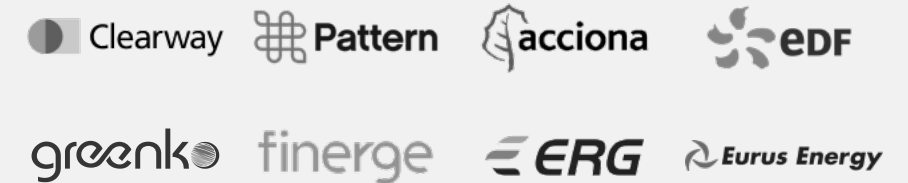# ONYX

Insight

Making wind work for the **world**

Your Whole Turbine Predictive Maintenance Partner

We provide smart and unbiased data analytics, underpinned by real-world engineering expertise. Monitoring **20,000+ turbines** in **30+ countries**, taking part in **75GW+** of due diligence projects.

Our flexible approach to predictive maintenance gives owners of rotating machinery long-term clarity and control in O&M decision-making, enabling them to increase asset utilisation and reduce costs.

Just some of our customers and partners:

Clearway Pattern acciona eDF

greenko finerge ERG Eurus Energy

ONYX Insight

www.onyxinsight.com

Making your assets work across
the entire asset project lifecycle

Year 0   Year 2/3   Year 20/25   Year 30/40

Pre-COD   Warranty   Post-Warranty   Extend/Repower

Pre-COD
- OpEx Forecasting
- Component QA/QC
- Contract & Technology Due Diligence
- CMS Strategy for Technology Risk Mitigation

Warranty
- O&M Consulting
- End of Warranty Campaign
- Shadow Monitoring
- Health Assessments
- Targeted Inspections

Post-Warranty
- Condition Monitoring (Vibration, Oil, SCADA)
- Software for Self-Monitoring
- Case Management
- CMS Retrofit/Upgrade
- Pitch Bearing Monitoring
- Portable Health Sweeps
- Blade Health Inspections
- Foundation Monitoring
- Health Assessments
- O&M Consulting
- Training

Extend/Repower
- Foundation Monitoring
- Life Extension Consulting

ONYX Insight

Our Purpose

Advanced Sensing

Software & Analytics

Engineering & Consultancy

www.onyxinsight.com

Three reasons **our partners choose us**

1 - Independent & unbiased

We are OEM and hardware-agnostic, providing full and transparent access to the data you need to make better O&M decisions.

2 - More than just data

All of our innovative data analytics products and services are underpinned by robust engineering principles and drivetrain expertise.

3 - Smart and flexible

We deliver just what you need to improve your profitability – whether you want a fully integrated approach or one-off decision support.

That's why we have been trusted to protect more than **$12 billion** worth of assets worldwide

A **unique** combination

Advanced Sensing

More than just a CMS, our high performance, cost effective advanced sensing hardware will accurately and reliably manage the health of your assets.

- Drivetrains
- Blades Root Connections
- Towers & Foundations
- Main Shafts
- Pitch Bearings

Software & Analytics

Our cutting-edge AI and machine learning software solutions give our customers unparalleled, game-changing knowledge and insight.

- Condition Monitoring Services
- Condition Monitoring Software
- Case Management
- Inspection & Service Software

Engineering & Consultancy

As a collaborative and independent engineering partner, we work with you to create tailored services based on what you need.

- O&M Consulting
- Technical Advisory
- Reliability Engineering
- Training

ONYX Insight

Advanced Sensing

Next Generation Condition Monitoring

Remote condition monitoring, advanced sensor technology, machine learning, and data analytics all underpinned by real-world engineering expertise.

- Powerful technology, **making forward-planning simple**

- **Future-proof and adaptable** for other types of sensing

- **Turnkey solutions** to suit your business

Monitor your turbines, **from the foundations up.**

Main Shafts

The majority of wind turbines lack ongoing main shaft monitoring. This can lead to costly failures.

Blade Root Connections

Blade root connections are a critical component that can develop faults over time. Many faults exist specifically for insert-type blade roots.

Drivetrains

The drivetrain is prone to a range of failure modes, many of which can now be detected well ahead of time – if the right technology is in place.

Pitch Bearings

Pitch bearing failures come with a high cost of repair and many complex failure modes. However, they can be detected prior to failure with a proactive condition monitoring approach.

Blades

Blades are one of the most costly and complex components to fix. Getting your maintenance campaign right is critical to fixing what you need to fix and not wasting money on what you don't.

Towers & Foundations
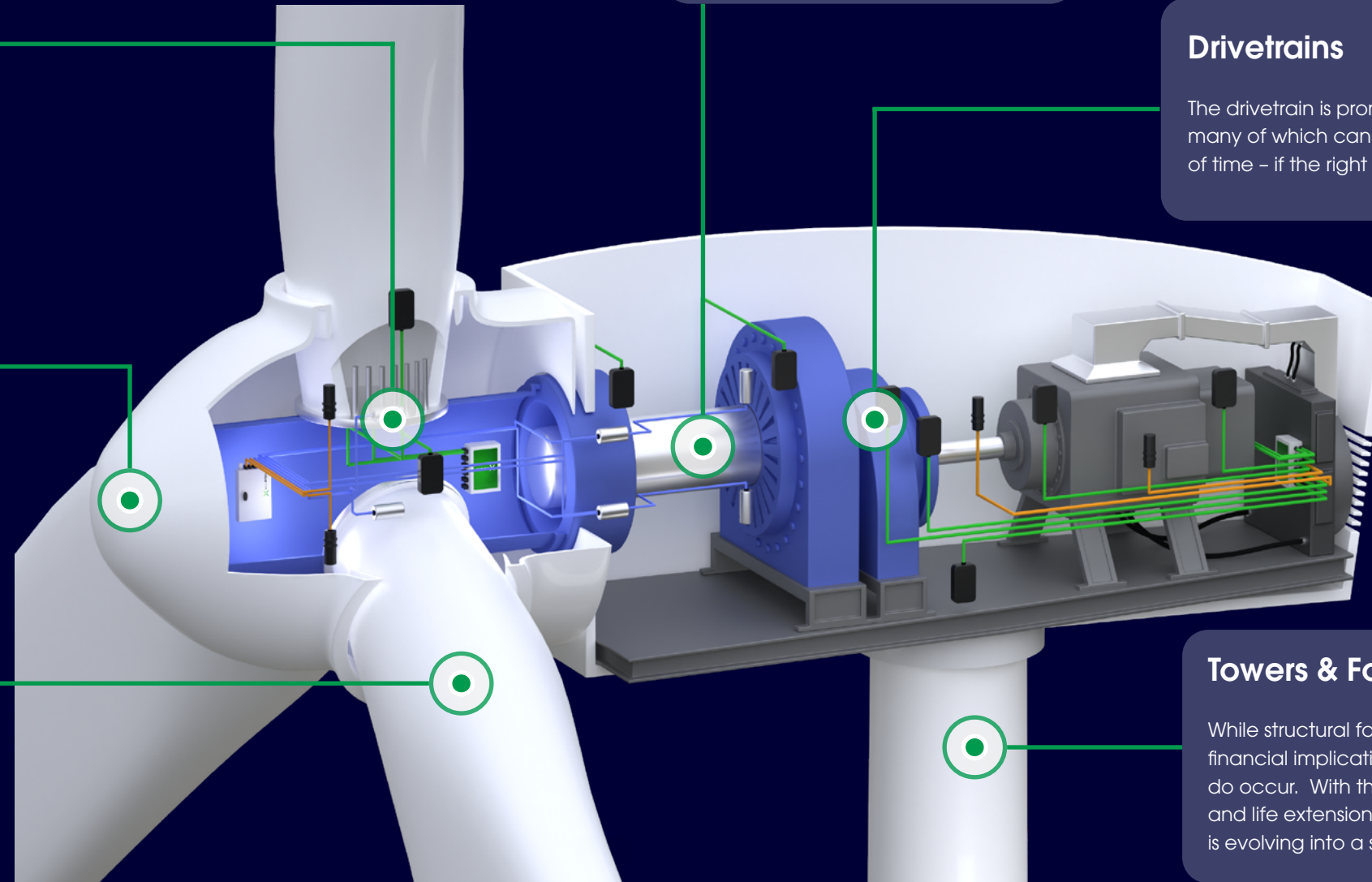
While structural failures are less frequent, their financial implications are substantial when they do occur. With the surge in partial repowering and life extension projects, proactive monitoring is evolving into a strategic necessity.

ONYX
Insight

www.onyxinsight.com

ecoCMS
By ONYX Insight

Affordable & effective CMS

ecoCMS is a unique blend of advanced sensing, hardware, and affordable yet more capable MEMS technology.

It forms a key part of your Predictive Maintenance strategy – reliably delivering high-quality data that allows you to understand the health of your assets.

ecoCMS MEMS accelerometer retrofitted to a GE1.5 MW gearbox

Winner of 2x
Queen's Awards

Your flexible turn-key drivetrain condition monitoring solution

We are continually innovating to ensure we support our partners in keeping ahead of the curve when making strategic decisions.

We monitor
Acting as an extension of your team, our monitoring teams will ensure you always know what's next with minimal upfront cost.

You monitor
We'll train your monitoring team and provide them with one, flexible software platform to monitor all your turbines.

Many sensors
Already have third-party sensors such as oil for lubrication monitoring? No problem; ecoCMS is designed to interface with third-party sensors.

Proven technology you can depend on

ecoCMS has been recognised for its blended approach of ingenuity, quality and insightfulness.

But don't just take our word for it; **GE Renewable Energy** selected ONYX as its sole provider for onshore condition monitoring. It's also been the receipt of two Queen's Awards for Enterprise and is UL Certified.

UL CERTIFIED
SAFETY US·CA
E531400

Main bearing macropitting detected using ecoCMS

Monitor imbalance with ecoCMS and fleetMONITOR

Rotor imbalance is a chronic problem for owners and operators around the world.

Turbines with rotor imbalance still produce power, but with an increased risk of failure due to incorrect loading of the drivetrain and blades. A strategy should be in place to detect and remedy the problem.

## Seamless integration with fleetMONITOR

We routinely monitor vibration and SCADA data from many gigawatts of assets worldwide from our Monitoring Centres around the world using fleet**MONITOR** software.

ecoCMS data is analysed in fleet**MONITOR** for detailed insights into the health of your turbine. With dashboard views for top-level alarms and trends, through to detailed vibration analysis tools for the expert analyst.

ONYX
Insight

www.onyxinsight.com

ecoCMS Flex

The drivetrain upgrade you've been waiting for...
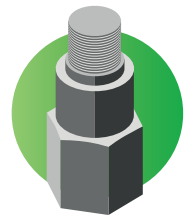
Retain valuable sensors and existing cable routing

Discard legacy hardware and IT systems

Issues with legacy CMS systems add up. **Fast**.

Poor end-to-end PdM	Detection Capability	IT Systems	Non-Universal CMS
Fragmented support across hardware, IT, analytics, and actionable insights	Poor sampling configuration, missing sensors, lower true positive rate	Difficult to manage CMS IT systems with locked away data and unreliable data flow	Challenges maintaining consistency, quality and efficiency across multi-brand systems

✓ Excellent fault detection
- Optimised sample rates/durations for your exact turbine make and model
- Replace damaged sensors or retrofit new sensors during install

✓ Optimal end-to-end PdM solution
- Work with our monitoring experts to set up optimal automatic alarms, thresholds, and advanced analytics methods
- Update configuration for hardware & analytics remotely at any time

✓ Cost-effective hardware
- Reuse existing sensors/cables and only replace the CMS unit

✓ Cost-effective install
- Rapid "plug and play" install can be carried out during scheduled maintenance

No matter your requirements, there's a CMS for you

	ecoCMS By ONYX Insight	ecoCMS Flex
Existing sensors installed?	No	Yes
When to use	Complete CMS system retrofits	Replacing/upgrading existing CMS interfaces
Sensor technology	New MEMS accelerometers bundled with interface	Existing Piezo Electric (IEPE) accelerometers already connected to drivetrain

ONYX Insight

www.onyxinsight.com

ecoPITCH
By ONYX Insight

Control the uncontrollable with blade root monitoring

Blade-bearing bolt connections are vital yet vulnerable. Faults here can mean severe outcomes, from blade loss to complete turbine failure, and the ensuing downtime can be costly.

Enter eco**PITCH** blade root connection monitoring, we move beyond expensive, unreliable visual checks. Our system provides proactive, data-driven monitoring to detect and resolve issues early, safeguarding turbine performance and your investment.

AEE
Winner
Eolo Innovation Award

Monitor **your way**

Our blade root connection monitoring system can be deployed in two ways, dependent on site requirements and restraints around maintenance campaigns.

Using eco**PITCH**, a permanent monitoring system, continuous data and insights are delivered, reducing site visits and providing long-term visibility.

Alternatively, eco**PITCH** Portable, a temporary solution, can be deployed rapidly, enabling a snapshot of asset status at any given time.
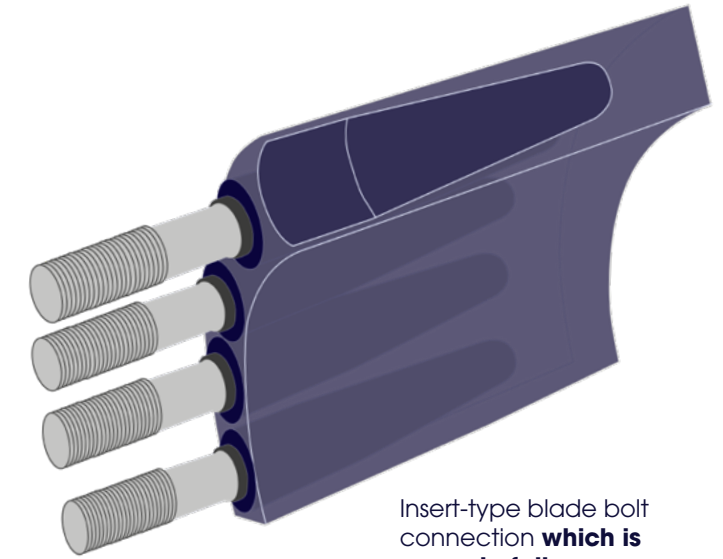
Insert-type blade bolt connection **which is prone to failure**

A growing failure **rooted in risk**

Blade root connection failures are a growing issue across the wind industry and are not limited to any one turbine type or blade manufacturer.

Some design concepts and blade models have experienced particularly high failure rates in the field and are a natural target for continuous online monitoring.

If not addressed early, blade root connection failure can lead to blade loss or, in extreme cases, full turbine collapse. This can seriously impact asset profitability, with a single blade replacement costing approximately $300,000 to $500,000.

Our record **in numbers**

World's 1st dedicated blade root CMS

Built on our track record of innovative and extensive range of Advanced Sensing solutions.

Field tested & proven on 3,000+ blades

Launched following two years of extensive testing and validation with our partners.

Get up to 12 months ahead of failures

Receive actionable recommendations you can rely on to plan for the long term.

ONYX Insight

www.onyxinsight.com

ONYX Insight | Foundation Condition Monitoring

A **solid foundation** to your life extension or repower

Delivered as a quarterly report, our Foundation Condition Monitoring uses MEMS sensors in existing drivetrain CMS (such as eco**CMS**) to provide early detection across an entire fleet, reducing costs and giving you time to plan.

Giving you a long-term trend of alert levels of your foundation's health and, ultimately, confidence regarding when/where/how issues are (or are not) occurring on your machines.

Four limitations to current approaches alone

1 Destructive testing has a chance of damaging essential pullout rebar or anchor bolts

2 Subset inspections and measurements alone often result in no data for the majority of a site

3 Visual inspections are unable to inspect the foundation rebar - critical to judging its health

4 All existing techniques require mobilisation and time of skilled professionals, driving up costs

Get **up to 12 months ahead** with our foundation ranking system

Our Health Tracker identifies issues up to 12 months in advance, allowing you to address specific problems and save costs by avoiding overpriced quick fixes that require specialists at short notice.

Pinpoint your intensive testing on known issues

Target intensive on-site testing, like strain gauging, according to foundations' alert levels. Ensuring you don't waste valuable resources, giving you peace of mind and inspiring investor confidence in your understanding of your fleet's health.

Fully maximise your wind assets

Unlock Repowering or Life Extension
Gain foundation service life potentially exceeding 40 years

Longer Useful Asset Life
Get a potentially 25% longer useful asset life

Higher Asset Value
If an asset does change hands, get an up to 12% higher sale price

Reduce Costs from Fixes
Identify issues up to 12 months before they are serious.

ecoPITCH
By ONYX Insight

Revolutionary technology for pitch bearing monitoring

ecoPITCH is a revolutionary sensor system for monitoring pitch bearings. Robust, innovative sensor hardware, coupled with advanced data analytics enables wind farm operators to detect the early warning signs of impending pitch bearing failure.

AEE
Winner
Eolo Innovation Award
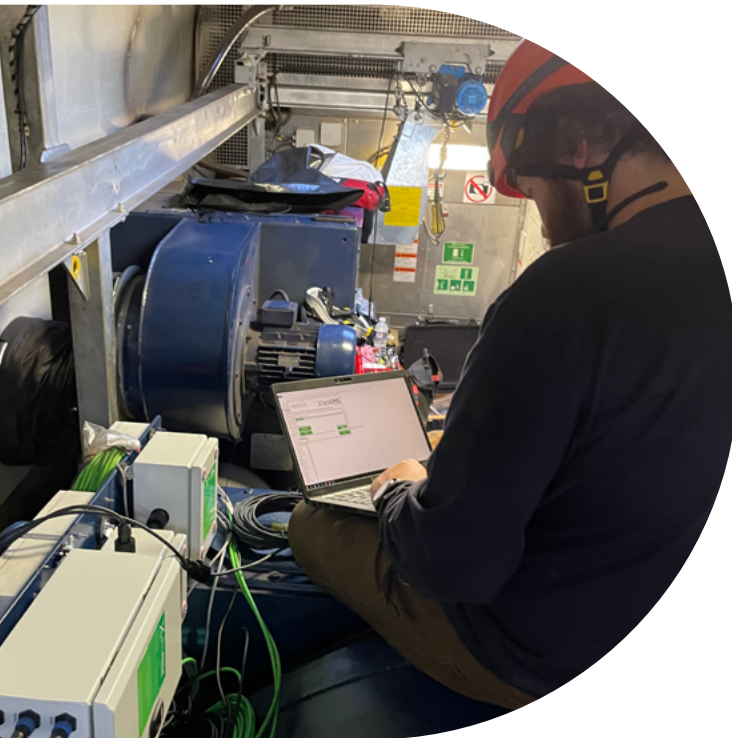
Make more **informed decisions**

The ecoPITCH system uses multiple data streams and advanced signal processing techniques to maximise insights and minimise consequential costs.

ecoPITCH will help you make smart decisions by giving you access to new information about your pitch bearing health.

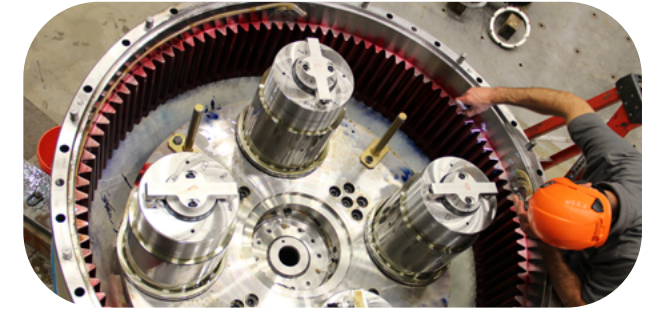- Detect critical failure modes
- High performance advanced sensing
- Flexible connectivity solutions

Predictive maintenance **solutions for pitch bearings**

Pitch bearing monitoring

Blade to bearing connection monitoring

Blade bolt monitoring

Flexible communication options - 4G & WIFI
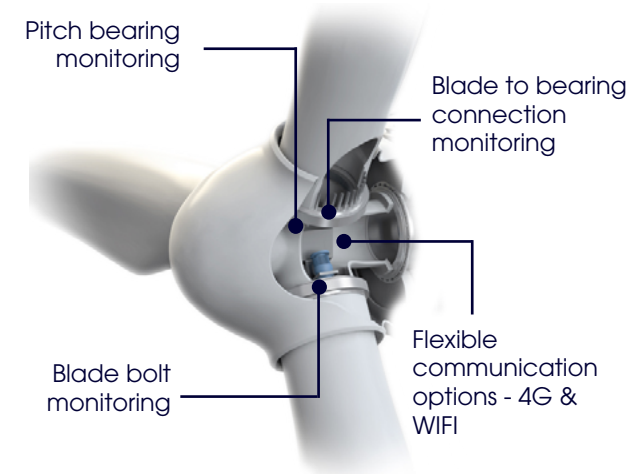
Online monitoring **backed up by engineering services**

ecoPITCH leverages ONYX Insight's extensive experience in engineering solutions, Root Cause Analysis (RCA), teardowns, and life extension solutions for wind turbine pitch bearings worldwide.

Prefer a **one-off health sweep or support** with a specific campaign?

ecoPITCH
Portable

Looking for insights for snapshot data for end-of-warranty campaigns, due diligence, RCA or for understanding serial defects? ecoPITCH Portable's one-off health sweeps are the solution for you.

Built on the same award-winning technology, ecoPITCH Portable helps determine initial pitch-bearing issues' without CapEx investment or an ongoing OpEx contract.

It can be completed independently with instructions and training or by our skilled engineers, providing insights with severity ratings and recommendations.

ONYX Insight | In partnership with NEARTHLAB

Blade Health Management

The wind industry is always seeking to make operations and maintenance more efficient. And reducing reliance on the availability of trained drone pilots, whilst enabling self-performing operators to perform visual inspections of blades is a great way to reduce costs substantially.

Nearthlab and ONYX Insight's partnership combines expertise in mobile drone technology and turbine reliability engineering to offer comprehensive predictive maintenance and reporting, integrating drivetrain condition monitoring, blade inspections, and enterprise management into a single ecosystem.

NearthWIND Pro Drones
Autonomous professional drones

NearthWIND Mobile Drones
Plug-and-play drones

NearthWIND Zoomable
Blade asset management platform

Bring **drone inspections in-house**, without the fuss

NearthWIND Mobile eliminates the high cost of bringing drone inspections in-house, which can reach $30k per drone after accounting for hardware, software licensing, and specialist pilots.

With minimal training required, regular maintenance engineers can use off-the-shelf drones equipped with an onboard software that automates program execution.

Whole turbine predictive maintenance

Monitor 85% of major components, all from a single turbine health management provider.

Simplify the journey to self-perform by identifying problems sooner, managing with fewer resources, and reducing overall wind farm operation costs.

Blade consultancy from factory to field

Looking for more than just inspections and prioritisation? ONYX provides 30 years of blade expertise for advanced problem-solving needs.

Our experts can refine your critical fix list, conduct root cause analysis, design repair campaigns, and offer due diligence as needed.
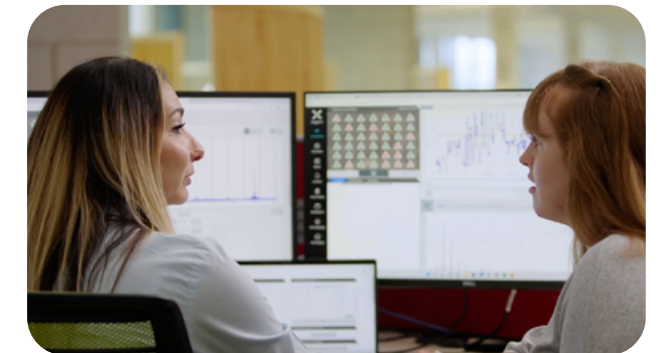
Software & Analytics

Smart, secure and easy-to-integrate predictive analytics

Our cutting-edge automation and machine learning solutions bring multiple data streams and analytics together for unparalleled insights and actionable recommendations.

- **Easy to deploy and customise,** offering convenience and fluidity

- Underpinned by **deep engineering expertise** and know-how

- Pay **as you need** expertise

ONYX Insight | Condition Monitoring Services

Get the data, advice and support you need to plan ahead - and **stay ahead**

Acting as an extension of your team, our teams of experts provide you with regular advanced monitoring and diagnostics of drivetrains, towers, rotors and generators using multiple data points (including vibration, SCADA, and oil to name a few).

Benchmarking your farm against over 20,000 turbines, including 95 models and 23 manufacturers and delivering clear guidance on how to avoid costly, unexpected failures.

You will receive detailed reports on potential faults, likely time frames and recommendations on how to manage them. There are not many faults we've not seen.

All giving you the ability to plan confidently and **save up to 30%** on your O&M costs while increasing your **AEP by up to 2%**.

Constantly **benchmark your turbines**

Our constantly evolving database means you get the latest insights - even for newer turbine models with a limited data set.

And with total visibility of your wind asset's health, your team can plan maintenance campaigns with confidence. The best bit? Your data is yours. You can access it without us at any time.

Futureproof your ever-evolving portfolio

Technologies develop, portfolios grow, and business approaches change - choosing a condition monitoring service that evolves with you is essential.

When expanding your portfolio, we will work with you to either plug into existing hardware or add our own - all within the same platform.

Our story **in numbers**

Monitoring over 20,000 turbines

3 Global monitoring Centres

1 hardware agnostic platform

75GW of due diligence data

ONYX Insight

www.onyxinsight.com

fleetMONITOR
By ONYX Insight

Powerful analysis of your vibration data

Using the fleet**MONITOR** web application, monitoring engineers can diagnose reliability problems quickly and effectively analysing data from vibration condition monitoring hardware including temperature, particle counters, and lubrication data.

With users and rotating machinery monitored around the world, fleet**MONITOR** is proven to save you money and improve O&M planning.
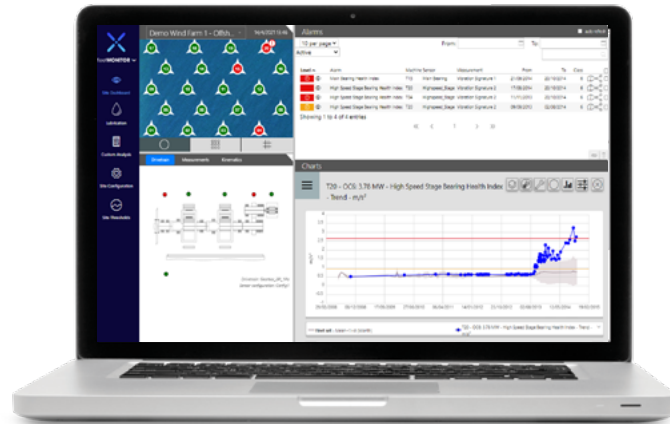
Predictive maintenance software for **rotating machinery**

Independent software that brings together & interrogates diverse data sources to support key decision making.

Compatible with data streams – vibration, temperature, oil condition, inspection images and much more.

 Interface with your existing CMS hardware and IT systems

 Detect failures early and improve efficiency with powerful punchlists

 Flexible cloud-based software platform

Reduce planned and unplanned downtime by:

- Knowing "what is happening", not just that "something is happening"

- Optimising maintenance regimes by predicting failures well in advance

- Reducing inventories by identifying which components need replacing

Your essential tool for partial or full self-perform

Wherever you are in your monitoring journey, we can support you. We believe in a collaborative approach and will flexibly add value with our unique combination of real-world engineering and advanced data analytics.

## ERG **unifies its multi-brand European fleet** into one platform with fleet**MONITOR**

Working together, ONYX has supported ERG to be able to self-monitor its turbine health across its mixed fleet using one platform, as well as now having full data ownership across its European fleet.

ONYX Insight

ONYX AI HUB

One platform for **empowered, scalable** fleet management

The leading predictive analytics platform for more effective operations and centralised O&M data streams.
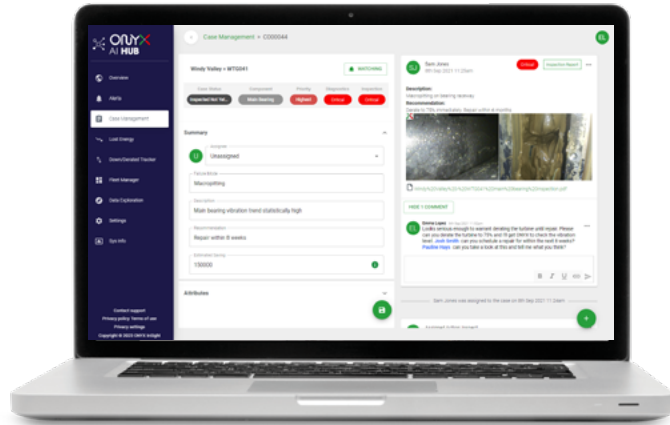
Software and hardware-agnostic platform

AI **HUB** interfaces seamlessly with your existing hardware and software tools, no matter which vendor you use.

Collaborative decision making

AI **HUB** empowers owners and operators to maximise power output and reduce OpEx, consistently driving down LCoE fleet wide.

At a glance
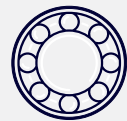
Pitch Bearing Monitoring
Advanced analytics and online sensor solutions to detect early warning signs of impending pitch bearing failures.

Case Management
More efficient workflows with all your analytics in one place for better collaboration and communication.

Lost Energy Intel
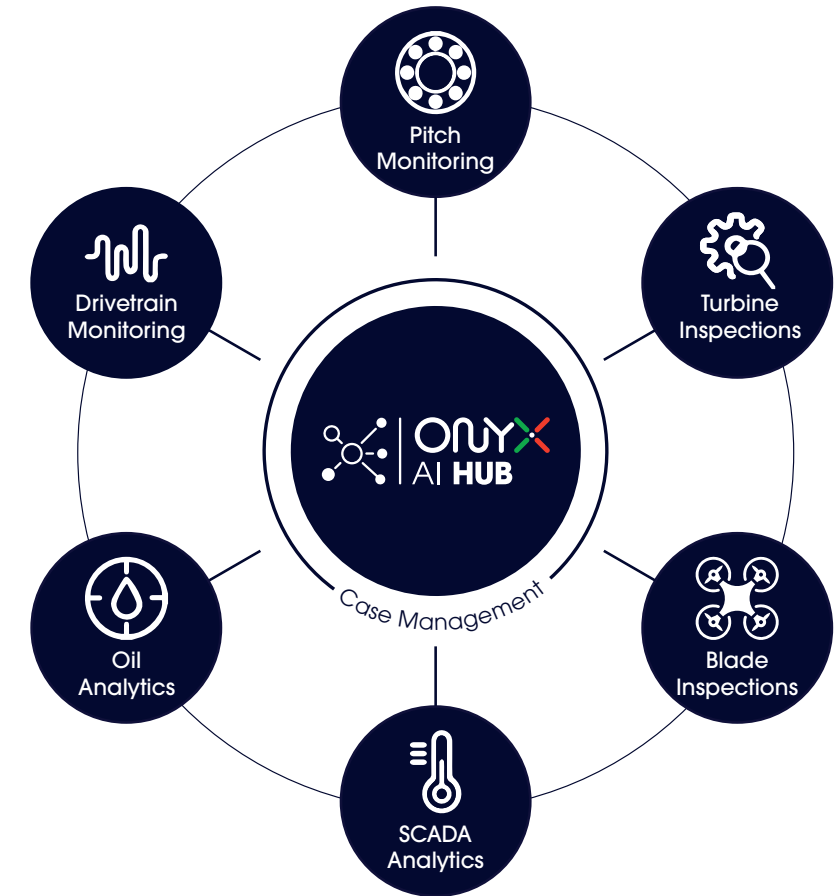Machine learning powered SCADA analytics identifying issues causing the most lost energy and reliability problems.

Blade Drone Analytics
Drone agnostic blade analytic software for fleet-level blade defect analysis and repair management.

Whole turbine predictive maintenance solutions

Improve the accuracy of your O&M decisions with advanced analytics from an engineering-centric AI platform.

Pitch Monitoring
Turbine Inspections
Blade Inspections
SCADA Analytics
Oil Analytics
Drivetrain Monitoring
Case Management

ONYX
Insight

fieldPRO
By ONYX Insight

Go digital without the pain

Developed by ONYX Insight, field**PRO** is a mobile and web, cloud-based inspection and service tool that maximises the safety and efficiency of rotating machinery and equipment inspections.

With ONYX Insight's engineering expertise built in, it makes the transition from **pen and paper to digital** recording easy, opening the door to a fully digitalised O&M approach.

- Collect field data clean first time
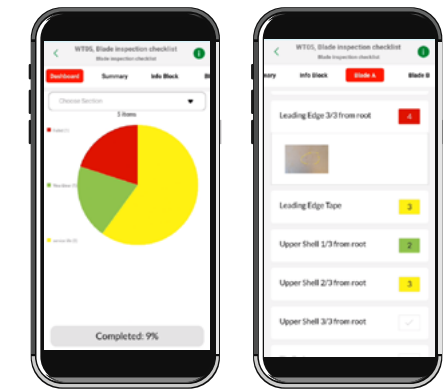
- Stay in control of field operations at your desk

- Mitigate safety risks

- Empower field team with O&M

Empower field teams with O&M expertise in cloud software

Utilising best practice processes and time-saving field report tools boosts efficiency and productivity, benefiting new and inexperienced staff with faster results. Reports are generated in seconds replacing hours of manual work.
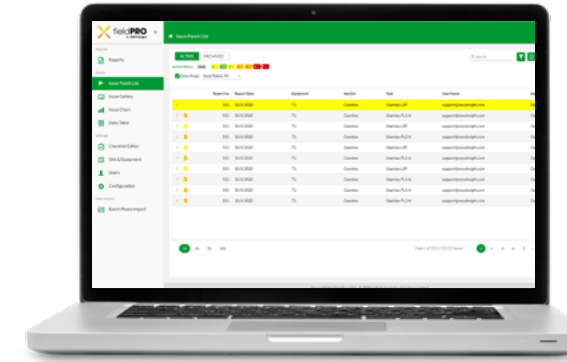
Stay in control of field operations at your desk

- Instant visibility over major findings and H&S issues

- Enable real time support

- Data ready for search and analysis

> field**PRO** was easy to use and it guided me through the End of Warranty inspection process from start to finish.

After the inspections were completed, field**PRO** converted the pictures I took and comments I wrote into a report and sent it to the project manager.

I didn't have to spend time in the evening renaming photos, writing reports, or uploading files.

Project Deployment & Support Technician

EDF renewables

Our Purpose

Advanced Sensing

Software & Analytics

Engineering & Consultancy

ONYX Insight

www.onyxinsight.com

ONYX Insight | Reliability & Lost Energy Intel

Are your turbines **underperforming?**

Access the insights you need to enhance the **performance** and **reliability** of your wind farms.

Reliability & Lost Energy Intel combines your readily available SCADA data with cutting-edge machine learning techniques and our extensive engineering expertise.

Delivering you a comprehensive health assessment that identifies issues causing inefficiencies and downtime, helping you increase your profits.
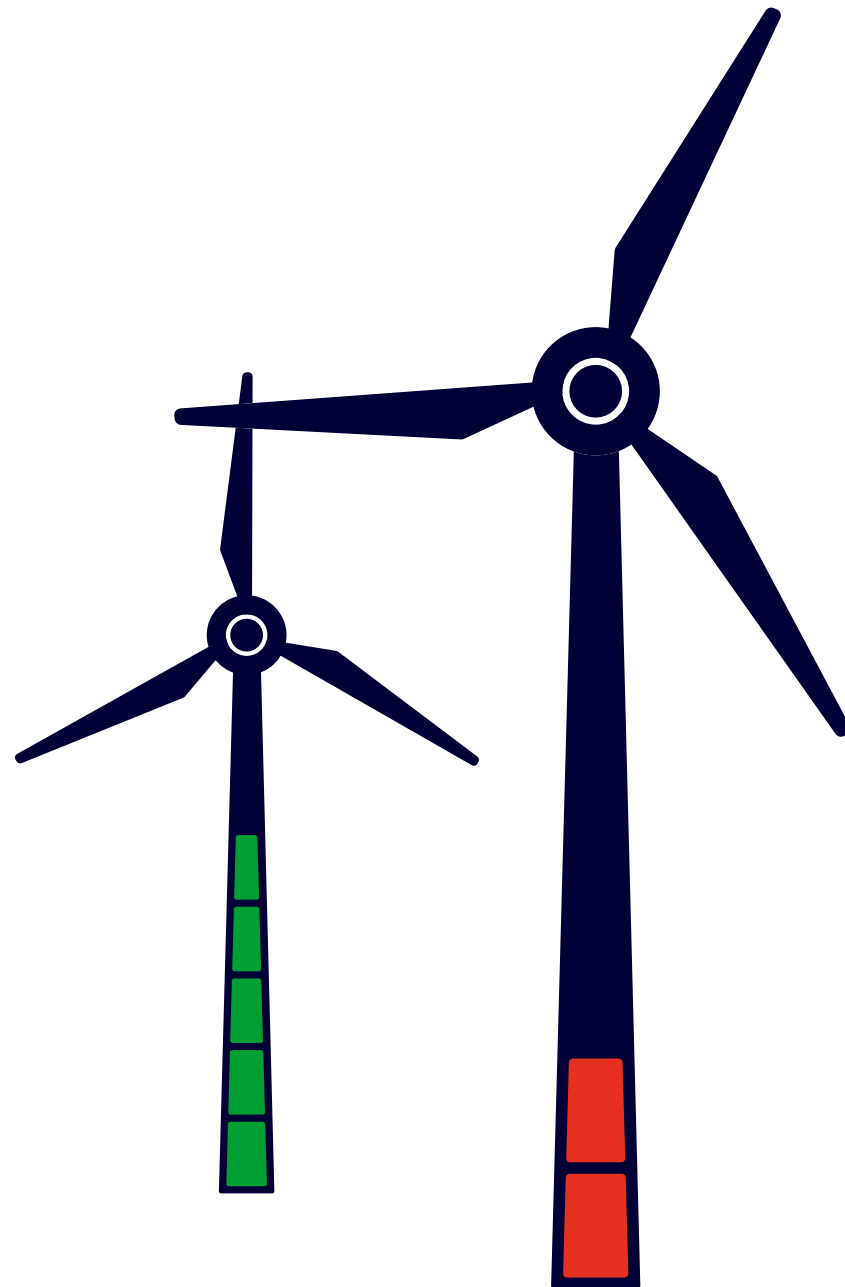
$ Actionable recommendations
With a $ and MWh amount on each issue and how to fix

☺ All insights, no fuss
No IT, no setup, simply arrange a SCADA data collection

⚙ Get it how you need it
Pinpoint at specific issues or get a comprehensive view

Receive **actionable results** so you can prioritise what matters most

Issues are identified down to component level, with potential $ & MWh amount per issue.

You'll get expert recommendations to help you balance costs and savings. Amounts vary by site, but our record is $450k (so far).

$450k per year
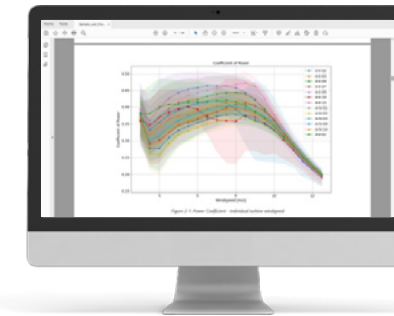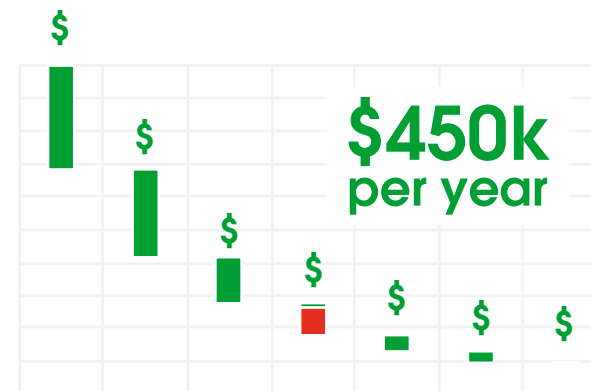
Waste no time with our **rapid turnaround** results

We use machine learning and physics-based algorithms on your SCADA data to evaluate component health and predict your turbines' expected behaviour.

Our rapid techniques provide info for quick decisions on M&A, maintenance preparation, or service contracts evaluation.

Four elements of the report

Reliability & Maintenance	Sensors & Controls	Site & Turbine Performance	Deep-Dive Analytics

ONYX Insight | Shadow Monitoring

Empowering you with **unparalleled visibility**

Rapid advances in turbine technology promise to reduce LCOE. However, they also bring dramatic increases in reliability uncertainty. Compounding this, OEMs often limit access to crucial data, only sharing information when major failures occur and withholding valuable insights gained from minor corrective actions.

That's where Shadow Monitoring comes in. By leveraging our advanced vibration-based data model, it puts you the owner in control, providing full transparency over the health of your assets.

Whether assuming asset liability after the warranty period, planning large-scale maintenance campaigns, or devising a long-term O&M strategy, Shadow Monitoring ensures you have a comprehensive understanding of your assets for successful operations.

5GW+ Offshore assets covered through monitoring services since 2010

Substantial expertise in direct drive & geared technology

75GW+ Operational reliability database offshore and onshore

4 Reasons Shadow Monitoring is more than "just" a backup

1 **Clarity with no costly surprises**
Get trusted, independent data analysis for a long-term health visibility.

2 **Focus valuable resources**
Minimise the need for multiple jack-ups by leveraging our vibration-based life models.

3 **Make your data work for you**
Utilise independent data analysis for partnership support & flexible post-warranty O&M planning.

4 **Day 1 confidence in new designs**
Access new turbine design insights with our failure comprehensive database.

At a glance

Daily monitoring to quickly assess any rapidly developing issues.

Quarterly summaries & SCADA analysis giving concise summaries to identify faults ahead of time.

Decision support with Vibration-Based Life modelling to help you make informed decisions.

Full access to data to get transparency over trends and benefit from knowledge transfer.

P90 Fault Date

Probability of Advanced Damage

Time

ONYX Insight
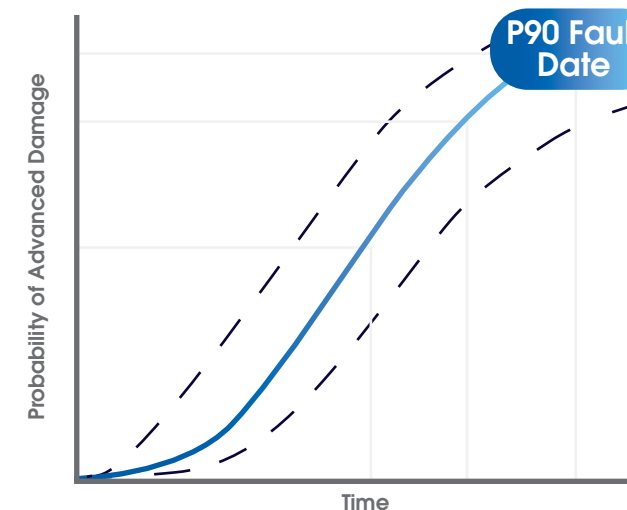
Engineering & Consultancy

Your practical engineering partner

Your practical engineering partner, working collaboratively and flexibly with you to solve your wind turbine challenges.

- We're flexible, working **to suit the needs of your business**

- Bringing external knowledge to augment your in-house teams

- Partnerships centered **around trust**

ONYX Insight | O&M Consulting

Don't lose power keep your assets in top shape

Getting a clear picture of your wind assets' health, performance and reliability is essential in creating an effective O&M strategy.

Our range of O&M Consulting services have been finely tuned to give you the insights to plan with certainty.

Whether utilising existing SCADA data, installing temporary hardware, deploying drones, using visual inspections or taking advantage of borescoping, you will have one of the most extensive ranges of data acquisition options in the market.

Gain a clear view of your wind turbines to **plan with confidence**

Benchmark your turbines against thousands of models, faults & fixes

Deploy one of the **most extensive ranges** of data acquisition options

End of Warranty Inspections & Analytics

Our experienced experts will perform drivetrain borescope inspections, tower walk-downs, visual and drone inspections to provide you with a comprehensive understanding of the status of your turbines, how they have been managed, and any component defects.

Reliability Centred Maintenance

If your assets aren't managed correctly, it can significantly limit your options further in the turbine's lifecycle. Our Reliability Centred Maintenance service involves thoroughly auditing either your current service provider or in-house teams against industry best practices and contractual obligations.
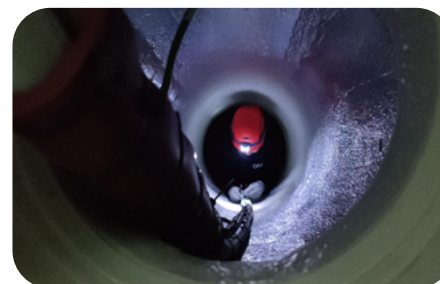
Health Assessments

By using your existing data, completing one-off major component inspections (such as borescoping) or installing portable measurement hardware, our Health Assessments give you quick answers to complex problems.

Reliability & Lost Energy Intel

We analyse your existing SCADA data to identify issues that cause inefficiency and downtime, ultimately saving you money. You will receive clear recommendations and timescales for addressing issues, enabling you to balance the cost per issue against the potential savings.

ONYX Insight

ONYX Insight | Reliability Engineering

Boost your bottom line, **avoid costly downtime**

Wind turbine components are complex pieces of engineering, all with varying levels of degradation and risk profiles. Reasons for failures can therefore be complex.

With 65% of operations and maintenance costs being spent on unplanned maintenance, it's essential that owner/operators seek a long-term engineering solution.

This is where reliability engineering comes in. Getting a full understanding of your turbine allows for more accurate corrective maintenance, and therefore greater efficiencies in the windy season.

Empower your decision-making with confidence built on clarity

**Prevent** repeat failures (or get ahead of serial defects)

**Pay as you need** expertise to manage your fleet with confidence

Root Cause Analysis

Understanding the causes of component failures is crucial for preventing future issues. Our Root Cause Analysis process, involving sampling, data assessment, inspections, metallurgical tests, and teardowns, ensures accurate identification of failure causes.
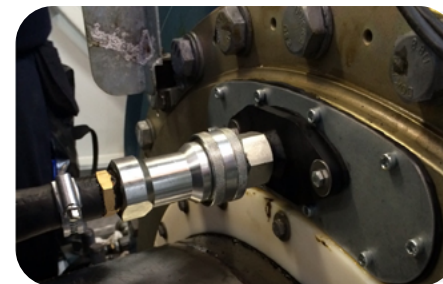
Main Bearing Grease Flushing

Keep your main bearings performing their best. ONYX's patented grease flushing protects and extends bearing life. Our process removes up to 95% of old grease and debris using low-viscosity mineral oil, reducing friction.
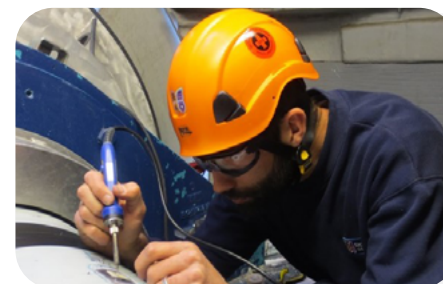
Instrumentation & Custom Data Acquisition

Data is vital for wind farm O&M strategies. When standard tools fall short, our tailored data acquisition sensors and algorithms provide actionable insights. Our experienced engineers handle installation, review, and reporting for you.

Repair Consultancy

Maximise asset life with effective repairs. Our Repair Consulting ensures successful maintenance campaigns by gathering insights, assessing variables, and providing expert guidance for optimal repair execution.

ONYX Insight
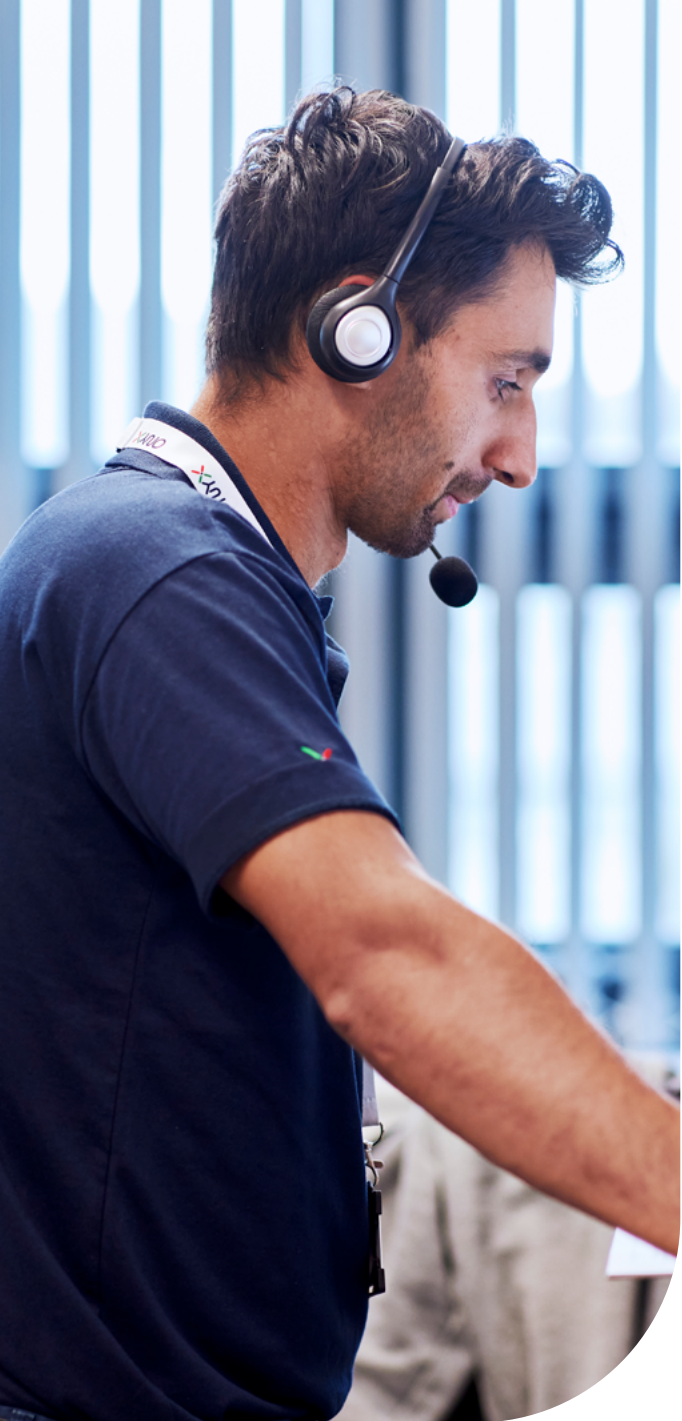
ONYX Insight | Technical Advisory

Get the big decisions right, **every time**

The cost of running a wind farm possesses a great number of variables. These include turbine type and manufacturer, through to the cost of labour, quality of servicing, usage of preventative technologies, and much more.

From planning pre-COD through to forecasting end of warranty costs and extending the life of your wind turbines, we're here to help you get the big decisions right every time.

Independent wind asset consultancy you can trust

Identify **high-quality** turbine components

Minimise financial risk and consolidate essential data

Life Extension Consultancy

Life Extension is our strategic approach to enhance a turbine's lifespan beyond its initial expectancy.

We focus on pinpointing components for replacement or maintenance, improving turbine longevity through detailed analyses.

Supplier Quality Audit

Our Supplier Quality Audit, is a key part of any due diligence process offering a dedicated review of component manufacture and design. We scrutinises OEMs, identifying potential costly practices that might emerge from blades to generators. With stakeholder involvement, we ensure clear documentation and seasoned teams for effective on-the-ground evaluations.

Turbine Technology Review

Selecting a wind turbine manufacturer is the start a longterm relationship with an OEM so its important to get it right.

Our approach, grounded in analysing industry insights and our robust failure data, mitigates risks linked to new high-capacity tech and assesses repowering and acquisition potentials for your wind assets.

ONYX Insight | OpEx Forecasting

Engineering financial confidence in wind investments

Leverage our extensive failure database and physics based modelling to build robust Operational Expenditure Financial models that enable de-risking of key operational strategy decisions.

Whether you are reviewing a Service Agreement or considering going self-perform – ONYX can provide you with the data you need to make an informed choice.

How we've supported offshore developers since 2010

Quantify O&M benefits of designs
Reviewing turbine & foundation concepts in terms of reliability, serviceability & more.

Develop accurate OpEx forecasts
With forecasts and comparison of site performance under different O&M scenarios.

Propose monitoring mix to maximise ROI
Project specific condition monitoring strategies minimising risk exposure from turbine reliability.

Bigger turbines without bigger problems

As the pressure on CapEx increases, there is a push to increase power density.

However, there's a problem. As turbine designs get larger and more complex, so do the unknowns: reliability, costs, skilled technicians, maturity of supply chain and more.

Making the need for clarity in the long-term reliability critical when making decisions over turbine model and make.

Plan with confidence - OpEx forecasts across the entire asset lifecycle

Embrace the power generation performance of newer turbine designs without the fear of reliability concerns.

By reviewing different turbine makes, models, failure histories and more we'll provide you detailed breakdown of likely costs by probability rating.

Giving you the foresight to make decisions today that will have longterm benefits tomorrow and beyond.

P70%

P50%

P10%

5   10   15   20   25

Year

ONYX Insight

www.onyxinsight.com
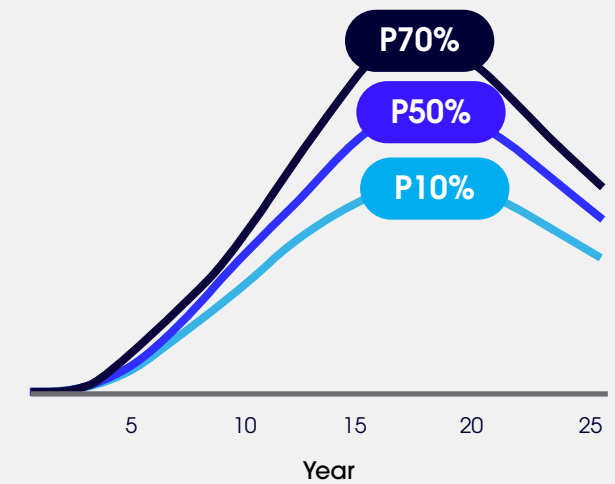
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