# Sardeolica Digitalizes Wind Farm Maintenance—Reducing Costs, Improving Uptime and Transforming Culture

**SARAS**

> "By providing six months warning of equipment degradation–via Aspen Mtell prescriptive maintenance–power production is increased by scheduling maintenance during lower wind periods, and equipment replacement and repair costs are reduced through advanced planning."
>
> - Giuseppe Citterio,
> Chief Energy and Sustainability Officer, Saras SpA

# Sardeolica expects a reduction of maintenance costs up to

# 10%
## per year

## CHALLENGE

- Extend lifetime and reduce maintenance costs of wind farm (57 generators total)
- Predict maintenance requirements to optimize scheduling

## SOLUTION

Aspen Mtell® and Aspen Maestro™ for Mtell Predictive Maintenance

## BENEFITS

- Proactively manage wind farm to avoid catastrophic damage
- Forecast potential issues up to 6 months in advance
- Flexibly schedule maintenance during low-wind periods
- Reduce annual maintenance costs up to 10% while increasing power uptime

## The Wind Farm Maintenance Challenge

The Saras Group has been producing electricity from renewable sources since 2005, through its subsidiary Sardeolica Srl. Sardeolica operates a 126 MW wind farm, comprising 57 wind generators located in Ulassai and Perdasdefogu, with a yearly energy yield of 250 GWh.

Starting in 2017, Sardeolica, launched its digitization process with the aim to optimize plant control, plan maintenance interventions during low-wind periods, increase productivity and mechanical availability with a view to continuous improvement and implement a "digital" maintenance culture.

## Digitalization at Saras and Sardeolica

As an independent refining and electric power producer—competing on key principles of operational excellence, agility and innovation—Saras has embarked on a broad digitalization initiative over the past several years. Saras was an early leader, achieving success in applying data analytics and AI via the Aspen Mtell solution at the Saras refinery. Building on that success, the Saras Sardeolica unit approached AspenTech to apply Mtell in a new domain for both Saras and AspenTech, using prescriptive maintenance to maximize uptime and reduce costs for wind turbines.
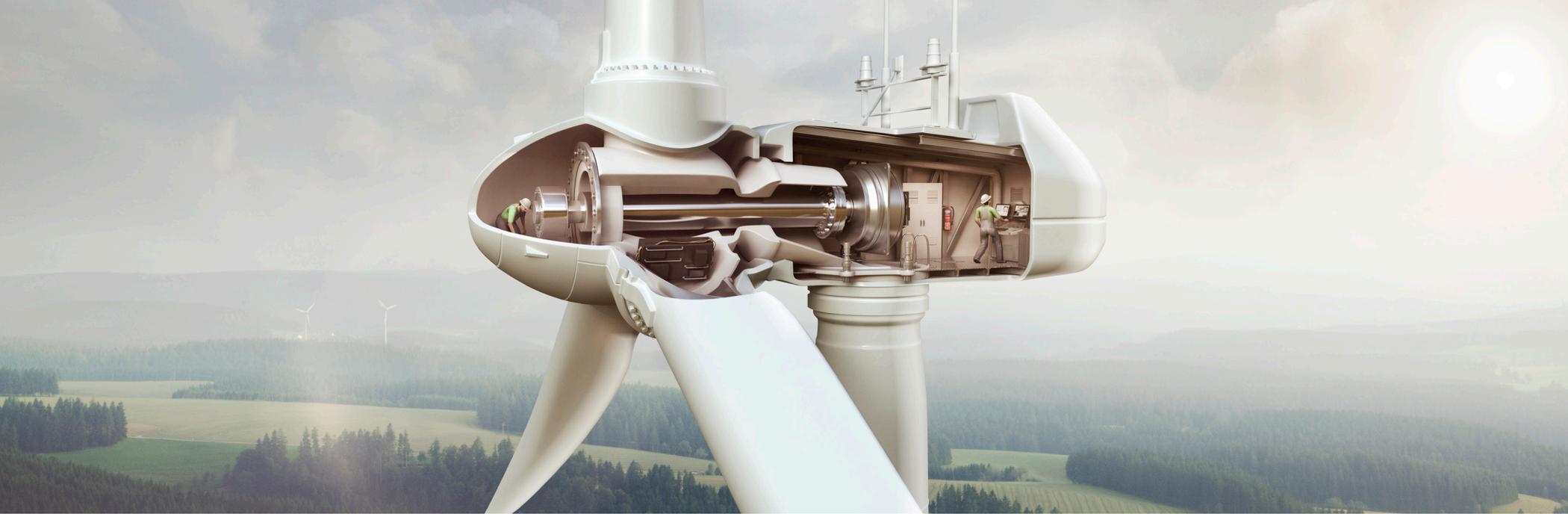
# Applying Aspen Mtell to Wind Turbine Generators

Sardeolica installed a network of vibration sensors and equipment data collectors across the wind turbine generators and gear boxes—a key step in applying digitalization to their wind farm operations. This allowed the company to transform its maintenance function and more proactively manage wind assets to not just avoid catastrophic damage, but also potentially extend their lifetime.

The collaborative project exceeded both organizations' expectations. Based on the availability of sensor data and the highest maintenance areas, the initial deployment of the Aspen Mtell solution focused on two major types of equipment: wind turbine gear boxes and wind turbine generators. Prior to applying prescriptive maintenance, advance notice of issues was minimal, forcing a reactive approach. In some cases, equipment failed without any notice, forcing wind generator shut down and repair or replacement of expensive equipment.

AspenTech's unique Aspen Maestro for Mtell is a feature engineering solution, which automates the data preprocessing needed to train the Mtell solution on a new business domain, in this case wind farm generators. This enabled Sardeolica to rapidly develop the machine learning agents for the wind generator and gearbox equipment that provide advance notice of issues. After quickly seeing how the solution forecasts problems up to six months in advance, Sardeolica accelerated the project, implementing prescriptive maintenance on 48 of the 57 wind turbines, further proving Mtell's advanced transfer learning capability.

# Integrating Mtell into Sardeolica Operations Business

To achieve maximum value with the use of prescriptive analytics, Sardeolica has adopted a business workflow. A team of analysts run and maintain the Mtell solution and perform first-level alert analysis. Once an alert is validated, it is passed to the operations maintenance team and the equipment provider. Mtell alerts and weather (wind) forecasts/predictions are combined to generate a maintenance strategy with instructions. For example, certain conditions may require reducing power output for a specific turbine in order to avoid the component breaking while waiting for it to be repaired.

## Value Created in Uptime and Maintenance Costs

Results to date have been even better than expected. Sardeolica estimates a 10 perent business improvement to date, which is a combination of reduced maintenance cost and increased power generation uptime. Part of this savings comes from sourcing less expensive parts, as procurement now has longer lead time to shop around and avoid priority shipping costs.

## New Maintenance Culture

A key to Sardeolica's success with data analytics and Aspen Mtell is an evolution of the maintenance culture at Sardeolica. Prior to the Mtell project, the wind farm maintenance team followed traditional practices and was fundamentally reactive in nature. Maintenance on wind turbines has historically been scheduled according to consolidated standards consisting of ordinary maintenance every six months and extraordinary unscheduled and corrective maintenance following failures. With the start of the prescriptive maintenance AI project, staff with data analytics and digitalization backgrounds were added to the team. The data analytics group learned about wind generator equipment from the electromechanical maintenance experts, while the maintenance team learned about the power of digital solutions from the analytics experts.

Additionally, Mtell enables Sardeolica to create agents and manage alerts without ongoing third-party involvement. The outcome, according to Pamela Deidda, Head of Business Analytics at Sardeolica, is an exciting new maintenance culture, with a focus on excellence and high morale. The quick results (e.g., predicting equipment degradation well ahead of time) made believers out of the maintenance staff and created momentum for the new culture.
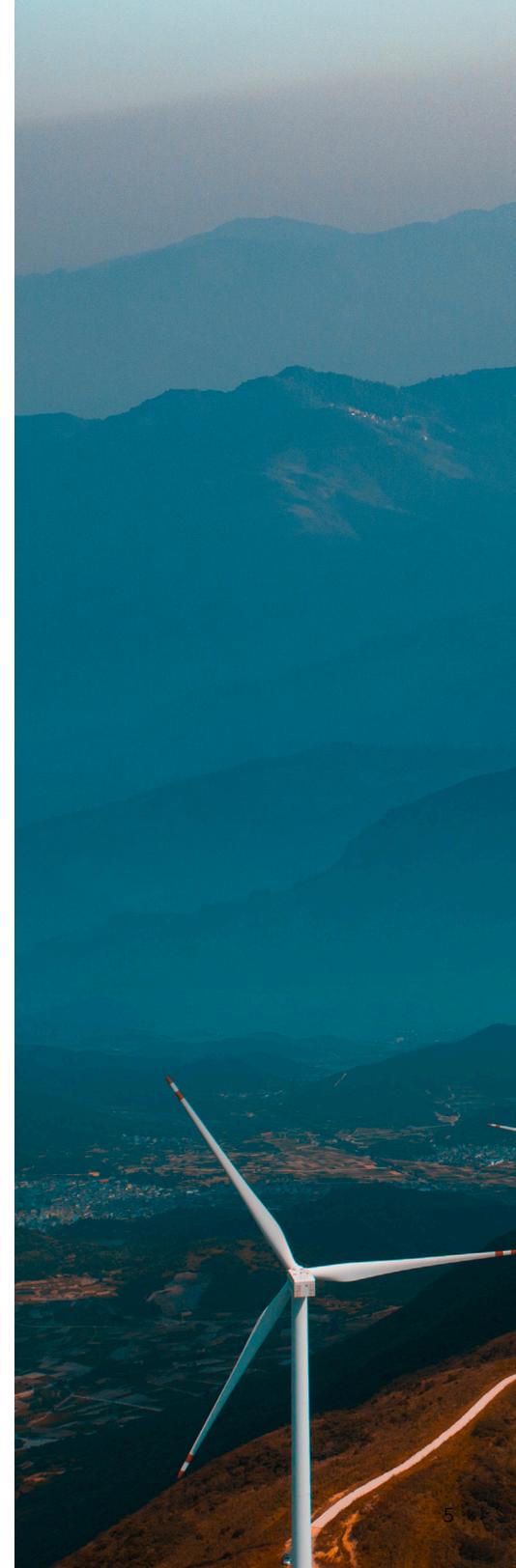
# More Benefits from Next Steps

Today, the Sardeolica team is pursuing new areas. Currently, they are looking at where sensors should be added to increase the value of the Mtell solution. The next target is the wind power transformers, which are a critical maintenance focus after gear boxes and generators.

Sardeolica believes that the future potential from full implementation of Mtell across the Saredolica wind generation business will be three to five times the already impressive benefit for the overall lifetime of the wind turbines. The company will also look at Mtell implementation to other portions of the plant currently not monitored.

In addition, the enhanced collaboration between functions combined with the new digitalization mindset and improved operational and maintenance capabilities will encourage subsequent projects. By forming agile and specialized teams, Sardeolica can leverage historical knowledge of alerts to confirm the presence of anomalies while limiting false positives.

"The maintenance team was quickly convinced of the value of the Mtell approach after the first equipment inspections, based on data analytic warnings. Now we have a new maintenance culture combining the best of mechanical engineering with data analytics."

Pamela Deidda, Sardeolica Head of Business Analytics

**About Aspen Technology**

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