



Energy Thrust

Increasing revenue with a proven upgrade of the power curve

Old wind turbines with outdated technologies do not provide the benefits of updated control, software, and hardware. This is where the Siemens Gamesa solution, Energy Thrust, comes into play.

Energy Thrust is an upgrade that transfers state-of-the-art algorithms and strategies to older turbines, allowing them to operate like new.

With this upgrade, your turbine is able to improve power output across all parts of the power curve:

Partial Power Range: Turbine alignment

Improved orientation algorithm allows the turbine's alignment to be maintained for longer. Only for G58 a new sonic anemometer is needed to increase accuracy in wind direction and wind speed.

Partial Power Range: Improved Pitch algorithm

Thanks to the new sensor and algorithms, the performance of turbines can be improved for low-wind conditions.

Enhanced corner

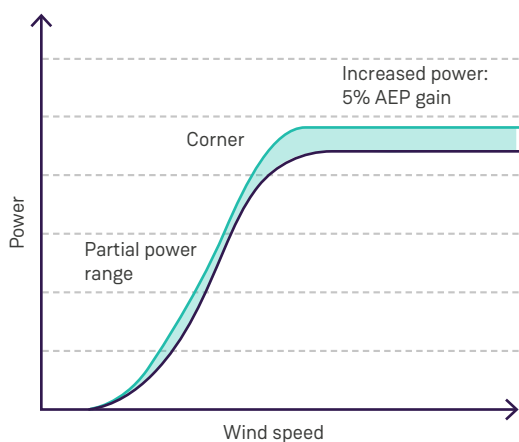
The evolution of the corner strategy increases production at lower wind speeds. The power increased above nominal power in short time periods to compensate for power losses due to turbulence. The transition between the partial and the nominal power ranges is improved.

Production improvements depend on site wind conditions such as K, V_m , turbulence, shear and upflow.

Increased power: Higher real power

This upgrade gives you the opportunity to benefit from an increase of up to 5% in annual energy production (AEP), depending on the real-time parameters of the turbines (temperature, voltage, reactive power increase).

Fig. 1: Energy Thrust – Power curve



Platforms	Original (kW)	Up to (kW)	Energy Thrust	AEP* increase
850 kW	850	920	8.2%	Up to 5%
2.0 MW	2,000	2,070	3.5%	Up to 5%

*Depending on: temperature, voltage, reactive power and nominal power increase

Key benefits of Energy Thrust

- No upfront costs
- Energy production increased by up to 5%, from day one
- OEM-designed and third-party approved
- Measurable increase in energy production, demonstrated in a report provided every quarter
- Includes software and, if necessary, the necessary hardware upgrades
- Total transparency and access to raw performance data
- Improved performance in low-wind conditions



Industry approved

The Energy Thrust product has been validated by Garrad Hassan:

- Turbine integrity is not compromised
- Modifications will not affect the turbine design life
- Methodology to calculate energy gain is Garrad Hassan approved

Siemens Gamesa Renewable Energy
 Parque Tecnológico de Bizkaia, Edificio 222
 48170, Zamudio, Vizcaya
 Spain
 +34 944 03 73 52 (International)
 902 734 949 (Spain)

siemensgamesa.com

Copyright 2022 Siemens Gamesa Renewable Energy (SGRE).

All rights reserved.
 No part of this document may be reproduced without the prior written permission of SGRE.

The information contained in this document is for general information purposes only and may not apply in all cases. Information is subject to change without prior notice. No binding commitments are made by SGRE unless expressly agreed upon in a separate contract.