20–24% over the previous models. Built from the maturity of its predecessors, the 2.0-2.4MW platform evolution provides increased capacity factor while increasing AEP and application space of GE's 1-2MW platform of products.

Significant component enhancements to the 1.x models have resulted in a substantial performance increase, enabling the use of a 107-meter and 116-meter rotor on the 1.x series, and a nameplate range of 2.0-2.4MW (with applicable rotor). These enhancements include new aerodynamics enabling a greater blade length (116-meter rotor), larger bedplate, generator frame and gearbox, controls improvements, and enhanced power conversion capabilities resulting in an increase in nameplate and AEP. Made for high reliability, GE's 2.0-2.4MW platform can provide excellent availability, comparable with the 1.x series units operating in the field today.

Technical Description

GE's 2.0-2.4MW platform, is a three-blade, upwind, horizontal axis wind turbine with a rotor diameter of either 107 or 116 meters. The turbine rotor and nacelle are mounted on top of a tubular steel tower, providing a hub height of either 80 or 94 meters. The turbine uses active yaw control to keep the blades pointed into the wind. The 2.0-2.4MW platform operates at a variable speed and uses a doubly fed asynchronous generator with a partial power converter system.

Specifications:

- 2.2-2.4MW, 107-meter rotor wind turbine: engineered to IEC 61400-22 ed 3, Class IIS
- 2.0-2.3MW, 116-meter rotor wind turbine: engineered to IEC 61400-22 ed 3, Class IIIS
- Standard and cold weather extreme options
- Standard tower corrosion protection: C2 internal and C3 external with internal and external C4/C5 options available
- Rotational direction: Clockwise viewed from an upwind location
- Speed regulation: Electric drive pitch control with battery backup
- Aerodynamic brake: Full feathering of blade pitch

Features and Benefits

- 2.2-2.4MW, 107-meter rotor: higher AEP than its 1.x predecessors by incorporating a larger gearbox scaled from GE's 2.x platform and longer 52.2-meter blades
- 2.0-2.3MW, 116-meter rotor: GE proprietary 56.9-meter blade; highest capacity factor in its class
- Engineered to meet or exceed the 1.x platform's historic high availability
- Grid friendly options are available
 - Enhanced Reactive Power, Voltage Ride Thru, Power Factor Control
- Wind Farm Control System; WindSCADA*
- Available in both 50 Hz and 60 Hz versions for global suitability

Construction:

Towers: Tubular steel sections provide a hub height of either 80 or 94 meters

Blades: GE 52.2 meter blades (107-meter rotor), and GE 56.9m meter blades (116-meter rotor)

Drivetrain components: GE's 2.0-2.4MW platform uses an enhanced gearbox, main shaft, and generator with appropriate improvements to enable the 107-meter diameter rotor in medium winds, and the 116-meter rotor in lower wind speeds

Enhanced Controls Technology

The 2.0-2.4MW wind turbine products employ enhanced control features including:

- GE's patented Advanced Loads Control reduces loads on turbine components by measuring stresses and individually adjusting blade pitch.
- Controls developed by GE Global Research to reduce extreme loads, including those near rated wind speeds, to improve Annual Energy Production (AEP).

Condition Monitoring System (option)

GE's Condition Monitoring System* (CMS) and SCADA Anomaly Detection Services, a complementary suite of advanced condition monitoring solutions, proactively detect impending drivetrain and whole-turbine issues enabling increased availability and decreased maintenance expenses. Built upon half a century of power generation drivetrain and data anomaly monitoring experience, this service solution is now a standard feature available on GE's 2.0-2.4MW platform, for both rotor types.

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