

# smart wind

Advance tools to  
optimise  
operation and  
maintenance  
activities in wind  
farms

SmartWind project  
has a consortium  
of 6 members  
from 3 countries  
and a budget of  
€2M



SmartWind provides an integrated platform for cost reduction and revenue optimisation for wind farms operators based on advanced and automated functions for data analysis, performance diagnosis, fault detection, performance diagnosis, root cause analysis and Operations and Maintenance (O&M) recommendations through a cloud platform that collects, normalises and stores data from SCADA, IoT, sensors and information systems, such as maintenance management or inspections, including a set of data cleansing procedures and algorithms.

### Recommendations Engine

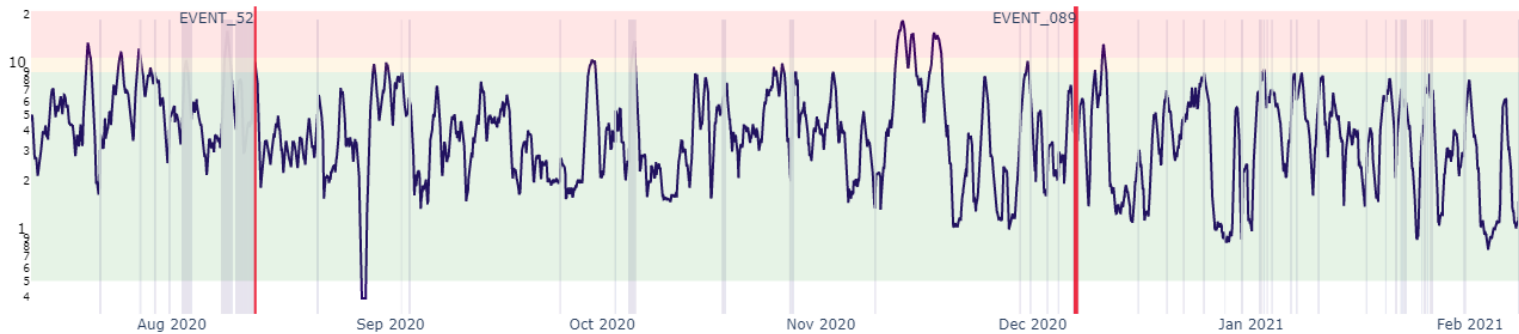
Wind Turbine
▼

Subassembly
▼

WTG	Subassembly	Recommendation	FailureMode	Day 🕒 ▼	Criticality 📌 ▼
T27	Converter Control Unit	Check the Converter Control Unit	Generator Side CCU Fault Current, Line CB Close Fail, Generator Side CCU Fault Voltage, Generator Side CCU Fault Temperature	4 Sub 2020	<div style="width: 100%; height: 10px; background-color: #007bff;"></div>
T08	Converter Control Unit	Check the Converter Control Unit	Generator Side CCU Fault Current, Line CB Close Fail, Generator Side CCU Fault Voltage, Generator Side CCU Fault Temperature	3 Sub 2020	<div style="width: 100%; height: 10px; background-color: #007bff;"></div>
T52	Converter Control Unit	Check the Converter Control Unit	Generator Side CCU Fault Current, Line CB Close Fail, Generator Side CCU Fault Voltage, Generator Side CCU Fault Temperature	3 Sub 2020	<div style="width: 100%; height: 10px; background-color: #007bff;"></div>
T27	Converter Control Unit	Check the Converter Control Unit	Generator Side CCU Fault Current, Line CB Close Fail, Generator Side CCU Fault Voltage, Generator Side CCU Fault Temperature	1 Sub 2020	<div style="width: 100%; height: 10px; background-color: #007bff;"></div>
T10	Converter Control Unit	Check the Converter Control Unit	Generator Side CCU Fault Current, Line CB Close Fail, Generator Side CCU Fault Voltage, Generator Side CCU Fault Temperature	1 Sub 2020	<div style="width: 100%; height: 10px; background-color: #007bff;"></div>
T49	Generator	Check the generator winding phases and the magnet in the stator.	Magnet and phases friction or degradation	7 Sub 2020	<div style="width: 80%; height: 10px; background-color: #007bff;"></div>
T04	Generator	Check the generator winding phases and the magnet in the stator.	Magnet and phases friction or degradation	1 Sub 2020	<div style="width: 80%; height: 10px; background-color: #007bff;"></div>
T53	Generator	Check the generator winding phases and the magnet in the stator.	Magnet and phases friction or degradation	1 Sub 2020	<div style="width: 80%; height: 10px; background-color: #007bff;"></div>
T49	Generator	Check the drive end bearing.	Mechanical or lubrication failure in the drive end bearing	1 Sub 2020	<div style="width: 40%; height: 10px; background-color: #007bff;"></div>

- The main Key Performance Indicators (KPIs) to measure the project success are the **reduction of O&M costs by 10%** and the **increase of production availability by 5%**.
- Algorithms have been developed that predict faults in each subsystem of the wind turbine days before the fault occurs.
- Based on the algorithms results, recommendations are made for the subsystem, criticality level, and identified causes of the potential fault that may occur in a wind turbine.

T27 - Error



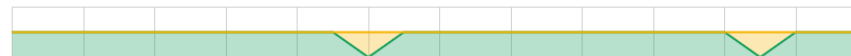
Time series visualization

Wind Turbine: T10 (1) ▾

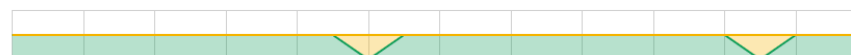
Ok

Outliers

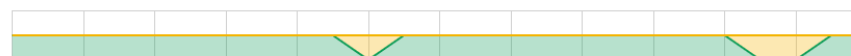
temp\_generator\_1\_c



temp\_generator\_2\_c



generator\_temp\_3\_c



### Gokcedag Wind Farm Analysis

1	<a href="#">Plant Status</a>	7	<a href="#">Pitch</a>
2	<a href="#">Energy Losses</a>	8	<a href="#">Yaw</a>
3	<a href="#">Performance Curves</a>	9	<a href="#">Converter Control Unit</a>
4	<a href="#">Generator</a>	10	<a href="#">Turbine Shaft</a>
5	<a href="#">Gearbox</a>	11	<a href="#">General</a>
6	<a href="#">Low speed shaft</a>	12	<a href="#">Wake Effect</a>

