

# Digitalisierung in der Windindustrie



Möglichkeiten zur Performanceverbesserung und Serviceoptimierung  
durch die Digitalisierung von Windenergieanlagen

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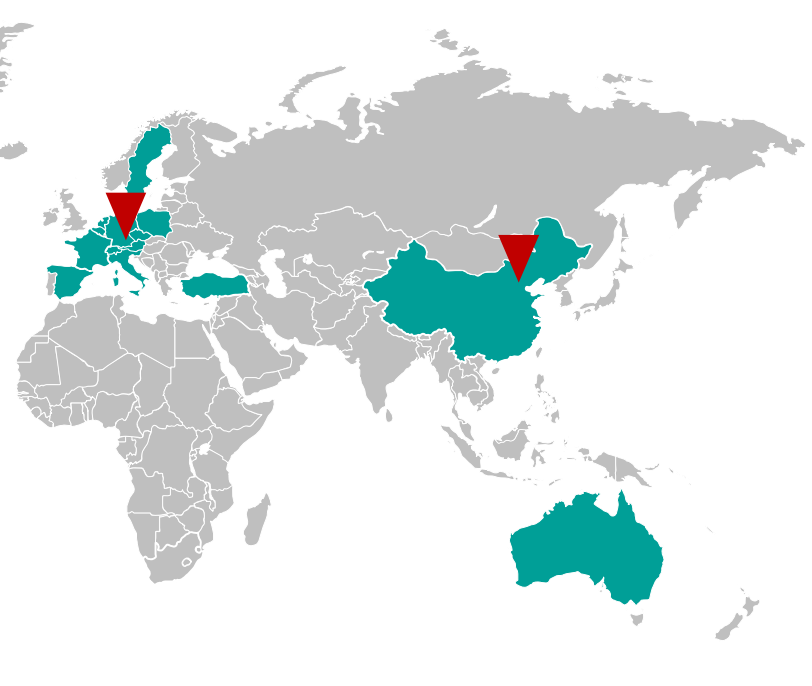
10,000+ sensors operative in 19 countries

300+ Ice Detection Systems in operation

All top 10 OEMs are customers already

A-rated series supplier of German OEMs

80 employees, headquartered in Munich



**SENVION**  
wind energy solutions

**ENERCON**  
ENERGY FOR THE WORLD

**ENVISION**



**Vestas**

**NORDEX**  
We've got the power.

**SIEMENS**

**GOLDWIND**



**MINGYANG WIND POWER**  
PERFORMANCE BY NATURE

**上海电气**  
SHANGHAI ELECTRIC



2012



2013



2014

2015

2016

2017

2018

2019



SCADA Analysis



Sensor Solution



Real-time Analytics



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## Opportunities & Obstacles

Data & Tools

Cooperation & Innovation

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Improve  
Service



Identify  
Risk



Increase  
AEP



Extend  
Lifetime



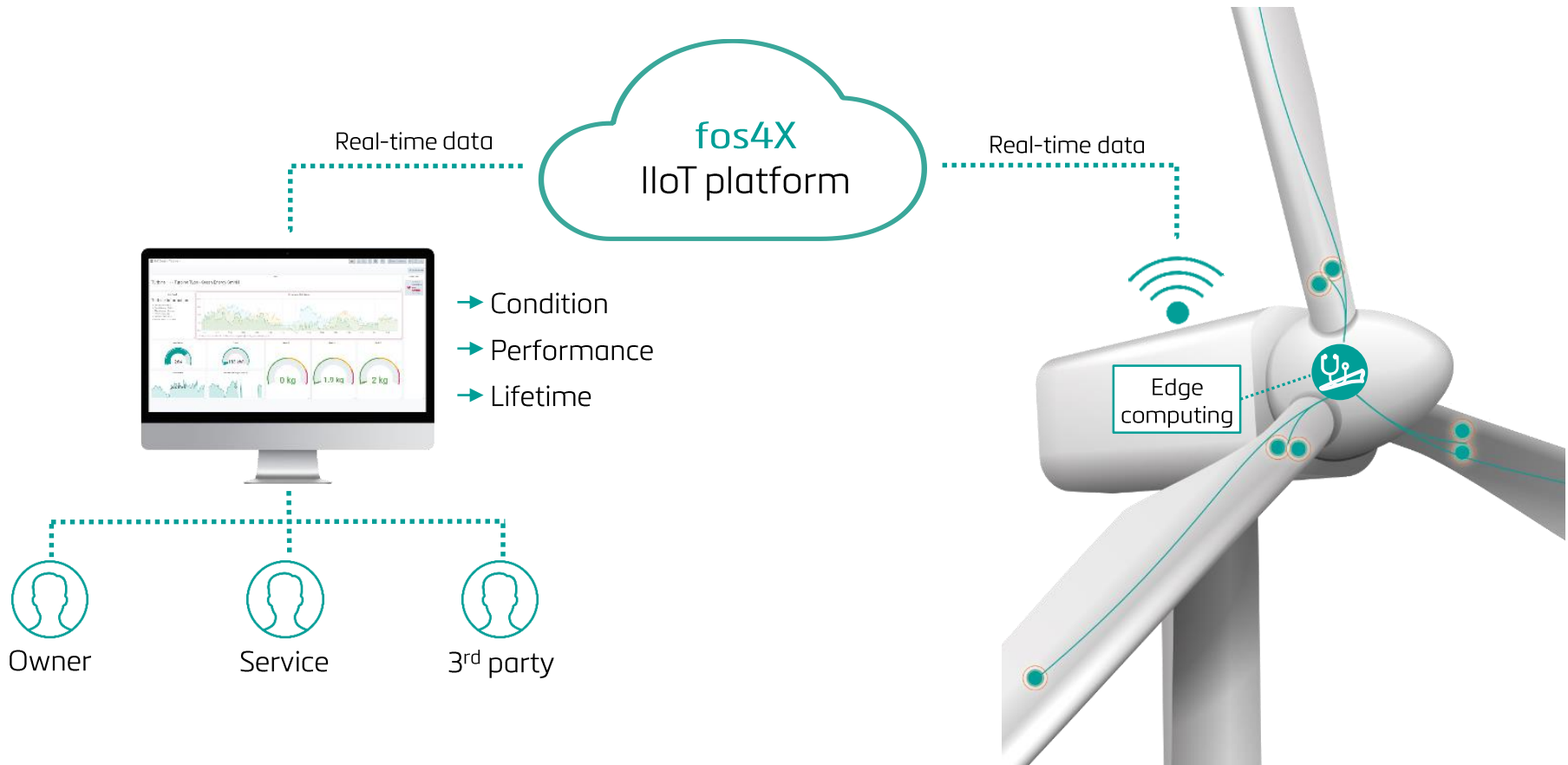
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Opportunities & Obstacles

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#### ROTOR ICE CONTROL

Stops a wind turbine with ice-buildup and restarts automatically after melting



#### TURBINE LOAD CONTROL

Avoids detrimental loads, helps optimize blade design, and enables turbine lifetime extension



#### TURBINE EFFICIENCY CONTROL

Improves sector curtailment and power curve over the entire range of wind speeds and terrains



#### TURBINE INTEGRITY CONTROL

Identifies different types of degradation and damage based on analytical and empirical tools



Reduce OpEx



Identify Risk



TURBINE INTEGRITY CONTROL

Identifies different types of degradation and damage based on analytical and empirical tools



# Increase AEP



## ROTOR ICE CONTROL

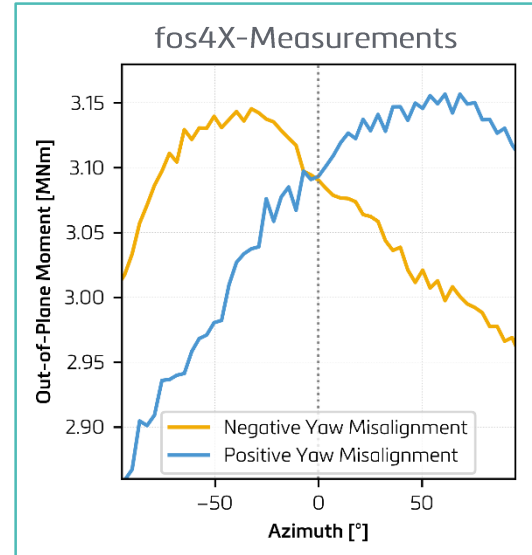
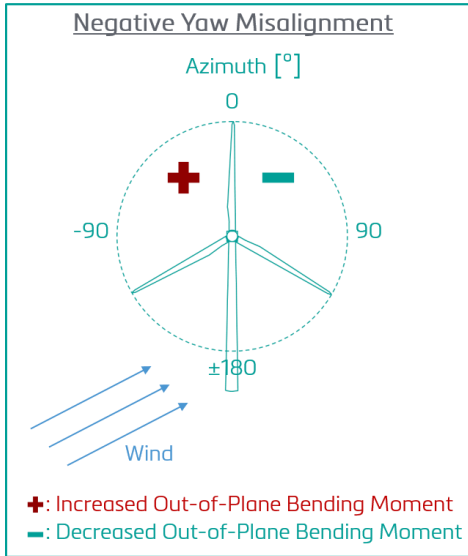
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# Increase AEP



## TURBINE EFFICIENCY CONTROL

Improves sector curtailment and power curve over the entire range of wind speeds and terrains



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SCADA  
Analysis



Sensor  
Solution



Real-time  
Analytics



Phase 1  
Digitalization of Asset

Phase 2  
Launch MVP of  
product

Phase 3  
Full Blade CMS  
(prepare for Predictive Maintenance)

Basic view of blade  
condition in real-time  
 („CMS“)

Alerts for physical follow-  
up by service personnel

Feed into maintenance  
program



+ Retrofit fiber-optic sensors and connect to the IIoT

+ Utilize high-frequency data for model-based analytics

+ Leverage data-driven optimization to grow profit

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fos4X

rotor blade sensing

