



Supporting Pattern with Predictive Analytics and Engineering

4 years, 25 projects: Monitoring, SCADA analytics, data-driven End of Warranty, drivetrain consulting



CLIENT

Pattern Energy is a leading U.S. based independent renewable company with over 2.5GW of owned interest in wind assets.

CHALLENGE

A rapidly expanding company with the goal to increase CAFD and aggressively lower O&M costs needs a smart approach to application of predictive technology.

BENEFITS

ONYX engineering and predictive technology applies the right focus to reducing O&M costs across different phases of the project lifecycle.

Pattern used ONYX predictive analytics to assess the health of 405 turbines coming out of warranty. A data-driven approach with fleet**MONITOR**™ drives a lower cost and highly effective EOW campaign.

“ONYX provides Pattern with the expertise to better understand and anticipate our turbine component failures.”

Pattern Manager

Over 4 years and 20 projects, Pattern has been supported by ONYX InSight for challenging engineering problems, transitioning assets through end of warranty and in monitoring the health of their turbines with advanced predictive analytics.

“We signed an agreement with ONYX InSight for **long-term condition monitoring** because of their proven track record of predicting component failures.”

Ben Rice, Senior Manager, Pattern Energy

ONYX InSight supports Pattern’s ongoing drive to lower O&M cost, with impacts on downtime, repair costs, warranty claims and quality assurance.

Drivetrain Engineering

ONYX InSight provides Pattern with resources to supplement their strong in-house engineering group. This provides specialist skills as well as the valuable independent view. In a recent project, ONYX InSight supported the development of an on-site teardown procedure for pitch bearings and performed failure root cause analysis. Through careful investigations the primary failure mode was identified along with corrective actions. With the new disassembly procedure, Pattern can now perform on-site investigations, providing valuable insights. Similarly, to reduce OPEX cost of an unplanned failure, Pattern sought to implement innovative uptower repair procedures offered by an ISP. With ONYX engineers also uptower providing QA/QC and then confirming the repair quality by vibration analysis, Pattern were able to rest easy and introduce a new and lower cost repair practice.



Most Valuable InSight

Multi-brand solutions from ONYX InSight allow any turbine or CMS hardware to be connected to fleet**MONITOR**™.

Predictive Analytics

Since 2014, ONYX InSight have been providing Pattern predictive analytics blended with the wind turbine engineering knowledge to drive the data to practical conclusions. One project was timed with a large part of their operating fleet, over 400 turbines, approaching end of warranty. ONYX were able to use the vibration data from the installed condition monitoring system to “see” into the drivetrain and build a shortlist of turbines for inspection – aiming to capture all the incidences of main bearing spalling, high speed bearing cracks and other warrantable drivetrain damage. This provided the knowledge of what turbines to inspect to gather image-based evidence for claims.

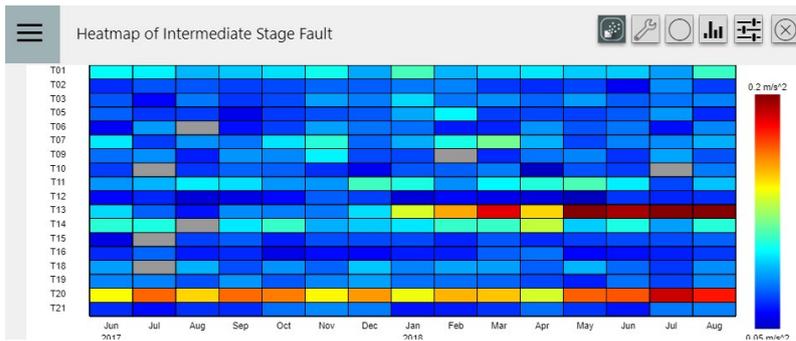
ONYX InSight’s data-driven approach to End of Warranty inspections both saves money and increases the quality of the review process. We have reduced the labor hours spent on drivetrain inspection work, and have instead focused that attention where it was most effective.

Pattern

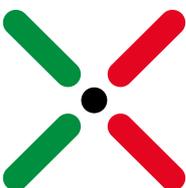
Most recently, Pattern have awarded ONYX with a long-term monitoring contract for the Grand Renewables Wind Farm. ONYX have connected the existing CMS hardware to their own multi-brand cloud-based predictive platform, fleetMONITOR™ and are providing a daily condition monitoring service. With 6-18 months warning as typical ONYX lead times on developing bearing damage Pattern are able to plan far in advance and reduce costs in many ways: combine repair activity, competitively bid, reduce downtime and avoid collateral or catastrophic damage.

Value Generation: OPEX Cost Reduction

OPEX cost reduction is a big part of the equation allowing renewable energy to come to par and then be more affordable than other types of power generation. “By combining their predictive analytics solution with their engineering expertise, ONYX empowers our goal of reducing our OPEX costs, and we value this long-term relationship.” - Ben Rice, Senior Manager at Pattern Energy. Dr. Ashley Crowther, Global VP, ONYX InSight says “Pattern is an impressive company, tremendously successful since their 2014 IPO. We are pleased to have been supporting them along this journey with such a wide range of projects.”



fleetMONITOR™ heat map allows easy comparison of turbines at Pattern Grand Renewable wind farm. Turbine T13 has a confirmed bearing crack awaiting repair thanks to ONYX early detection. T20 has standstill marks.



Most Valuable InSight

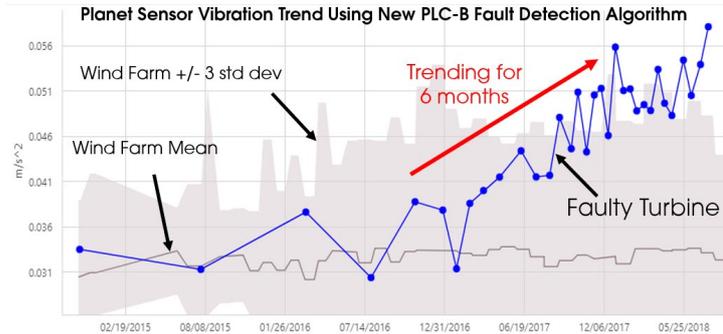
With 6-18 months warning as typical ONYX lead time on developing bearing damage Pattern are able to plan far in advance. Every early failure detection presents an opportunity for savings.



ONYX INSIGHT PROVIDES ROTATING MACHINERY SUPPORT TO PATTERN, SUCH AS PITCH BEARING TEARDOWN PROCEDURES AND GEARBOX PROCUREMENT SPECIFICATIONS

“By combining their predictive analytics solution with their engineering expertise, ONYX empowers our goal of reducing our OPEX costs, and we value this long-term relationship.”

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fleetMONITOR™ powerful trending tools allow easy comparison of a faulty turbine at Pattern Grand Renewable Wind against the entire wind farm. (All historical data is stored and can be reprocessed in seconds for new diagnostics. This is critical to success when new failure modes develop such as this planetary carrier bearing example.)



PLANET CARRIER BEARING DAMAGE

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