

Operation, control and steering of the offshore wind farm

27 October 2021



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BDM UK & Northern Europe



Department for
International Trade



ONYX Insight

Making every Offshore MWH count



Making every Offshore MWH count

Europe continues to set a benchmark, led by the UK, which has committed to power every home through offshore wind by 2030

Challenges

High Costs & Risks

High Government Targets

Technical Challenges

Competitive Auctions

Storage & Port Infrastructure

Grid Integration

The European Union has added further momentum with a target of 60GW installed capacity by 2030

ONYX Insight

- ✕ **Global leader** in hardware, software and engineering services for the wind industry
- ✕ We provide **trusted and unbiased** predictive analytics underpinned by engineering expertise
- ✕ Engineering **heritage of rotating machinery** design, monitoring and lubrication
- ✕ **Global reach:** UK, Spain, USA, S. Korea, India, China and Australia
- ✕ Part of **bp Group**

Making every MWH Count



Advanced Sensing

ecoCMS™
ecoPITCH™
Oil Sensing



Software & Analytics

AI-Hub™
fleetMONITOR™
fieldPRO™



Engineering & Consulting

Over **5,000** ecoCMS retrofitted

8,000+ wind turbine monitoring services

2,000+ gearbox teardowns and inspections

65 GW reliability data of wind assets worldwide

8 out of top **10** global industry IPPs work with ONYX

✕ **2GW+** offshore wind turbines monitored

✕ **600+** offshore wind turbines monitored

Bringing sensing, analytics and engineering together.



ONYX's work in renewable energy provides huge environmental benefits by making wind energy more cost-competitive and maximising the uptime of wind turbines.

We are committed to lowering the cost of energy. A study conducted in 2019 and independently assured by Deloitte LLP calculated that ONYX had enabled an additional 228 GWh (gigawatt hours) of energy production from wind turbines and saved over 110,000 tonnes of CO2 per year.

228 GWh is enough to power 26,000 homes for whole year and so we are saving enough energy production to power a whole town. It's also the weight of 9000 double decker busses! Or 27,000 elephants!

In 2020 and 2021 we successfully increased the number of CO₂ saved by 30% each year.



2017 was a big year for us when we joined the BP family of companies.



The recipient of two Queens Awards - one for International Trade and one for Innovation.



More than 10 global patents with more in the pipeline.



2GW+ offshore wind turbines monitored

Some BIG numbers

Monitoring over

8,000
wind turbines

In over

30
different countries

Taking part in over

65GW
of due diligence projects

600+ offshore wind turbines monitored



Uninterrupted growth in 2020

Over
110

employees at our offices

Over
25

nationalities

Over
700

years of engineering knowledge combined

Over
200

global customers



www.onyxinsight.com



What do we do?

ONYX bringing sensing, analytics and engineering



Advanced Sensing

ecoCMS™
ecoPITCH™



Software & Analytics

fleetMONITOR™
AI-Hub™
fieldPRO™



Engineering & Consulting

Wide range of onshore & offshore
services delivered

Full turbine predictive maintenance vision

RELIABILITY

Blades

Inspection, Imbalance, Icing

Pitch System

Bearing, Hydraulics/Motors

Drivetrain

Generator

Cooling System

Wake, Turbulence

Foundation

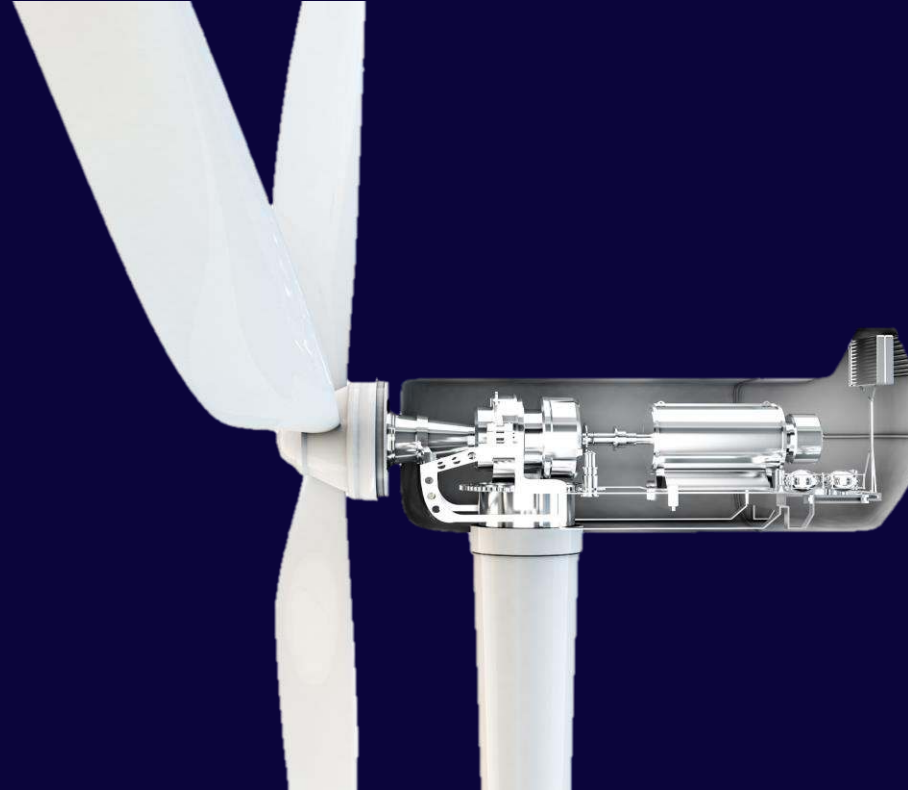
LOST ENERGY

Pitch calibration,
misalignment

Anemometer issue

Yaw misalignment

Power Curve Anomaly



Physics-based
models



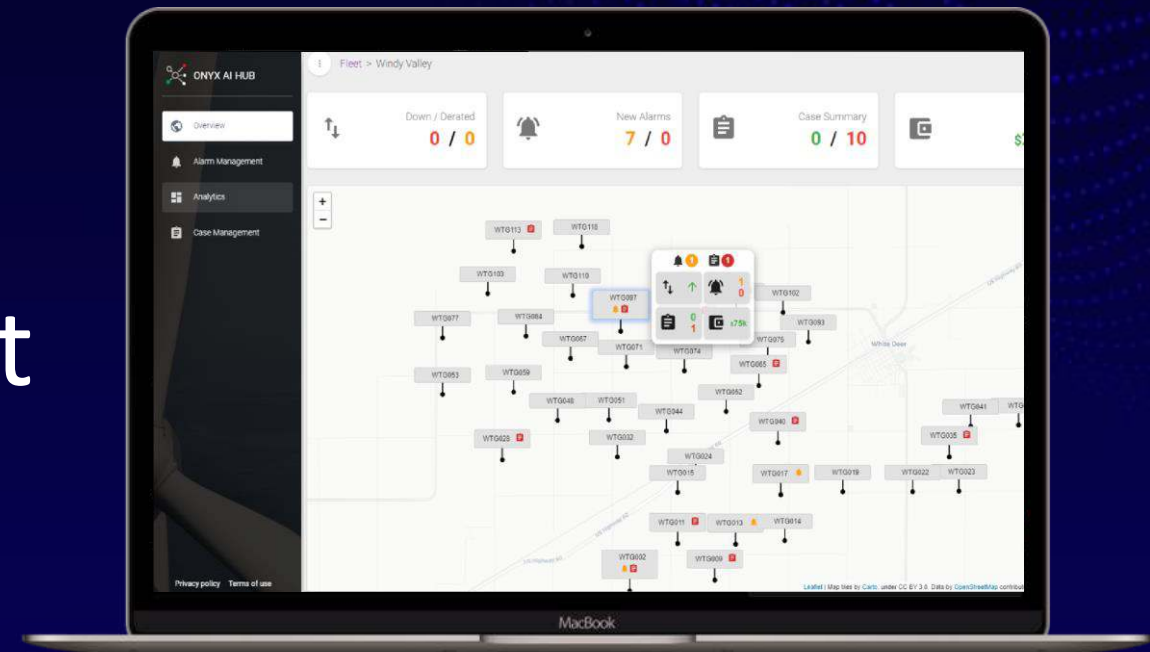
Big
Data



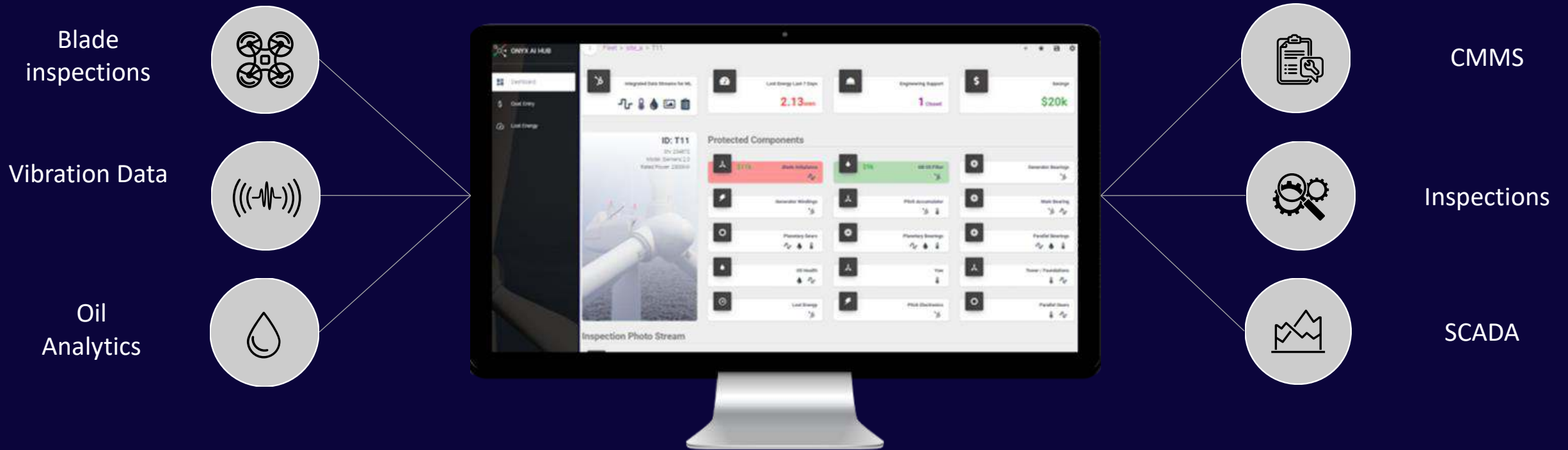
Powered by
ML & AI



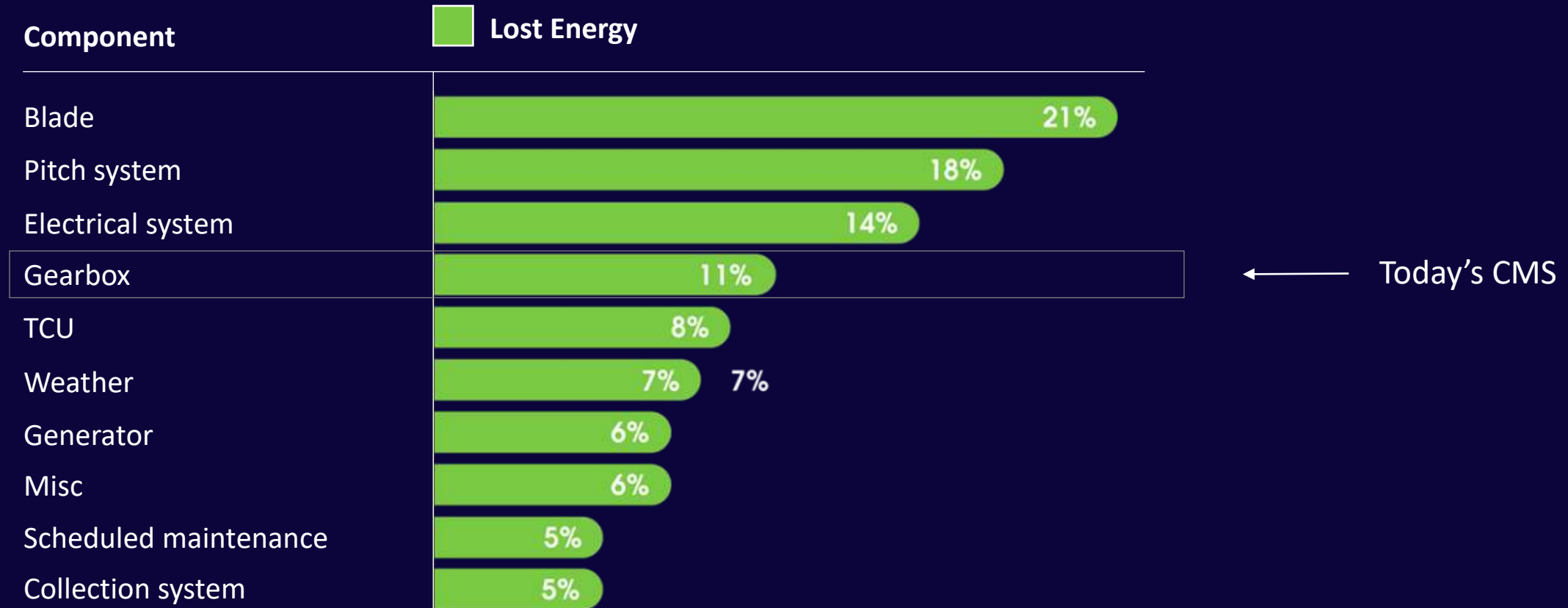
One scalable O&M platform for efficient fleet management



One platform with all your data centralised



Unmonitored components account for >50% of lost energy



% of lost energy from unplanned maintenance
Example from Major Operator in North America

AIHUB brings tangible results



**REDUCE LCOE COST
BY UP TO 12%**

Utilise the latest ML and AI systems to
maximise insight from your data.



**INCREASE ASSET
AVAILABILITY BY 2%**

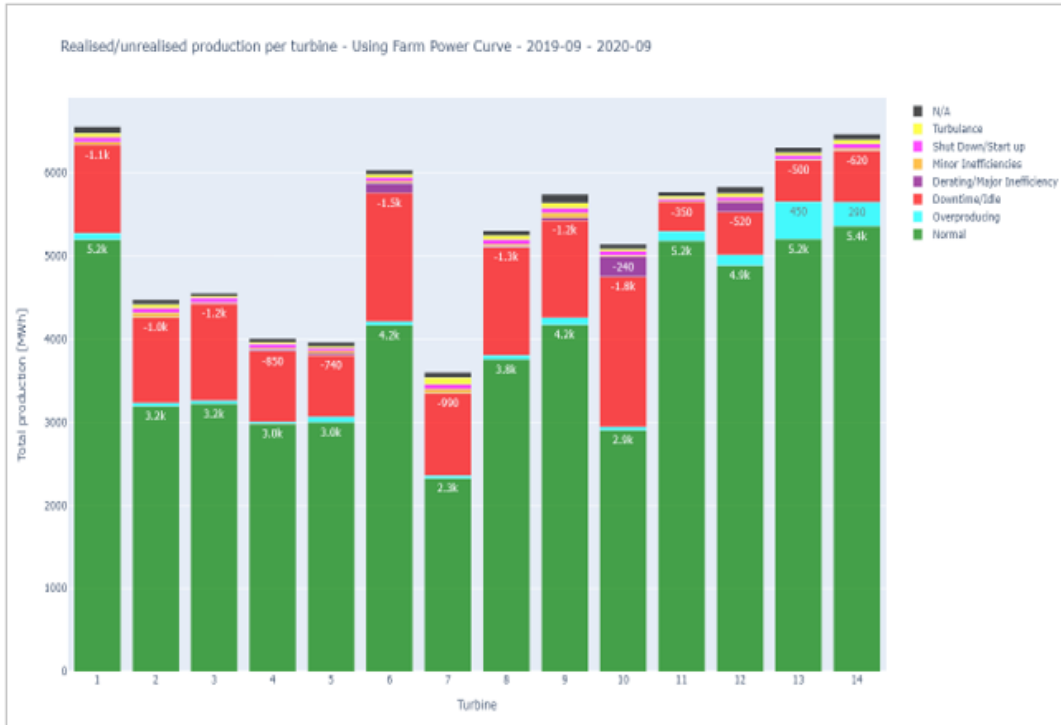
Grow your assets with efficient and accurate
risk management.



**SAVE UP TO 30% IN
MAINTENANCE COSTS**

Efficient and accurate risk management
with tangible results.

Lost energy summary



LOST ENERGY

Make every MWh count



Maximise production beyond contractual availability

- ✓ Automated fleet-level lost energy summary
- ✓ Wake and turbulence risk



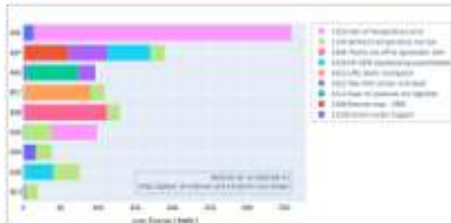
Detect lost energy powered by advanced analytics

- ✓ Derating *
- ✓ Blade LE erosion, icing *
- ✓ Yaw misalignment *
- ✓ Blade imbalance
- ✓ Bad control parameters
- ✓ Bad anemometers

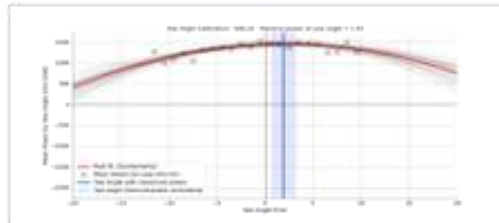


Prioritise maintenance by combining lost energy and reliability analysis

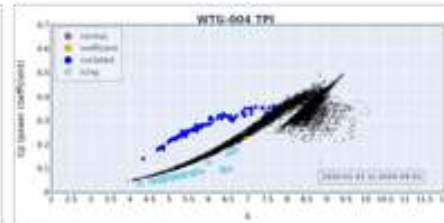
Lost energy breakdown



Yaw misalignment



Blade icing



RELIABILITY

Efficient and accurate risk management of a large fleet

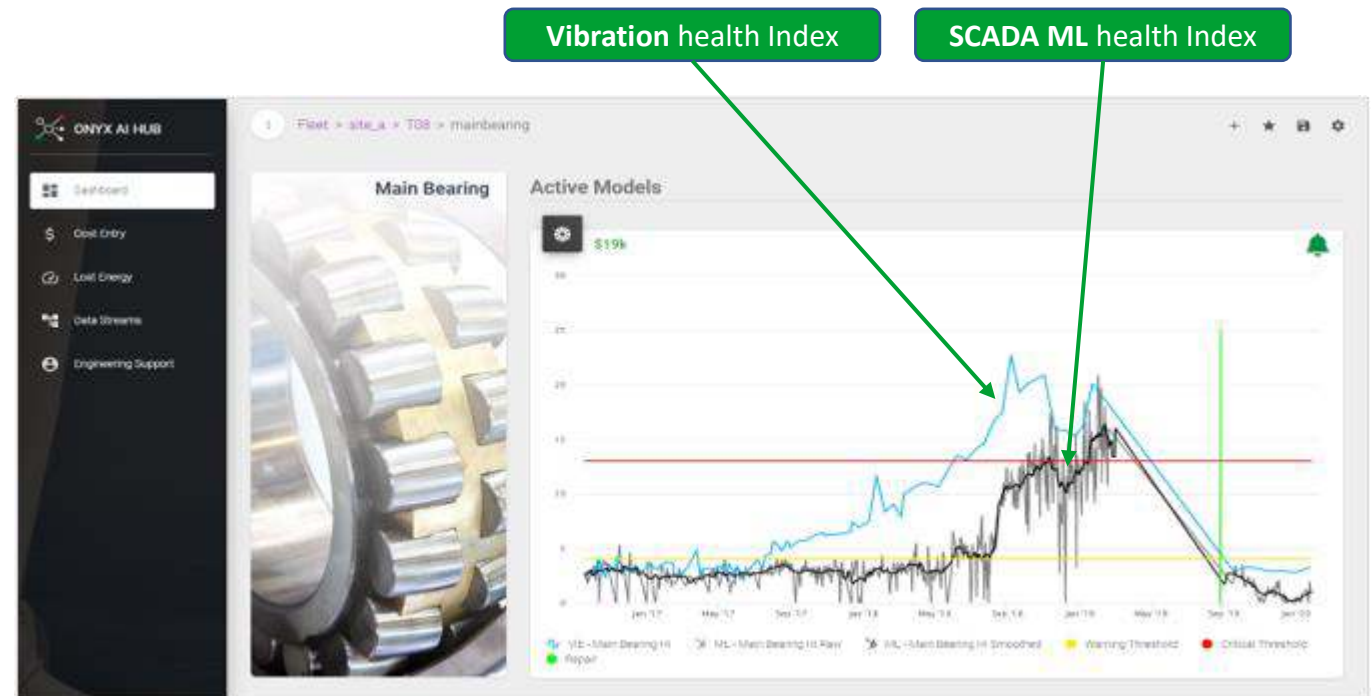
✗ Vibration & SCADA analytics combined

✗ Full turbine Predictive Maintenance

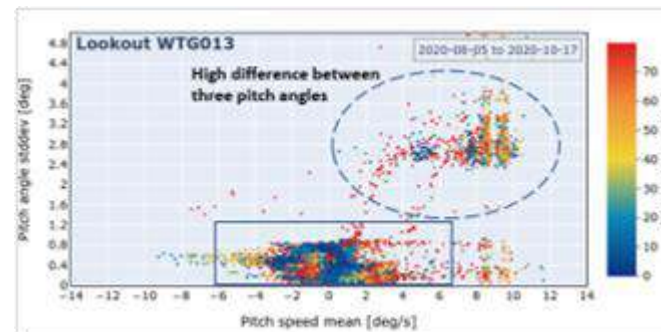
- ✓ Drivetrain
- ✓ Cooling system
- ✓ Pitch bearing ; Hydraulic system
- ✓ Blade imbalance
- ✓ Wake and turbulence risk

✗ Advanced Analytics powered by ML and Big Data statistics

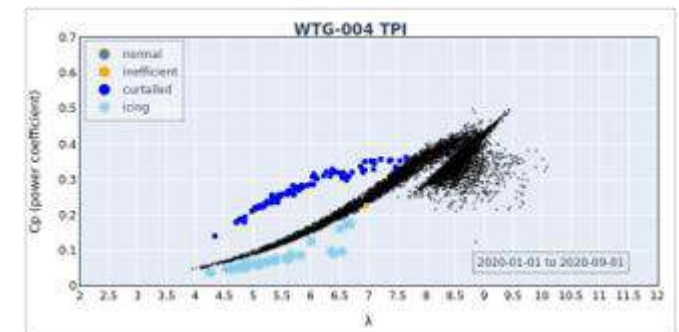
- ✓ Powered by ONYX big database
- ✓ Engineering enhanced machine learning models
- ✓ Early fault detection with higher confidence



Pitch bearing fault



Blade icing detection



CASE MANAGEMENT

Collaborative, analytic reach case management

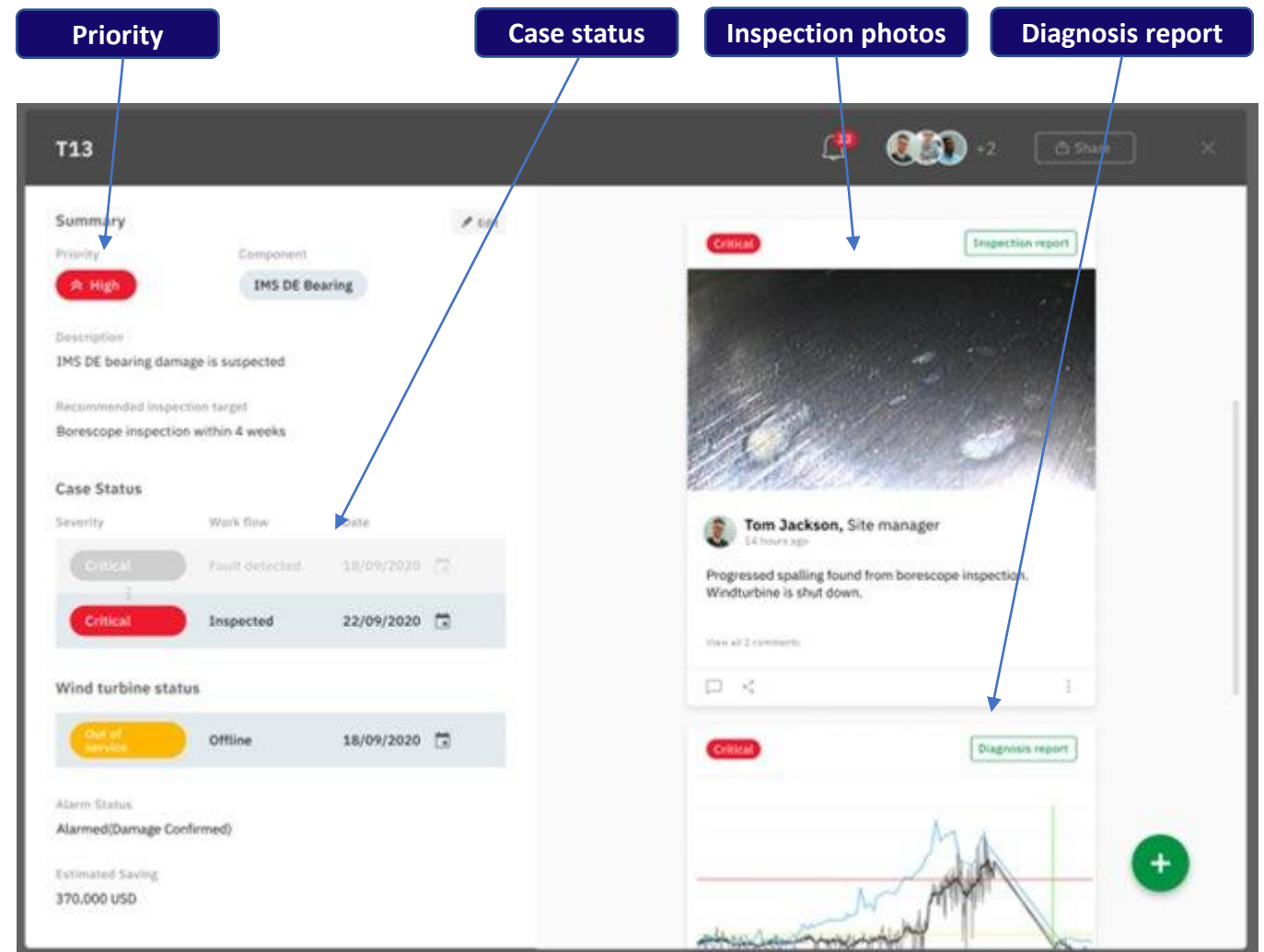
✗ Bring everyone's input in one place

- ✓ Vibration, SCADA analytics
- ✓ Inspection photos
- ✓ Engineers' comments

✗ Faster data-driven repair prioritization

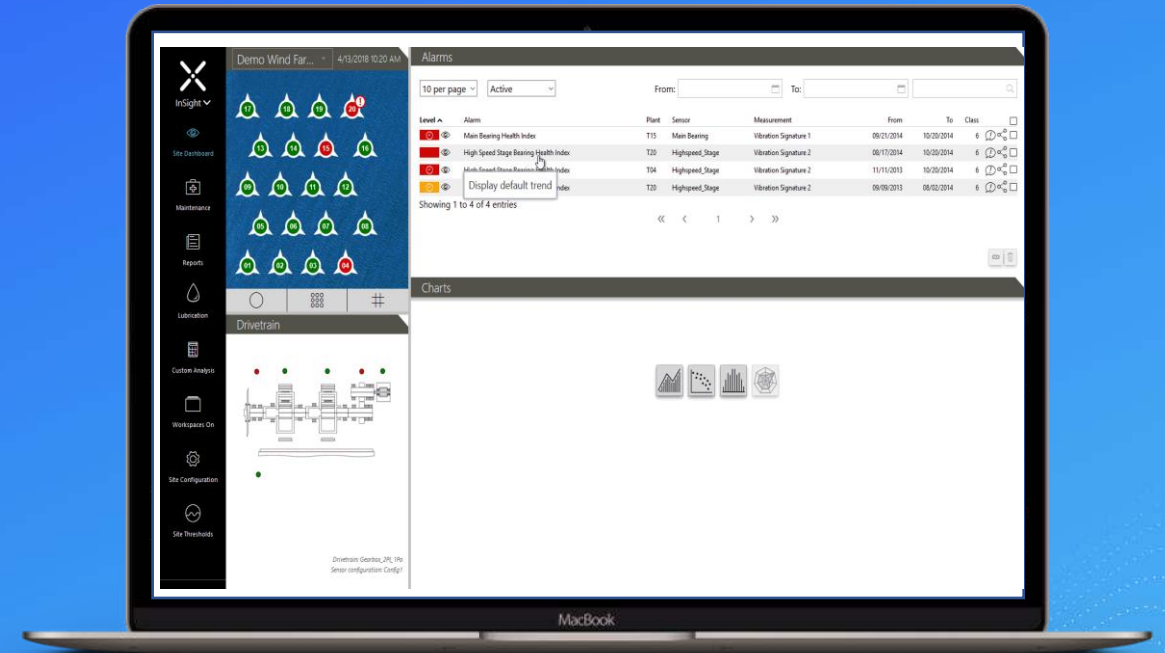
✗ Workflow status

✗ KPIs tracking (e.g. time to response)





Powerful analysis of your vibration data



Value of Shadow Monitoring

Shadow Monitoring puts our clients a step ahead of the OEM..

- ✕ **ONYX provides “shadow” monitoring on vibration and SCADA data, providing much more than a backup:**
 - ✕ ONYX Shadow Monitoring is independent and unbiased
 - ✕ OEM’s often limit data access and do not reveal potential serial issues or their technology learning curve
 - ✕ Owners often don’t find out about minor corrective actions unless they lead to major failures
 - ✕ Independent data analysis supports pro-active relationships with OEM
 - ✕ ONYX provides deep additional expertise that empowers our clients to make better operational decisions on major component asset integrity
 - ✕ ONYX has access to wider fleets of the same WTG models and technology which allows cross fleet comparisons
 - ✕ Client has better “visibility” of their WTG assets and a longer lead time on potential component issues
 - ✕ ONYX’s data science team regularly supports the client’s site team with investigative enquiries helping to expand the client’s first hand knowledge base of their WTG assets
 - ✕ The ONYX client has full access to “their” data





Affordable and Effective CMS



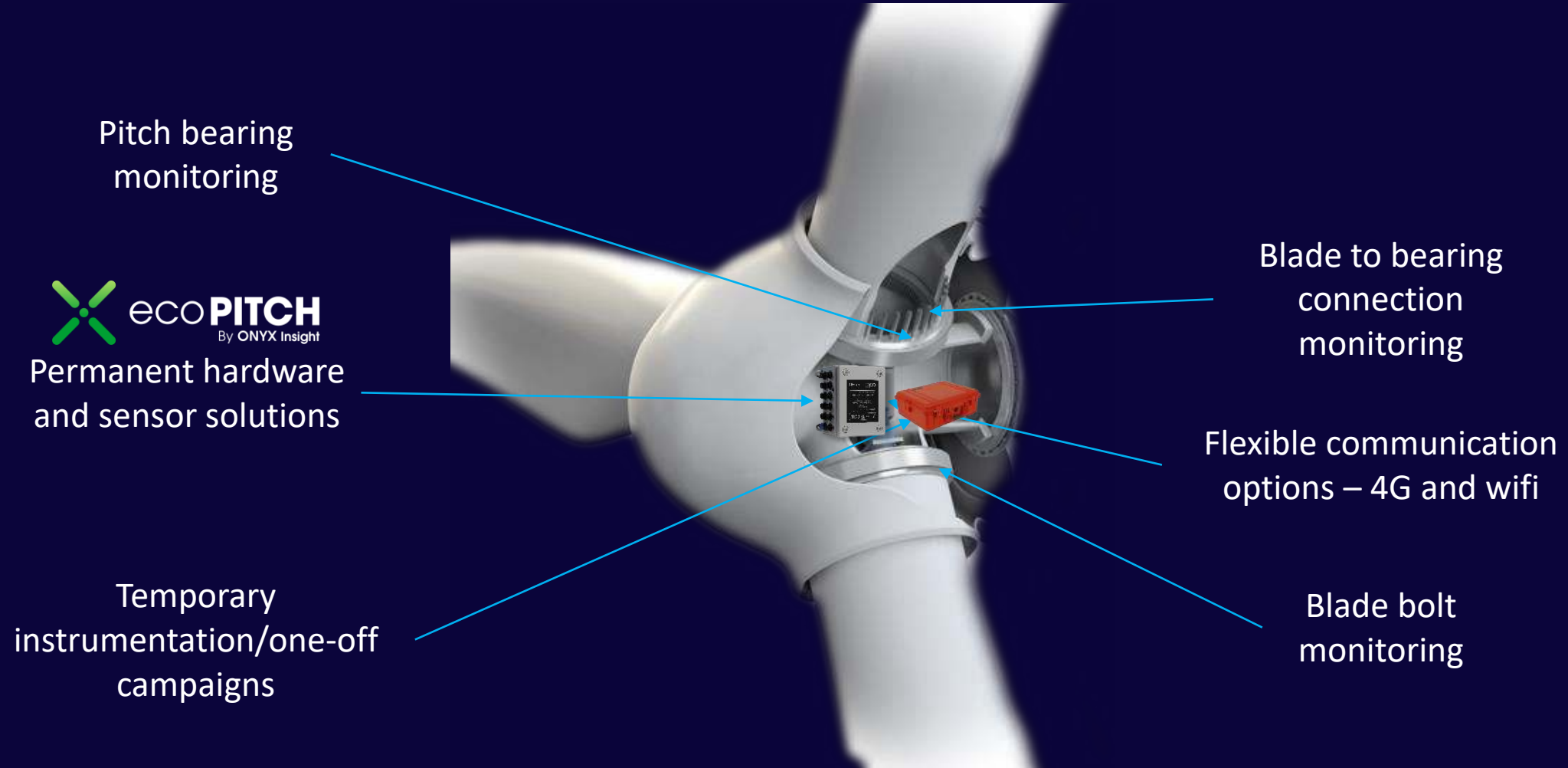


eco**PITCH**
By ONYX Insight

Revolutionary new technology
for pitch bearing monitoring



ecoPITCH – online pitch bearing health monitoring



ONLYX Insight

- ✗ Wind Turbine General Architecture
- ✗ Gearbox and Main Bearing Inspections
- ✗ End of Warranty Inspections
- ✗ Life analysis & extension
- ✗ Main Bearing Grease Flushing
- ✗ Pitch Bearing Health Assessment
- ✗ Large Component Replacement
- ✗ Gearbox Re-engineering and Rebuild
- ✗ Root Cause Analysis (RCA's)
- ✗ Engineering Consultancy
- ✗ ecoCMS & ecoPITCH Installations
- ✗ O&M forecasting & improvement program
- ✗ Gearbox re-engineering / design upgrade
- ✗ Training: technician and engineer courses

Engineering & Consulting Services



Our local and regional offices

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A low-angle, upward-looking shot of a white wind turbine against a bright blue sky with wispy white clouds. The perspective makes the tower and nacelle appear to converge towards the top of the frame.

THANK YOU

