

Prolong the lifetime of your wind turbines



Life Extension



3,900+

turbines under Life Extension contracts, representing more than 4.2 GW.

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Extend the life, extend the revenue

Life Extension is an attractive option for many wind turbines nearing the end of their original design lifetimes.

When operating aging fleet, turbine owners face challenges with reliability, performance and increasing operations and maintenance (O&M) costs.

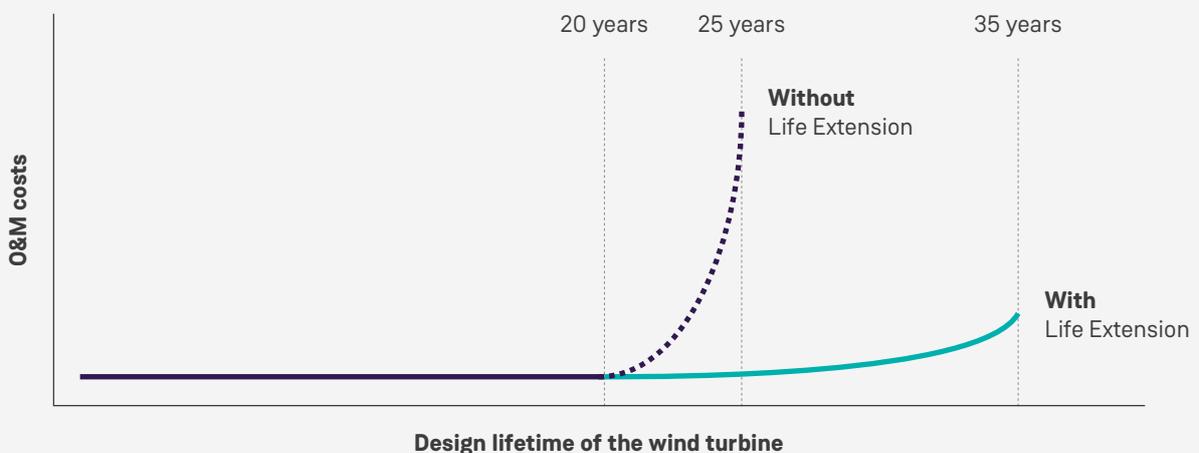
Advances in reliability-centered maintenance and reconditioning programs enable turbine owners to extend the design lifetime of wind turbines – often improving them in the process.

Siemens Gamesa offers Life Extension for up to 10 additional years for a wide range of turbines.

Through on-site inspections and evaluations, upgrades of critical components and decades of original equipment manufacturing (OEM) and maintenance know-how, we are capable of maintaining energy production while keeping risks and O&M costs under control.

The main benefits for turbine owners

- 10 additional years of income
- Business case certainty
- Full control over operation and maintenance, keeping costs low
- Higher net asset value



The lifetime O&M costs of the wind turbine are reduced dramatically by applying Life Extension. Depending on the model and the technology used, it is possible to keep the turbine in operation for up to 35 years.

Maximize the profitability of your wind assets

Globally, more than 280 GW of wind turbines have been running for more than 10 years. The challenge for owners is to make these assets profitable beyond their original useful lifetimes in the face of rising O&M costs due to wear and tear.

Gain revenue by avoiding critical component failures

The service lives of critical components in wind turbines, such as the tower, frames and blades, are the first to be affected.

Fatigue failures can jeopardize the original business case, as the potential solutions are costly and are not covered by either manufacturers' warranties or customers' insurance.

The options

Life Extension, repowering or decommissioning

Owners of 20+ year-old wind farms typically face three options for dealing with rising O&M costs and maximizing their profit.



Life Extension is a cost-efficient and profitable method for maximizing the initial investment. With a service contract including upgrades to improve and extend the original design life, wind turbines can keep producing for up to 10 additional years with minimal risk.



Repowering by installing larger and more efficient turbines is also an attractive option, which can be combined with Life Extension. However, repowering can be made difficult by lengthy and uncertain authorization procedures. It also requires additional investments in decommissioning and new turbines. Siemens Gamesa offer repowering services.



Decommissioning the wind turbines may be relevant if neither Life Extension nor repowering are viable options. In this case, the asset owners incur the immediate costs of clearing the site as well as the opportunity cost of not having their permits extended.



A unique approach to Life Extension

Siemens Gamesa offers Life Extension based on a winning combination of technical know-how, operational experience and a well-proven process.

Our unique advantages

Our structured approach includes inspections prior to project implementation and site-specific tailored studies that determine which upgrades are needed and how retrofits of the wind turbines are to be performed.



Improved aeroelastic models

Turbine designs validated by certifying agencies ensure sufficient security margins for the turbine to bear loads during the entire original useful lifetime. Siemens Gamesa has used our extensive technical know-how and experience to improve aeroelastic mathematical models which simulate the long-term evolution of turbine structural elements.



Operational fleet experience

Siemens Gamesa has maintained wind turbines for the last 40 years, and this has provided operational experience with turbine technology of all sizes and configurations. This experience helps us foresee all major challenges that a wind farm will face.



Technical know-how

We employ our deep technical know-how in our analysis and evaluation of the critical mechanical wind turbine components to assess whether the fatigue loads are within their structural limit. The data from these findings are essential to determine the correct maintenance required to extend the life of the turbine.



Site-specific assessments

The conclusions of our inspections and site-specific analytical studies are always complemented by operational experience, thus ensuring optimal recommendations for the Life Extension.

Take advantage of our extensive know-how

Life Extension is entirely customized on the basis of each individual project. Our comprehensive methodology ensures that upgrades are implemented only when necessary, ensuring entirely safe operational conditions for both personnel and the turbine.

Fatigue assessment

- Technical audits: Theoretical structural analysis, current state of the wind turbines and failure rates of this type of wind turbine

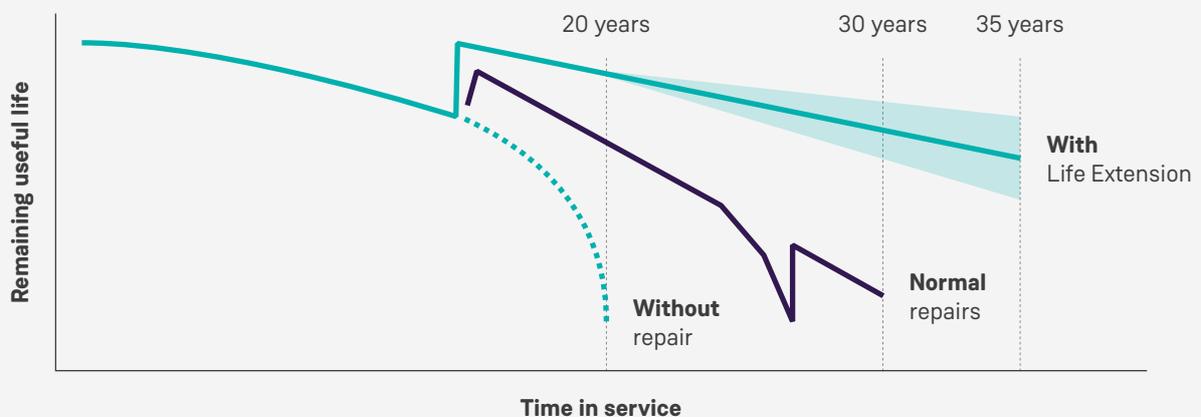
Customized site action plan

- Specific maintenance program tailor-made for any site and platform
- Implementation of any necessary upgrades to bring the turbine to the latest state-of-the-art (including repairs, reinforcements, and component replacements)

Mechanical component evaluation

- Main component upgrades based on the most advanced technology
- Guarantees completely safe operational conditions for both personnel and turbine

Prolong the lifetime of wind turbines with Life Extension



After 20 years without repairs, the useful life of the fatigue components is reached. With normal repairs after the first failure, the remaining useful time will be prolonged, but will never reach the optimized lifetime of a wind turbine where you have implemented the Life Extension service. By having regular inspections, you prevent failure and therefore increase revenue.

Upgrade your turbines to the next level

Siemens Gamesa can transfer the latest design improvements for turbine components to existing fleets, making them more reliable and easier to maintain.

Reliability-centered maintenance

Reliability-centered maintenance optimizes maintenance tasks by defining predictive, preventive and corrective actions, and determining when a component should be upgraded with the latest state-of-the-art design.

Vibration diagnostics

Siemens Gamesa use continuous and critical data from vibration diagnostics to detect risks in the moving parts of the turbine. This monitoring is as critical as preventive interventions, and upgrades cost on average 80% less than corrective actions.

Improve and upgrade

Each maintenance program is individually configured on the basis of the evolution of the wind turbine. Rather than just replacing a broken turbine component with the same component, this guarantees optimized maintenance. It also identifies possible hardware or software upgrades, making the turbine more reliable or easier to maintain.

Compatibility with other AEP upgrades

Life Extension can be combined with our complete catalogue of AEP upgrade solutions. The AEP upgrade can vary, depending on site-specific conditions. Reach out to our experts to learn more.

As part of Life Extension, all critical components of the load path of the turbine are evaluated in order to secure a thorough maintenance program.

Rotor

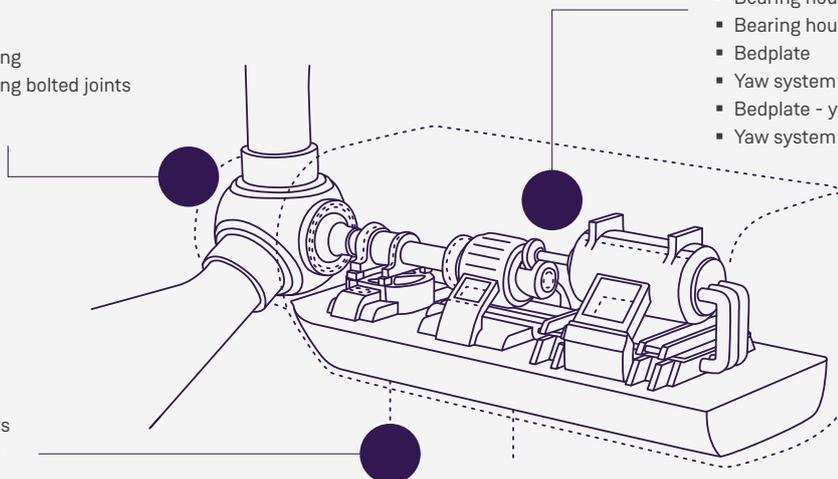
- Blade
- Blade bearing
- Blade bearing bolted joints
- Hub

Tower

- Bolted joints
- Door frame
- Weldings

Nacelle

- Main shaft
- Main shaft - hub bolted joint
- Main shaft bearings
- Bearing housing
- Bearing housing - bedplate bolted joint
- Bedplate
- Yaw system
- Bedplate - yaw system bolted joint
- Yaw system - tower bolted joint



Check whether Life Extension is available for your turbines

Life Extension can be applied to most existing turbines, and Siemens Gamesa is continuously adding newer platforms to the program.

Available now

Life Extension is already available for these platforms:

G47, G2, G5X, G8X

Coming soon

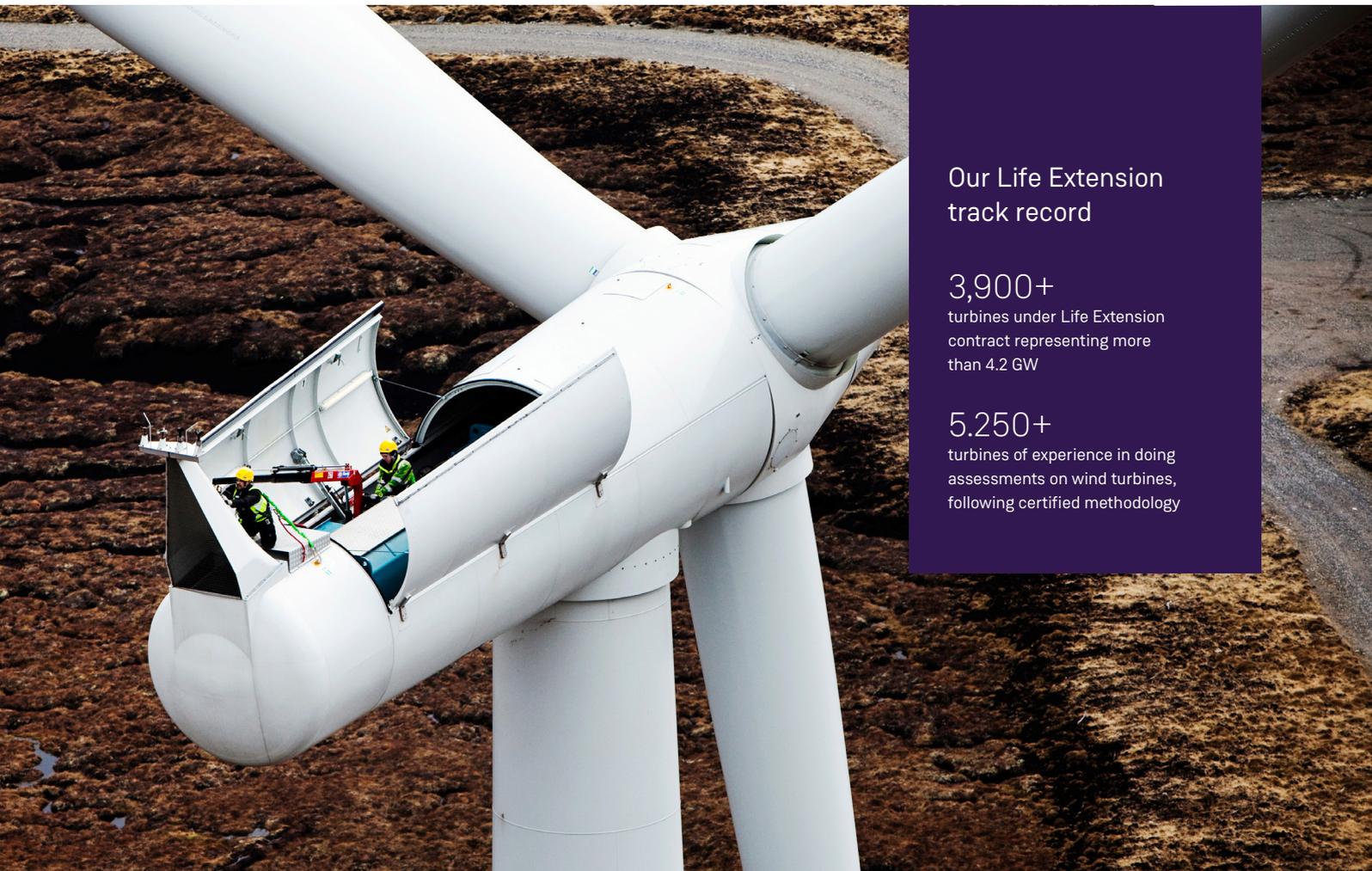
Siemens Gamesa is currently developing Life Extension for these platforms:

G9X, G4, D3 and Senvion 3.XM and MM

Our Life Extension track record

3,900+
turbines under Life Extension contract representing more than 4.2 GW

5.250+
turbines of experience in doing assessments on wind turbines, following certified methodology



Siemens Gamesa – the only global partner you need



Safety first

Safety is in our DNA.
It is our top priority.



Commitment

You can be confident that data, resources
and spare parts will always be available
for your asset.



Global Partner

We have a global reach
with a local focus.



Fleetwide experience

We service and upgrade turbines, regardless
of technology, throughout their entire lifetime.

“Asset owners seek certainty when managing the end-of-life of their assets. As a leading OEM in the market, we aim to partner with you by providing extensive know-how backed up by a solid track record of safe operations and high availability of turbines past their design lifetime, all the way up to 30 years.”

Contact us today to get started with Life Extension

The combination of turbine design and maintenance expertise makes Siemens Gamesa the perfect partner for Life Extension.

Siemens Gamesa has the necessary operational experience, technical expertise and proven track record on turbine upgrades. This guarantees an optimized cash flow for customers over the long term.

Life Extension provides unique capabilities that you can benefit from

- A safety-first approach is a central part of our DNA
- Owners of aeroelastic model and wind turbine control to provide reliable loads
- Owners of 3D CAD models and the Finite Element Method to provide reliable reinforcements
- Wind turbine control development capability
- Worldwide data on fleet failure rates
- Broad experience of behavior and predictive analysis
- Flexible and customized operations and maintenance contract
- Reliability-centered maintenance
- Vibration diagnostics service

As a turbine designer, we have know-how combined with operation and maintenance experience of more than 83 GW.



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