

Turn to one-of-a-kind service
for all kinds of turbines



Multibrand Service – no matter the make

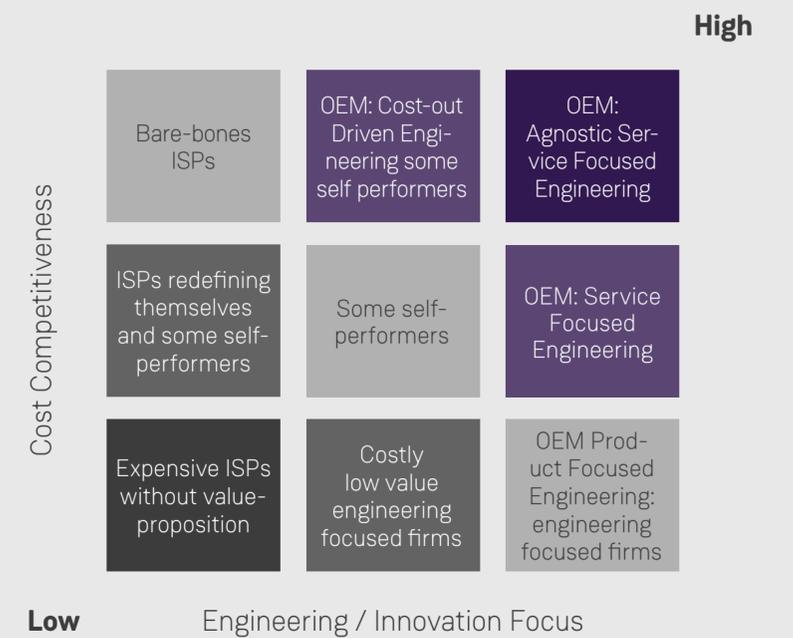


Where there's wind, there's a way

Our Multibrand Services stand out –
for cost and quality

The wind industry is going through a critical period of change, and although in our fast-paced industry change is nothing new, this shake-up is more fundamental than most – with the challenges to match. Inefficient repair loops, unexpected and unbudgeted failures well outside of the warranty period, poorly monitored equipment with a limited supply chain and even turbine manufacturers who pull out of markets altogether. Things go wrong when things don't turn. So providers and owners must quickly learn to adapt. Which above all else requires one thing: innovative, cost-effective engineering.

With more than 20 years of multibrand OEM service experience, Siemens Gamesa puts unparalleled assets to work on your behalf. We harness a strong engineering workforce, third-party experts, vast engineering know-how and deep market knowledge to improve your LCoE and maximize availability – no matter the market, no matter the make.



In the multibrand service market, the combination of cost efficiency and strong, innovative engineering is rare. But one provider delivers both: Siemens Gamesa

Made by our competitors, serviced like our own

Your OEM is our USP

Turbines and wind make for high-yield assets, but when the time comes for cost-effective service solutions, people are our most valued resource. Every Siemens Gamesa employee is dedicated to delivering on our commitments, and just as proud to outperform expectations on third-party turbines as they are on our own.

Outstanding engineering

We have a proven track record in integrated asset management and we offer a full range of service solutions to major turbine manufacturers worldwide. Our tailor-made, flexible and value-driven service-plans are designed to meet your specific operational needs and business objectives. This calls for exemplary service, in breadth as well as depth.

Custom contracts

Whatever your business model, we'll create a tailor-made model to suit. If powering up is not an option, our solution will focus on cutting costs. If more power is your priority, we'll offer a choice of dedicated OEM upgrades. If those upgrades are constrained in a low price per MWh market, we have the financing options to meet your repayment agreement.

But don't take our word for it. Read on for the figures to support these facts.





The proof is in the partnerships

50% of our multibrand agreements cover 100% scope

In an unpredictable and demanding market, how does Siemens Gamesa tailor its multibrand services to suit every customer when every customer has such different needs? The answer is our unique combination of strengths that feed into our services. From state-of-the-art engineering innovations through cutting-edge analytics and a global network of experts who really know their job.

Premium partners

Intensive cross-company cooperations are routine at Siemens Gamesa. For example, our third-party expert for realtime diagnostics, NEM is monitoring and turning data into step ahead solutions. Thanks to such long-standing partnerships our strong engineering network delivers industry-leading services, no matter the make:

Facts and figures:

Over 500 MW upgraded and modernized by our multibrand solutions 	Up to 1,100 Turbines serviced 	7.3 GW Multibrand solutions in partnership with NEM 
More than 20 years of multibrand experience 	DNV certified Lifetime extension solution for the Vestas V4X platform 	8+ OEM Over 500 MW of servicing experience via established partnerships 

As the case studies show, whatever your business goals, we have the resources to find the ideal solution. That's guaranteed.

Maintenance beyond maintenance

Service: Full-scope maintenance

Turbines: Suzlon, 400 MW

Challenge: Effective operation after OEM exits the market



Background

When OEM and maintenance-contract holder Suzlon chose to pull out of northeast Brazil in 2017, it was committed to transferring its knowledge to a reliable provider capable of maintaining the client's 11 parks, which generated 400 MW. The primary selection criteria were technical proficiency, experience in a multitech environment, and proven flexibility to negotiate win-win agreements. In 2017, Suzlon submitted Siemens Gamesa for approval by the client.

After Siemens Gamesa demonstrated its commitment to efficient operation, maintenance and optimization of the parks, the client approved Siemens Gamesa as the best and most financially viable solution. The result: a full-scope contract for the next decade.

A full recovery

As part of this solution, Siemens Gamesa worked closely with the client to create a recovery plan, which commits Siemens Gamesa to ensuring that several turbines perform at full capacity in 2018/19 – setting a benchmark for service for the decade to come.

The recovery plan meets the customer's needs by:

- identifying pre-existing major component damage
- assessing spare-part requirements and inventory
- formalizing and quantifying current state versus nominal state turbine conditions

Recovery, operation and maintenance of the parks proceeded in parallel, with regular monitoring.

Turning, learning and earning

The Brazil project also incorporates data-driven analytics, a key technology in our portfolio of multibrand services. Siemens Gamesa continues to actively invest in analytics to ensure that all the turbines can be remotely monitored, diagnosed and, where possible, repaired. The solution combines legacy Siemens Gamesa engineering competence with the latest algorithm-based SCADA analytics from NEM Solutions, as well as a long-standing partnership with Graam and Juhl.

Siemens Gamesa has more experience with vibration diagnostics than any other wind power company worldwide and we carry that expertise over to non-Siemens Gamesa assets. A win-win in every respect!



Technical Training



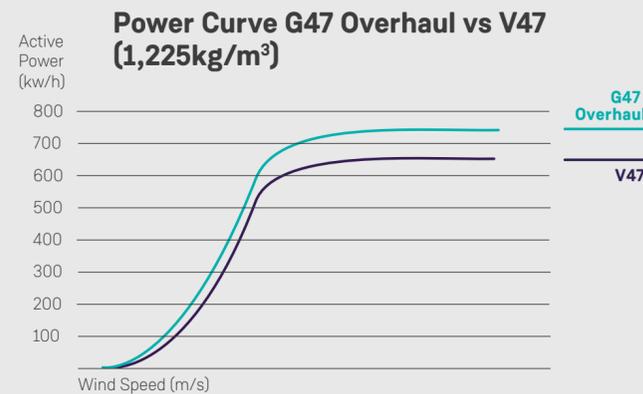
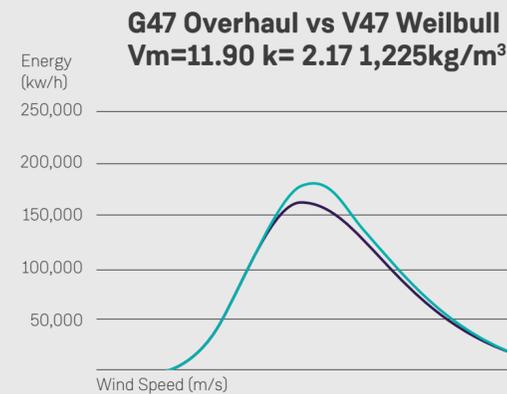
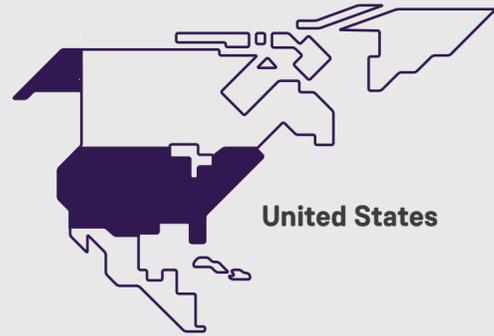
Data Based Diagnostics



Brazil

Everything's big in Texas, except CAPEX

Service: Repower, upgrade, life extension
Turbines: Vestas V47
Challenge: Maximize power, minimize outlay



Background

Siemens Gamesa has special knowledge of certain OEM products and V47 is one of these. Back in 2000, Gamesa (not yet Siemens Gamesa) received a technology transfer for the V47 turbine from its then partner, Vestas. Gamesa engineers adapted a double feed and converter solution to the turbine, which ensured energy output stayed safely within permissible load parameters.

This configuration was certified according to regulations at the time, which allowed Gamesa to manufacture and supply its own G47 turbine within a few months. The G47 was structurally identical to the V47 except for an important upgrade to the electrical and electronic configuration, which gave it a superior power curve and energy performance.

When a Texas-based client needed to upgrade the service contract for its fleet of V47s, familiarity with the turbine made Siemens Gamesa the ideal candidate. Not to mention our engineering know-how. Siemens Gamesa devised sophisticated engineering solutions to increase production while keeping capex to a minimum.

The result was greater output at low cost:

- Power converter enabled active power (P) increase via rotor power extraction
- Power up to 710 kW from 660kW, or 735 kW if Energy Thrust strategies deployed
- Reactive power generation (Q) capability
- Grid code compliance (individual country analysis required)
- Active/reactive power & voltage/frequency regulation (SCADA regulators)
- Compatible with Gamesa's life extension program as certified by GL_DNV for the G47 turbine in 2014

In addition, the Gamesa Double Feed Generator (stator connected directly to the network and rotor connected through an electronic bidirectional power converter) allows for incremental adjustment of the variable speed range by +/- 20%:

- From 1200 to 1800 rpm for a network frequency of 50Hz
- From 1440 to 2160 rpm for a network frequency of 60Hz





Less waste, more speed

Service: Modular repair and upgrade

Turbines: V80, gearboxes

Challenge: 0 to 100% readiness with full-scope coverage in less than six months

Background

In July 2017, a client from northern Europe was looking for a supplier to repair Vestas V80 gearboxes at an offshore wind project and approached Siemens Gamesa. At the time, the OEM gearbox didn't feature in our repair catalogue. What's more, our closest repair shop was some 2,000 kilometers from the farm, a mere ten times further than the 200 km from the site to the OEM.

In our favour, the client specified two key criteria for the contract: price and quality.

Less downtime

Siemens Gamesa secured a five-year agreement with a commitment to minimize downtime, despite the challenges this presents for major component exchanges offshore. To make this possible, Siemens Gamesa ensured the potential for up-tower repair work. Another key factor is our capacity to monitor the turbine gearboxes remotely, which dramatically lowers the cost of a potential gearbox replacement offshore.





Full-service excellence, no matter the make

Wherever your wind park,
we turn it to your advantage

Siemens Gamesa's approach is driven by our determination to add value at a competitive price, with solid financials and solutions that maximize your ROI. More than 400 Siemens Gamesa engineers and expert partners such as NEM are constantly developing new service solutions that include state-of-the-art technologies for monitoring, control and diagnostics.

No multibrand wind park can thrive without a backbone of innovative engineering. Our engineers deliver just that. Their goal: to exceed the expectations of your business in every respect.

With our holistic approach and profound engineering expertise, we anticipate the challenges you will face in the future. Like the market, the wind may be hard to predict, but we can find a way to turn it to your advantage.

**Siemens Gamesa
Renewable Energy S.A**
Avenida Ciudad de la Innovación, 2
31621 Sarriguren – Navarra
Spain

**Siemens Gamesa
Renewable Energy A/S**
Borupvej 16
7330 Brande
Denmark

All rights reserved.

Trademarks mentioned in this document are the property of Siemens Gamesa Renewable Energy, S.A., its affiliates, or their respective owners.

Subject to changes and errors.

The information given in this document only contains general descriptions and/or performance features, which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.